PROCEEDINGS

SOUTHERN WEED SCIENCE SOCIETY

VISION FOR THE FUTURE

59th Annual Meeting
Servicing Agriculture In:

ALABAMA	MISSOURI
ARKANSAS	NORTH CAROLINA
FLORIDA	OKLAHOMA
GEORGIA	SOUTH CAROLINA
KENTUCKY	TENNESSEE
LOUISIANA	TEXAS
MISSISSIPPI	VIRGINIA
PUERTO RICO	

January 23-25, 2006
Omni Hotel
San Antonio, Texas

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PREFACE

These PROCEEDINGS of the 59th Annual Meeting of the Southern Weed Science Society contain papers and abstract of presentations made at the annual meeting. A list is also included giving the common and trade or code names, chemical names and manufacturers of all herbicides mentioned in the publication. Other information in these PROCEEDINGS includes: biographical data of recipients of the SWSS Distinguished Service, Outstanding Educator, Outstanding Young Weed Scientist, and Outstanding Graduate Students awards; the RESEARCH REPORT; lists of officers and committee members; minutes of all business meetings; and lists of registrants attending the annual meeting, sustaining members, charter members, and contributors to the SWSS Endowment Foundation.

Only papers presented at the meeting and submitted to the Editor in the prescribed format for printing are included in the PROCEEDINGS. Papers may be up to five pages in length and abstracts are limited to one page. Authors are required to submit an original abstract according to the instructions available in the "Call for Papers" and on the SWSS web site (www.swss.ws). Templates are available in Word and WordPerfect to help ensure an acceptable format was followed. The use of commercial names in the PROCEEDINGS does not constitute an endorsement, nor does the non-use of similar products constitute a criticism, by the Southern Weed Science Society.

Additional copies of the 2006 PROCEEDINGS and of some prior year editions of the PROCEEDINGS AND RESEARCH REPORTS are available. Also, copies of the SWSS RESEARCH METHODS IN WEED SCIENCE (3rd edition, 1986), and the SWSS WEED IDENTIFICATION GUIDES are available. This document is also available in PDF format at the SWSS web site (www.swss.ws). For information concerning the availability and cost of these publications, contact Mr. R. A. Schmidt, Business Manager, Southern Weed Science Society, 1508 West University Avenue, Champaign, IL 61821-3133.

William K. Vencill, Editor
Southern Weed Science Society
www.swss.ws

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REGULATIONS AND INSTRUCTIONS FOR PAPERS AND ABSTRACTS TO BE PUBLISHED IN THE PROCEEDINGS OF THE SOUTHERN WEED SCIENCE SOCIETY

Regulations

1. Persons wishing to present a paper(s) at the conference must first electronically submit a title to the SWSS web site (http://www.swss.ws/) by the deadline announced in the "Call for Papers".

2. Only papers presented at the annual conference will be published in the Proceedings. An abstract or paper must be submitted electronically to the SWSS web site by the deadline announced at the time of title submissions.

3. Facilities at the conference will be provided for LCD-based presentations only!

4. Terminology in presentations and publications shall generally comply with standards accepted by the Weed Science Society of America. English or metric units of measurement may be used. The approved common names of herbicides as per the latest issue of Weed Science or trade names may be used. Chemical names will no longer be printed in the annual program. If no common name has been assigned, the code name or trade name may be used and the chemical name should be shown in parenthesis if available. Common names of weeds and crops as approved by the Weed Science Society of America should be used.

5. Where visual ratings of crop injury or weed control efficacy are reported, it is suggested that they be reported as a percentage of the untreated check where 0 equals no weed control or crop injury and 100 equals complete weed control or complete crop kill.

6. A person may not serve as senior author for more than two articles in a given year.

7. Papers and abstracts must be prepared in accordance with the instructions and form provided in the "Call for Papers" and on the SWSS web site. Papers not prepared in accordance with these instructions will not be included in the Proceedings.

Instructions to Authors

Instructions for title submissions, and instructions for abstracts and papers will be available in the "Call for Papers" and on the SWSS web site (http://www.swss.ws/) at the time of title or abstract/paper submission. Word and WordPerfect templates will be available on the web to help ensure the proper format is followed. Because a CD ROM containing all electronically submitted abstracts and papers will be the only form of publication available in the Abstract Collections room, it is important that submission deadlines are carefully followed.

Typing Instructions-Format

1. Margins, spacing, etc.: Use 8-1/2 x 11" paper. **Leave 1" margins on all sides.** Use 12 point type with a ragged right margin, **do not justify and do not use hard carriage returns** in the body of the text. Single space with double space between paragraphs and major divisions. **Do not indent paragraphs.**

2. Content:

Abstracts - Title, Author(s), Organization(s) Location, the heading ABSTRACT, text of the Abstract, and Acknowledgments. Use double spacingbefore and after the heading, ABSTRACT.

Papers - Title, Author(s), Organization(s), Location, Abstract, Introduction, Methods and Materials (Procedures), Results and Discussion, Literature Citations, Tables and/or Figures, Acknowledgments.

Each section of an abstract or paper should be clearly defined. The heading of each section should be typed in the center of the page in capital letters with double spacing before and after.

Pertinent comments regarding some of these sections are listed below:

Title - All in capital letters and bold. Start at the upper left hand corner leaving a one-inch margin from the top and all sides.

Author(s), Organizations(s), Location: - Start immediately after title. Use lower case except for initials, first letters of words, etc. Do not include titles, positions, etc. of authors.

Example: **WEED CONTROL SYSTEMS IN SPRINKLER-IRRIGATED RICE.** K.H. Akkari, R.F. Talbot, J.A. Ferguson and J.T. Gilmour; Department of Agronomy, University of Arkansas, Fayetteville, AR 72701.

ABSTRACT

First line of abstract begins at left margin. **Do not indent paragraphs.**

Acknowledgments - Show as a footnote at the end of the abstract (not end of the page) or the bottom of the first page of papers.

Literature Citations - Number citations and list separately at the end of the text.

Table and Figures - Place these after literature citations. Single space all tables. Tables should be positioned vertically on the page. Charts and figures must be in black and white.

2006 Distinguished Service Award-Academia

Charles T. Bryson

Dr. Charles T. Bryson was raised on a small farm southwest of Tupelo, MS. He received a B.S. in Entomology in 1972, M.S. in Entomology with a minor in Botany in 1974, and a Ph.D. in Botany with a minor in Entomology in 1980 from Mississippi State University. Dr. Bryson was initially employed with USDA to research long-term effects of herbicides and various tillage production systems on weed populations and on cotton growth and yield. Since 1996, Dr. Bryson's research has focused on non-native invasive weeds that threaten agricultural, forest, urban, and natural areas. He has been ac active member of the SWSS, WSSA, and other professional organizations for over 20 years. He is a respected expert on identification, biology, ecology, and control of sedges, prickly nightshades, and cogongrass. During his tenure with USDA-ARS, Dr. Bryson has authored or co-authored over 250 peer reviewed journal manuscripts, book chapters, and abstracts. His research on weed biology and ecology has lead to a number of popular publications including senior editor of the recently published Interactive Encyclopedia of North American Weeds DVD by the Southern Weed Science Society. He has been an active member of the SWSS Weed Identification committee and has chaired the committee since 1995. This project has provided the society with high-quality, visible educational outreach program that has also provided a very significant source of funds for the society. He also assisted the "Forestry Weeds of the South" subcommittee with its very successful book. Charles has also graciously provided original paintings for auction at the SWSS as a fund-raising activity for several years that have also contributed significant funds to the SWSS Endowment Foundation.

2006 Outstanding Educator Award

Don S. Murray

Dr. Don S. Murray was born May 3, 1944, in Beaver, OK, the son of Glen E. and Betty L. Murray. He graduated from Pauls Valley High School in Pauls Valley, OK, in May 1962. He received his B.S. degree in Agronomy (Soils option) in 1966 and his M.S. degree in Agronomy (Soil microbiology) in 1968 from Oklahoma State University, Stillwater, OK. He then enlisted in the U.S. Army in 1968 and served until 1971 primarily in the Medical Corps in Europe. He returned to Oklahoma State University in 1971 to continue his graduate studies and received the Ph.D. degree in Crop Science (Weed Science) in 1974

Following graduation, Dr. Murray joined CIBA-GEIGY Corp. as a Field Research Representative (assigned to North Dakota, South Dakota, and Montana). In 1975, he joined the faculty of Auburn University in the Department of Agronomy and Soils where he conducted weed science research with soybeans and developed and taught "Advanced Principles of Weed Science". In 1978, he joined the faculty of Oklahoma State University in the Department of Agronomy (later its name was changed to Plant and Soil Sciences) where he conducted weed science research with row crops (cotton, soybeans, peanuts, grain sorghum, etc.) and taught several junior, senior, and graduate weed sciences courses.

Dr. Murray's research (to date) has resulted in 55 published journal articles,1 accepted for publication (with revision), and 3 in review; 3 book chapters; 4 bulletins; 8 miscellaneous publications; 2 software programs; and 159 presentations at professional meetings. In very popular classroom courses, he's taught 812 students at the junior level, 253 at the senior level, and 140 at the graduate level. He has served or is serving as the major advisor for 47 graduate students and on the committees of 31 others. His graduate students are in great demand on the job market because they are highly trained professionals.

Dr. Murry has held elective offices and/or served on committees in four weed science societies including the SWSS, NCWSS, WSSA, and the Alabama Society of Weed Science. He has been a member of SWSS since 1972, served on 30 SWSS committees (multiple times on many of them), and served SWSS on the Board of Directors, as Secretary-Treasurer, Representative to WSSA, Vice President, President Elect, President, and Past President. SWSS named him "Outstanding Young Weed Scientist" in 1984 and the recipient of its "Distinguished Service Award" in 2004. He was named "Fellow" of WSSA in 1999. At Oklahoma State University, he has held the P.E. Harrill Distinguished Professorship in Crop Science since 1999 and the title of Regents Professor since 1998.

2006 Weed Scientist of the Year

James L.Griffin

James L. "Jim" Griffin is the Lee F. Mason LSU Alumni Association Professor in the Department of Agronomy and Environmental Management at Louisiana State University, Baton Rouge, LA. He grew up on a row crop and livestock farm in Greenville, MS and as a youth was active in 4-H. He received his B.S. in Agronomy (1975) and M.S. in Agronomy/Weed Science (1976) from Mississippi State University. In 1979, he completed a Ph.D. in Agronomy/Crop Management and Physiology with a minor in Animal Nutrition at Pennsylvania State University. From 1979 until 1987 while at the Rice Research Station in Crowley, LA, his research program emphasized crop and weed management in soybean, rice, grain sorghum, and wheat. In 1988 he joined the Department of Plant Pathology and Crop Physiology with responsibility for weed management research in soybeans, sugarcane, and corn, and in 2001 moved to the Department of Agronomy and Environmental Management. His research interests include integrated weed management, weed-crop competition, weed biology, herbicide persistence, and weed-pathogen-herbicide and weed-insect interactions.

His research program has been strongly supported by commodity groups including the Louisiana Soybean and Grain Research and Promotion Board, the American Sugarcane League, and the Louisiana Rice Research Board as well as agri-chemcial companies. Efforts with colleagues also have resulted in competitive grant funding from USDA, EPA, and Louisiana Department of Environmental Quality. Over the last 22 years, he has generated around 2.36 million dollars in extramural support. He holds a research and extension appointment with the LSU AgCenter and a teaching appointment with the College of Agriculture and is a Full Member of the LSU Graduate Faculty. Jim has chaired or co-chaired 30 graduate committees and currently has four graduate students. He has served as committee member for 29 other graduate students. He has served as a coach for the LSU weed team and his students have participated in the Southern Weed Science Society weed contest since 1990. Formal teaching responsibilities include courses in introductory weed science and field research methods. Jim was actively involved in the development of the undergraduate Environmental Management Systems curriculum and Agricultural Pest Management and Urban Entomology concentrations within the College of Agriculture. Jim was recognized for his teaching contributions by being named to the Teaching Merit Honor Roll by the College of Agriculture and Gamma Sigma Delta. In 1995 he received the Joe E. Sedberry Award as the Outstanding Graduate Teacher in the College of Agriculture at Louisiana State University. Jim was recognized as the Outstanding Teacher by the Weed Science Society of America in 2000 and was named the Outstanding Educator by the Southern Weed Science Society in 2001.

During his career Jim has published four book chapters, 97 refereed journal articles, 10 Experiment Station bulletins, and 274 abstracts co-authored with graduate students and colleagues. He is active in the Louisiana Plant Protection Association having served as President and Treasurer. Jim served as Executive Board member of the Southern Weed Science Society and is active on various committees in both the Southern Weed Science Society and the Weed Science Society of America. He has served as Associate Editor for *Weed Technology* journal and on numerous peer review panels for competitive grants. Jim was the recipient of the First Mississippi Corporation Award in 1990 for outstanding research in the Louisiana Agricultural Experiment Station and in 1993 was named the Outstanding Young Weed Scientist by the Southern Weed Science Society. He was recipient of the Research Award for the Louisiana State University Chapter of Gamma Sigma Delta in 1998 and in 1999 received the Doyle Chambers Research Award for career contributions to Louisiana Agriculture. In 2000, he was one of several scientists in the Louisiana Agricultural Experiment Station to receive the Tipton Team Research Award, which recognized team contributions in sugarcane breeding and variety development . Jim was recipient of the Distinguished Service Award in the Southern Weed Science Society in 2003 and in 2004 was named a Fellow in the Weed Science Society of America.

2006 Outstanding Young Weed Scientist Award

Todd A. Baughman

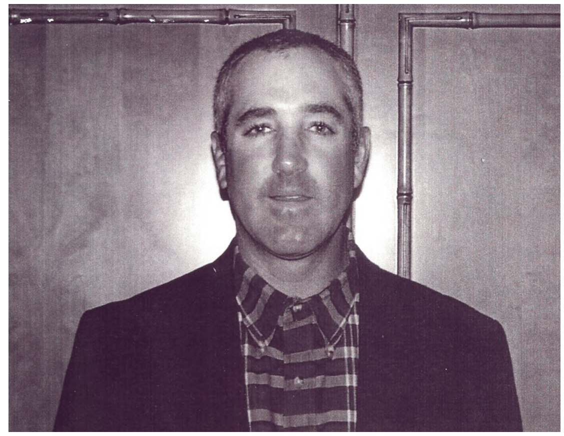
Todd Baughman is a native of southwestern Oklahoma growing up in the small town of Cache. He received his B.S. in Agronomy from Oklahoma State University and his M.S. in Agronomy/Weed Science at Oklahoma State University under the direction of Dr. Thomas F. Peeper. He completed his Ph.D. in Weed Science at Mississippi State University under the direction of Dr. David R. Shaw.

After graduation, Todd worked shortly as a Post-Doctoral Research and Extension Assistant at Mississippi State University and as a Product Development Representative with Sandoz Agro, Inc. in the V-C Region. Todd then accepted a position with Texas A&M University as an Agronomist for the Rolling Plains of Texas located at the Texas A&M University Agricultural Research and Extension Center near Vernon, TX. In his position, Todd is responsible for conducting research and educational training in all aspects of crop production for the Rolling Plains of Texas. Major crops include cotton, wheat, peanut, and forages. Todd assumed the additional responsibilities of State Extension Peanut Specialist in 2002. This job entails providing statewide leadership for peanut extension agronomy programs, along with conducting research, educational programs, and training in peanut throughout the state of Texas. Todd's research and extension programs have centered on providing useful information to producers especially in the area of weed management. He has authored or co-authored 16 journal articles, 128 abstracts and proceedings, 71 technical publications, 38 popular press articles, and 4 plant material releases. Todd is an adjunct Professor in the Plant and Soil Science Department at Texas Tech University and has served on the committee of 11 graduate students.

Todd has been active member of the Southern Weed Science Society since 1990. As a student, he has participated and placed in the SWSS Student Paper and Poster Contest and the Southern Weed Contest. Todd has served on the Student Program Committee for 9 years and as the chairperson of that committee three different times. He has also served as a program section chair, session moderator, student paper or poster judge, and member or chair of several other committees. Todd has served as an Associate Editor for Weed Science. Todd has been awarded with the Soil and Crop Science Department's Special Achievement Award for Extension and with the Syngenta Crop Protection Recognition Award from the American Society of Agronomy.

2006 Outstanding Young Weed Scientist Award

John V. Altom



John V. Altom was born on September 22, 1966 in Ardmore, OK. He Graduated from Plainview High School in 1984 and then attended Oklahoma State University. John graduated there with a B.S. in Agronomy (Plant Protection option) in 1988, a M.S. in Agronomy (Forage Weed Science) in 1990, and a Ph.D. in Crop Science (row Crop Weed Science) in 1994. John is married to Melinda and they have two boys, Jake(9) and Eli (7). Since graduating from Oklahoma State University, John has worked for Valent USA Corporation. From April 1994 to January 1996, he worked at a research farm located near Champaign, IL. Since February 1996, John has been located in Gainesville, FL working as a Field Market Development Specialist. His role as an FMD Specialist includes a research and development role as well as a market support role throughout Alabama, Georgia, and Florida. John has been an active member of numerous societies and has received numerous awards throughout his collegiate and professional career including Outstanding Senior awards, Outstanding Ph.D. award, and the Spirit of Valent award.

2006 Outstanding Graduate Student Award (MS)

Marcos J. Oliveira

Marcos J. Oliveira was born in Ribeirao Preto, San Paulo, Brazil, on February 25, 1978, the second of three sons of Marcos A. Oliveira and Celia R.M. Oliveira. He grew up close to the largest production regions of sugarcane and oranges in Brazil. From an early age, he was interested in areas related to agriculture, and in February of 1997, he entered the Sao Paulo State University (UNESP) in Agronomy Engineering. After the first semester of college, he began in internship in the Department of Technology)UNESP) where he investigated the use of limestone and sewage sludge as a source of silicate and alternative fertilization in corn. After hsi freshman year, he was selected to take part in the Special Training Program, which stressed the practical application in the field of agronomic techniques learned in class. He was also active during the months when school was not in session, participating in conferences, workshops, and internships in different companies related to extension and crop production. In 1999, due to academic merit, leadership potential, and language skills, he received a one-year Fulbright Scholarship to study at Clemson University in the U.S. In July 2002, he returned to the U.S. to do his internship in the Soybean Breeding Program of Clemson University, and in December 2002, he obtained his B.S. in Agronomy Engineering from UNESP. He then accepted a graduate assistantship at Clemson University under the direction of Dr. Jason K. Norsworthy and began research in August 2003. During his Master's study, his responsibilities included conducting laboratory and greenhouse experiments involving environmental factors affecting seed germination and emergence, and conducting field research under different tillage systems in the absence and presence of soybean to describe the temporal emergence of important weeds of the southern U.S.

He was a member of the Clemson University Weed Teams that placed third (2004) and second (2005) at the Southern and Northeastern Weed Contests, respectively. He is an active member of Alpha Epsilon Lambda (AEL), Honor Society of graduate and Professional School Students; the International Weed Science Society; the Weed science Society of America; the Southern Weed Science Society(SWSS) and the SWSS Graduate Student Organization-Clemson University representative; the American Society of Agronomy; the Crop Science Society of American; and the Soil Science Society of America. He has given eight posters (2 at the SWSS) and two oral presentations and has authored or co-authored ten abstracts from these presentations. He was awarded the First Place Graduate Oral Presentation from the SWSS in 2005. He has co-authored 2 referred journal articles with an additional one in review under his authority.

2006 Outstanding Graduate Student Award (PhD)

Christopher L. Main

Christopher L. Main was born April 10, 1976, in Hillsboro, OH. He is the son of Mr. and Mrs. Gary Main. He attended Hillsboro High School and graduated in June 1994. He entered the University of Tennessee in August 1994 and received a B.S. in Agriculture, majoring in plant and soil science. Upon graduation, he accepted the position of Graduate Research Assistant in the graduate program at the University of Florida and was awarded a M.S. in agronomy with a concentration in weed science in 2001. Chris returned to the University of Tennessee in 2001 to pursue a Ph.D. in Plants, Soils, and Insects. Chris is the author of 11 published manuscripts. He has made presentations at the Weed Science Society of America, the Southern Weed Science Society, the Florida Weed Science Society, the Tennessee Agricultural Production Association, and the Milan No-Till Field Day. Chris is married to the former Ms. Shelly Hughes of Germantown, TN and is father to one son, Christopher ‘Hayden’ Main. Chris enjoys spending time with his family, playing golf, and relaxing with a good book. Chris is currently employed as the state-wide weed management extension specialist for Clemson University located at the Pee Dee Research and Education Center near Florence, SC.

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Minutes
SWSS Board of Directors Meeting
Sunday, January 22, 2006
Omni Hotel, San Antonio, TX

1. Meeting called to order at 1 PM by President David Shaw. Attendance included David Shaw (President), Jackie Driver (President Elect), David Monks (Vice-President), Alan York (Secretary-Treasurer), Bob Schmidt (Business Manager), Gene Wills (Constitution and Operating Procedures), Fred Strachan (Member-at-Large, Industry), Sue Rick (Member-at-Large, Industry), David Jordan (WSSA Rep.), Larry Nelson (Forestry Rep), Peter Dotray (CAST Rep.), Luke Etheredge (Student Rep.), Dan Reynolds (Webmaster), Ann Thurston (newly elected Vice-President), and Darrin Dodds (newly elected Student Rep.). John Harden (Past President) came in later.

2. **Minutes** of June, 2005 Board meetings were read by York. **Motion** by Strachan to approve minutes, seconded by Dotray. Motion carried (unanimous).

4. **Business Manager's Report**: Report given by Bob Schmidt. Membership as of December 31, 2005 was 461. Preregistration for 2006 annual meeting as of December 31, 2005 was basically the same as the previous year. Shaw asked how transition to Quick Books had gone. Schmidt replied saying no major problems; Schmidt provided York a digital copy of records for June to December, 2005 earlier in the day. Membership records are on Access software. Schmidt noted that expenses so far in fiscal year were approximately half of that budgeted for the year. DVD sales had been a little higher than expected. December through February is when most member and sustaining member dues will come in.

   Discussion ensued on one-day registrations. Benefits and liabilities to the Society were discussed. The matter was deferred to the Membership Committee, with an expectation of a report at the summer Board meeting.

5. **Long-Range Planning Committee Report**: Bill Witt was unable to be at meeting but had provided a report which Shaw discussed. The report was very similar to that provided at the summer, 2005 meeting; general comments had been added to the end of the report. The Board had acted on items 1 and 2 in June, 2005. Item 3 will be discussed in the general business meeting, January 23. Board concurs with thinking of the LRP Committee regarding items 4 and 5. Board's charge to the LRP Committee was to identify new groups that might be interested in joining SWSS and then look at feasibility of attracting them.

6. **Awards Committee Report**: Shaw presented in absence of Harden (see attached). Awards will be presented as follows: Distinguished Service Award, Academia - Charles Bryson; Outstanding Young Weed Scientist, Academia - Todd Baughman; Outstanding Young Weed Scientist, Industry - John Altom; Weed Scientist of the Year - Jim Griffin; Outstanding Educator Award - Don Murray; Outstanding Graduate Student Award, M.S. -Marcos Oliveira; Outstanding Graduate Student Award, Ph.D. - Chris Main. There was no nomination for Distinguished Service Award, Industry in 2005. Shaw encouraged nominations for all awards next year. Shaw stated that Awards Committee needs to get materials submitted sooner next year so Board can officially confirm winners.

   A **motion** was made by Driver, seconded by Nelson, to accept the slate of 2006 award winners. Motion carried (unanimous).

7. **Nomination Committee**: York presented in absence of Harden. Candidates included the following: Vice-President, Bob Nichols and Ann Thurston; Member-at-Large (industry), Patrick Burch and Brad Minton; Member-at-Large (academia), Andy Kendig and Jason Norsworthy; Endowment Fund Trustee, Mitch Blair and Frank Carey. Based upon 164 ballots cast, winners were Ann Thurston, Brad Minton, Andy Kendig, and Frank Carey.

8. **2006 Program Committee Report**: Presented by Driver. Program will have 123 posters and 166 oral presentations (traditional papers and symposia). Eight symposia will be held. Industry update session, with 5-minute presentations, has been added. General session will be combined with an awards luncheon (sponsored by industry). Memorabilia event will be held, with donations going to Endowment Fund. State peanut groups had donated peanuts for breaks. Etheredge noted that the graduate student symposium

would include a senator speaking on ag policy, a high-level Smith-Barney financial advisor speaking on investments, and Lee Van Wychen speaking on legislative affairs and granting. Shaw commended Driver for the 2006 program.

9. **Newsletter Editor Report**: In Al Rankins absence, Shaw stated that newsletter editor had asked the Board to mandate digital pictures to be at least 300 dpi. No motion was made, but the Board concurred with the request.

10. **CAST Report**: Presented by Dotray. CAST has a new executive Vice-President. CAST is concerned with membership. Dotray has the CAST display to set up at the 2006 Annual Meeting. Questions arose on "Friday Notes". Several members of the Board are members of CAST, but only one person on the Board was currently receiving Friday Notes. Shaw asked Dotray to relay that concern to CAST. Board will visit with Lee Van Wychen on January 23, 2005 about value of CAST to SWSS.

11. **WSSA Report**: Report presented by Jordan. The SWSS Board dealt with the Director of Science Policy (DSP) position at the Summer, 2005 meeting, where it was decided to support the DSP position at the level of $16,000 annually as compared to $17,600 as requested by WSSA. According to Jordan, the WSSA wants the SWSS to consider increasing support of the DSP position. Also, the WSSA is developing an opt-out clause for their MOP in case a regional society withdraws support. The WSSA wants a 1-year notice if a regional society plans to withdraw support. As discussed at the Summer, 2005 Board meeting, the SWSS had conveyed to the WSSA the need to look at other groups to help support the DSP position. Some groups previously not supporting the DSP had chipped in.

    Jordan mentioned that the WSSA was attempting to bring other groups into its fold but with limited progress.

    Discussion ensued on WSSA's current advertisements for a website technical position (technical webmaster) and a website editor responsible for content. WSSA is hoping regional societies will participate. Although not specifically stated, it was assumed participation would mean a financial commitment. Reynolds stated that the upside of participation would be a "cleaner" site that could also bring in the marketing side of things. A down side would be that uploading abstracts would not be as good as we currently have. Reynolds stated he was willing to continue at about the same level of input as current but would be limited in how much more he could provide. Shaw will convey to Computer Applications Committee that our Board wanted specific recommendations to consider. Consensus was to continue with SWSS website as currently done until tangible benefits from joining with WSSA could be determined. Further discussion was tabled until the Thursday morning Board meeting.

12. **Constitution and Operating Procedures**: Report given by Wills. Wills encouraged Board to read MOP and bring to his attention any inconsistencies between the MOP and current practices. For example, it had been agreed some years ago to drop economic losses from research report but MOP still mentions economic losses. Wills asked for committees and others to bring any suggested revisions to his attention for consideration by the Board. Wills complimented Reynolds on getting the MOP online and in a system for easier revision.

13. **Treasurer's Report**: Given by York. Report covered six-month period of June 1, 2005 through November 30, 2005. Income during the period was $22,038.98 while expenses were $31,784.76, for a deficit of $9,747.78. With project sales of publications , annual meeting sponsorship from industry, and expected member and sustaining member dues, which come mostly in December and January, it is anticipated that the Society can finish the year with a positive balance. Total assets (cash, CD's, and money market accounts) were $229,271.78. Of that total, $26,181.16 belongs to the weed contest. After accounting for the weed contest monies and the negative balance in the current year's budget to date of $9,745.78, net equity as of November 31, 2005 was $203,090.62.

14. **Local Arrangements Committee**: Report by Paul Baumann. Most recent communication indicated a room-night commitment of 787. Contract has guaranteed 1030 room-nights. Hotel is full (know some members seeking room few days before meeting could not get a room). Between that and the fact that a lot of money was being spent on food functions, it is hoped the Society won't be held to the room-night guarantee. Bauman noted that 300 spaces were reserved for the Tuesday awards luncheon, which was

sponsored by industry. AV costs were estimated at about $2700, a bargain. Shaw thanked Bauman and his committee for its hard work.

15. **Other Business**: There was discussion on expressing appreciation to Reynolds for his work as webmaster. NCWSS gives $500 annual honorarium to its webmaster. **Motion** by Driver, seconded by Jordan, to give webmaster a $500 annual honorarium plus a one-time $500 for past service. Motion approved (unanimous).

16. Meeting adjourned 4:35 PM.

Minutes
SWSS Board of Directors Meeting
Monday, January 23, 2006
Omni Hotel, San Antonio, TX

1. President Shaw called meeting to order at 10 AM.

2. Attendance included David Shaw (President), Jackie Driver (President Elect), David Monks (Vice-President), John Harden (Past President), Alan York (Secretary-Treasurer), Bill Vencill (Editor), Gene Wills (Constitution and Operating Procedures), Fred Strachan (Member-at-Large, Industry), Sue Rick (Member-at-Large, Industry), John Byrd (Member-at-Large, Academia), David Jordan (WSSA Rep.), Larry Nelson (Forestry Rep), Peter Dotray (CAST Rep.), Luke Etheredge (Student Rep.), Dan Reynolds (Webmaster), Ann Thurston (newly elected Vice-President), Al Rankins (Newsletter Editor), and Lee Van Wychen (Director of Science Policy).

3. Shaw introduced Lee Van Wychen. Van Wychen gave a brief summary of his background, his activities to date as DSP, and some future plans. Shaw commended Van Wychen for getting off to a good start.

4. **Editor's Report**: Presented by Vencill. The 2005 proceedings had 430 pages. There were 322 presentations in 2005 but some symposium speakers did not submit an abstract or paper. Abstracts and papers are available from SWSS web site. Mira Digital Publishing had submitted a proposal to handle proceedings. Cost would be $12.91/unit, probably more than we currently pay, but it would streamline the whole process from abstract submission to publishing the proceedings. Vencill suggested the Board discuss this at length during summer meeting. Shaw asked Vencill to compare Mira price to what we currently pay Omni Press, determine advantages and disadvantages of each vendor, and present to the Board during the summer 2006 meeting.

5. **Research Committee Report**. Presented by Monks. Weed survey nearly done (computer glitch had delayed it). Monks stated that current activities are not as specified by MOP and he will be working to get MOP changed to better reflect current activities.

6. **Finance Committee Report**. Presented by Monks. Monks stated that the committee anticipated a balanced budget for the 2005-06 year. Committee had raised the question of why the fiscal year runs from June 1 to May 31. Shaw responded that the fiscal year was set as it is long ago to ease closing of the books at the end of the year. December 31 would be a really busy time to try to close out books due to all the activity taking place at that point in the year. The committee made the following comments and recommendations:

   The Finance Committee anticipates a balanced budget for 2005-06.

   The Finance Committee recommends that the Membership Committee provide a strategy for increasing general membership and sustaining membership to the Board by the summer meeting. Areas of membership to explore include: 1) agricultural chemical companies manufacturing predominantly generics; 2) seed companies; 3) equipment companies; and 4) state weed science societies.

   The Finance Committee recommends that the Board reevaluate the Director of Science Policy position yearly with regard to the ability to fund the position and continued support. (NOTE: this item not presented until January 26 meeting).

   The Finance Committee recommends to the Board that a specific structure of membership and cost of single day attendance, such as attendance to a symposium, be worked out in a manner to enhance attendance. The Finance Committee will work with the Membership Committee to have a recommendation to the Board by the 2006 summer Board meeting.
   The Finance Committee is concerned that the cost of "Weeds of the South" may drop fiscal reserves below a 2-year operating budget reserve, which is required by the MOP.

The Finance Committee recommends that the Board discuss the policy of travel reimbursement to summer Board meetings with regard to flexibility in transferring currently established travel reimbursement among board members.

7. **Weed Contest Committee Report**: Report by Koger. 2005 contest held in conjunction with NCWSS. Only two teams (Arkansas and Missssissippi) from SWSS states participated, but those teams did extremely well. Contest went well overall. The 2006 contest will be held in Little Rock, Arkansas, hosted by Bob Scott. NCWSS has so far not ruled out coming to SWSS contest. SWSS contribution to contest in 2005 was $3100, but about $4200 were donated, hence did not use any of the reserves. The committee planned to meet later in the day and discuss the merger idea with NCWSS again and also ways to make contest more appealing to groups other than row crops (ie, turf, forestry). Shaw asked Koger to keep Shaw and Driver informed of further discussions and plans by the committee in case the Board needs to discuss any related issues. Shaw thanked Koger for his leadership of the committee.

8. **Membership Committee**: Report presented by Wilcut (see attached). Wilcut presented several ideas to attract participation by groups outside the SWSS but also warned that the Society should not change so radically as to alienate current members while trying to attract new ones. Byrd mentioned that personnel from state departments of transportation and utility companies typically could not travel out of state for meetings, hence to attract these people, SWSS would have to promote its program to such individuals within the state that the annual meeting is held. These people might be more interested in one-day registration. Monks raised question if such groups could be tapped more effectively if the annual meetings rotated among only three cites so that those groups could anticipate participation every three years. Harden pointed out that any attempt to have programs to attract such people would require much more advanced planning of the program. Byrd suggested targeting NRCS for 2007. The vegetable industry was suggested as a target audience for the 2008 meeting in Jacksonville.

For health reasons, Wilcut asked to be relieved of his duties on committee.

9. **Sales Coordination/Weed ID Publications Report**: Presented by Bryson and Defelice. Preparation of "Weed of the South" was progressing well. Anticipate having it ready to go to publisher in fall of 2007. Anticipate 720 pages, 400 weeds. Focus will be mainly on weeds of row crops and horticultural crops. Would be the most comprehensive book on the market. Next version of DVD also expected in 2007, with estimated cost of $5000. Some discussion ensued on SWSS publishing "Weeds of the South" versus a university press. Much more money to be made if SWSS publishes, but no input costs if a university press publishes. Anticipate costs to be $110,000 to $120,000 to print 5000 copies. Break-even price would be about $50. Shaw reminded Vencill to contact the University of Georgia Press and Monks to contact University of North Carolina Press. In making those contacts, Defelice suggested telling the university presses to see the success of "Weeds of the Northeast". Arlen Evans is retiring this summer. There is apparently nothing in his will to give photo rights to SWSS nor to keep SWSS from using the photos, but SWSS business manager should have on file a letter from Arlen several years ago giving SWSS permission to use his photos in SWSS publications, but SWSS can not pass them on to others nor license to others. Crop Science and Soil Science societies have agreed to sell our DVD. About 1000 copies of the DVD have been sold since initiation of sales, with about 400 still on hand. Schmidt said he was currently selling three to four copies per month. Shaw expressed the Board's sincere appreciation for Defelice's and Bryson's efforts on the publications.

10. **Computer Applications Committee**: Reynolds presented report for Andy Kendig. The committee had discussed the option to upload Power Point presentations prior to the annual meeting next year. They had also discussed having a free computer at meeting for folks to upload on (similar to 2006 Beltwide Cotton Conferences). Committee so far had not looked into video or audio capture. Reynolds was unsure of what advantages that would offer. It would take a huge amount of disk space; any long-term storage would be expensive.

11. **Herbicide-Resistant Weeds Committee**: Report by Bob Nichols. HRW committee was originally set up as a special committee to run for five years. More problems are expected with weed resistance in the future. HRAC had put a quantative protocol on its web site to resolve technical aspects. Committee wants to publish a bulletin on principles of resistance management that weed scientists can agree upon. Nichols mentioned philosophical conflicts among governmental agencies concerning resistance management.

Committee will prepare a report for summer 2006 Board meeting and maybe a proposal to governmental organizations as to whether they are following (promoting) best practices for resistance management.

12. **Endowment Foundation Report**: Presented by Eric Prostko. Foundation in good financial condition. About $297,000 in the foundation. For the 2007 annual meeting, student awards will be increased as follows: First place in paper and poster contests, increase from $100 to $200; second place in paper and poster contests, increase from $50 to $100; Outstanding M.S. and Ph.D. student awards, increase from $250 to $400. Foundation is considering a raffle rather than silent auction for Bryson's pictures in the future; anticipate that will generate greater revenues. Also considering pre-conference sales of raffle tickets. Shaw and Etheredge both expressed appreciation for the work the Foundation is doing.

13. **Site Selection Committee Report**: Presented by Byrd. Greg MacDonald and Jay Ferrell had completed a site inspection of the Radisson Riverwalk, the Omni Jacksonville, and the Hyatt Regency - Riverfront in Jacksonville. MacDonald and Ferrell were unimpressed with Radisson Riverwalk and committee strongly recommended the Hyatt for the 2008 meeting. (Note: At summer 2005 meeting, Board had decided to go to Radisson in 2008; contract has not yet been signed). There was a **motion** by Jordan, seconded by Monks, to drop the planned contract with the Radisson Riverwalk and change site of 2008 annual meeting to the Hyatt Regency. Motion approved (unanimous).

    Byrd was of the opinion that as long as we rotate among states within a region, it would be helpful to have a person on the site selection committee from each state. Currently six individuals on committee. No Board action on this; President has the authority to increase committee membership.

    Byrd mentioned that some recent changes in format of annual meeting had caused some concerns for his committee. With hotel contracts negotiated a couple years in advance, deviations from the "standard" number of rooms, room size, room setup, etc., were sometimes hard for the hotel to deal with.

    The 2009 meeting will rotate back to the western region. Klosterboer is beginning to look at potential sites.

14. Meeting adjourned 12:10 PM.

Minutes
SWSS Board of Directors Meeting
Thursday, January 26, 2006
Omni Hotel, San Antonio, TX

1. President Driver called meeting to order at 7 AM.

2. Those in **attendance**: Jackie Driver (President), David Monks (President-Elect), David Shaw (Past President), Alan York (Secretary-Treasurer), David Jordan (WSSA Rep), Andy Kendig (member-at-large), John Byrd (member-at-large), Brad Minton (member-at-large), Peter Dotray (Cast Rep), Gene Wills (Constitution and Operating Procedures) , Bob Schmidt (Business Manager), Dan Reynolds (Webmaster), Darrin Dodds (Student Representative), Larry Nelson (Forestry Rep), Tom Mueller (Local Arrangements Chair, 2007), Paul Baumann (2006 Local Arrangements Committee), Chris Tingle (Graduate Student Program Committee), and Lee Van Wychen (Director of Science Policy).

3. **Forestry Section Report**: Presented by Nelson. There were six papers in forestry section in 2006, 15 to 20 individuals in the session, and no graduate student participation. Forestry group voted to go with a one-day symposium as much as possible for 2007. Chair of section next year is Jimmie Yeiser. Forestry section does not want to be video taped.

4. **Graduate Student Program Committee Report**: Report given by Chris Tingle. Forty students participated in the 2006 contests. Overall, contest went well although Tingle reported difficulty in getting abstracts by the deadline of 7 days prior to meeting. Tingle asked if it would be possible to get one submission. Reynolds noted it would be easy to include abstracts with submission. The committee noted questionable quality of the student abstracts and raised the question of why abstracts counted only three points toward overall scoring. According to Mueller, major professors can assist greatly with the abstract and the scoring had been set with low value on abstracts so as to not evaluate the major professor. Wilson Faircloth is the incoming chair of the committee. Driver informed Tingle that if the committee wished to restructure the scoring sheets, Faircloth should submit suggested changes to the Board by the summer 2006 meeting.

5. **Local Arrangements Report**: Presented by Paul Baumann. Baumann reported the perennial problem of getting attendees at the meeting to make room reservations by the deadline. No complaints had been received on meals or breaks. Hotel had been responsive to our needs. Except for AV rental (no bill yet), other costs were very close to projected. Society had guaranteed 1030 room-nights but only 780 (estimate) were used. Society did not face any penalty for falling short of guaranteed room-nights as hotel filled with other guests. Tom Mueller will be chair of committee for 2007. Driver requested a list of his committee.

   Driver commended Baumann and his committee for a great job.

   Driver requested the Board to hold the dates June 15, 16, and 17 and June 22, 23, and 24 for the summer 2006 Board meeting. Mueller will be checking with the hotel and will confirm dates later. Byrd noted that the contract with Opryland did not mention comp rooms for summer Board meeting. He will check with Helms-Brisco to see if something can be worked out.

   Discussion ensued on the 2007 meeting. Mueller stated that SWSS will be a tiny portion of the business at Opryland in 2007. Although not in the contract, he would try to arrange to have all the posters up at one time. He advised the Board to reduce guaranteed room blocks in the Opryland contract as much as could be done within the terms of the contract. The Opryland will likely not be lenient if room block is not made. The contract is for 855 room-nights, 90% of which must be made to avoid penalty.

   Byrd noted that the contract for the hotel in Jacksonville specified 937 room-nights, but he was unsure if that could be reduced. Driver and Shaw suggested dropping the number to 850 if that can be done. Discussion followed on a Wednesday awards luncheon and dropping the Wednesday night banquet. It is too late to do that in 2007, but it could be done beginning in 2008. It was noted that this move would have big impact on hotel contracts as it would effectively cut out one night. Schmidt reported actual rooms used at 2006 meeting to be the following:

Saturday nght	14
Sunday night	136
Monday night	219
Tuesday night	222
Wednesday night	152
Thursday night	2

There was a **motion** by Shaw, seconded by Kendig, as follows: Effective with the 2007 annual meeting, the Board directs the program committee to attempt to begin the conference on Monday morning and end the conference shortly after noon on Wednesday. Motion approved (unanimous).

Raffle tickets had been discussed earlier for the Bryson painting in 2007. Mueller mentioned that raffles are illegal in Tennessee unless a considerable amount of paperwork is done ahead of time. He volunteered to do it if the Board requested.

6. **Program Committee Report**: Presented by Monks. The 2007 committee had met with the 2006 committee and discussed possible themes. He expressed concern with low attendance in agronomy and horticulture sessions. His committee also had raised the question of an awards luncheon but no Wednesday banquet.

Monks mentioned a regulatory session for 2007, with a workshop on how companies write labels.

Mueller mentioned planning a "quiz bowl" for graduate students (would be called the Tennessee Invitational). The event would be held after the paper contests, possibly at a mixer. The idea is for it to be fun and not so competitive. Universities will submit the questions. There would be no request to the Board for funding.

Mueller also mentioned undergraduate outreach. He wanted to reach out to non-land-grant institutions around Nashville and have some type of educational event to introduce undergraduates to weed science. He suggested no registration fee for such undergraduates. Board had no problems with that. Monks and Mueller volunteered to visit some of the schools to line up something for the 2007 meeting.

Monks reported that Eric Prostko was taking leadership on setting up something to bring at least one extension agent from each state to the 2007 meeting. Some sort of program will be offered for those agents, with agent presentations expected.

7. **Graduate Student Report**: Presented by Dodds. Graduate students really want something done about the poster session. Students were disappointed in attendance at poster session and strongly suggested moving the time of the poster session (they did not like early morning time slot). He commended Luke Etheredge on the student symposium but was displeased with the attendance.

8. **Finance Committee Report**: Presented by Monks. Most of the items were covered on January 23, 2006. One item remained for discussion, which related to the Director of Science Policy (DSP) position. The Finance Committee recommended that the Board reevaluate the DSP position yearly with regard to the ability to fund the position and continued support. Consensus of the Board was that the Society had already expressed support of the position and had made a five-year commitment to support the position. No further action was taken.
There was also a suggestion from the Finance Committee to revise the MOP as it relates to travel reimbursement to the summer Board meeting. The suggestion read as follows:

> The Society will reimburse the following six individuals for travel expenses to the summer Board meeting: Past President, President, Vice-President, Secretary-Treasurer, Business Manager, and Graduate Student Representative. If any of the above decline reimbursement, other Board members will have the option to have travel expenses reimbursed in the following order: Editor, junior Member-at-Large (academia), senior Member-at-Large (academia), junior Member-at-Large (industry), senior Member-at-Large (industry), WSSA representative, CAST representative, Forestry representative, and Constitution and Operating Procedures Committee chair.

Schmidt noted that travel for the local arrangements chair comes out of the overall annual meeting expenses.

Following discussion, there was a **motion** by Shaw, seconded by Byrd as follows: For the summer Board meetings, no Board member shall be required to pay for travel from personal finances; the Society shall reimburse those who would have to pay for travel from personal finances. It was noted that this motion specifically addressed those whose travel was not covered under actions taken in the summer of 2005. Motion carried (not unanimous, one vote against).

Driver and Mueller will check on video conferencing for summer 2006 meeting as most of the Board members do not need to be physically present at the meeing.

9. **Business Manager's Report**: Presented by Schmidt. Total attendance at the 2006 meeting was 319 (238 individual members, 81 students). This compared with 326 in 2005. There were 4 and 7 one-day registrations for the invasive weeds and the forestry symposia, respectively. Banquet attendance was 179 compared with 178 in 2005. Cost of banquet was $38/person.

Schmidt was asked if it was possible to get a membership list online. Basically a directory with individuals' areas of involvement. It could help with program planning if such was available. Reynolds was against that as it opened members to spam. Reynolds was willing to email everyone on list serve to request above information and make it available to program committee.

10. **WSSA matters**: As a follow-up to discussion on January 22, 2006, Jordan was directed to go back to the WSSA with the following messages:

SWSS is comfortable with its own web site and was not interested in supporting the WSSA on its site.

SWSS is not ready to increase its support for the DSP position.

SWSS members had responded to the request to supply images for WSSA XID.

SWSS had not received a contract to sign for support of the DSP position.

11. Meeting adjourned 10 AM.

Respectfully submitted;
Alan C. York
Secretary-Treasurer

Contact information
Revised January, 2006

Name	Position	Email	Phone	Fax
David Shaw	Past President	dshaw@gri.msstate.edu	662-325-9575	662-325-9578
Jackie Driver	President	jackie.driver@syngenta.com	254-848-5650	254-848-7333
David Monks	President Elect	david_monks@ncsu.edu	919-515-5370	919-515-7747
Ann Thurston	Vice-President	Ann.thurston@bayercropscience.com	972-633-9176	
Alan York	Sec.-Treas.	alan_york@ncsu.edu	919-515-5643	919-515-5315
Bill Vencill	Editor	wvencill@uga.edu	706-542-3117	706542-0914
Bob Schmidt	Bus. Man.	raschwssa@aol.com	217-352-4212	217-352-4241
Dan Reynolds	Webmaster	dreynolds@pss.msstate.edu	662-325-0519	662-325-8742
Gene Wills	Con. Op. Proc.	gwills@drec.msstate.edu	662-686-9311	662-686-7336
John Byrd	M.A.L. (Acad.)	Jbyrd@pss.msstate.edu	662-325-4537	662-325-8742
Scott Senseman	M.A.L. (Acad.)	s-senseman@tamu.edu	979-845-5375	979-845-0456
Brad Minton	M.A.L. (Indus.)	Brad.minton@syngenta.com	281-304-0609	281-304-0609
Susan Rick	M.A.L. (Indus.)	susan.k.rick@usa.dupont.com	919-345-1656	
Larry Nelson	Forestry Rep.	lnelson@clemson.edu	864-656-4866	
David Jordan	WSSA Rep.	david_jordan@ncsu.edu	919-515-4068	919-515-3332
Peter Dotray	CAST Rep.	Pdotray@tamu.edu	806-742-1634	806-742-0988
Darrin Dodds	Student Rep.	Dmd76@pss.msstate.edu	662-325-2311	662-325-8747

Minutes

SWSS Board of Directors Summer Meeting
Session I
June 15, 2005
Omni Hotel, San Antonio, TX

1. Meeting called to order at 1 PM, June 15 by President David Shaw. Individuals in attendance included John Harden (Past President), Jackie Driver (President Elect), David Monks (Vice-President), Alan York (Secretary-Treasurer), Bob Schmidt (Business Manager), Gene Wills (Constitution and Operating Procedures), John Byrd (Member-at-Large, Academia), Scott Senseman (Member-at-Large, Academia), Fred Strachan (Member-at-Large, Industry), Sue Rick (Member-at-Large, Industry), David Jordan (WSSA Rep.), and Luke Etheredge (Student Rep.). The following joined the meeting via tele-conference line: Peter Dotray (CAST Rep.), Bill Vencill (Editor), Dan Reynolds (Webmaster), Al Rankins (Newsletter Editor), and Larry Nelson (Forestry Rep). Mike Defelice was present on tele-conference line for part of the meeting.

2. **Minutes of January, 2005 Board meetings** (attached) were read by York. **Motion** by Harden to approve minutes, seconded by Strachan. Motion carried (unanimous).

4. **Business Manager's Report**: Report given by Bob Schmidt (attached). A question was raised as to how many paid memberships came in after the 2005 annual meeting. Schmidt replied that 140 came after the 2005 annual meeting compared with 170 after the 2004 annual meeting. A question was raised as to whether the members lost over past year(s) could be categorized. Schmidt replied this was not possible for student membership, but it could be done for non-student members according to affiliation. **Motion** by Byrd to accept the report, seconded by Monks. Motion carried (unanimous).

5. **Secretary-Treasurer's Report**: Report given by York (attached). Discussion on proposed budget deferred until after discussion on Director of Science Policy position the following day.

6. **Report on 2005 Proceedings**: Report given by Bill Vencill. There were 278 abstracts and papers from 2005 meeting. Vencill was in final stages of proofing and ready to load on Omni Press web site. He anticipated Proceedings being available in about a month. There was discussion on 10-point vs 12-point font. Using 10-point font, only one abstract exceeded the 1-page limit in 2005. Vencill estimates 60% of the abstracts would have exceeded the limit if 12-page font was used. The Board recommended keeping abstracts in 10-point font. A question was raised by a member concerning when committee reports were published. The policy is for the reports from a given year to be printed in the Proceedings from that same year; that policy will be continued. Vencill reported that no committee reports were received before the meeting in 2005. There was discussion related to Tobacco Abstracting Service's request to use our abstracts online. Byrd suggested putting a link in Tobacco Abstracting Service site to the SWSS web page. Shaw, Reynolds, and Vencill will work on a response to Tobacco Abstracting, share that

response with the Board, then send response to Tobacco people.

7. **DVD Sales/Promotion Report**: Report given by Defelice. According to Schmidt, there were 640 copies left, so 800+ copies had been sold. Those sales were basically all profit. The Georgia Cooperative Extension Service had purchased 170 copies. Defelice reminded the Board that SWSS needed to promote the DVD more aggressively.

Discussion ensued on the weed identification book in preparation. Shaw passed around a proposed page of a grass and a page of a broadleaf weed from the book for Board to view. Quality was excellent. Defelice indicated the book would sell much better than the DVD, but that there was little profit to be made on books. Defelice indicated it would take 18 to 24 months to put the pictures, etc., together for the book. He wanted a commitment from the Board before beginning the work. Shaw indicated the Board was still committed.

Defelice was of the opinion that a book specifically for the southern U.S. had a better potential (greater demand) than one for the whole country. There are no good books for the South now except the SWSS binder. A book focused on southern weeds could be put together more quickly, and it would also include fewer pages. There was concern that an 800+ page book covering the whole country would be problematic (binding a paperback, etc). Note: the Board had previously decided on a book for the whole country. Defelice requested that the book focus on southern weeds. A book with a national focus could follow in the future if there was sufficient market.

Discussion followed on whether the SWSS should publish the book or have it published through a university. Vencill was asked to check with Tim Murphy and Carl Miller about the University of Georgia Press publishing the book. Monks was requested to contact the University of North Carolina Press.

A **motion** was made by Harden, seconded by Senseman, to proceed with preparation of the book with the proposed title of "Weeds of the South". Motion carried (unanimous).

Byrd will take lead on getting a permit to allow spiderwort to be transported to Arlan for photographing.

8. **2006 Conference Report**: Presented by Driver. Theme of meeting will be "Vision for the Future". Program committee wants to separate the social hour from the poster session. They have discussed adding an industry session on Wednesday afternoon to help hold people at meeting. The presentations would be 5 minutes. Seed industry people would be allowed to participate. Scott McElroy is working on a turf session which will include a symposium plus 15-minute papers. Two symposia are being planned for the pasture and rangeland section. April Fletcher is working on a session for invasive weeds. Jordan is planning a symposium on curricula in universities and training needs for students. Shaw suggested some thought on meeting those needs via distance learning. Jerry Wells is working on a regulatory workshop and trying to draw in regulatory people. Etheredge indicated there would be a graduate student symposium. The program for agronomic crops was unclear. Driver indicated there would be a conference call in July to pin down more details on the program. A call for papers will appear in the Newsletter which should go out about August 1. There is a July 1 deadline for entries in the Newsletter, including the call for papers. Reynolds indicated he needed symposia titles by third week in July.

Driver indicated Omni Hotel contract included five shuttles to transport people to River Walk on one night of the meeting.

Bob Scott and Ken Smith had approached the program committee with an idea for a memorabilia event that would cover history, old photos, etc. A time slot of 5:00 to 6:00 p.m. was suggested. The thinking was to allow people to "drop a few dollars in a pot" as they entered, with the monies going to the Endowment Fund. Consensus of the Board was to proceed with the event if it meshed with the program Driver was planning.

There was discussion on an all-electronic call for papers. There was a **motion** by Monks, seconded by Senseman, that there be an electronic call for papers (twice) plus regular mailing to the approximately 30 members that do not have access to email. Motion carried (unanimous). Reynolds agreed to put a link in the Newsletter to go directly to the call for papers site.

9. Shaw reminded the Board that Tom Mueller had agreed to prepare a poster on the history of the SWSS for the 2006 WSSA annual meeting.

10. **2007 Site Selection Report**: Report given by Byrd. Quotes and other information had been gathered on ten properties, including the following: Imperial Palace Hotel and Casino, Biloxi, MS; Sheraton Music City Hotel, Nashville, TN; Isle of Capri Casino Resort, Biloxi, MS; Sheraton Birmingham Hotel, Birmingham, AL; Beau Rivage, Biloxi, MS; Riverview Plaza and Battle House Hotel, Mobile, AL; Gaylord Opryland, Nashville, TN; Nashville Marriott, Nashville, TN; Renaissance Nashville, Nashville, TN; and Grand Hotel Marriott Resort, Golf Club, and Spa, Point Clear, AL. See attachment.

    Further discussion and a decision were delayed until the next day to await a call from Kathy Tatom of Helms Briscoe.

11. **2008 Site Selection Report**: Report given by Byrd. Prices, dates, and other information were available on the following 16 properties: Radisson Riverwalk, Jacksonville, FL; Hilton Knoxville, Knoxville, TN; Holiday Inn Select, Knoxville, TN; Adam's Mark, Charlotte, NC; Hilton North Raleigh, Raleigh, NC; Myrtle Beach Marriot, Myrtle Beach, SC; Westin Charlotte, Charlotte, NC; Crowne Plaza Ravinia, Atlanta, GA; Amelia Island Plantation, Amelia Island, FL; Sawgrass Marriott, Jacksonville, FL; Sheraton Greensboro, Greensboro, NC; Westin Peachtree Plaza, Atlanta, GA; Sheraton Atlanta, Atlanta, GA; Grandover Resort, Winston-Salem, NC; Westin Savannah, Savannah, GA; and Omni at CNN Center, Atlanta, GA.

    There was discussion on joining with the WSSA for a joint meeting in Puerto Rico in 2008. The consensus of the Board was not to meet jointly with WSSA.

    Further discussion of the 2008 meeting site was delayed until the following day.

12. **SWSS/NCWSS Weed Contest**: Trey Kogger is the new chair of the SWSS weed contest committee, which is autonomous from the Board. The committee had decided to join with the NCWSS for the 2005 contest, which will be held in Kansas. There was discussion on a joint contest with the NEWSS in 2006, but the consensus of the Board was to encourage the contest committee to continue with the SWSS contest as in past years after 2005.

13. **WSSA Report**: A lengthy report was given by Jordan on activities, concerns, journals, etc., of WSSA (see attachment). Of greatest concern to the SWSS was the Director of Science Policy (DSP) position. Discussion on the DSP was delayed until the following day.

14. Meeting was adjourned at 5:20 p.m.

Respectfully submitted,

Alan York
SWSS Secretary-Treasurer

Minutes
SWSS Board of Directors Summer Meeting
Session II
June 16, 2005
Omni Hotel, San Antonio, TX

1. The meeting was called to order at 7:30 a.m. on June 16, 2005 by President Shaw. Individuals in attendance included John Harden, Jackie Driver, David Monks, Alan York, Bob Schmidt, Gene Wills, John Byrd, Scott Senseman, Fred Strachan, Sue Rick, David Jordan, and Luke Ethredge. The following joined the meeting via tele-conference line: Peter Dotray, Bill Vencill, Al Rankins, Dan Reynolds, and Larry Nelson.

2. **WSSA-SWSS Interactions**: David Jordan lead the discussion on the Director of Science Policy (DSP) position (see attachment, WSSA report). The history of the position and accomplishments were outlined. Total annual contributions from the WSSA ($68,700), the SWSS ($14,000), the NCWSS ($14,000), the WSWS ($7,300), the NEWSS ($4,000), and the APMS ($2,000) have been $110,000 since the position became full-time in 1999. That includes salary, travel, and office supplies. Rob Hedberg, who has been in the position since it became full-time in 1999, has accepted another position and will be vacating the DSP position in the last week of June, 2005. The position is being advertised.

   Former WSSA president Don Thill appointed an ad hoc committee, chaired by Reid Smeda, to consider options for funding the DSP position after February, 2006. Projected costs of the DSP position were estimated to be $145,000 in 2006. With a 5% increase per annum, the costs would total $185,061 by the year 2011. Proposed contribution levels for each society were established at the mean expected for the 2006 to 2011 period, which was $164,379. The ad hoc committee suggested the annual funding level for the SWSS to be $17,600.

   Jordan stated that the WSSA needs to know if the SWSS is committed to giving $17,600 annually for the next six years to support the DSP position. Discussion ensued as to whether the SWSS was in a position to meet the increased commitment. Shaw was of the opinion that the other regional societies were committed to supporting the position, but he was not sure of the level of support to which they were committed. There was discussion on the potential of bringing in other groups (North American Weed Management Association, national Vegetation Management Association, others) to help support the position. Jordan stated that the ad hoc committee wanted to keep the DSP working only for the WSSA and current supporting regional societies. He also stated that the WSSA would be willing to reach out to other groups if the regional societies could not meet the projected level of support.

   Discussion followed on whether the SWSS could afford that level of funding. An increase in sustaining membership dues would help. Sustaining members benefit from the legislative support given by the DSP in Washington. There are currently 28 sustaining members at one of the three sustaining membership levels.

   There was a **motion** by Harden, seconded by Strachan, to increase sustaining membership dues to $1,000 for companies with annual sales greater than $100 million, $500 for companies with annual sales of $10 to 100 million, and $200 for companies with annual sales up to $10 million. Motion carried (unanimous).

   Discussion followed on creating sustaining membership for state weed science societies or other state plant protection organizations. There was a **motion** by Byrd, seconded by Driver, to create a new sustaining membership category for state weed science societies and other plant protection organizations at a fee of $100 per year. Motion carried (unanimous).

   Discussion followed on the level of support for the DSP. Harden suggested the SWSS tell WSSA that the SWSS had supported the DSP at a rate greater than its share over the first six-year period. With current financial constraints, he suggested the SWSS commit to $15,500.

   There was discussion on increasing individual membership dues, but there was concern for backlash in light of the recent increase in registration fees. Schmidt suggested a varying individual membership fee, depending upon whether or not the member attended the annual meeting.

There was a **motion** by Byrd, seconded by Monks, to increase individual membership dues from $30 to $40 for members not attending the annual meeting. Motion carried (unanimous).

There was a **motion** by Driver, seconded by Senseman, for the SWSS to contribute $16,000 annually towards the DSP position for the period 2006 to 2011. Motion carried (unanimous).

There was discussion on whether the SWSS should encourage the WSSA to approach other groups to help support the DSP position. There was no motion to this effect, but the consensus of the Board was to do that. Shaw will email Mallory-Smith on this matter, telling WSSA that SWSS wants to support the DSP position, but at a level somewhat less than suggested by WSSA, because the SWSS needs to work on its financial footing.

3. **SWSS management**: The following **motion** was made by Byrd and seconded by Rick: To prepare for the transition upon retirement of Bob Schmidt, all SWSS financial records, beginning with the current fiscal year, will be transferred to QuickBooks software by the January, 2006 conference and will continue to be maintained on such software. The SWSS will pay for a CPA to set up the files and any necessary training and software. Motion carried (unanimous).

The following **motion** was made by Rick and seconded by Byrd: The Business Manager shall keep membership records on Access data base software and provide both an electronic copy and a hard copy to the Secretary-Treasurer each year before the summer Board meeting. Motion carried (unanimous).

The following **motion** was made by Driver and seconded by Strachan: The Business Manager shall be required to provide quarterly, detailed financial reports generated on QuickBooks to the Secretary-Treasurer beginning with the January, 2006 conference plus a copy of all receipts and expenses, and an electronic data base backup for membership and financial records. Motion carried (unanimous).

The following **motion** was made by Strachan and seconded by Rick: The SWSS will pay for any software needed by the Secretary/Treasurer to read files provided by the Business Manager. Motion carried (unanimous).

4. **Local Arrangements Report**: Presented by Paul Baughman. Rooms for committee meetings are tight. It was suggested that Local Arrangements poll committee chairs to make sure their committees will meet (several committees did not meet last year). The poster session will likely have to be split into two sessions due to a smaller room compared with 2005. There are several eating establishments within walking distance of the Omni; this needs to be pointed out in the Newsletter and also as a handout at registration. The Board empowered Baughman to spend approximately $45/person for a buffet at the awards banquet and gave Driver the authority to decide how to proceed on the mixer, poster session, and other events.

Discussion followed on a spouse’s program. A good bit of money has typically been spent on the spouse’s program, and it is probably not worth the expense. There was a **motion** by Byrd, seconded by Monks, to discontinue the SWSS-sponsored spouse’s program beginning with the 2006 annual meeting. Motion carried (unanimous).

5. **Budget**: Adjustments were made to the proposed budget (third column in Secretary-Treasurer’s report, attached), with revised budget in fourth column. The revisions resulted in a balanced budget, as suggested by the Finance Committee in January, 2005.
There was a **motion** by Byrd, seconded by Driver, to accept the revised budget for 2005-06. Motion carried (unanimous).

There was a **motion** by Senseman, seconded by Jordan, to accept the Secretary-Treasurer’s report. Motion carried (unanimous).

6 **Long Range Planning Committee Report**: Report given by Harden (see attachment). The committee

recommended that all members of the Board have voting privileges with the exception of the Business Manager and the Endowment Foundation representative. There was a **motion** by Harden, seconded by Driver, to give all Board members, except the Business Manager and the Endowment Foundation representative, voting privileges. Motion carrier (unanimous).

The Committee had discussed possibly having only industry personnel vote to select their Board members, and only academic personnel vote to select their representatives on the Board. The consensus of the Board was to make no changes in the current procedure of electing members at large.

The Committee had also considered pursuing "other groups" to join the SWSS and whether or not such groups should have representation on the Board. The new groups could be represented similar to how the forestry group is currently represented. Provisional membership for a 2- to 3-year period would be an option, and during this time the new group would have a non-voting member on the Board. The committee made no particular recommendations on representation of new groups except to say that in the long term, SWSS might have to alter its Board composition if new groups joined. The consensus of the Board was that new groups should have representation, but those groups had to first be identified.

Discussion followed on what types of groups might fit in with the SWSS and whether the current composition of the Board with members-at-large should be replaced with representatives that reflect the program (ie, a rep for invasive weeds, a rep for turf and rights-of-way, a rep for agronomic crops, etc.). It was felt that one of the most likely groups to interact with and perhaps join SWSS would be vegetation management groups. Byrd mentioned interest in formation of a regional vegetation management society. Other potential groups would be invasive plants groups and seed technology groups. The Board encouraged the Program Committee to develop a strong section on vegetation management for the 2006 meeting. The Board supported Shaw in writing a letter to state vegetation management groups informing them there would be a session on that area at the 2006 meeting.

At some point in future, the SWSS might need to change its name to better reflect the membership, assuming other groups can be attracted to the SWSS.

Shaw will put something in August, 2005 Newsletter to membership on attracting new groups to SWSS and representation of such groups on the Board. Email to membership would also stimulate discussion.

7. **2008 Site Selection**: Discussion of potential locations was continued from previous day. There was a **motion** by Jordan, seconded by Senseman, to hold the 2008 annual meeting at the Radison Riverwalk in Jacksonville, FL. Motion carried (unanimous).

8. **2007 Site Selection**: Discussion of potential locations was continued from previous day. The following **motion** was made by Byrd and seconded by Harden: Pending availability of the property, the 2007 annual meeting will be held at the Gaylord Opryland, Nashville, TN, during January 20 to 25. Otherwise, the meeting will be held at the Beau Rivage, Biloxi, MS, during January 26 to February 2. Motion carried (unanimous).

9. Shaw will send Board members suggestions on changes in the MOP concerning presentations before the call for papers.

10. The meeting was adjourned at 11:45 a.m.

Respectfully submitted,

Alan York
SWSS Secretary-Treasurer

January 16, 2006

Southern Weed Science Society
Business Manager's Report

Membership as of December 31

	2005	2004	2003	2002	2001	2000	1999
Members and Sustaining Members	376	464	452	500	510	527	559
Students	85	104	111	118	126	131	136
Total	461	545	563	618	636	658	695

Research Methods to date
Expense $38,011 Income $41,760

Weed Identification Guide to date
Expense $489,514 Income $793,058

Weeds of the Unted States and Canada CD-ROM vs 1, 2, 2.1
Expense $29,038 Income $141,912 Final

Forest Plants of the Southeast and Their Wildlife Uses
Expense $110,379 Income $187,344 Final

Preregistration	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997
Members	177	180	181	220	226	248	249	261	285	292
Students	65	61	74	66	80	87	115	116	74	74
Total	242	241	255	266	306	335	364	377	359	365
Percentage of final		74%	68%	66%	68%	76%	75%	59%	60%	60%
Total Attendance		326	354	374	400	456	492	476	501	601

Weed DVD
Expenses $9,946 Income $31,266

Secretary/Treasurer's Report
Southern Weed Science Society
January 23, 2006

Profit/Loss Statement For the Period June 1, 2005 to November 30, 2005

INCOME	PROGRAM SERVICES	
	Membership Dues	$300.00
	Sustaining Member Dues	$800.00
	Investment Income	$1,435.72
	Total	$2,535.72
	PUBLICATIONS	
	Weed ID Guides	$1,181.40
	Proceedings	$420.00
	Research Methods	$30.00
	Weed DVD	$9,907.35
	Forest Plants of the Southeast	$1,139.56
	Total	$12,678.31
	ANNUAL MEETING (2006)	
	Registration	$5,824.95
	Sponsors	$1,000.00
	Total	$6,824.95
	TOTAL INCOME	$22,038.98
EXPENSES	PROGRAM SERVICES	
	Telephone	$416.36
	Postage	$72.17
	Insurance, Legal & Audit	$4,587.00
	Office Supplies	$252.87
	Newsletter	$243.96
	General printing	$45.00
	Travel	$2,106.18
	Management fee	$14,388.00
	Miscellaneous	$614.94
	WSSA Science Director	$7,000.02
	Total	$29,726.50
	PUBLICATIONS	
	Weed ID Postage	$254.74
	Proceedings	$634.09
	Weed DVD	$386.86
	Total	$1,275.69
	ANNUAL MEETING	
	Postage	$261.61
	Registration Materials	$220.84
	Name Badges & Holders	$300.42
	Total	$782.67
	TOTAL EXPENSES	$31,784.76
NET INCOME		($9,745.78)

Balance Sheet
For the Period June 1, 2005 to November 30, 2005

ASSETS				
	Current Assets			
		Cash (checking and savings)		$19,369.02
		Certificates of Deposit and Money Market Accounts		
			A.G. Edwards, MM	$22,448.66
			A.G. Edwards, CD, 5/06, 5.75%	$25,000.00
			A.G. Edwards, CD, 6/06, 5.5%	$25,000.00
			Merrill Lynch, MM	$3,277.00
			Merrill Lynch, CD, 8/06/ 2.2%	$70,000.00
			Merrill Lynch CD, 8/08 4.17%	$30,000.00
			National City, CD, 10/06, 2.17%	$32,846.00
			Accrued Interest Receivable	$1,331.10
			Total	$209,902.76
		Total Assets		$229,271.78
LIABILITIES & EQUITY				
	Liabilities	Weed Contest		$26,181.16
	Equity			
		Fund Balance		$212,836.40
		Net Income		($9,745.78)
		Total Equity		$203,090.62
		Total Liabilities & Equity		$229,271.78

Finance Committee Report
January 23, 2006

1. The Finance Committee anticipates a balanced budget for 2005-06.

2. The Finance Committee recommends that the Membership Committee provide a strategy for increasing general membership and sustaining membership to the Board by the summer meeting. Areas of membership to explore include: a) agricultural chemical companies manufacturing predominantly generics; b) seed companies; c) equipment companies; and d) state weed science societies.

3. The Finance Committee recommends that the Board reevaluate the Director of Science Policy position yearly with regard to the ability to fund the position and continued support.

4. The Finance Committee recommends to the Board that a specific structure of membership and cost of single day attendance, such as attendance to a symposium, be worked out in a manner to enhance attendance. The Finance Committee will work with the Membership Committee to have a recommendation to the Board by the 2006 summer Board meeting.

5. The Finance Committee is concerned that the cost of “Weeds of the South” may drop fiscal reserves below a 2-year operating budget reserve, which is required by the MOP.

6. The Finance Committee recommends that the Board discuss the policy of travel reimbursement to summer Board meetings with regard to flexibility in transferring currently established travel reimbursement among board members.

Respectfully submitted:
David Monks

Committee: 102

Committee Name: Awards Committee (Standing)

Summary of Progress:
The annual call for nominations for awards was published in the summer newsletter. Dan Reynolds also sent a reminder via email to the membership as to the deadline for nominations.

Distinguished Service Award, Academia – Charles Bryson
Outstanding Young Weed Scientist, Academia – Todd Baughman
Outstanding Young Weed Scientist, Industry – John Altom
Weed Scientist of the Year –
Outstanding Educator Award – Don Murray
Outstanding Graduate Student Award, M.S. – Marcos J. Oliveira
Outstanding Graduate Student Award, Ph.D. – Christopher L. Main

Objective(s) for Next Year:
Maintain the awards program.

Recommendation or Request for Board Action:
All nomination packages should be forwarded to the business manager. Archive the award winners and retain the candidates not receiving the award in the active file system. This may help to prevent the loss of nominations from one year to the next.

Finances (in any) Requested: None

Respectively submitted:
John Harden, Awards Committee Chair
W. K. Vencill, Distinguished Service Award Chair
S. W. Murdock, Outstanding Young Weed Scientist Chair
L. Nelson, Weed Scientist of the Year Chair
T. F. Peeper, Outstanding Educator Award Chair
A. W. Ezell, Outstanding Graduate Student Award Chair

<u>Distinguished Service Award Subcommittee</u>

W. K. Vencill	C. Walls	K. Reddy
J. L. Yeiser	J. Norsworthy	S. Hand

<u>Outstanding Young Weed Scientist Subcommittee</u>

S. W. Murdock	H. Wilson	B. Brecke
L. Cargill	J. Zawierucha	F. Carey

<u>Weed Scientist of the Year Subcommittee</u>

L. Nelson	D. Miller	A. Rankins
J. Breen	R. Scott	T. Grey

<u>Outstanding Educator Award Subcommittee</u>

T. F. Peeper	R. Perkins	J. Sanders
J. Doran	G. Schwarzlose	D. Poston

<u>Outstanding Graduate Student Award Subcommittee</u>

A. W. Ezell	E. Scherder	C. Waltz
W. K. Vencill	C. H. Koger	J. Richburg

Committee: 113

Committee Name: Nominating Committee (standing)

Summary of Progress:
Members of the committee solicited nominations while the summer newsletter reminded the membership to provide nominations for the offices. Nominations were sought for the offices of Vice President, Member at Large – Academia, Member at Large – Industry, and Endowment Foundation Trustee. The Nomination Committee considered each nomination and ranked them by office. The top two ranked nominees for each office was placed upon the ballot. Ballots were mailed to the membership. The names appearing on the ballet for each office is listed below. The name of the candidate receiving the most votes is indicated with an asterisk.

Vice President:	Bob Nichols Ann Thurston*
Member at Large (Academia)	Andy Kendig* Jason Norsworthy
Member at Large (Industry)	Patrick Burch Brad Minton*
Endowment Fund Trustee	Mitch Blair Frank Carey*

Objective(s) for Next Year:
Select a new set of candidates to fill open positions

Recommendation or Request for Board Action:
Approve new officers.

Finances (in any) Requested:
None

Respectively submitted:

G. Schwarzlose	J. Ferrel	J. Wells
M.A. Thompson	J. E. Street	W. W. Witt
G. MacDonald	R. Strahan	L. E. Nelson
J. S. Harden, Chair		

Report to SWSS Board of Directors, January 22, 2006
Peter Dotray and Jim Barrentine

Council of Agricultural Science and Technology (CAST)

1. GENERAL COMMENTS:
CAST named Dr. John Bonner, formerly of Land O'Lakes Purina Feed, the new Executive Vice President. Bonner's nomination follows months of research, evaluation, and screening. The original 24 applicants for the position were narrowed down to 3, and these were invited to attend CAST's Spring Board meeting for further interviews with the Executive Committee, Staff, and full Board of Directors. Dr. Bonner is particularly suited for the responsibilities required of CAST's EVP. Not only does he have extensive experience in supervising and encouraging staff and coworkers, he also is proficient in both development and implementation of successful, profitable agricultural programs. In addition, he is adept at interacting with and motivating "people on the job" and as well as "people in the know," and altogether demonstrates broad, articulate leadership and initiative. Dr. Bonner and his wife Sandy reside in Vincent, Iowa. He officially began his duties as CAST's EVP based in the Ames Office on July 1, 2005 and may be reached at that time at 515-292-2125.

Other staff members to know:
Kathy S. Buhman, Office Manager
Linda M. Chimenti, Managing Scientific Editor
Donna M. Freeman, Membership & Marketing Director

CAST President:
Dr. Donald C. Beitz

2. WHAT IS CAST? WHAT DOES CAST DO? CAST MISSION STATEMENT
The Council of Agricultural Science and Technology (CAST) was founded in 1972 after a meeting of the U.S. National Research Council, National Academy of Sciences identified the need for better communication of the science behind the issues. CAST is an international consortium of 37 scientific societies, including WSSA, SWSS, WSWS, NCWSS, NEWSS, representing over 173,000 member scientists, 100 nonprofit organizations, 72 companies and cooperatives, and nearly 2,000 individual members.

CAST disseminates scientific facts and summarizes the latest scientific research for leaders in public policy, private citizens, and the media. Drawing upon its societies' membership of over 173,000 distinguished scientists, CAST's task forces address issues of national and global significance. CAST's authoritative publications are recognized internationally for their concise, impartial assessment of the most advanced science to date. CAST accomplishes its goals by providing publications for a wide readership as well as briefings and testimonies for leaders in Washington, D.C. CAST also coordinates national workshops for the public and the media. CAST is often asked to present the scientific perspective to the White House, U.S. Senate and House Agriculture Committees, USDA, FDA, and EPA.

<u>Mission statement:</u> CAST assembles, interprets, and communicates credible, science-based information regionally, nationally, and internationally to legislators, regulators, policymakers, the media, the private sector, and the public.

CAST is a nonprofit organization composed of scientific societies and many individual, student, company, nonprofit, and associate society members. CAST's Board of Directors is composed of representatives of the scientific societies and individual members, and an Executive Committee. CAST was established in 1972 as a result of a 1970 meeting sponsored by the National Academy of Sciences, National Research Council.

3. SWSS ROLE IN CAST:
Attend all Board of Directors' meetings of CAST and be prepared to "inform the CAST Board of significant SWSS activities that might have bearing on CAST activities". At my first CAST Board meeting in Albuquerque, NM (November 16-18, 2005), I was assigned to the Plant Protection Sciences workgroup and the Budget, Finance, and Investment Standing Committee.

4. MEMBERSHIP:
Membership continues to be a high priority for CAST. Membership has decreased substantially creating a significant decrease in revenue. The effort required to retain and to grow the membership has been affected by not having an EVP to contact the current members as well as new prospects. Dr. Dick Stuckey, former CAST EVP, has

been serving as a consultant and has made valuable contacts associated with membership. Are you a member? **Individual Members** receive issue papers, interpretive summaries, Friday Notes, and *NewsCAST*. They may order one free copy of each new report or special publication. The member pays shipping fees. ($60/calendar year) Become a member at http://www.cast-science.org/cast/src/cast_top.htm

5. PUBLICATIONS:
Worldwide Risks of Infectious Animal Diseases Examined in New CAST Issue Paper CAST has called on the expertise and experience of scientists and researchers on the front lines of fighting animal diseases to produce its newest Issue Paper, *Global Risks of Infectious Animal Diseases*. The paper discusses the severe economic, social, and political impacts of disease outbreaks and outlines national and international monitoring, surveillance, and response practices. (February 15, 2005) *News Release*

Agricultural Ethics Examined in New CAST Issue Paper A new Issue Paper, *Agricultural Ethics*, written and reviewed by a Task Force of seven leading experts in the field examines the nature of ethics as applied to agriculture. Among the topics discussed in relation to ethics are food safety and security, international trade, agricultural biotechnology, research, and public trust in science. (February 17, 2005) *(News release)*

CAST Commentary Addresses Crop Biotechnology and Future of Food Production. In response to recent concerns raised about the use of biotechnology in crop production and the resultant safety of the food supply, effect on the environment, and potential for further industrialization of agriculture at the expense of biodiversity, CAST has released a Commentary on the subject, *Crop Biotechnology and the Future of Food: A Scientific Assessment*. The purpose of the Commentary is to weigh hypothetical hazards voiced by activist critics against available scientific evidence and experience with transgenic crops and to provide the public and policymakers with valid information on which to base current and future decisions on the use of crop biotechnology in food production. (Read the *News Release*)(October 31, 2005)

CAST Releases Spanish Translation of Commentary on Crop Biotechnology and the Future of Food In an effort to expand its outreach to an international audience, CAST has arranged for the translation into Spanish of its most recent Commentary on crop biotechnology and the future of food. *La biotecnologia de los cultivos y el futuro de los alimentos: una contribucion cientifica* is now available free of charge to all readers. (December 7, 2005)

Forthcoming publications:

Acrylamide in Food (Issue Paper)

Animal Productivity and Genetic Diversity: Transgenic and Cloned Animals (Issue Paper)

Avian Influenza: Human Pandemic Concerns (CAST Commentary)

Avian Influenza: Trade Issues (CAST Commentary)

Biotechnological Approaches to Manure Nutrient Management (Issue Paper)

Fate and Transport of Zoonotic Bacterial, Viral, and Protozoan Pathogens during Swine Manure Storage, Treatment, and Land Application (Special Publication)

Implications of Total Maximum Daily Loads on Rural and Urban Land (Issue Paper)

Nondietary Exposure to Organophosphate and Carbamate Pesticides: Reporting and Estimation of Exposure and Risk (Special Publication)

Postcommercialization Gene Flow from Biotechnology-derived Crops: Policy and Research Considerations (Issue Paper)

Poultry Carcass Disposal Options (for Routine and Catastrophic Mortality) (Issue Paper)

Probiotics in Food: Their Potential to Impact Human Health (Issue Paper)

Role of Transgenic Animals in Development of New Medications (Issue Paper)

Ruminant Carcass Disposal Options (for Routine and Catastrophic Mortality) (Issue Paper)

Safety of Meat, Milk, and Eggs Produced from Animals Fed with Biotechnology-derived Crops (Issue Paper)

Swine Carcass Disposal Options (for Routine and Catastrophic Mortality) (Issue Paper)

Using Risk Analysis to Inform Microbial Food Safety Decisions (Issue Paper)

Vaccine Development Using Recombinant DNA Technology (Issue Paper)

Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes (Special Publication)

6. CHARLES A. BLACK AWARD:

Charles A. Black Award The Charles A. Black Award honors Dr. Black, the founder and long time Executive Vice President of CAST. The Charles A. Black Award is presented annually to an individual for outstanding achievement by an agricultural, environmental, or food scientist in contributing to the advancement of science in the public policy arena. Primary consideration is given to candidates who are actively engaged in research, and who have demonstrated excellence in communicating the importance of their scientific achievements to policy makers, the news media, and the public. Nominees may have demonstrated their ability to communicate either through written or spoken material, including the use of television, radio, and/or other media. Individuals from all nations are eligible to receive the award

This year's recipient was Dr. Norman E. Borlaug. The Award is presented annually by CAST to a food or agricultural scientist actively engaged in research, who has made significant scientific contributions to science, and who communicates the importance of food and agricultural science to the public, policymakers, and news media. Dr. Borlaug made an excellent presentation at the banquet even at 91 years of age. Focus of his presentation was on tillage systems, herbicide tolerant crops and wheat production.

7. ANNUAL REPORT:

CAST 2004 Annual Report Now Available. The *2004 Annual Report* has been published and is now available. Features include publication highlights, biotechnology communication activities, personnel notes, board meeting summaries, a message from the CAST president, a list of Sustaining Members for 2004, and financial statements. Printed copies of the Report are available upon request from the CAST office at cast@cast-science.org.

8. UPCOMING WORKSHOP:

The next CAST-sponsored workshop held January 23-25, 2006 will be on 'Water Quality & Quantity Issues for Turfgrasses in Urban Landscapes.' The 3-day workshop, to be held at the Las Vegas Renaissance Hotel, will provide a science-based summary of all aspects of turfgrass and water management in urban landscapes; review the current use of nonpotable water sources and their impact on turfgrasses and the environment; and identify best management strategies and technologies to enhance the environmental quality of urban turfgrass systems. Registration details are now available at *www.castwaterquality.info*. For further information now, contact project manager Dr. Jim Baker at jlbaker@iastate.edu or call the CAST Office at 515-292-2125.

9. NEXT CAST BOARD MEETING:

The spring Board of Directors meeting will be held April 19-21, 2006 at the Washington Plaza Hotel, 10 Thomas Circle, Washington D.C.

Committee Name: CONSTITUTION AND OPERATING PROCEDURES COMMITTEE (Standing)

Summary of Progress: At the annual meeting of the SWSS Executive Board in January and at the Summer Meeting in June 2005, suggestions for changes in the SWSS Operating Procedures were presented to the Executive Board. Following the annual meeting and again following the summer board meeting all approved revisions and all directives for changes by the Executive Board were made in the SWSS Manual of Operating Procedures (MOP). During April and again in November 2005, the revised edition of the MOP was submitted for distribution on the SWSS Web Site, http://www.swss.ws .

Objective(s) for Next Year: To continue with a timely revision of the SWSS Manual of Operating Procedures following the annual meeting and again following the Summer Meeting of the SWSS Executive Board and submitting the revised Procedures for distribution on the SWSS Web Site.

Finances Requested: None

Respectively submitted;
J. A. Dusky, R. M. Hayes, and G. D. Wills, Chairperson

Gene D. Wills
Research Professor
Delta Research and Extension Center
Stoneville MS 38776
662-686-3228

Committee: 111

Committee Name: Long Range Planning

Summary of Progress:
A document was sent to the Long Range Planning Committee, with a copy to the SWSS Board of Directors, in April 2005. Comments were received from Laura Whatley and Joe Street and I included my comments in developing the following document for the Board to consider.

1. **With regard to selecting members of the SWSS Board, who should be allowed to vote?**

The Long Range Planning committee (LRP) believes that all members of the Board should have voting privileges with the **exception** of Business Manager and Endowment Foundation representative. The Business Manager is a paid employee of SWSS and does not now have voting privileges and we do not see any need for change. There exists the possibility for a conflict of interest for the Endowment Foundation representative concerning matters between the two organizations (SWSS and Endowment Foundation). We do agree it is good for the Endowment Foundation to have a representative at the SWSS Board meetings.

2. **Should only industry personnel vote to select their Board members? Similar question could be asked about the Academia reps.**

The LRP strongly believes that all At-Large members of the Board (Industry and Academia) should be elected by the entire membership. We see no need for change.

3. **If SWSS is to pursue 'other groups' such as those interested in invasive weeds, should there be a representative on the Board from these groups and should they have voting privileges?**

The LRP believes that any 'new group' that want to join our Society, or if SWSS invites another group to join SWSS, then careful consideration should be given to make sure the 'new group' feels comfortable and a part of SWSS. This could be done in a variety of ways and we could follow the 'Forestry' model in which they help select the Forestry representative to the SWSS Board. Further, LRP suggests that possibly a 'new group' would join SWSS on a provisional basis for 2 or 3 years and during this provisional membership, the 'new group' would have a non-voting member on the Board. This would allow the 'new group' representative to see how SWSS conducts business and to determine if SWSS is sincere in its endeavor to include new groups into SWSS. This provisional membership has one very big advantage: SWSS needs to be sure that any 'new group' will fit into the Society and will be a part of the Society for a long time. SWSS needs to be sure that we do not invite a group to participate and then have the group leave in a few years because the 'new group' decides they do not fit with the goals and objectives of SWSS. Provisional membership should give both sides time to decide if the 'marriage' will work to the satisfaction of both groups.

Long term, the SWSS might have to alter its Board composition if several 'new groups' join SWSS. This committee makes no recommendation on this matter and should be left to future SWSS Boards or LRPs when and if this occurs.

4. **Should the Board have representation from other groups—corn, soybean, cotton, rice, turf, pasture, forestry, aquatic, right-of-way—with voting privileges?**

This would allow for a more inclusive Board composition and the Board may wish to pursue this approach. However, the LRP sees no need for this sort of representation on the Board. SWSS needs to be sensitive to the needs of its constituents but having representation from each group would lead to a very large Board. For the most part, each group had strong proponents on the Board in the past.

5. **Should the Board have representation from Extension, Research, Teaching, Consultants with voting privileges?**

The comments on 4 above apply equally to this question.

General comments:

Every organization needs to periodically review the workings of the organization and consider changes for improvement. Changes typically cause people to 'fret and worry', often needlessly. The way an organization addresses change will define that organization and SWSS has changed over the years to meet its needs. Following are two items that the LRP believes needs to be considered, one for obvious reasons and one for 'future' consideration depending on how successful SWSS is in expanding its membership.

New Group(s) joining SWSS. We need to be sensitive to the needs of an organization joining SWSS. Likely, this organization will have a slate of officers and will not want to lose all identity by being 'swallowed' by SWSS. The Board should think about how we would feel if the shoe were on the other foot! More reason for careful consideration of Provisional Membership.

Changing the name of SWSS. This issue will likely arise if SWSS is successful in getting other groups to join us. The LRP considers Southern Weed Science Society to be an inclusive term that covers all aspects of weed science activities. However, that may not be the case with other groups or individuals within the SWSS today, much less in the future. The LRP suggests that the Board be open-minded in this regard.

Reaching out to new groups. Chad Brommer in January 2006 sent a thoughtful document to President Shaw and he sent this to all SWSS members. The LRP believes that Chad had some interesting comments and we encourage the Board to consider his opinions, as well as those of members that may have commented on this issue.

The LRP welcomes suggestions from the Board that we can address.

Objective(s) for Next Year:
Consider issues brought by the Board

Recommendation or Request for Board Action: Accept report

Finances (in any) Requested:
None, unless the Board asks for a project that would require funds

Respectively submitted:
John Harden
Jerry Wells
Joe Street
Laura Whatley
William Witt, Chair

Committee Number and Name: 124 Weed Identification Committee (Standing)

Committee Chair: C. T. Bryson

Chair Phone: 662-686-5259

Chair e-mail: cbryson@ars.usda.gov

Committee Members and Terms of Service:

M. Blair	**2006**	**J. Boyd**	**2007**	**C. T. Bryson**	**2008***
T. M. Webster	**2006**	**S. Askew**	**2007**	**C. H. Koger**	**2008**
M. DeFelice	**2006**	**V. Maddox**	**2007**		

Recommendations for Board Action:

None

Finances Requested:

None

Summary of Progress:

Photos of additional weeds were taken by Arlyn Evans and write ups are being prepared for the next version of the SWSS Weed Encyclopedia of Weeds DVD-ROM. Photo files are being updated to in preparation for the next version of the DVD. A list of weeds to be included in the SWSS Weed Encyclopedia of Weeds Identification Book was developed in September 2005 and editing weed write-ups was initiated.

Action Plan for 2005:

1. Continue writing the SWSS Weed Encyclopedia of Weeds Identification Book. Estimated time to complete book layout for publication is fall 2007.

2. Continue photographing and writing descriptions for new weed species for both the book and the next version of the DVD-ROM. Estimated time to complete Version 4 of the Weed ID DVD is summer of 2007.

Newsletter Editor’s Report

January 22, 2006

Subject: Restrictions on digital images and photographs accepted for publication in the SWSS Newsletter
Rationale: The resolution of some of the digital images and photographs submitted for publication has been low, which directly impacts the quality of the image when is published in the newsletter.
Editors Proposed
Recommendations:
1. Digital photographs and images will only be accepted if the resolution is at least 300 dpi (dots per inch).
2. Digital photographs and images will only be accepted if the resolution is at least 150 dpi; however, 300 dpi is preferred.
Action from
SWSS Board:
The newsletter editor respectfully ask the board to support proposal recommendation one (Digital photographs and images will only be accepted if the resolution is at least 300 dpi).
Expected
Outcome:
The editor believes that adoption and implementation of proposal one will greatly improve the quality of the SWSS newsletter.
Respectfully

Al Rankins, Jr., Editor

Committee: 100a

Committee Name: Editor's Report

Summary of Progress:

The 2005 Proceedings contained 430 pages, which is down from 617 in 2004 and 573 in 2003, but up from 408 and 396 pages in the 2002 and 2001 Proceedings, respectively. This decrease in number of pages was the result of a change in font size (from 12 to 10 point) and a fairly significant number of symposia speakers who did not submit an abstract or paper. There were 322 presentations in 2004, compared to 285, 291, and 295 at the 2003, 2002, and 2001 meetings, respectively. The 2005 Proceedings were the third Proceedings that were available in CD form only. The 2005 Proceedings contained all executive board minutes, committee reports, business manager's report, award winners, and research reports that were submitted as well as abstracts and full papers. The abstracts and full papers are available via the web from the SWSS home page (www.swss.ws). Following is the distribution of number of presentations and number of pages.

Section	Number of Pages
Minutes of Executive Board, Committee Reports, etc	67
Weed Management – Agronomic Crops	82
Symposia – Weed Management - Cotton	5
Symposia – Weed Management - Peanut	8
Symposia – Weed Management in Reduced Tillage	6
Weed Management - Turfgrass	23
Symposia – Use & Impact of Transgenic Turfgrass Species	2
Symposia – Weed Control Options During Establishment	2
Weed Management – Pastures & Rangelands	9
Symposia – Problem Weeds in Pastures & Rangelands	3
Weed Management - Horticulture	11
Symposia – Components & Complete System Alternatives to Methyl Bromide	4
Symposia – New & Potential Herbicides for Vegetables	3
Vegetation Management - Forestry	2
Symposia – Forestry in the New Millennium	21
Vegetation Management – Rights-of-Ways	3
Symposia – Weed Management in Rights-of-Ways	3
Physiological & Biological Aspects of Weed Control	23
Symposia – Glyphosate-Resistant Horseweed	6
Symposia – Managing Weed Resistance to Herbicides	6
Invasive Species	7
Symposia – Invasive Species Management	4
New Technologies	5
Symposia – New Developments from Industry	12
Soil & Environmental Aspects of Weed Control	5
Symposia – Emerging Issues in Environmental Aspects of Weed Science	3
Symposia – Regulatory Fundamentals Workshop	3
Weed Survey (Most Common & Most Troublesome)	15
State Weed Control Publications - 2005	19
Herbicide Names (common, chemical, and trade)	5
Registrants of 2005 Annual Meeting	28
Sustaining Members for 2005	2

Objective(s) for Next Year:
To get the final copy of the Proceedings to membership earlier and to find ways to streamline the process as much as possible.

Recommendation or Request for Board Action:
None.

Finances (in any) Requested:
$500 for secretarial assistance.

Respectively submitted;

William K. Vencill, Editor

Committee Number 114: Committee Name: Program (Standing)

Summary of Program:

The theme for the 59th Southern Weed Science Society annual meeting held in San Antonio was "SWSS – Vision for the Future'. During a noon Awards Luncheon/General Session, Dr. Ed Smith, Director and Associate Vice Chancellor, Texas Cooperative Extension, Texas A&M University welcomed the membership to San Antonio and the State of Texas. Mr. Sano Shimoda, President, BioScience Securities, Inc. addressed the group during the luncheon speaking to the topic: 'On the Edge – Mindset, Matter, and Weed Control? The Challenge – "Transformation" or "Change'. A special Thank You to Bayer CropScience, DuPont Ag Products, Monsanto Company, and Syngenta Crop Protection, Inc. for sponsoring the luncheon.

The 2006 program consisted of 123 poster and 166 oral presentations. Graduate Student competition consisted of 14 poster and 28 oral presentations. Several symposia were held during the annual meting. Symposia included:

- Weed Management in Turf with Sulfonylurea Herbicides,
- Invasive Grasses and Sedges: Deep-rooted Issues
- Herbicides: Not what your father used, or are they?
- Grassy Weed Control in Pastures
- Issues Associated with Formal Instruction,
- Regulatory Aspects Workshop
- Herbicides in Intensive Forest Management Systems

The Graduate Student symposium featured an investment analyst from Smith Barney, Dr. Lee Van Wychen, Director of Science Policy, and Texas Senator Craig Estes. The Industry Section was presented in a new format – 5 minute updates from seeds and chemical industry reps in contrast to the 15 minute traditional product updates.

A special feature of the 2006 was a Memorabilia Room which was the brain child of Drs.: Ken Smith and Bob Scott. Donations were submitted to the Endowment Foundation. A reception for the Memorabilia Room was sponsored by BASF Corporation. Thanks for the support!

No actions from the Board are required.

No funding requested.

Respectfully submitted:

Shawn Askew, Todd, Baughman, Michael Blazier, Twain Butler, Nilda Burgos, Peter Dotray, Luke Etheridge, April Fletcher, James Holloway, David Jordan, Scott, McElroy, Doug Montgomery, Jason Norsworthy, Jerry Wells, Jackie Driver (Program Chair)

Weed Management In Agronomic Crops

Weed Management In Turf Grass

Weed Management - Horticultural Crops

Forest Vegetation Management

Weed Management - Utility, Railroads, Rights-Of-Ways

Physiological And Biological Aspects

Educational & Regulatory Aspects

Invasive Species

Industry Updates

Soil & Environmental Aspects

Symposia - Herbicides: Not What Your Father Used, Or Are They?

Symposia - Weed Management In Turf With Sulfonylurea Herbicides

Symposia - Grassy Weed Control In Pastures

Symposia - Herbicides In Intensive Forest Management Systems: Efficacy, Cost-Effectiveness, And Ecological Impacts

Symposia - Issues Associated With Formal Instruction Of Weed Science

Symposia - Invasive Grasses And Sedges: Deep-Rooted Issues

Symposia - Regulatory Aspects Workshop

SOUTHERN WEED SCIENCE SOCIETY

Directory of Officers
Executive Board Members
Committees and Committee Members
2005-2006

Note: Duties of each committee are detailed in the Manual of Operating Procedures, which is posted on the SWSS web site at http://www.swss.ws

Future Meeting Site

Omni Hotel
San Antonio, TX
January 23-25, 2006

100. SOUTHERN WEED SCIENCE SOCIETY OFFICERS AND EXECUTIVE BOARD

100a. OFFICERS

President – D.R. Shaw - 2006
President-Elect – J.L. Driver – 2006
Vice-President –D.W. Monks 2006
Secretary-Treasurer – A.C. York - 2008
Editor – W.K. Vencill - 2008
Immediate Past President – J.S. Harden - 2006

100b. ADDITIONAL EXECUTIVE BOARD MEMBERS

Member-at-Large – S.A. Senseman - 2006
Member-at-Large – W.F. Strachan - 2006
Member-at-Large – J.D. Byrd - 2007
Member-at-Large – S.K. Rick - 2007
Representative to WSSA – D.L. Jordan - 2008
Representative to CAST – P.A. Dotray - 2008

100c. EX-OFFICIO BOARD MEMBERS

Constitution and Operating Proc. – G.D. Wills - 2006
Business Manager – R.A. Schmidt
Forestry Representative – L.R. Nelson - 2007
Student Representative – L. Etheridge - 2006
Web Master – D.B. Reynolds

101. SWSS ENDOWMENT FOUNDATION

101a. BOARD OF TRUSTEES - ELECTED

E.P. Prostko – President - 2007
R.L. Ratliff – Vice President - 2008
A.C. York – Secretary - 2009
R.M. Hayes – Past President - 2006
G.N. Rhodes - 2010

101b. BOARD OF TRUSTEES – EX-OFFICIO

A.C. York (SWSS Secretary-Treasurer)
D.W. Monks (SWSS Finance Committee Chair)
R.A. Schmidt (SWSS Business Manager)
G.D. Wills (SWSS Constitution & Operating Proc. Committee Chair)
S. Lancaster (Student Representative)

102. AWARDS COMMITTEE PARENT (STANDING) – *The Parent Awards Committee shall consist of the immediate Past President as Chairperson and each Chair of the Award Subcommittees.*

J.S. Harden*	2006	W.K. Vencill	2006
S.W. Murdock	2006	L.R. Nelson	2006
T.F. Peeper	2006	A.W. Ezell	2006

The Awards Subcommittees shall consist of six members including the Chair, serving staggered three year terms with two rotating off each year.

102a. Distinguished Service Award Subcommittee

J.L. Yeiser	2006	C. Walls	2007	K. Reddy	2008
W.K. Vencill	2006*	J. Norsworthy	2007	S. Hand	2008

102b. Outstanding Young Weed Scientist Award Subcommittee

S.W. Murdock	2006*	H. Wilson	2007	B. Brecke	2008
L. Cargill	2006	J. Zawierucha	2007	F. Carey	2008

102c. Weed Scientist of the Year Award Subcommittee

J. Breen	2006	D. Miller	2007	A. Rankins	2008
L. Nelson	2006*	R. Scott	2007	T. Grey	2008

102d. Outstanding Educator Award Subcommittee

J. Doran	2006	R. Perkins	2007	J. Sanders	2008
T.F. Peeper*	2006	G. Schwarzlose	2007	D. Poston	2008

102e. Outstanding Graduate Student Award Subcommittee

W.K Vencill	2006	E. Scherder	2007	C. Waltz	2008
A.W. Ezell	2006*	C.H. Koger	2007	J. Richburg	2008

103. COMPUTER APPLICATION COMMITTEE (STANDING)

W.K. Vencill	2006	T. Gray	2007	R. Batts	2008
L. Steckel	2006	A. Kendig	2007*	C. Craig	2008
D.B. Reynolds (Ex-officio)		J. Boyd	2007	S. Senseman	2008

J. Prince (Student Representative)

104. CONSTITUTION AND OPERATING PROCEDURES COMMITTEE (STANDING)

G.D. Wills*	2006	J.A. Dusky	2006	R.M. Hayes	2006

*Chair
**Vice-Chair

105. FINANCE COMMITTEE (STANDING) – *Shall consist of the Vice President as Chairperson and President-Elect, Secretary-Treasurer, Chairperson of the Sustaining Membership Committee, and others if the President so chooses, with the Editor serving as ex-officio member.*

D. Monks	2006	J. Driver	2006	J. Zawierucha	2007
A. York	2008	F. Carey	2007	M. Shankle	2007
W. Vencill (Ex-Off)	2008				

106. GRADUATE STUDENT ORGANIZATION

President	L. Etheridge
Vice President	D. Dodds
Secretary	W. Givens

107. HERBICIDE RESISTANT WEEDS COMMITTEE (STANDING)

R.L. Nichols *	A. Bailey	N. Burgos	F. Carey
J.M. Chandler	J. Collins	L. Glasgow	J.D. Green
J.L. Griffin	J.B. Guice	R.M. Hayes	I. Heap
D.C. Heering	J.A. Kendig	V.B. Langston	G.E. MacDonald
C.R. Medlin	D. B. Reynolds	D. Sanders	D. Poston
R.E. Talbert	W.K. Vencill	G. Wehtje	J.W. Wells
J.W. Wilcut	H.P. Wilson	W.W. Witt	A.C. York

108. HISTORICAL COMMITTEE (STANDING)

N. Buehring	2006	L.R. Oliver	2007	M. Chandler	2008
J.L. Griffin	2006*	G.D. Wills	2007	R. Hayes	2008

109. LEGISLATIVE AND REGULATORY COMMITTEE (STANDING)

D. Shilling*	2006	G. Ferguson	2007	J. Wells	2008
G. MacDonald	2006	B. Stall	2007	R.L. Nichols	2008
J. L. Ralston	2006				

110. LOCAL ARRANGEMENTS COMMITTEE – 2005 (STANDING)

Chair – P. Baumann
Audio Visual – T. Baughman
Registration – B. Bean
Meal Functions – P. Nester
Room Setup – A. Klosterboer
Spouses Program – A. Wiese
Signs & Exhibits – G. Morgan
Graduate Students & Rooms – P. Dotray
Public Relations – M. Dozier
Placement – W. Keeling
Information Booth – G. Schwarzlose
Equipment & Security – J. Grichar

111. <u>LONG RANGE PLANNING COMMITTEE (STANDING)</u> - *Shall consist of the previous five presidents with the Chair appointed to a three year term.*

L.L. Whatley	2006	J.E. Street	2007	J.W. Wells	2008
W.W. Witt	2009*	J.S. Harden	2010		

112. <u>MEETING SITE SELECTION COMMITTEE (STANDING)</u> - *Shall consist of six members and the business manager. The members will be appointed by the President on a rotating basis of one each year and shall serve six-year terms. The Chairperson will rotate to the senior member within the geographical area for the meeting being considered.*

J.D. Byrd	2006*	T. Grey	2007	L.R. Oliver	2008
J.D. Green	2006	B. Brecke	2007	A. Klosterboer	2008
R. A. Schmidt (Ex-Off)					

113. <u>NOMINATING COMMITTEE (STANDING)</u> – *Be composed of the Past President as Chairperson in addition to nine individuals each chosen to represent one of the three different geographic areas and different disciplines of the Society. The members will serve staggered 3-year terms with 3 new members going on each year.*

G. Schwarzlose	2006	J. Ferrel	2007	J. Wells	2008
M.A. Thompson	2006	J.E. Street	2007	W.W. Witt	2008
G. MacDonald	2006	R. Strahan	2007	L.E. Nelson	2008
J.S. Harden	2006*				

114. <u>PLACEMENT COMMITTEE (STANDING)</u>

C. Brommer	2006	M. Shankle	2007	S. Kelly	2008
D. Dodds	2006	J. Ellis	2007*	C. Main	2008
N. Goldschmidt (Student Representative)					

115. <u>PROGRAM COMMITTEE – 2006 (STANDING)</u> - *Shall consist of the President-Elect as Chairperson and the Program Section Chairpersons as the remaining members.*

Chairperson .... J. Driver
Agronomic Crops .... J. Holloway
Turf .... S. Elroy
Horticultural Crops .... P. Porpigilia
Forest Vegetation Management .... M. Blazer
Ecological, Physiological and Biological Aspects .... S. Askew
Soil and Environmental Aspects .... N. Burgos
Posters .... P. Dotray
Pasture and Rangeland .... T. Butler
Regulatory .... J. Wells
Educations Aspects of Weed Control .... D. Jordan
Application of Herbicides .... T. Baughman
Utility, Railroad & Highway Rights of Way, Industrial Sites .... D. Montgomery

116. PROGRAM COMMITTEE—2007 (STANDING)

Chairperson ....D. Monks

117. PUBLIC RELATIONS COMMITTEE (STANDING)

C.H. Koger*	2006	T. Adcock	2007	M. Dozier	2008
L. Nelson	2006	S. Garris	2007	S. Kelly	2008

118. RESEARCH COMMITTEE (STANDING) - *Shall consist of the Vice President as Chairperson and the remaining members as Section Chairpersons for the following sections: (1) Chemical and Physical Properties of New Herbicides, (2) Extension Publications (3) Economic Losses Due to Weeds, and (4) Weed Survey - Southern States. Section Chairpersons shall be appointed by the Chairperson for a period of 3 years.*

D. Monks*		2006
E. P. Webster	Economic Losses Due to Weeds	2008
J. D. Byrd	State Extension Weed Control Publications	2008
T. M. Webster	Weed Survey - Southern State	2008
K. Reddy	Chemical & Physical Properties of New Herbicides	2008

119. RESOLUTIONS AND NECROLOGY COMMITTEE (STANDING)

T. Willian	2006	J. Reed	2007
C. Main	2006	D. Robinson	2007

120. SALES COORDINATION COMMITTEE (STANDING)

M. DeFelice*	2006	S. Murdock	2007	J. Yeiser	2008
J. Miller	2006	A. Rhodes	2007	J. Bean	2008

121. SOUTHERN WEED CONTEST COMMITTEE (STANDING)

S.D. Askew	C.T. Bryson	N. Burgos	C.B. Corkern
P.A. Dotray	J.W. Everest	J.L. Griffin	E.S. Hagood
R.M. Hayes	J.A. Kendig	R.T. Kincade	C.H. Koger*
V.B. Langston	G. MacDonald	C.R. Medlin	D.W. Monks
T.C. Mueller	L.R. Oliver	M.G. Patterson	A. Rankins
D.B. Reynolds	S.A. Senseman	D.G. Shilling	W.K. Vencill
E. P. Webster	T. Whitwell	W.W. Witt	

S. Malik (Student Representative)

122. STUDENT PROGRAM COMMITTEE (STANDING)

C. Tingle	2006*	(Student Representative)			
S. Murdock	2006	J.B. Guice	2007	M. Burton	2008
T. Peeper	2006	L. Steckel	2007	N. Buehring	2008
T. Grey	2006	F. Carey	2007	D. Jordan	2008
D. Gealy	2006	W. Faircloth	2007**	B. Unruh	2008

W. Barker (Student Representative)

123. SUSTAINING MEMBERSHIP COMMITTEE (STANDING)

M. Nespeca	2006	E. Scherder	2007	J. Richburg	2008
J. Ralston	2006	K.L. Smith*	2007	W.C. Johnson	2008

124. WEED IDENTIFICATION COMMITTEE (STANDING)

M. Blair	2006	J. Boyd	2007	C.T. Bryson	2008*
T. Webster	2006	S. Askew	2007	C.H. Koger	2008
M. DeFelice	2006	V. Maddox	2007		

125. CONTINUING EDUCATION UNITS COMMITTEE (SPECIAL)

B. Rogers*	D.E. Dippel	R. Rivera	S. Snodgrass

126. MEMBERSHIP COMMITTEE (SPECIAL)

J.D. Byrd	W.N. Kline	T.R. Murphy	G. Stapleton
R.B. Cooper	M. Locke	T.F. Peeper	A. Fletcher
J.H. Miller	S.A. Senseman	J.W. Wilcut*	S. Culpepper

SWSS Committee Members 2005-2006

TOLERANCE OF ROUNDUP READY FLEX TO VARIOUS GLYPHOSATE FORMULATIONS. J.A. Huff, D.B. Reynolds, D.M. Dodds, M.T. Kirkpatrick, J.T. Irby, J.A. Mills. Mississippi State University, Mississippi State, MS, Monsanto, Collierville, TN

ABSTRACT

In 2005, 1.2 million acres of cotton were planted in Mississippi, approximately 82% of which were herbicide resistant or stacked gene varieties. Since the introduction of Roundup Ready cotton in 1997, cotton farming has seen a drastic shift toward glyphosate-resistant varieties. The current Roundup (glyphosate) label on Roundup Ready cotton varieties allows for over-the-top applications up to the fifth true leaf. Applications of glyphosate inconsistent with label directions have led to square and boll abscission and subsequent yield loss. Current Roundup Ready technologies lack reproductive tolerance to glyphosate when applied beyond the fifth true leaf. Roundup Ready Flex cotton, which will be marketed in March 2006, has been developed to provide both vegetative and reproductive tolerance to glyphosate allowing applications to be made up to seven days before harvest without affecting yield. However, recent research on the new Roundup Ready Flex cotton has shown leaf injury symptoms when sprayed with various glyphosate formulations beyond the fifth true leaf. Due to these observations, Monsanto is developing new formulations that will prevent formation of these symptoms.

The objective of this research was to determine the effect of new formulations of glyphosate on cotton leaf injury and subsequent yield loss to Roundup Ready Flex cotton. Studies were conducted at the Black Belt Research Station in Brooksville, Mississippi. Roundup Ready Flex variety MON 171 ERR was planted in four row plots, 3.86 m wide by 12.19 m long on 96.52 cm rows. Roundup formulations MON 3539 and Roundup Weathermax were sprayed at rates of 0.84, 1.26, 1.68, and 2.52 kg ae/ha. Roundup formulations MON 79845 and MON 79883 were sprayed at rates of 0.84 and 1.68 lb ae/a with an untreated check plot included for comparison. Each formulation was applied at the 1 to 3 leaf stage with a tractor mounted sprayer, at the 6 to 8 leaf stage with a CO_2 pressurized backpack, and at the 14 to 16 leaf stage with a tractor mounted layby rig. All applications were applied in a spray delivery volume of 140.31 l/ha. Visual assessments of crop injury were recorded 7, 14, and 28 days after treatment. Plots were then harvested to determine the effect of glyphosate formulations on seed cotton yield. Data were analyzed using Fisher's protected LSD at the 0.05 level. Preliminary results indicate there were no visual cotton symptoms regardless of formulation or rate of application. There was also no effect on seed cotton yield due to glyphosate formulation or rate of application.

MANAGEMENT SYSTEMS FOR IVYLEAF MORNINGGLORY (*IPOMOEA HEDERACEA*) IN ROUNDUP READY FLEX COTTON. M.A. Batla; Texas Tech University and Texas Agricultural Experiment Station, Lubbock, TX; J.W. Keeling; Texas Agricultural Experiment Station, Lubbock, TX; P.A. Dotray; Texas Tech University and Texas Agricultural Experiment Station, Lubbock, TX; J.D. Everitt; Texas Agricultural Experiment Station, Lubbock, TX.

ABSTRACT

Ivyleaf morningglory (*Ipomoea hederacea*) is a difficult weed to control in cotton. Although not a widespread problem across the Texas High Plains, an increasing number of fields are infested each year. Control of ivyleaf morningglory has been inconsistent with both Staple applied preemergence (PRE) and postemergence (POST) and glyphosate applied POST and postemergence-directed (PDIR) due to weed size, semi-arid conditions, and repeated weed flushes during the growing season. The development of Roundup Ready Flex cotton will permit higher glyphosate rates and POST applications throughout the season.

A study was conducted at the Texas Agricultural Experiment Station near Lubbock to evaluate glyphosate at different rates in Roundup Ready Flex cotton for ivyleaf morningglory control. Glyphosate was also evaluated in combination with PRE and POST residual herbicides as well as in systems that included cultivation. Ivyleaf Morningglory control inputs included all combinations of Caparol PRE, Roundup WeatherMax (RUWM) POST or PDIR, Staple early POST, and cultivation. Three POST and one PDIR Roundup WeatherMax application were made at two rates (0.75 and 1.12 lb ae/A) as needed alone or in combination with three in-season cultivations. All treatments were compared with or without Caparol PRE at 1.2 lb ai/A or Staple early POST at 0.032 lb ai/A. Treatments were arranged in a randomized block design with three replications. Plots were 4 rows by 25 feet long. A Roundup Ready Flex cotton variety was planted on May 18 and mechanically harvested on October 15. All applications were made with a carrier volume of 10 GPA. Visual weed control was evaluated prior to and 14 days after each Roundup WeatherMax application. Means were separated using Fisher's protected LSD at the 5% level of probability.

Season-long ivyleaf morningglory control increased with Roundup WeatherMax at 1.12 lb ae/A compared to the lower rate (0.75 lb ae/A). The higher rate of Roundup WeatherMax controlled ivyleaf morningglory 90% when used alone and up to 98% when used in combination with Caparol and cultivation. The lower rate of Roundup WeatherMax controlled ivyleaf morningglory 70% when applied alone, while control increased to 86% when used in combination with Caparol and cultivation. Staple plus Roundup WeatherMax POST did not improve control when used with the high rate of Roundup WeatherMax, but control did improve when applied with the lower rate of Roundup WeatherMax compared to the lower rate of Roundup WeatherMax applied alone. Lint yield ranged from 736 to 945 lbs/A and did not always correlate to the morningglory control achieved. However, there was a trend towards increased yield with increased weed control.

RESPONSE OF RED MORNINGGLORY (*IPOMOEA COCCINEA* L.) TO SHADE AND SOIL APPLIED HERBICIDES. C.A. Jones, J.L. Griffin, L.M. Etheredge, Jr., and W.E. Judice. Louisiana State University AgCenter, Baton Rouge, LA 70803.

ABSTRACT

Research was conducted over three years in the field to evaluate red morningglory emergence and growth in response to shade. Treatments included 0, 30, 50, 70, or 90% shade. The experimental design was a randomized complete block with four replications. Shade levels were established using 0.6 m by 0.6 m by 0.6 m structures covered with shade cloth. Weed emergence, plant height, and leaf and stem dry weight data were collected 20 to 41 days after soil was tilled to a four-inch depth and shade enclosures were installed. At the time of data collection red morningglory in the no shade (full sun) treatment had three to six leaves. Data were expressed as percent of the full sun treatment. Emergence of red morningglory decreased 5 and 8% for the 30 and 50% shade treatments, respectively, compared with full sun. Increasing shade to 70 and 90% decreased weed emergence 37 and 43%, respectively. Shade did not affect height of red morningglory. Leaf weight per plant was reduced when compared with full sunlight only for the 90% shade treatment (48% reduction). Stem weight of red morningglory was reduced for both the 70 and 90% shade treatments (31 and 50% reduction, respectively).

A study also was conducted to determine seasonal changes in light penetration into the sugarcane canopy and to use these findings to help predict red morningglory emergence in the crop. An AccuPAR Linear Par Ceptometer was used to measure photosynthetic active radiation (PAR) at ground level in four sugarcane varieties: LCP 85-384, L 97-128, HoCP 96-540, and Ho 95-988. Sugarcane varieties did not differ in regard to PAR that penetrated the crop canopy at ground level for any of the sampling dates. On June 13, PAR was 36 to 68% and increased to 73 to 85% on July 6. On July 21, PAR at ground level was 88 to 94%. Using the red morningglory shade data it would be expected that plants would be able to emerge and grow into late July underneath a sugarcane canopy. Results also suggest that soil applied herbicide with long residual activity would be needed to provide season long red morningglory control.

Residual control of red morningglory with soil-applied herbicides was evaluated over two years. The experimental design was a randomized complete block with four replications, and plot size was 3 m by 6 m. Herbicide treatments were applied on June 10, 2004 and May 25, 2005 using a tractor-mounted, compressed air sprayer calibrated to deliver 179 L/ha. Red morningglory control data were collected 5, 7, 9, and 11 weeks after treatment (WAT). To allow for evaluation of residual activity of the herbicides, glufosinate was applied at 0.37 kg ai/ha after each rating to eliminate weed competition as a variable. Red morningglory control 5 WAT was at least 90% with sulfentrazone at 0.21, 0.26, 0.31, 0.37, and 0.42 kg ai/ha; atrazine at 3.36 and 4.48 kg ai/ha; diuron plus hexazinone at 1.57 plus 0.44 and 2.1 plus 0.59 kg ai/ha; metribuzin at 2.52 kg ai/ha; and flumioxazin at 0.14, 0.21, and 0.28 kg ai/ha. By 7 WAT sulfentrazone at 0.21 to 0.42 kg/ha controlled red morningglory at least 93% and no other treatment provided more than 80% control. By 9 WAT sulfentrazone at 0.21 kg/ha and higher controlled red morningglory at least 83%, and the low rate of sulfentrazone (0.16 kg/ha) and the highest rates of diuron plus hexazinone and flumioxazin were the only other treatments controlling red morningglory at least 61%. Red morningglory control was still around 80% 11 WAT when sulfentrazone was applied at 0.21 kg/ha and higher.

Results clearly show that reported red morningglory control failures in sugarcane are related to the shade tolerance of red morningglory and the lack of long-term residual control with some soil applied herbicides. Findings show that red morningglory can emerge and grow well under the sugarcane canopy into late July. To maximize the effectiveness of soil applied herbicides, the layby application should be delayed until late June or early July to assure that sufficient herbicide is present in soil when germination of red morningglory seed can be expected. Of the herbicides evaluated, sulfentrazone was most effective and at 0.21 kg/ha provided around 90% control 7 WAT and around 80% control 11 WAT.

SITE-SPECIFIC WEED MANAGEMENT USING HADSS^{TM}. A.J. Ford and P.A. Dotray; Texas Tech University and Texas Agricultural Experiment Station, Lubbock, TX; J.W. Keeling and L.V. Gilbert; Texas Agricultural Experiment Station, Lubbock, TX; J.B. Wilkerson; University of Tennessee Agricultural Experiment Station, Knoxville, TN

ABSTRACT

Commercial sprayers apply herbicides uniformly across the entire field even though there is extensive documentation that indicates weeds are patchy in distribution and are typically found on less than 40% of the area. This patchy distribution is ideal for real-time, site-specific weed management. A light-activated weed sprayer was linked to a data logger and global positioning system to simultaneously treat and map weeds discretely in real time. The use of a DSS (decision support system) was used to optimize and/or reinforce weed management input selections. By increasing site-specific weed management, effective weed control may be achieved and herbicide use may be reduced at the same time.

Field experiments were established in 2005 at the Texas Agricultural Experiment Station near Halfway to 1) evaluate weed management systems and herbicide usage in different variable application systems compared to a conventional broadcast application system, 2) modify the Herbicide Application Decision Support System (HADSS^{TM}), for implementation in site-specific weed management systems on the Texas Southern High Plains, and 3) develop useful weed biology and management information.

A tractor-mounted compressed-air sprayer with a 4-row boom, a 4-row shielded sprayer, and a 4-row light-activated hooded sprayer were used to apply the herbicide based upon treatment and crop stage. All applications were made using a sprayer volume of 10 GPA. WebHADSS^{TM} was used to determine a portion of the treatments based on herbicide efficacy and economics. No residual herbicides were used in the first year of this three-year study. However, future herbicide inputs will contain the use of residual herbicides. The light-activated sprayer was modified to spray weeds within the crop row if weeds were detected in the row middles. Roundup Weathermax was applied at 0.75 lb ae/A in all treatments for the cotton (*Gossypium hirsutum*). In the peanut (*Arachis hypogaea*) test, 2,4-DB + Gramoxone Max (0.4 + 0.25 lb ai/A) were selected for the first two applications, and Cobra (0.2 lb ai/A) and Ultra Blazer (0.25 lb ai/A) were selected at the third and fourth application timings, respectively. Treatments included commercial broadcast, variable spray under the hood/continuous over the row (VH/CR), variable under the hood/variable over the row (VH/VR), and a weed-free and weedy control. VH/CR and VH/VR were compared to the broadcast application to determine percent weed control and herbicide savings. A weed map was created after in-season applications and aerial IR (infra-red) photos were taken during the growing season. Means were separated using Fisher's protected LSD (P=.05).

Broadcast Roundup Weathermax applications in cotton controlled Palmer amaranth (*Amaranthus palmeri*), silverleaf nightshade (*Solanum elaeagnifolium*), and yellow nutsedge (*Cyperus esculentus*) at 75 to 98% throughout the season. In the variable applications (VH/CR and VH/VR), control ranged from 24 to 90% for those same weeds. The broadcast applications in peanut controlled Palmer amaranth, silverleaf nightshade, devil's-claw (*Proboscidea louisianica*), and Texas blueweed (*Helianthus ciliaris*) from 35 to 100%. Control of those same weeds in both variable applications ranged from 6 to 68%. The VH/CR applications controlled weeds more effectively than the VH/VR applications throughout the season. However, neither variable application obtained the same level of control as the broadcast application. In both crops, the VH/VR application used approximately 58% less herbicide and the VH/CR application used 41% less herbicide relative to the conventional broadcast application. In general, the level of weed control decreased as herbicide savings increased.

UTILIZATION OF REMOTE SENSING TOOLS FOR ROUNDUP® DRIFT DETECTION IN NON-ROUNDUP READY® CORN. J.T. Irby, D.B. Reynolds, M.T. Kirkpatrick, J.A. Huff, and D.M. Dodds, Mississippi State University, Mississippi State, MS.

ABSTRACT

With the increased use of glyphosate on transgenic crop varieties, incidences of off-target deposition to sensitive crops has increased dramatically. When glyphosate resistant crops are planted within short distances of non-glyphosate resistant crops, there is an increased likelihood of having crop injury due to glyphosate spray drift. Injury from these events may vary from minimal visual injury to severe losses in crop yield. Assessment of these events is difficult to achieve due to the large areas that may be affected and the spatial variability that may be present. The increased availability of remotely sensed data which may account for this spatial variability could result in more accurate assessment of off-target deposition and may allow a better method to predict the effects on crop yield.

Experiments were conducted at the Black Belt Branch Experiment Station in Brooksville, MS to evaluate the use of remotely sensed data to assess glyphosate drift to corn. Dekalb 69-71 seed corn was planted in 2 field sections of 6 hectares and 2 hectares. Seed was planted at a rate of 79,000 seeds per hectare. Each field contained sampling points that were laid out using a GPS (Global Positioning System). There were 6 glyphosate drift simulation treatments consisting of an untreated check in addition to rates applied at 0.027, 0.054, 0.108, 0.216, and 0.432 kg ae/ha. Applications were made in 18 meter swaths using a ground based applicator equipped with site-specific and variable rate application tools. Each field was ground truthed in order to record visual injury and plant height data at the sampling points. Digital aerial images were taken of the fields before drift simulation 7, 36, 54, 77, and 96 days after simulation. Yield maps were created using a combine equipped with a yield monitor and a GPS with sub-meter accuracy.

Yield data, digital images, and plant height data were analyzed to determine if either the level of injury due to the glyphosate drift could be detected or if it is possible to predict potential yield loss. Slight to severe yield losses were observed for all rates and were observed in yield maps. However, rates of 0.216 and 0.432 kg ae/ha resulted in the most extreme yield reductions. Results showed significant decreases in NDVI values for all treatments. Yield data were variable due to hurricane damage to the experimental area. Further research needs to be conducted in order to determine if remote sensing can be used as a tool to analyze crop injury due to herbicide drift and/or if it is possible to detect crop injury and potential yield loss. This information could provide growers with an early detection program that could aid in valuable production decisions.

INTERACTIONS OF CARFENTRAZONE AND PARAQUAT APPLIED ALONE AND WITH OTHER HERBICIDES USED IN PEANUT. D.L. Jordan and P.D. Johnson, North Carolina State University, Raleigh.

ABSTRACT

Response of the Virginia market type peanut cultivar Gregory to postemergence applications of carfentrazone (Aim) and paraquat (Gramoxone Inteon) were compared during 2005 when these herbicides were applied alone or with other herbicides registered for postemergence application in peanut. Carfentrazone (0.008 lb ai/acre) was applied alone or with paraquat (Gramoxone MAX), acifluorfen plus bentazon (Storm), acifluorfen (Ultra Blazer), diclosulam (Strongarm), imazethapyr (Pursuit), imazapic (Cadre), and 2,4-DB (Butyrac 200). Herbicides other than carfentrazone were also applied alone. In a separate experiment, two formulations of paraquat (Gramoxone MAX and Gramoxone Inteon) were applied alone or with metolachlor (Dual Magnum) plus bentazon (Basagran), dimethenamid (Outlook) plus bentazon, diclosulam plus bentazon, imazethapyr plus bentazon, and bentazon. Herbicides were applied with nonionic surfactant at 0.25% (v/v) when peanut diameter was approximately four inches. Visual estimates of percent peanut injury were recorded 1 and 3 weeks after treatment (WAT). Six weeks after peanut emergence, clethodim (Select), lactofen (Cobra), and 2,4-DB were applied over the entire test to control escaped weeds. Weed populations were variable across both experiments and this prevented making visual estimates of weed control. The interaction of carfentrazone with complement herbicides was significant 1 WAT but was not observed 3 WAT. Paraquat, imazapic, and diclosulam injured peanut 19 to 33% 1 WAT when these herbicides were applied alone. Injury from the other herbicides was 9% or less. In contrast, injury from all herbicide treatments containing carfentrazone, including carfentrazone alone, was between 25 and 38%. This interaction was not observed 3 WAT, and peanut recovered from most of the earlier injury. Carfentrazone applied alone or with complement herbicides did not negatively affect peanut yield when compared with non-treated peanut. The interaction of paraquat formulation and complement herbicide was not significant in either evaluation, and the main effect of complement herbicide was the only significant treatment factor for any of the parameters. Percent visual injury and pod yield did not vary due to paraquat formulation. Although diclosulam plus bentazon was the most injurious treatment 1 WAT, injury declined by 3 WAT and did not affect yield.

TOLERANCE AND WEED CONTROL FOLLOWING AIM AND ET IN PEANUT. P.A. Dotray, W.J. Grichar, T.A. Baughman, and L.V. Gilbert; Texas Tech University and Texas Cooperative Extension, Lubbock; Texas Agricultural Experiment Station, Beeville; Texas Cooperative Extension, Vernon; and Texas Agricultural Experiment Station, Lubbock..

ABSTRACT

In 2004, Spartan 4F (sulfentrazone) received a Federal label for use in peanut in the southeast after several years of testing. The current label excludes Texas because Spartan has been shown to injure peanut 50 to 80%. Aim (carfentrazone-ethyl), like Spartan, is in the PPO family of herbicides and may be applied to the row middles (with specialized hooded equipment) of emerged peanut. Until 2004, little university data had been collected on the use of Aim postemergence-topical in peanut. ET (pyraflufen-ethyl), is a new and similar PPO inhibitor that is being tested for selectivity in peanut. Field experiments were conducted in 2004 and 2005 to examine peanut tolerance and weed control following Aim and ET applied postemergence at different application timings.

Field studies were conducted in 2004 and 2005 in west Texas (at AG-CARES near Lamesa and at the Western Peanut Growers Research Farm (WPGRF) near Denver City), in south Texas (Yoakum), and in the Rolling Plains (Rochestor and Lockett). In peanut tolerance studies, Aim at 0.024 and 0.032 lb ai/A (1.5 and 2.0 ounces of product per acre) and ET at 0.00234 and 0.00313 lb ai/A (1.5 and 2.0 ounces of product per acre) were applied early-postemergence (EP) (30 to 50 days after planting (DAP)) and late-postemergence (LP) (90 to 120 DAP). Peanut injury was evaluated after each application and yield and grade determined at the end of the growing season. In order to ensure that plant injury and yield/quality loss was the result of a herbicide treatment, plots were maintained weed-free. Additional studies were conducted in south and west Texas to determine peanut response and weed control following Aim and ET at 0.5, 1.0, 1.5, and 2.0 ounces per acre made at-crack (AC), 28 days after crack (28 DAC), and 56 DAC. Weed control was evaluated on various weed species and peanut injury was evaluated throughout the growing season.

Visual injury ranged from 47 to 62% following Aim treatments and 35 to 40% following ET treatments applied EP at AG-CARES in 2004. Injury decreased over time but was still apparent at harvest (2 to 7%). Visual injury following LP treatments did not exceed 5%. Yield loss was observed following Aim (2 oz) and ET (1.5 and 2 oz) applied EP and ET (2 oz) applied LP at this location. At WPGRF in 2004, visual injury was observed following Aim and ET applied 30 DAP. This injury ranged from 22 to 47% following Aim treatments and 33 to 48% following ET treatments 14 days after treatment (DAT). All injury decreased over time, but was still apparent at harvest (2 to 3%). Visual injury from applications made at 120 DAP did not exceed 7%. Peanut yield was not reduced following any herbicide treatment at this location. At Rochestor in 2004, Aim and ET (2 oz) applied EP injured peanut 23 to 25%, but injury decreased to less than 5% at the end of the season. Aim and ET applied LP caused up to 20% injury 19 DAT. Peanut yield loss was observed following Aim at 2 oz applied EP. At Yoakum in 2004, visual injury was observed following Aim and ET applied EP regardless of rate. Plots treated with ET at 2 oz applied EP produced less yield than ET at 2 oz applied LP. At a second south Texas location, AIM and ET applied 35 DAP caused more injury (14 to 20%) than applications made at 97 DAP (4 to 8%). No differences in yield were noted between herbicide treatments at this location. At AG-CARES in 2005, peanut injury 14 days after EP applications ranged from 17 to 30% following Aim treatments and 27 to 38% following ET treatments. All peanut injury decreased over time, but was still visible at harvest (2 to 6%). Visual injury following Aim and ET applied LP ranged from 9 to 13% and 12 to 16%, respectively. Peanut yield and grade were not affected at this location. At Lockett in 2005, peanut injury did not exceed 7% regardless of herbicide, rate, and time of application. Peanut yield and grade were not different from the untreated control.

At AG-CARES, ivyleaf morningglory was controlled at least 88% by Aim (1.0, 1.5, and 2.0 oz) and ET (1.5 and 2.0 oz) when applications were made AC. In general, control decreased when applications were delayed, especially to 56 DAC. Peanut injury was less than 5% (2004) and 14% (2005) when applications were made AC. Injury increased to as much as 60% when applications were delayed to 28 DAC. Peanut yield decreased relative to ivyleaf morningglory control. In south Texas, tall waterhemp was controlled at least 82% with both Aim and ET regardless of rate and timing. Broadleaf signalgrass control was poor with either herbicide. These results suggest that peanut tolerance and weed control with Aim and ET is growth stage dependent.

USING HERBICIDES TO CONTROL VOLUNTEER PEANUT (*ARACHIS HYPOGAEA*) IN COTTON.
W.J.Grichar, Texas Agricultural Experiment Station, Beeville, TX 78102 and P.A.Dotray, Texas Agricultural Experiment Station, Lubbock, TX 79403

ABSTRACT

The use of a cotton-peanut rotational system has been beneficial to growers that are seeking to improve yields and reduce disease development. However, peanuts that are left on or in the soil after harvest can become a problem when planted to cotton the following year. Rotating peanut (*Arachis hypogaea* L.) with non-host crops such as cotton (*Gossypium hirsutum* L.) is a key component of a management system for nematodes and diseases of the two crops. In addition to agronomic and weed management benefits, crop rotation assists in disease management by reducing the initial inoculum. Volunteer peanut can emerge in crops planted the year following the peanut crop. Since uncontrolled volunteer peanut can produce disease inoculum that likely reduces the effectiveness of crop rotation for disease management, it is necessary to control these peanuts. The severity of the infestation depends upon peanut harvesting losses, fall or winter tillage programs, consumption by birds and other wildlife, and time of seedbed preparation for the rotational crop. Preemergence (PRE) cotton herbicides are only partially effective on volunteer peanut. The mediocre control with these root-absorbed herbicides likely is due to many volunteer peanut emerging from below the herbicide treated zone. Postemergence (POST) herbicides have been shown to control volunteeer peanut but little work has been reported on the use of glufosinate for control.

Field studies were conducted in two different peanut growing areas of Texas using typical small plot procedures. The experiments were conducted in conventionally planted peanut fields. It was assumed that the response of planted peanut to POST herbicides would be similar to the response of volunteer peanut. Spanish peanut was planted in west Texas while runner type peanut was planted in south Texas. At the south Texas location, six different runner peanut varieties (‘Carver’, ‘OL01’, ‘Hull’, ‘Tamrun 96’, ‘Georgia 02C’, and ‘Georgia 01R’) were planted while in west Texas a spanish (‘Tamspan 90’) variety was planted. Planting dates were typical for each growing region. Experimental design in south Texas was a two factorial (cotton herbicide and peanut variety) while in west Texas the experimental design was a randomized complete block with three to four replications depending on location. Initial herbicide application in south Texas were made when peanuts were approximately 7.5 to 10 cm tall with sequential applications made approximately 2-3 wks later. In west Texas, the initial application was made when peanuts were 3.5 cm tall with sequential applications when peanuts were 12 to 15 cm tall. Herbicides were applied in a spray volume of 187 L/ha in south Texas and 94 L/ha in west Texas. Peanuts were rated approximately 4 weeks after the initial herbicide application using a scale of 0 (no control) to 100 (complete control). Data were subjected to analysis of variance and means were separated by Fisher’s protected LSD at $P \leq 0.05$.

In south Texas there was no peanut variety by cotton herbicide interaction; therefore, all treatments were combined over herbicides. Bromoxynil or fluometuron failed to control peanut in either year while glyphosate at 0.9 L/ha, MSMA, and prometryn provided inconsistent control. Diuron, diuron + MSMA, glyphosate at 1.8 or 2.7 L/ha, glufosinate, linuron, trifloxysulfuron, and trifloxysulfuron + prometryn controlled volunteer peanut at least 85% in both years. Glufosinate control was apparent after 3 to 4 days and gradually increased over time. At the west Texas location in 2003 and 2004, all herbicides provided inconsistent peanut control. Glyphosate provided better contol when applied to smaller peanut. In 2005, all herbicide applications controlled peanut at least 80%. Sequential applications of glufosinate controlled peanut 100%.

WEED MANAGEMENT SYSTEMS FOR PALMER AMARANTH IN PEANUT. C.L. Main and J.W. Chapin. Department of Entomology, Soils, and Plant Sciences, Clemson University, Florence, SC.

ABSTRACT

Several plants in the pigweed family (*Amaranthaceae*) are common weeds in many row-crop production systems *Amaranthus rudis* and *Amaranthus tuberculatus* are common in the Midwestern United States, *Amaranthus palmeri* (Palmer amaranth) is common in southern and central portions of the United States were peanuts are grown. Palmer amaranth is not only one of the most common weeds in South Carolina peanut production, it is also the most troublesome. Palmer amaranth is particularly troublesome in South Carolina peanut production due its ability to germinate throughout the growing season, wide-spread infestation, fecundity, resistance to dinitroanaline herbicides, and resistance to acetolactate synthase (ALS) inhibiting herbicides. The objective of this research is to evaluate Palmer amaranth response to herbicide management systems typical for South Carolina peanut production.

Field studies were conducted in 2005 at the Pee Dee Research and Education Center near Florence, SC. Soil preparation included disking and smoothing of the soil followed by bedding prior to planting. Planting date for the two studies was May 20, 2005. Peanut (NC V-11) was seeded at 6 seed/ft of row. The experimental design was a randomized complete block with four replications of individual treatments. Plots were 20 ft long and four 38-in rows wide. All data was collected from the two center rows. Clemson University Cooperative Extension Service recommendations were followed for management of fertility, diseases, and insect pests. Treatments were applied using a compressed air sprayer calibrated to apply 15 gallons per acre of spray solution. Peanuts were inverted at physiological maturity and harvested 5 days later with picker modified for small plot research.

Visual estimates of weed control were recorded prior to harvest. Foliar chlorosis, necrosis, and plant stunting were considered when making the visual evaluations using a scale of 0 to 100% with 0 = no weed control and 100 = complete weed control. Data were analyzed using the MIXED procedure of SAS and means were separated by Fisher's Protected LSD (P=0.05).

No peanut injury was visible for any treatment beyond what is expected for POST paraquat application to peanut. Palmer amaranth control was excellent (>89%) with any treatment containing paraquat and bentazon EPOST f.b. imazapic POST. Flumioxazin PRE with or with out S-metolachlor or pendimethalin provided the best early season Palmer amaranth control. Diclosulam provided less than adequate control of Palmer amaranth unless paraquat + bentazon and imazapic were applied in sequence. Peanut yielded similar for all treatments except the untreated controls, treatments that did not receive a PRE herbicide, and treatments containing chlorimuron applied POST. This is consistent with other research demonstrating yield loss with chlorimuron applications. The inclusion of a PRE herbicide and an EPOST treatment of paraquat + bentazon removes early season Palmer amaranth interference. While POST treatments removed Palmer amaranth, the effect of not using a PRE or EPOST herbicide could potentially cause yield reductions.

INFLUENCE OF COVER CROPS ON PEST MANAGEMENT IN PEANUT. B.L. Robinson, D.L. Jordan, G.G. Wilkerson, B.B. Shew, and R.L. Brandenburg, North Carolina State University, Raleigh.

ABSTRACT

Experiments were conducted during 2005 to determine the impact of planting peanut (*Arachis hypogaea* L.) into the desiccated cover crops annual ryegrass (*Lolium perenne* L.), cereal rye (*Secale cereale* L), oats (*Avena fatua* L.), triticale (*Triticale hexaploide* Lart.), and wheat (*Triticum spp.*) or into a stale seedbed (native vegetation). In these experiments raised beds were prepared and planted to cover crops in the fall, and then strip tilled in the spring prior to planting peanut. Glyphosate and paraquat were applied as a burndown treatment to the cover crops just prior to planting. The experimental design was a split plot with cover crop serving as the whole plot unit and weed/disease management combinations serving as sub-plot units. Herbicide regimes were: 1) clethodim preemergence, 2) metolachlor preemergence with acifluorfen plus bentazon plus paraquat and clethodim postemergence clethodim [based on recommendations using the decision model HADSS (Herbicide Application Decision Support System)], and 3) diclosulam plus metolachlor preemergence with imazapic postemergence. Yellow nutsedge (*Cyperus esculentus* L.) and common ragweed (*Ambrosia artemisiifolia* L.) control did not differ among cover crop treatments regardless of herbicide program. One unexpected finding was that common ragweed resistance to ALS (acetolactate synthase inhibiting)-herbicides is suspected in this field. Additionally, there was no difference in foliar disease development or incidence of tomato spotted wilt virus (TSWV) regardless of cover crop when compared with incidence in the stale seedbed system. Research in other states has demonstrated less TSWV and foliar disease in reduced tillage systems compared with conventional tillage systems. Although a conventional tillage system was not included in this experiment, results from these experiments demonstrate that cover crops may not influence weed and disease control compared with a stale seedbed system that excludes a cover crop. These data also suggest that the cover crops cereal rye, oats, and triticale can serve as effective alternative cover crops to wheat. Although annual ryegrass was an effective cover crop in this experiment, additional research is needed to ensure that its use is feasible under current peanut production systems. Concern exists about the possible link between using wheat as a cover crop and increased problems associated with Hessian fly [*Mayetiola destructor* (Say)] in grain production fields, and these data suggest that alternatives to wheat as a cover crop exist which may improve management of this pest in wheat production. Results are preliminary.

CRITICAL PERIOD OF WEED INTERFERENCE IN PEANUT. W.J. Everman[1], S.B. Clewis[1], I.C. Burke[2], D.L. Jordan[1], and J.W. Wilcut[1] [1]NC State University, Raleigh, NC 27606 and [2]USDA-ARS, Stoneville, MS 38776.

ABSTRACT

Researchers have focused on evaluating density-dependent and/or time removal interactions of a single weed species on peanut growth and yield. However, most fields have more than one weed species. Therefore, our objectives were to evaluate peanut yield response to various weed-free timings, weed removal timings, and determine the critical period of weed control for peanut. Trials were conducted at the Peanut Belt Research Station near Lewiston-Woodville and the Upper Coastal Plain Research Station near Rocky Mount, NC in 2005. Treatments were designed to determine both the critical weed-free period and the critical timing of weed removal. The critical weed-free period is defined as the minimum period following crop emergence that the crop must be maintained free of weeds in order to prevent crop yield loss, while the critical timing of weed removal is defined as the maximum amount of time that weeds can be allowed to compete with the crop and not result in yield loss. The critical period of weed control is the relationship between the critical weed-free period and the critical timing of weed removal. Treatments included weed competition periods of 0 (Weed-free), 3, 5, 7, 9, 11, and 16 weeks after planting (WAP) where weeds were allowed to compete with the peanut crop then removed and plots were maintained weed-free for the remainder of the season, weed-free periods of 0 (Full season weedy), 3, 5, 7, 9, 11, and 16 WAP where plots were maintained weed-free until weeds were allowed to compete with the crop for the rest of the season, and weedy intervals of 3 to 7, 3 to 9, 3 to 11, 5 to 9, 5 to 11, and 7 to 11 WAP where plots were maintained weed-free for a period of 3, 5, or 7 WAP and weeds were then allowed to grow for a period of up to 8 weeks before being removed and kept weed-free until harvest. Peanut varieties NC-V11 and VA 98R were planted in 12 ft x 20 ft plots with 36 in row spacing on May 3 and 4 at Rocky Mount and Lewiston, respectively. Fields used were research grade plots containing 20 weed species with 11 common to both locations including common lambsquarters, common ragweed, eclipta, large crabgrass, pitted morningglory, tall morningglory, yellow nutsedge, and purple nutsedge. ANOVA was used to detect differences in studies, replications, and treatments. Peanut yields were modeled using Gompertz model: Yield = ae^{bekT}. North Carolina experienced dry weather in 2005 which was evident in Rocky Mount, but not at Lewiston where (overhead lateral move) irrigation was available. Reduced moisture resulted in lower yield potential; however, responses based on percent of weed-free yield were similar at both locations. Peanut yields were reduced 15, 35, 30, 80, and 80% when weeds were allowed to compete with peanuts for 5, 7, 9, 11, or 16 WAP, respectively at Rocky Mount. Yield reductions were similar at Lewiston for all removal timings excluding the 9 WAP removal timing which resulted in a 50% yield loss. These results clearly show that early to mid-season weed control is essential to avoid a yield loss of 20% or greater. When peanut were kept weed-free for 0, 3, 5, or 7 WAP and weeds were allowed to establish for the remainder of the season, yields were reduced 87, 40, 20, and 10%, respectively. The importance of mid-season weed control is further demonstrated by the critical period of interference. Due to the sub-optimal growing conditions, the critical period of weed interference was 4 to 6 WAP to avoid a 5% yield reduction at Rocky Mount while under optimal growing conditions at Lewiston the critical period of weed interference in peanut was from 3 to 8 WAP. When peanut plots were kept weed-free for 3 weeks and weeds were allowed to compete for 4, 6, and 8 weeks and kept weed-free the rest of the season yields were reduced 1, 9, and 22%, respectively compared to the weed-free plots at Rocky Mount. When weeds were allowed to compete for 4 and 6 weeks starting at 5 WAP, yields were reduced 3 and 15%, respectively, at Rocky Mount. Peanut yield was 13 and 12% at Lewiston when weeds were allowed to compete from 3 to 9 and 3 to 11 WAP, respectively. At all other interference intervals yields were not reduced more than 5%. These weedy intervals are reflective of the critical period of weed interference derived from the critical period of weed removal and critical weed-free periods seen at Rocky Mount (4 to 6 WAP) and Lewiston (3 to 8 WAP). These data show that you can have timely early season weed control soon after crop emergence and late season weed-free peanuts, but if you are not timely on weed management inputs for the first 11 WAP you can suffer appreciable yield loss. Everyone understands the benefits of late season weed control such as harvesting weed-free peanuts for better harvesting efficiency and high quality peanuts. Everyone also understands that you need to be timely in your initial POST treatment as peanuts are also sensitive to early season weed interference. But our data show peanuts are sensitive to weed interference losses for at least 8 WAP and that interference losses are affected by growing conditions. Therefore, growers need to be cognizant of early to mid-season weed interference (3 to 8 WAP) in order to maintain full yield potential. Even if weeds are controlled early and then cleaned up later in the season to aid harvesting, weed competition in late June or early July if excessive, can still result in reduced yields.

PENOXSULAM A NEW HERBICIDE FOR BROADLEAF WEED MANAGEMENT IN RICE. B.J. Williams and A.B. Burns. LSU AgCenter, Baton Rouge, LA.

ABSTRACT

In 2004 and 2005, studies were conducted to evaluate penoxsulam for broadleaf weed management in drill- and water-seeded rice at the Northeast Research Station near St. Joseph, LA on a Sharkey Clay soil. Rice was seeded at 101 kg/ha on a 19 cm spacing in dry-seeded rice and broadcast at 170 kg/ha in water-seeded rice to plots measuring 2 by 4.5 m. Permanent floods were established 4 to 5 weeks after planting. Nitrogen, in the form of prilled-Urea, was applied at 126 kg/ha just before permanent flood. At panicle initiation an additional 42 kg/ha of nitrogen was applied. Herbicide treatments were applied in 140 L/ha of water using a CO2 pressurized backpack sprayer. Randomized complete blocks with three replications were used for all studies. All penoxsulam treatments were applied with 2.3 L/ha crop oil concentrate. Penoxsulam at 0.15 to 0.17 L/ha had some activity on small (5-8 cm) Texasweed (<i>Caperonia palustris</i> (L.) St. Hil.). Texasweed control was improved dramatically when 0.15 L/ha penoxsulam was applied with 35 g/ha halosulfuron or 52.5 g/ha bensulfuron. Penoxsulam at 0.15 L/ha demonstrated excellent activity on hemp sesbania (<i>Sesbania exaltata</i> (Raf.) Rydb. ex. A.W.Hill). However, application timing was critical, sesbania control from penoxsulam applied to 1 leaf sesbania resulted in less control than later timings. The reduced control was likely due to new emergence. As with Texasweed, penoxsulam mixed with halosulfuron often improved sesbania (taller than 10 cm) control. Overall, the best tank mix partners for penoxsulam appear to be halosulfuron and bensulfuron. Carfentrazone at 0.11 L/ha also improved sesbania and Texasweed control in certain situations. Penoxsulam 0.15 L/ha mixed with 0.58 L/ha triclopyr do not appear promising for sesbania or Texasweed control. In Clearfield rice, 0.15 L/ha penoxsulam mixed with 0.3 L/ha imazethapyr controlled sesbania and improved dayflower (<i>Commelina diffusa</i> Burm. f.) and Texasweed control. Penoxsulam did not appear to affect red rice (<i>Oryza sativa</i> L.) control in 2005. Broadleaf weed control was best when penoxsulam was included in the first imazethapyr application. In water-seeded rice, 0.15 kg/ha penoxsulam controlled barnyardgrass (<i>Echinochloa crus-galli</i> (L.) Beauv.) from pegging through the 2-3 lf stage, later timings were less effective. Sesbania control was best at the 2-3 lf timing, while ducksalad (<i>Heteranthera limosa</i> (Sw.) Willd.) and purple ammannia (<i>Ammannia coccinea<i> Rottb.) control was best at the pegging stage. Overall, penoxsulam appears to be very promising for controlling broadleaf weeds in conventional and Clearfield rice regardless of the seeding method. Penoxsulam is most effective on small weeds and higher rates (at least 0.17 L/ha) are required for consistent control of weeds larger than 5 to 8 cm. Residual activity on sesbania and Texasweed is limited, so applications are best made as close to permanent flood as possible. At later timings, penoxsulam mixes with halosulfuron or bensulfuron will be beneficial, but needs further evaluation.

PENOXSULAM FOR POSTFLOOD WEED CONTROL IN SOUTHERN U.S. RICE. R.B. Lassiter, R.A. Haygood, R.K. Mann, J.S. Richburg, and L.C. Walton; Dow AgroSciences LLC, Indianapolis, IN.

ABSTRACT

Rice growers continue to face weed control challenges in rice. Penoxsulam, trade name GRASP™ SC herbicide, developed by Dow AgroSciences LLC, is a new postemergence broad spectrum triazolopyrimidine sulfonamide herbicide for use in rice. GRASP SC was launched commercially in rice in 2005 in the U.S. Primary uses of GRASP SC in the Southern U.S. include postemergence, preflood application in drill-seeded rice, and early postemergence application in water-seeded rice. Even with extensive management, rice growers often still face significant weed problems after the permanent flood has been applied to the rice. Preliminary research prior to 2005 had indicated that GRASP SC applied postflood in rice would provide control of barnyardgrass and key broadleaf weeds. Therefore, the objectives of this research were to evaluate the rice tolerance and weed control efficacy of GRASP SC applied postflood at various application timings alone and in tank mixtures to broaden the spectrum of control.

Experiments were conducted in AR, LA, MO, MS, and TX during the 2005 growing season. Research methods were typical of small plot research. GRASP™ SC herbicide provided control of *Echinochloa* species as well as many annual rice weeds including hemp sesbania (*Sesbania exaltata*), ducksalad (*Heteranthera limosa*), alligatorweed (*Alternanthera philoxeroides*), smartweed (*Polygonum* spp.), eclipta (*Eclipta alba*), and rice flatsedge (*Cyperus iria*). In general, the best weed control with GRASP SC was achieved when applied 7-10 days after the permanent flood was established. Rice injury from postflood applications of GRASP SC was minimal. Tank mixtures of GRASP SC with Basagran and Aim did result in antagonism on numerous weeds. The use rate of GRASP SC postflood is 0.036 to 0.045 lbs ai/a (2.3 to 2.8 fl oz product/acre). GRASP SC can be applied from rice emergence up to 60 days prior to harvest in drill-seeded rice and from rice pegging with 1 leaf up to 60 days prior to harvest in water-seeded rice.

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WEED CONTROL SYSTEMS FOR RATOON RICE PRODUCTION. J.A. Bond and E.P. Webster; Louisiana State University AgCenter, Baton Rouge, LA 70803.

ABSTRACT

Ratooning, harvesting grain from tillers originating from the stubble of a previously harvested crop (main crop), can enhance rice grain yields by providing higher resource use efficiency per unit of land area and time. Weeds emerging after harvest of the main crop can hinder ratoon rice development and yield. Unfortunately, few herbicides are labeled for application to ratoon rice. These herbicides include 2,4-D, Basagran (bentazon), Grandstand (triclopyr), and Grasp (penoxsulam). Rice has been ratooned in the Gulf Coast areas of Florida, southwest Louisiana, and Texas since the early 1960's, but research focused on improving recommendations for ratoon rice in these areas is limited. Research addressing weed management in ratoon rice is vital to improving total rice production in the rice-growing areas along the Gulf Coast. An experiment was conducted in 2005 at Crowley, LA, to evaluate the efficacy of herbicides applied to a ratoon rice crop.

The long-grain rice cultivar, Cocodrie, was drill-seeded on March 29, 2005, and main-crop rice was harvested at 20% moisture content using a 12-in cutting height on August 10, 2005. Ratoon herbicide treatments included 2,4-D at 2 pt/A, Grandstand at 1 pt/A, Basagran at 1.5 pt/A, Grasp at 2 oz/A, and Permit at 1 oz/A. Crop oil concentrate at 2.5% v/v was included with Basagran and Grasp, while nonionic surfactant at 0.25% v/v was added to Grandstand and Permit. The experimental design was a randomized complete block with four replications. Rice injury and control of ducksalad (*Heteranthera limosa*), purple ammannia (*Ammannia coccinea*), and Indian toothcup (*Rotala indica*) were visually estimated at 14 and 28 d after herbicide treatment (DAT). Ratoon days to 50% heading was determined as the time from main-crop harvest until 50% of ratoon rice in a plot had visible panicles. Data were subjected to ANOVA with means separated by Fisher's Protected LSD test at $P = 0.05$.

None of the herbicides evaluated injured ratoon rice. Grasp controlled ducksalad 91%, but control with other herbicides was no more than 81% 14 DAT. No treatment controlled ducksalad greater than 70% 28 DAT. Poor ducksalad control with Basagran and 2,4-D 14 DAT resulted from insufficient exposure of weed foliage above the floodwater at application. Slow ratoon growth and subsequent ducksalad reinfestation following herbicide application led to poor control 28 DAT. Basagran, Grandstand, and 2,4-D controlled purple ammannia 94 to 98% 14 DAT and 91 to 96% 28 DAT. Grasp and Permit controlled purple ammannia no more than 60% at either evaluation. Indian toothcup was controlled 95 to 98% 14 DAT with Basagran, Grandstand, and 2,4-D. Excellent Indian toothcup control (95%) was maintained 28 DAT with 2,4-D, while control with Basagran and Grandstand declined to 84 and 81%, respectively. Neither Grasp nor Permit controlled Indian toothcup greater than 45% at 14 or 28 DAT.

No differences in ratoon rice maturity were detected. Factors affecting crop maturity are more important for the ratoon crop than the main crop. In areas where rice is ratooned, the growing season is short (90 d), and cool temperatures can impact ratoon grain yields. Furthermore, the ratoon growing season coincides with peak hurricane season. Consequently, delays in ratoon rice maturity could reduce grain yields in years when tropical weather systems or early winter conditions occur before ratoon rice is fully developed. Damage from Hurricane Rita prevented ratoon rice maturation and harvest in 2005.

Permit was the only herbicide evaluated not currently labeled for ratoon rice. Permit was included because it is effective against *Cyperus* spp., which are often troublesome in ratoon rice. Although no *Cyperus* spp. were present in the study, Permit caused no visible rice injury or delays in ratoon rice maturity. This information would be valuable if a ratoon rice application is considered as an addition to the Permit label in the future.

In rice-growing areas along the Gulf Coast, a ratoon rice harvest is valuable to a producer's income. However, income from the additional harvest must offset added ratoon production costs. Weed species common during ratoon rice development can be effectively controlled with herbicides currently labeled for ratoon rice application. However, none of the herbicides evaluated were effective on all weed species present. Weed control 28 DAT demonstrated that, due to reinfestation following application, ratoon rice weed control strategies should be designed for control of ducksalad. Reinfestation did not appear problematic for purple ammannia or Indian toothcup.

LATE-SEASON RED RICE SUPPRESSION IN EARLY MATURING CLEARFIELD RICE WITH GROWTH RETARDANTS. R.T. Dunand; Rice Research Station, Louisiana State University Agricultural Center, Crowley, LA 70526.

ABSTRACT

Plant growth regulators, applied during the booting and heading stages of red rice, have been shown to reduce red rice panicle production in early-season varieties, infested with red rice. Imidazolinone herbicides applied preflood provide seedling control of red rice in Clearfield varieties, and multiple applications are more effective than single applications. Red rice not controlled by preflood imidazolinone herbicides can effectively be rendered sterile (produce no or limited seed) by mid- and late-season applications of imidazolinone herbicides. With the recent release of an early-season Clearfield variety, the potential to replace mid- and late-season applications of imidazolinone herbicides with plant growth regulators that suppress reproductive development exists.

Imazethapyr (Newpath, BASF) applied at 4 fl oz/A prior to establishment of the permanent flood controlled approximately 95% of the red rice infesting plots drill-planted with CL131 (Clearfield, Horizon Ag). Imazethapyr was reapplied during the early stages of the reproductive phase (PD, panicle differentiation), and mefluidide (Embark 2S, PBI/Gordon) and maleic hydrazide (Royal MH-30 SG, Chemtura) were applied at milk and dough stage, respectively. Single applications of imazethapyr, mefluidide, and maleic hydrazide were included for comparison, as well as an untreated control. Crop and weed growth and development were evaluated at maturity.

Red rice growth was significantly affected by herbicide and plant growth regulator treatments. Mature plant height (distance from the soil surface to the tip of the panicle extended vertically) of CL131 ranged between 84 and 88 cm (control=88 cm). With red rice, mature plant height ranged between 120 and 154 cm in the herbicide and plant growth regulator treatments (control=151 cm). Mefluidide and maleic hydrazide alone had no effect on plant height. Because of the relatively moderate red rice infestation, lodging was variable, ranging from 0 to 48%. Treatments including Newpath applied preflood had 0% lodging, and mefluidide and maleic hydrazide treatments alone had 40 and 48% lodging, respectively (control = 17%). Red rice panicle density was reduced by all treatments containing imazethapyr applied preflood (2 to 5 panicles/m^2) compared with the control and mefluidide and maleic hydrazide treatments alone (65 to 75 panicles/m^2).

Crop maturity and production were significantly affected by the herbicide and plant growth regulators. Grain moisture (an indicator of crop maturity) ranged between 14.9 and 15.2% with treatments including imazethapyr applied preflood, and grain moisture was 16.5 and 18.1% for mefluidide and maleic hydrazide treatments alone (control = 17.9%). Grain yield (adjusted to 12% moisture) was highest with treatments including imazethapyr applied preflood (5418 to 6012 lb/A), with the lowest yield of the three highest yielding treatments being associated with the single preflood treatment. Of all treatments, grain yield was lowest with plant growth regulator treatments alone (2803 to 3541 lb/A) compared with the control (3565 lb/A).

Mid-season applications of imazethapyr and late-season applications of mefluidide and maleic hydrazide following an initial preflood application of imazethapyr can be used to suppress reproductive development in residual red rice with minimal effects on tolerant (Clearfield) rice varieties. The impact on grain production and future red rice infestations will be greatly improved. In early-season Clearfield varieties, a second application of an imidazolinone herbicide for residual red rice control may be effectively replaced with plant growth regulators with growth suppressant activity.

RESPONSE OF CREEPING RIVER GRASS (*ECHINOCHLOA POLYSTACHYA*) TO RICE PRODUCTION PRACTICES. S.L. Bottoms, E.P. Webster, W. Zhang, R.M. Griffin, J.B. Hensley, and R. Levy; Louisiana State University AgCenter, Baton Rouge

ABSTRACT

Creeping river grass [*Echinochloa polystachya* (Knuth) Hitch.] is an invasive aquatic perennial grass native to South America that is presently infesting 12,000 to 15,000 A of rice (*Oryza sativa*) and crawfish production in south Louisiana. The climate of this area and management practices associated with rice and crawfish production are conducive to the spread of creeping river grass. A study was conducted to evaluate the growth response of creeping river grass to rice density and to evaluate seed viability of creeping river grass.

Clearfield 'CL 161' rice was drill-seeded at seeding rates of 0, 20, 40, 60, 80, and 100 lb/A. Creeping river grass stem segments were planted at a density of one segment/10 ft^2, 3 days after rice was planted. Creeping river grass was allowed to compete with the rice for the entire season.

Creeping river grass biomass (fresh weight and total stem length), stem number and node production were reduced with all rice planting rates compared with no rice planted (Nontreated). Fresh weight was reduced 45 to 85% with all planting rates compared with the nontreated. Creeping river grass in the nontreated had an average of 22 stems per plant compared with 7 to 13 stems per plant in the presence of rice, resulting in stem counts 30 to 40% of the nontreated. Total stem length of creeping river grass from the nontreated was 812 inches. Total stem length of creeping river grass when rice was planted was reduced 50 to 75% with total lengths of 205 to 393 inches. Although creeping river grass total stem length was reduced in treatments with rice planted, the average stem length of creeping river grass did not differ between treatments.

Seeds were harvested from a natural stand of creeping river grass plants near the study area. Because of a limited number of seeds harvested, a preliminary test using 20 seeds was attempted. Seeds were removed from glumes to increase water imbibition. A 1% potassium nitrate solution was used for initial wetting to break dormancy. The germination study indicated the creeping river grass seeds to be viable. At 2 days after study initiation, 45% of the creeping river grass seeds germinated and 70% of seeds germinated by 7 days after study initiation.

Results indicate that production of creeping river grass is reduced when in direct competition with rice; therefore, rice production may slow the total biomass production of this invasive species. Although biomass production was reduced in treatments with rice present, the production was still considerable. Adding to the considerable vegetative growth, the viability of the seed adds another dimension to the aggressiveness of this plant. Proper management of creeping river grass is essential in controlling its spatial spread.

RESPONSE OF NON-TRASNGENIC RICE TO SIMULATED HERBICIDE DRIFT. J.B. Hensley, E.P. Webster, W. Zhang, R. M. Griffin, and S.L. Bottoms; Louisiana State University AgCenter, Baton Rouge, LA 70803

ABSTRACT

Four studies were conducted at the LSU AgCenter Rice Research Station near Crowley, Louisiana in 2005 to evaluate the effects of simulated herbicide drift on 'Cocodrie' rice. The experimental design for each study was an augmented two-factor factorial with a nontreated added for comparison. Factor A consisted of herbicide rate. The herbicides were applied at drift rates of 12.5 and 6.3% of the labeled usage rate of glyphosate as 22 oz/A of Roundup WeatherMax (2.8 and 1.4 oz/A, respectively), glufosinate as 24 oz/A of Ignite (3 and 1.5 oz/A, respectively), imazamox as 5 oz/A of Beyond (0.63 and 0.31 oz/A, respectively), and imazethapyr as 4 oz/A of Newpath (0.5 and 0.25 oz/A, respectively). Each application was made with the carrier volume varying proportionally to herbicide dosage based on a carrier volume rate of 25 GPA. The 12.5% herbicide rate was applied with a carrier volume of 3.1 GPA and the 6.3% herbicide rate was applied with a carrier volume of 1.6 GPA. Each application was made with a CO_2 pressurized sprayer calibrated to deliver a constant carrier volume and speed was adjusted to vary application rate. Factor B consisted of application timings at different growth stages: panicle differentiation (PD), boot, and physiological maturity. Each herbicide was evaluated in a separate study. Rice plant height at 21 days after treatment (DAT) and rough rice yield for the primary and ratoon crop were obtained. Primary and ratoon crop yield were combined as total rice yield. All data are presented as percent of the nontreated.

At 21 DAT, rice plant height was 70 to 89% of the nontreated regardless of application rate for the PD and boot timings. Rice treated with Roundup WeatherMax at 2.8 oz/A applied at the PD and boot stage resulted in a primary crop yield of 32 to 39% of the nontreated. A similar yield reduction was observed with the 1.4 oz/A rate applied at the boot stage. However, the reduced rate applied at PD resulted in a primary crop yield of 62% of the nontreated. Rice treated with Roundup WeatherMax applied at the boot stage regardless of rate resulted in a ratoon rice yield increase of 173 and 193% of the nontreated. Roundup WeatherMax applied at this timing resulted in excess tiller production which did not produce a seed head in the primary crop; however, a seed head was produced on the excess tillers in the ratoon crop causing a yield increase. However, total rice yield was 52% of the nontreated when rice was treated with both rates. Compared with the nontreated, a similar total crop yield was observed with the PD timing. Rice treated at maturity did not have a reduction in rice yield or plant height.

Rice treated with Ignite applied at 3 oz/A and 1.5 oz/A applied at PD, boot, or maturity resulted in little or no response to rice plant height at 21 DAT. Ignite applied to rice at the boot stage at both rates resulted in a primary crop yield of 75 to 80% of the nontreated and an increased ratoon crop yield 121 to 123% of the nontreated. This is similar to what was observed with Roundup WeatherMax applications. However, Ignite applied to rice at the boot stage resulted in a total crop yield of 83 to 88% of the nontreated, regardless of rate. Little or no response was observed when Ignite was applied to rice at PD or maturity compared with the nontreated.

At 21 DAT, rice plant height was 90 to 94% of the nontreated regardless of Beyond application rate at the boot timing. Beyond applied to rice at PD and maturity resulted in little to no difference in rice plant height. Rice treated in the boot stage with Beyond at 0.63 oz/A and 0.31 oz/A resulted in a primary crop yield of 16 and 30% of the nontreated, respectively, and an increased ratoon crop yield of 191 and 158% of the nontreated, respectively. This was similar to the results observed with Roundup WeatherMax applications. However, Beyond applied to rice at the boot stage resulted in a total crop yield of 48 to 54% of the nontreated, regardless of rate. Rice treated with Beyond at 0.63 oz/A at PD resulted in total crop yield of 92% of the nontreated. Little or no response on yield was observed when Beyond was applied to rice at maturity.

At 21 DAT, rice plant height was 80 to 92% of the nontreated when Newpath was applied at 0.25 and 0.5 oz/A at the PD and boot timings. Rice treated with Newpath at PD resulted in a primary crop yield of 84 and 93% of the nontreated and a ratoon crop yield 64 and 89% of the nontreated, regardless of rate. Rice treated at the boot stage with both rates of Newpath resulted in a yield response similar to those observed with Beyond at the same timing. Little or no difference was observed for rice treated at maturity with Newpath at both rates.

Drift of any herbicide evaluated in these studies can be detrimental to rice. The primary rice crop yield was reduced by all herbicides when a drift event occurred to the main crop in the PD or boot stage. A drift event to rice at physiological maturity was not as detrimental when compared with drift at the PD or boot stage. In most cases, the ratoon crop yield was not reduced when a drift event occurred in the primary crop.

WEED EFFICACY AND TOLERANCE OF RICE (*ORYZA SATIVA*) TO WHEAT (*TRITICUM AESTIVUM*) HERBICIDES. K.B. Meins, R.C. Scott, N.D. Pearrow, and T.W. Dillon; University of Arkansas, Division of Agriculture, Lonoke, AR.

ABSTRACT

A study was conducted to evaluate the potential of herbicides commonly used in Arkansas wheat production for their possible fit in rice. Both weed control efficacy and rice crop tolerance were evaluated. The herbicides included: Osprey, Hoelon, Sencor, Finesse, Axiom, Achieve, Penoxaden, Ally, Express, Harmony Extra, and Peak. Of the herbicides evaluated, Achieve, Penoxaden, and Hoelon controlled both barnyardgrass (*Echinochloa crus-galli*) and broadleaf signalgrass (*Brachiaria platyphylla*). All other herbicides expressed marginal grass activity. Hemp sesbania (*Sesbania exaltata*) and annual sedge (*Cyperus* sp.) were controlled by Ally, Express, Harmony Extra, Peak, Sencor, Finesse, Axiom, and Osprey. Rice injury was only a concern with Sencor, Finesse, Axiom and penoxaden. At two weeks after treatment, injury from these herbicides ranged from 40 to 80%; by 6 weeks after treatment injury was less than 25% for all treatments except penoxaden (59%).

Due to the effects of hurricanes Rita and Katrina rice yields were not obtained. However, due to the lack of injury with most treatments we feel that further evaluation of these herbicides is merited for use in rice production. Future research will depend on funding and the willingness of any of the chemical companies involved to pursue a label for rice.

HERBICIDES FOR GLYPHOSATE-RESISTANCE MANAGEMENT IN CORN AND SOYBEAN. J.C. Sanders, H. McLean, C. Pearson, and H.P. Wilson; Syngenta Crop Protection, Greensboro, NC; Virginia Tech, Painter, VA.

ABSTRACT

The introduction of glyphosate-resistant (Roundup Ready® or RR) soybean, cotton, and corn in the mid and late 1990’s was followed by rapid and widespread farmer adoption in the United States. The Subsequent decline in herbicide diversity has resulted in the propagation of glyphosate-resistant weeds. Weed management programs that include supplemental PRE and/or POST herbicides can reduce the risk of propagating glyphosate-resistant weeds. Research was conducted in the 2005 growing season at the Eastern Shore Agricultural Research & Extension Center, Painter, VA to evaluate herbicides that can be used to reduce the risk of propagating glyphosate-resistant weeds. Various herbicides to supplement glyphosate were selected for evaluation in Roundup Ready corn and soybean. Experiments were conducted in field plots arranged in a randomized complete block design and replicated four times. Treatments in corn included glyphosate alone at 0.78 lb ae/A applied mid-postemergence (MPOST) and following each of eight different preemergence herbicides that included Aatrex, Dual II Magnum, Outlook, Define, Callisto, Prowl H2O, Bicep II Magnum, and Lexar. Glyphosate was also applied in 0.78 lb ae/A sequential applications at early postemergence (EPOST) and MPOST timings. Treatments in soybean included glyphosate alone at 0.78 lb ae/A applied EPOST at the second trifolioate growth stage and in combination with each of eleven postemergence herbicides that included Reflex, Cobra, Ultra Blazer, Storm, Basagran, Resource, Classic, FirstRate, Scepter, Pursuit, and Raptor. Evaluations in corn included percent weed control at MPOST, 14 and 28 days after MPOST, and prior to harvest. Corn injury from weed competition was visually evaluated at 28 days after MPOST and yields were recorded at maturity. Evaluations in soybean included weed control at 7 and 28 days after treatment. Weeds that were evaluated in corn and soybean included entireleaf morningglory (Ipomoea hederacea var. integriuscula), common ragweed (Ambrosia artemisiifolia), and common lambsquarters (Chenopodium album), while giant foxtail (Setaria faberi) was only evaluated in corn.

Common ragweed and common lambsquarters in corn were controlled greater than 95% prior to the MPOST application of glyphosate with Aatrex, Callisto, Bicep II Magnum, or Lexar applied PRE or glyphosate applied EPOST. Glyphosate applied MPOST following either Bicep II Magnum or Lexar applied PRE controlled common ragweed and common lambsquarters 99% in late-season. Prior to harvest, glyphosate applied MPOST with no PRE controlled giant foxtail 63% while glyphosate MPOST following either Bicep II Magnum or Lexar controlled giant foxtail 96%. Entireleaf morningglory control prior to harvest was 20% with glyphosate applied MPOST but glyphosate applied MPOST following either Bicep II Magnum or Lexar controlled entireleaf morningglory 89% or greater. Corn injury resulting from weed competition at 28 days after MPOST was 75% with glyphosate applied MPOST but corn receiving Bicep II Magnum or Lexar PRE followed by glyphosate applied MPOST exhibited no injury. Corn yields reflected weed control. The addition of Reflex, Cobra, Ultra Blazer, Storm, Classic, FirstRate, Scepter, Pursuit, or Raptor to glyphosate applied MPOST improved entireleaf morningglory, common ragweed, and common lambsquarters control at 28 days after application. As with previous research in Roundup Ready corn, PRE herbicides can control weeds prior to the postemergence glyphosate application, provide residual control, and allow flexibility in glyphosate application timing. Mixtures of postemergence herbicides with glyphosate have also been demonstrated in previous research to improve weed control over that of glyphosate alone in Roundup Ready soybean. Herbicides that supplement glyphosate are critical for glyphosate stewardship.

EFFICACY OF VARIOUS SOYBEAN HERBICIDES ON GIANT RAGWEED. N.D. Pearrow, R.C. Scott, K.B. Meins, and T.W. Dillon; Cooperative Extension Service, University of Arkansas, Little Rock, AR.

ABSTRACT

In 2005, calls came in from 4 locations around the state of Arkansas with concerns from growers about glyphosate failing to control giant ragweed (*Ambrosia trifida*). In all cases, fields had been in some sort of continuous Roundup Ready crop, with multiple glyphosate applications for at least the last 4 years; in addition, these fields were in some form of a reduced tillage system. These fields are similar situations under which a glyphosate tolerant common ragweed was found in Arkansas in 2004.

Two studies were conducted at one of these giant ragweed locations near Paragould, Arkansas. Study one was designed to evaluate giant ragweed control with glyphosate alone. Study two was designed to evaluate several soybean herbicides for the control of giant ragweed.

In study one, Roundup WeatherMAX was applied at 11, 22, 33, 44, and 88 oz/A on 6” and 12” ragweed plants. Roundup WeatherMAX at 22 oz/A failed to control giant ragweed when applied at the 6 or 12 inch tall application timing. Treated plants often turned yellow and were significantly stunted, however these plants did not die and began to re-grow over time. Although single applications of glyphosate at 22 oz/A failed to control 6” giant ragweed, sequential applications of 22 oz/A applied at the 6” followed by the 12” timing controlled giant ragweed 90% at 20 days after treatment. Roundup WeatherMAX applied alone at 44 or 88 oz/A controlled giant ragweed over 85% when applied to 6” tall giant ragweed. These same rates controlled giant ragweed less than 60% if applications were delayed until giant ragweed was 12” tall. By 40 days after treatment, the only treatment controlling giant ragweed over 90% was a sequential application of 44 oz/A of Roundup WeatherMAX. However, a single application of Roundup WeatherMAX at 88 oz/A or a sequential application of 22 oz/A was controlling giant ragweed about 80% at either the 6” or 12” application timing. All other treatments had dropped to 70% control or less by this timing. Reductions in control for 20 to 40 days after treatment were due to regrowth. Although no crop was grown in these plots, only one germination flush of giant ragweed was observed.

In study two, Roundup WeatherMAX, Classic, Ultra Blazer, Scepter, Flexstar, Resource, FirstRate, Aim, Basagran, and Storm were applied to 6” and 12” ragweed. Only Flexstar at 1.0 pts/A and Firstrate at 0.3 oz/A applied to 6” ragweed controlled giant ragweed at least 90%. All other herbicides, including 22 oz/A of Roundup WeatherMAX provided less than 50% giant ragweed control. Giant ragweed control with both Flexstar and Firstrate at the 6” timing was above 90% up to 30 days after treatment. By 65 days after treatment, control of giant ragweed dropped to 25 and 80% with Firstrate and Flexstar, respectively.

EFFECT OF SULFONYLUREA RICE HERBICIDES ON SOYBEANS. T.W. Dillon, R.C. Scott, N.D. Pearrow, and K.A. Meins; Cooperative Extension Service, University of Arkansas, Little Rock, AR.

ABSTRACT

One of the most serious drift issues in Arkansas soybean production is the drift of sulfonylurea herbicides onto developing soybeans. Herbicides, such as, Permit and Regiment are occasionally drifted or miss-applied onto soybean fields causing severe damage in the form of stunting and delayed maturity and in some cases death. Injury symptoms include reddish to purple veins on leaves, severe stunting and chlorosis of the terminals. When this injury occurs questions often arise as to whether or not fields should be replanted, what the yield loss will be, or how long before the soybeans recover? Over the past few years a series of studies were conducted to evaluate the effect of certain rice herbicides on soybean. The objective of this research was to develop data that could be used to help make management decisions on soybean fields affected by herbicide drift.

In 2003, Permit (1.0 oz/A), Regiment (0.4 oz/A), and Stam M-4 (3.0 qt/A) were applied at full and drift rates 21 days after emergence in two studies. Both the 1 and 1/10X rates of Permit and Regiment severely injured soybean in both experiments conducted. Even the 1/100X rate of Permit and Regiment caused 58 and 100% injury at two weeks after treatment, respectively. This injury was in the form of severe stunting, chlorotic terminals, and reddish to purple leaf veins on the underside of affected plants. In terms of yield, Regiment caused the most damage in both studies. The 1X rates of both Permit and Regiment caused near 100% loss of soybean yield in both tests. However, yield reductions were more severe at the 1/10 and 1/100X rates with Regiment than those with Permit. By comparison, no yield reductions were observed with the 1/10 and 1/100X rates of Stam M4. Stam M4 was included as a comparison because over the years it has also been commonly drifted onto soybeans from adjacent rice fields and full soybean recovery is not uncommon.

In 2005, IR5878 (orthosulfamuron) and Grasp herbicides were both included along with Regiment in another simulated drift study on soybeans. Treatments were applied to 4-6" soybeans and to 8-10" soybeans. Similar results with Regiment were observed to those previously seen in the 2003 studies. By 8 weeks after treatment, 1X rates of IR 5878 (0.067 lb ai/A), Regiment (0.4 oz/A) and Grasp (2.0 oz/A) were all injuring soybean 80% or more regardless of timing. The only 1/10X rate to cause more than 10% injury after 8 weeks was Regiment. Although the 1/10X rates of both IR5878 and Grasp caused 50% injury initially when applied at the 4-6 inch timing, by the end of the season the soybean plants had recovered and yields were no lower than the Check. Larger soybean plants were able to tolerate the 1/10X rates of Regiment better than at the smaller timing. In terms of the affect on yield, soybeans were able to tolerate IR5878 better than both Regiment and Grasp, at the rates evaluated.

SOYBEAN YIELD AND GRASS CONTROL RESPONSE TO ROW SPACING, PLANTING DATE AND HERBICIDE MANAGEMENT SYSTEMS. [1]M.P. Harrison, [1]N.W. Buehring, [2]C.H. Koger and [1]R.R. Dobbs. [1]North Mississippi Research and Extension Center, Verona, MS 38879; [2]USDA-ARS Southern Weed Science Laboratory, Stoneville, MS 38776.

ABSTRACT

A study was conducted in 2005 on a Marietta silt loam and a Tunica clay soil at Verona and Stoneville, MS, respectively, to evaluate soybean yield and grass control response of a MG IV soybean variety to narrow and wide rows with selected planting dates and preemergence herbicides applied early postemergence. At Stoneville, Touchdown (glyphosate) Total (TDT) followed by (Fb) Sequence (glyphosate and metolachlor formulation mixture) showed higher late season weed control and higher yield than TDT Fb TDT and TDT Fb TDT + Prowl H2O (pendimethalin) with the April 18 and May 11 plantings. The 18-inch rows produced 5 to 7 bu/acre higher yield than 40-inch rows with April 18 and May 11 plantings with no differences between 18 and 40 inch rows for April 5 planting. The 18-inch rows showed higher late season weed control than 40-inch rows with all herbicide treatments. Foreign matter was less than 2% for all treatments.

At Verona, row spacing had no effect on weed control, yield, foreign matter and crop injury. The planting date by herbicide weed management system interaction indicated TDT Fb Sequence had higher yield than TDT Fb TDT and TDT Fb TDT + Prowl H2O planted April 5 with no herbicide treatment differences within April 20 and May 3 plantings. With the April 5 planting, TDT Fb TDT + Prowl H2O and TDT Fb and TDT Fb Sequence showed good (>80%) late season grass control and was higher than TDT Fb TDT. Late season grass control for the April 20 and May 3 plantings was excellent (>90%) for TDT Fb TDT + Prowl H2O and TDT Fb Sequence and was higher than two applications of TDT for the April 5 and May 3 plantings. TDT Fb TDT + Prowl H2O caused crop stunting and leaf crinkling across all planting dates but only produced lower yield than TDT Fb Sequence with the April 5 planting.

INTRODUCTION

The early soybean production system (ESPS) has been widely adopted in the mid-south. Primary benefits are drought avoidance (Bowers 1995; Heatherly 1999; Sweeney et al. 1995) and competitiveness during wet years (Boquet 1998; Bowers 1995). Preliminary results have shown that planting before the first of May in narrow rows (15-inch) has the potential to reduce glyphosate postemergence applications from two to one when applied 5 weeks after planting (Poston et al. 2002). However, weed resurgence can be problematic, especially when ample moisture is available during the soybean senescence period. Glyphosate plus metolachlor applied 39 days after planting reduced annual grass biomass by 31 to 38% and 15-inch rows reduced biomass by 51% compared to 30-inch rows (Poston et al. 2003). The recent label approval for Sequence (glyphosate + metolachlor formulation) for early postemergence application on soybeans has potential for late season grass control. The objective of this study was to evaluate the soybean yield and grass control response of a MG IV cultivar to narrow and wide rows with selected planting dates and preemergence herbicides applied early postemergence.

MATERIALS AND METHODS

Non-irrigated studies were conducted on a Marietta silt loam soil at Verona, MS and a Tunica clay soil at Stoneville, MS. Each study was conducted as a split-split-plot design with planting date as main plot, row spacing as the subplot and herbicide management system as sub-subplot. At Verona, plot size was four 38-inch beds wide by 40 feet long with four replications. Twin 15-inch rows and 38-inch rows were planted on 38-inch wide beds. At Stoneville, plot size was 13.3 ft by 40 feet long with four replications. Row spacings were 40-inch rows and 18-inch rows with a 26-inch skip between every four rows. Pioneer 94B73 cultivar was planted at Verona on April 5, April 20 and May 3; and April 5, April 18 and May 11 at Stoneville. Seeding rates at both locations was 137,000 seed/acre for all treatments.

Herbicide treatments at both locations were: TDT at 23 oz/acre Fb TDT at 26 oz/acre; TDT at 23 oz/acre Fb TDT + Prowl H2O at 26 oz/acre + 48 oz/acre for Stoneville and 26 oz/acre + 34 oz/acre at Verona, TDT at 23 oz/acre Fb Sequence at 48 oz/acre and the untreated check. All herbicides at both locations were applied as postemergence applications at 15 GPA using 8002VS nozzles. POT herbicide applications to each planting date were made when grasses were 2 to 5 inches tall at Verona and 1 to 3 inches at Stoneville. The first POT herbicide applications at Verona were made when each planting date had soybeans in the VC to V1 growth stage and early R1 at the second

POT application. The first POT herbicide applications at Stoneville were made when each planting date had soybeans in the V1 to V2 growth stage and V3 to V4 at the second POT applications. High grass infestations were observed at Verona with barnyardgrass (Echinochloa crus-galli) being the predominant grass species with some southern crabgrass (Digitaria ciliaris) at Verona. At Stoneville, weed infestations were light with the predominant species being barnyardgrass.

The center four 15-inch rows and center two 38-inch rows were harvested at Verona with a plot combine. The center four 18-inch rows and center two 40-inch rows were harvested at Stoneville with a plot combine. All plot seed samples were weighed before and after being cleaned with a three-sieve cleaner. The unclean seed weight minus the cleaned seed weight was divided by the unclean seed weight x 100 to determine the percent foreign matter. The clean seed weights and percent seed moisture were used to calculate soybean yield at 13% moisture. Data was subjected to SAS mixed procedure analysis and means were separated using Fisher's Protected LSD at the 5% probability level.

RESULTS AND DISCUSSION

VERONA**:** The 2005 soybean growing season was highly variable with 27% of normal rainfall in May; 17% above normal for June of which all occurred the first 13 days of June followed by a 3 week dry period through July 4. Rainfall for July 5 through the end of July was 85% above normal; and no significant rainfall was received in August. The early growing season temperature for April and early May was below normal.

Row spacing had no effect on soybean yield, foreign matter, and grass control or crop injury. Analysis indicated the only interactions were herbicide weed management system by planting date for grass control, yield and foreign matter. Herbicide weed management systems also affected crop injury. All data were pooled when there were no interactions.

Herbicide treatments across all planting dates produced higher yields than the untreated checks (Table 1). Soybean yield ranged from 10.1 bu/acre for the untreated check, planted April 5 to 52.4 bu/acre for the April 20 planting TDT followed by (Fb) Sequence TDT application. For the April 5 planting, TDT Fb Sequence with a yield of 43.5 bu/acre was higher than TDT Fb TDT, TDT Fb TDT + Prowl H2O and the untreated check. This treatment yield also was equal to TDT Fb Sequence and two applications of TDT for the May 3 planting. Each herbicide weed management treatment produced higher yield for the April 20 planting than the April 5 and May 3 plantings. Except for the untreated checks, both April 20 and May 5 plantings showed no yield differences between herbicide weed management treatments. The higher yield for April 20 planting was possibly due to the 85% above normal rainfall in July, which occurred during the pod fill period for April 20 planting. Except for the untreated checks in the April 5 and May 3 planting and April 5 planting TDT Fb TDT, all treatments showed no differences in foreign matter (Table 1). These treatments were lower in foreign matter than the April 5 and May 3 plantings untreated checks and TDT Fb TDT planted April 5.

Prowl H2O caused 7% sustained crop injury throughout the growing season and was higher than TDT Fb TDT and TDT Fb Sequence applications which showed no crop injury (Table 2). Grass control on June 15 and percent grass free on August 29 indicated across all planting dates that TDT Fb Sequence showed greater than 89% control and grass free (Table 2). TDT Fb TDT with the April 20 and May 3 plantings showed higher grass control on June 15 and higher percent grass free on August 29 than the TDT Fb TDT April 5 planting. On June 15 TDT Fb TDT + Prowl H2O showed excellent grass control (>90%) on all planting dates. However, on August 29 the April 5 planting TDT Fb TDT + Prowl H2O showed 81% grass free and was lower than the April 20 and May 3 plantings which showed greater than 91% grass free.

STONEVILLE: Growing conditions in 2005 were dry with 1.59, 2.11, 0.73, 4.19 and 2.98 inches of rainfall for April, May, June, July and August, respectively. However, yields were above average. Herbicide weed management affected yield and there was a planting date by row spacing interaction. However, there was no planting date by herbicide, row spacing by herbicide or planting date by herbicide by row space interactions for yield. The pooled data indicated the treatment of TDT Fb Sequence yield of 45.8 bu/acre was higher than TDT Fb TDT, TDT Fb TDT + Prowl H2O and the untreated check (Table 3). The untreated check, TDT Fb TDT and TDT Fb TDT + Prowl H2O showed no yield differences. The April 5 planting indicated no yield differences between 18-inch and 40-inch row with 44 bu/acre yield (Table 4). However, the April 18 and May 11 plantings indicated the 18-inch rows produced about 5 to 7 bu/acre higher yield than 40-inch rows.

Late season (August) weed control indicated only a row spacing by herbicide weed management interaction (Table 3). Except for the untreated check, the 18-inch rows with all herbicide treatments showed greater weed control than 40-inch rows across all herbicide treatments. TDT Fb Sequence which was the highest yield treatment also showed higher weed control than TDT Fb TDT and TDT Fb TDT + Prowl H2O and the untreated check in both 18 and 40-inch rows.

Plant population showed a planting date by row spacing interaction. There was no herbicide by row spacing, planting date by herbicide or herbicide by row spacing by planting date interactions. Plant populations ranged from 106,800 to 155,200 plants/acre (Table 4). For the April 5 planting, the 40-inch row populations of 155,200 plants/acre were greater than 18-inch rows. The higher plant population in the 40-inch vs 18-inch row spacing was attributed to an error in planter settings made prior to planting. The April 18 planting population ranged from 129,800 to 131,700 plants/acre with no differences between row spacing. The 40-inch row population of 106,800 plants/acre was lower than 18-inch row with 126,000 plants/acre planted May 11. The lower population for the 40-inch row May 11 planting was attributed to extremely dry conditions after planting and inconsistent emergence and stand establishment, which subsequently may have influenced the lower yield for the May 11 planting. Row spacing and herbicide weed management systems had no effect on percent foreign matter (data not shown). The foreign matter content was 2% or less across planting dates and row spacing.

CONCLUSION

TDT Fb Sequence showed higher late season weed control and higher yield than TDT Fb TDT and TDT Fb TDT + Prowl H2O at Stoneville with the April 18 and May 11 plantings. The 18-inch rows produced 5 to 7 bu/acre higher yield than 40-inch rows with April 18 and May 11 plantings with no differences between 18 and 40-inch rows for the April 5 planting. The 18-inch rows showed higher late season weed control than 40-inch rows with all herbicide treatments. Foreign matter was less than 2% for all treatments.

On a Marietta silt loam soil at Verona, row spacing had no effect on weed control, yield, foreign matter and crop injury. The planting date by herbicide weed management system interaction indicated TDT Fb Sequence had higher yield than TDT Fb TDT and TDT Fb TDT + Prowl H2O planted April 5 with no herbicide treatment differences within April 20 and May 3 plantings. With the April 5 planting, TDT Fb TDT + Prowl H2O and TDT Fb and TDT Fb Sequence showed good (>80%) late season grass control and was higher than TDT Fb TDT. Late season grass control for the April 20 and May 3 plantings was excellent (>90%) for TDT Fb TDT + Prowl H2O and TDT Fb Sequence and was higher than two applications of TDT for the April 5 and May 3 plantings. TDT Fb TDT + Prowl H2O caused crop stunting and leaf crinkling across all planting dates but only produced lower yield than TDT Fb Sequence with the April 5 planting.

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Table 1. Soybean yield and foreign material as influenced by herbicide and planting date, averaged over row spacing in 2005, Verona, MS.

Post Herbicide[1]	Rate Oz/A	Planting date Apr 5	Apr 20	May 3	Planting date Apr 5	Apr 20	May 3
		Bu/A			% Foreign matter		
1. UT check	-----	10.1	27.1	11.4	21	9	21
2. Touchdown Total (TDT) Fb TDT	23 23	29.1	50.4	40.6	14	6	8
3. TDT Fb TDT + Prowl	23 23 + 34	35.7	45.8	37.7	10	7	8
4. TDT Fb Sequence	23 48	43.5	52.4	41.4	8	5	7
Across or WI. Herb LSD .05		4.8			Across or WI. Herb LSD .05		5
WI. P. Date LSD .05		6.9			WI. P. date LSD .05		4

[1]Herbicide applications on all plantings were made when the grass was 2 to 5 inches tall. Soybeans were in the VC to V1 growth stage for the first herbicide application and early R1 reproductive stage for the second herbicide application.

Table 2. Crop planting date and injury as influenced by herbicide, averaged over planting date and row spacing; and grass control as influenced by herbicides, averaged over row spacing in 2005, Verona. MS.

Herbicide[1]	Rate Oz/A	Dates 6/15	8/29	Planting date Apr 5	Apr 20	May 3	Apr 5	Apr 20	May 3
		% crop injury		6/15/05 % Grass control			8/29/05 % Grass Free		
1. UT check	-----	0	0	0	0	0	8	41	23
2. TDT TDT	23 23	0	0	74	95	94	58	91	81
3. TDT TDT + Prowl	23 23 + 24	7	7	93	95	95	81	98	92
4. TDT Fb Sequence	23 48	0	0	94	95	95	90	97	93
	LSD .05	3	2	Across or WI Herb LSD .05		2	Across or WI Herb LSD .05		10
				WI. P. Date LSD .05		2	WI. P. Date LSD .05		10

[1]Herbicide applications on all plantings were made when the grass was 2 to 5 inches tall. Soybeans were in the VC to V1 growth stage for the first herbicide application and in the early R1 reproductive stage for the second herbicide application.

Table 3. Yield response to herbicide weed management systems on a Tunica clay soil, averaged over planting dates and row spacings; and late season weed control, averaged over planting date in 2005, Stoneville, MS.

Post Herbicide	Rate Oz/A	Yld. Bu/A	----------------Row space (in)-------------- 18	40
			----------% Weed control---------	
1. UT check	-----	40.2	0	0
2. TDT FB	23			
TDT	23	42.3	86	75
3. TDT FB	23			
TDT + Prowl	23 + 48	41.2	77	53
4. TDT Fb	23			
Sequence	48	45.8	98	89
	LSD .05	2.9		
			WI. R. space LSD .05	3
			Across &WI. R. herb LSD .05	3

Table 4. Plant population and yield response to row spacing and planting date, averaged over weed management system on a Tunica clay soil in 2005, Stoneville, MS.

Planting date	----Row spacing (in)--- 18	40	----Row spacing (in)--- 18	40
	-----------Bu/ac------------		--------------Plants/A x 1000--------	
April 5	44.4	44.2	122.3	155.2
April 18	49.7	42.3	131.2	129.8
May 11	39.7	34.0	126.1	106.8
WI. R. space LSD .05	3.5		WI. P. date LSD.05	8.3
WI. P. date LSD .05	3.5		Across and WI. R. Space LSD .05	7.8

IMPACT OF CULTURAL PRACTICES IN ROUNDUP READY® SOYBEAN ON RED RICE. J.A. Bullington, N.R. Burgos, K.L. Smith, B.A. Pearson, V.K. Shivrain, and J.R. Meier; University of Arkansas, Fayetteville, AR

ABSTRACT

Red rice (*Oryza sativa*) has always been a major weed problem for rice producers in the Mississippi River Delta. Red rice is of the same genus and species as commercial rice, which makes its removal a problem in rice culture. Commercial rice crop losses are estimated at 50 million dollars each year. Soybean crop losses from red rice cost producers more than 30 million dollars a year. Red rice is also a growing concern in soybean production fields. However, Roundup Ready® technology in soybeans has provided another option for red rice control. Although glyphosate is very effective in red rice control, high red rice density and season long germination patterns result in incomplete control. A single red rice plant can produce 1500 or more seeds per year. Both cultural and herbicidal practices are crucial factors to aid in the removal of red rice, and to eliminate future populations. The objectives of this study were to determine the effects of row spacing, soybean maturity groups, and timing of glyphosate application on red rice control and soybean yield.

Experiments were conducted at the Southeast Research and Extension Center at Rohwer, AR, and at the Rice Research and Extension Center at Stuttgart, AR, during the summer of 2005. The experimental design was split-split plot with four replications. Main plot was row spacing, subplot was cultivar, and sub-subplot was treatments. The two row spacings were 22.5 and 7 in, representing planter-spaced and drill-spaced soybean cultures, respectively. The two soybean cultivars used were a mid-group 4 (DK4461) and a mid-group 5 (DK5465). Each cultivar was planted at 50 lb/A (175,000 seeds/A). Red rice was drilled over the entire plot area at 20 lbs/A. Glyphosate (Roundup WeatherMAX®) at 0.75 lb ae/A was applied: 1) once 4 weeks after planting (WAP); 2) sequentially at 4 and 6 WAP; and 3) sequentially at 4 WAP and at red rice flowering. Visual ratings of red rice injury were made 2 weeks after each treatment by comparing the treated plots to untreated areas. Density, height, and seed weight of red rice was collected at soybean maturity. Red rice seeds collected from the surviving plants were tested for viability. Soybean yield and height were also collected at harvest. Data were subjected to ANOVA using PROC GLM in SAS. Means were separated using Fisher's Protected Least Significance Difference (LSD) at $\alpha = 0.05$.

At Rohwer, soybean yield and height were not affected by glyphosate treatments. Soybean yields from the two cultivars were similar regardless of spacing or glyphosate application. Red rice control at 6 WAP was affected only by cultivar differences, with the taller group 5 soybean providing 90% red rice control and the shorter group 4 soybean providing 85% when averaged over row spacing and glyphosate timing. Complete red rice control 8 WAP was achieved with the sequential 4 & 6 WAP applications in both cultivars and both row spacings. Red rice control 2 weeks after the late application timing showed 3 two-way interaction with all factors. Averaged over glyphosate timings, red rice control was greater than 85% with group 5 beans planted in 22.5 inch rows. When averaged over row spacing, red rice control was greater than 80% with group 4 & 5 soybeans and both sequential applications. Averaged over cultivar, red rice control was greater than 80% with the both sequential applications and at both row spacings. Plots that received only a single application had 12-inch-tall red rice in the 22.5-inch row spacing and 3-inch-tall red rice in the 7.5-inch row spacing. Red rice in the plots treated with the sequential applications had 1-inch-tall red rice in the 22.5-inch row spacing and 2-inch-tall red rice in the 7.5-inch row spacing. . Data from Rohwer was as expected, with poor control from the single application and good control with the sequential applications. Early in the season red rice control was better in the group 5 cultivar than the group 4 because of group 5 vigorous growth, but late in the season, control was affected more by the narrower row spacing.

At Stuttgart soybean yield and height again were not affected by the glyphosate treatments. Soybean yields did not differ between cultivars regardless of glyphosate timing or row spacing. Red rice control 6 WAP was affected by an interaction between cultivar and row spacing. When averaged over herbicide timing, 75% control was achieved with group 4 & 5 soybeans planted at 22.5 inches. Red rice control 8 WAP was affected by two-way interactions of cultivar & row and cultivar & herbicide timing. When averaged over herbicide timing, control was 50% using both soybean cultivars planted at both row spacings. When averaged over row spacing, 60% control was achieved using group 4 soybean with sequential treatments at 4 and 6 WAP. At the last rating time, red rice was controlled best with glyphosate applied sequentially 4 WAP and red rice flowering. Red rice density was also greatly reduced over all treatments; the mean initial stand count was 5 plants/ft^2, and the mean final stand count was 1 plant/ft^2. Red rice height and seed weight were both reduced with all the glyphosate timings. At both locations, the only plots that produced seed were the plots that received only the single application of glyphosate. The seeds produced had an average germination of only 40% across the single treatments.

POST-APPLIED RESIDUAL HERBICIDES IN AN EARLY-PLANTEDGLYPHOSATE-RESISTANT SOYBEAN SYSTEM. J.M. Prince, D.R. Shaw, L.A. Farno, D.H. Poston, C.H. Koger, T.W. Ewbank[1], and C.J. Gray[2]; [1]Mississippi State University, Mississippi State and Stoneville, MS; [2]University of Florida, Fort Lauderdale, FL.

ABSTRACT

Field experiments were conducted during 2004 and 2005 at sites in Brooksville, Starkville, and Stoneville, MS, to evaluate the effects of residual grass herbicides applied mid-POST in tank-mixes with glyphosate on early-planted glyphosate-resistant soybean [*Glycine max* (L.) Merr.] at two row spacings for annual grass control. Glyphosate was also applied alone at early- or mid-POST, as well as sequential applications at these timings. It was thought that tank mixtures of glyphosate with metolachlor, flufenacet, dimethenamid, or pendimethalin might provide added residual control for subsequent weed flushes that would arise after the initial control from glyphosate. Treatments for each spacing varied by the application rate and application tank-mix. Weed control was evaluated at two and six weeks after mid-POST application, except in 2005 at Stoneville where a six-week rating was not taken. Results were pooled across location and year.

At two weeks, the only significantly different treatment was a 0.69 kg/ha early-POST application of glyphosate with no tank-mix or M-POST treatment, which was not as effective as the other treatments. No differences in row spacing with regard to control were noted at this evaluation timing. At six weeks, all treatments containing a tank mixture were more effective than applications of glyphosate alone, but were not different from one other. A 0.69 kg/ha early-POST application of glyphosate was not different than the untreated check. At this evaluation timing weed control in the 38-cm row spacing was better than control in the 76-cm row spacing.

At two weeks, the highest injury (~20%) resulted from applications of glyphosate tank-mixed with flufenacet in a mid-POST application. With the exception of 12% injury resulting from a 0.69 kg/ha glyphosate plus 0.64 kg/ha pendimethalin application, all other treatments were not different, with injury being < 7%. Soybean injury at six weeks was < 7%.

Soybean yields in the 36-cm row spacing were higher than in the 76-cm row spacing. However, no significant differences in yield were seen for any chemical treatments, regardless of tank-mix or application timing.

EFFECT OF DENSITY AND INTERFERENCE PERIOD OF ROUNDUP READY COTTON INFESTATION IN ROUNDUP READY SOYBEAN. D.R. Lee, D.K. Miller and M. Mathews; Louisiana State University, St. Joseph, LA.

ABSTRACT

Field studies were conducted in 2005 at the Northeast Research Station in St. Joseph, La. in a relatively weed-free area to evaluate competitiveness of Roundup Ready cotton as a weed in a Roundup Ready soybean crop. In a density study, 'PM 1218 RR' cotton was planted with the crop ,approximately 2 inches beside 'DP 5644 RR' soybean, and thinned after emergence to densities of 0, 2, 4, 8, 16, 32, and 64 plants per 40 row ft (0, 0.05, 0.1, 0.2, 0.4, 0.8, and 1.6 plants per row ft) and allowed to compete season-long. In an interference period/removal timing study, 'PM 1228 RR' cotton was planted approximately 2 inches beside 'DP 5644 RR' soybean and thinned to a density of 64 plants per 40 row ft (1.6 plants per row ft) after emergence. Cotton was allowed to compete for 0, 1, 2, 3, 4, 5, 6, 7, or 8 wk and season-long. Cotton was manually removed at each removal timing. The study areas were kept weed-free throughout the season with glyphosate applications through a hooded sprayer. Crop yield was determined following mechanical harvesting. Both experiments were designed as a randomized compete block with four replications. Data were subjected to regression analysis.

Low cotton densities resulted in minimal competition with the soybean crop with a yield reduction of only 0.6 and 3.7% observed for a cotton density of 0.1 and 0.4 plants per row ft, respectively. Higher densities increased competitiveness of cotton as a soybean yield loss of 10.7 and 34.9% was observed with 0.8 and 1.6 cotton plants per row ft, respectively. Analysis indicated an expected soybean yield loss of 5.1 and 15.5% if cotton densities of 0.5 and 1 plant per row ft, respectively, are allowed to compete with soybean season-long.

Cotton interference at a density of 1.6 plants per row ft with soybean for a period of 1 to 5 weeks after emergence resulted in yield loss ranging from 4.5 to 5.5%. Allowing cotton to compete with soybean for a period of 8 weeks after emergence resulted in a yield loss of 10.5%. Season-long competition reduced soybean yield 43.3%.

Based on results, Roundup Ready cotton does not appear to be a very strong competitor with Roundup Ready soybean. Further research is needed to address impact of additional parameters including effects on harvest efficiency and insect infestations.

ANNUAL GRASS CONTROL IN MISSISSIPPI SOYBEAN WITH KIH-485 AND OTHER RESIDUAL HERBISIDES. T.W. Eubank[1], D.H. Poston[1], C.H. Koger[2], V. Nandula[1], and M.E. Kurtz[3]. [1]Delta Research and Extension Center, Mississippi State University, Stoneville, MS 38776; [2]USDA-ARS Crop Production and Genetics Research Unit, Stoneville, MS 38776, [3]Kumiai Chemical Industry Co., LTD, Leland, MS 38756. (37)

ABSTRACT

The advent of early-maturing herbicide-resistant soybean varieties and the trend toward early planting has led to a decrease in the use of preemergence herbicides and an increase in late-season grass pressure in Mississippi soybean (*Glycine max*). Mississippi has widely adopted the Early Soybean Production System (ESPS). In 2004, approximately 89% of the Mississippi soybean crop was planted by May 3 and 90% harvested by early October. Glyphosate only weed control systems may promote annual grass infestations in early-planted soybean. Glyphosate provides excellent control of most annual grasses but has no residual activity to control later emerging grasses. Weed resurgence during soybean senescence is likely with the ESPS especially during periods of ample rainfall. This resurgence can result from newly germinated weeds or the recovery of weeds initially suppressed by the soybean canopy. Weeds present at harvest can reduce soybean yields and may interfere with combine efficiency. These weeds may increase soybean moisture, dockage, and foreign material resulting in loss profits for producers. Postemergence applications of residual herbicides mixed with glyphosate may reduce late-season annual grass infestations in early-maturing soybean.

KIH-485 is an experimental preemergence herbicide being developed by Kumiai Chemical Industry Co. that is currently being evaluated in several major crops including corn, cotton, and soybean. Based on early field evaluations, KIH-485 will be applied at much lower use rates and may have longer soil residual than products currently available to producers. Consequently, KIH 485 could potentially provide season-long annual grass control in early-maturing soybean.

Field studies were conducted in 2005 at the Delta Research and Extension Center in Stoneville, MS to: 1) determine the preemergence weed control spectrum and length of residual for KIH-485 and compare results to other commercially available residual herbicides; and 2) evaluate KIH-485 and other residual herbicides applied postemergence with glyphosate to early-planted soybean and compare results to glyphosate only systems.

All studies were conducted using a randomized complete block design. Pioneer 94M30RR soybeans were planted April 25 for preemergence studies and April 20 for postemergence studies using a 30-inch row spacing. Plots were 10 x 40 feet. Treatments were made using a tractor-mounted sprayer applying 15 GPA @ 38 psi with Teejet XR11002VS nozzles. Yield was determined by harvesting the two center rows of each plot and soybean yield was adjusted to 13% moisture.

GLYPHOSATE STEWARDSHIP PROGRAMS IN ROUNDUP READY CORN. W.K. Vencill, Univeristy of Georgia, Athens.

ABSTRACT

Field studies were conducted inField studies were conducted at the Southwest Georgia Branch Experiment Station near Plains, GA and at the Plant Sciences Farm near Athens, GA to examine weed management systems to examine weed management systems to improve glyphosate (Roundup) efficacy and weed resistance management. The experimental design consisted of a 4 x 4 factorial design was used in which three rates of metoalchlor (0, 0.45, 0.65, and 0.9 lb ai/A applied preemergence) and four timings of glyphosate applied at 0.75 lb ae/A (2, 4, 6, and 8 weeks after emergence) were examined. Three replicates of all treatments were made. Visual weed control was observed at 90-100 days after application. The metolachlor by glyphosate interaction was not significant so combined data were used. Lower rates (0.45 and 0.65 lb/A) of metolachlor applied preemergence followed by glyphosate provided equivalent Palmer amaranth, sicklepod, and tall morningglory control to treatments containing a full rate of metolachlor (0.90 lb/A). As expected, timely applications of glyphosate (2 and 4 weeks after emergence) resulted in better corn yields than those treatments where glyphosate was applied six and eight weeks after emergence regardless of metolachlor rate applied.

A COMPARISON OF ACCENT AND OPTION FOR TEXAS PANICUM CONTROL IN FIELD CORN.
E.P. Prostko* and T.L. Grey, Department of Crop & Soil Sciences, The University of Georgia, Tifton, GA 31793.

ABSTRACT

Texas panicum (*Panicum texanum*), also known as Texas millet, buffalograss, or bullgrass is considered to be one of the most troublesome weeds of field corn in the southeast. Accent (nicosulfuron) is a postemergence grass herbicide that is routinely applied for the control of Texas panicum in field corn. Option (foramsulfuron) was registered for postemergence grass control in field corn in 2002. Limited studies have compared the effectiveness of Accent and Option for Texas panicum control. Four field trials were conducted in south Georgia in 2004 and 2005 to compare Accent and Option for the control of Texas panicum in irrigated field corn. Traditional small plot techniques were utilized. All herbicide treatments were applied with a back-pack sprayer calibrated to deliver 15 GPA using 11002DG flat-fan nozzle tips. Atrazine (1-1.5 lb ai/A) was applied postemergence in combination with either Accent 75WDG (0.67 ozs/A or 0.031 lb ai/A) or Option 35WDG (1.5 ozs/A or 0.033 lb ai/A). Adjuvants, such as crop oil concentrates, methylated seed oils, and nitrogen were used according to labeled directions. Applications were made to 1" to 4" tall Texas panicum. The treatments were arranged in a randomized complete block design with four replications. All data were subjected to analysis of variance (ANOVA) and means separated using Duncan's Multiple Range Test at P = 0.05. Results indicated that Accent provided statistically better control of Texas panicum at 4 of 15 rating dates (27%) when compared to Option. However, no differences in corn yield between Accent and Option treated plots were observed.

RESIDUAL WEED CONTROL ACTIVITY OBSERVED FROM COMMONLY USED PRE AND POST HERBICIDES IN COTTON. D.M. Scroggs[1], D.K. Miller[2], J.L. Griffin[3], P.R. Vidrine[1], A.M. Stewart[1], and M.S. Mathews[2]. LSU AgCenter, Alexandria[1], St. Joseph[2], and Baton Rouge[3], LA.

ABSTRACT

Field trials were conducted in 2005 at both the Dean Lee and Northeast Research Stations in Alexandria and St. Joseph, LA, respectively, to evaluate the effectiveness of commonly used cotton herbicides applied PRE alone or in combination with Dual II Magnum (s-metolachlor). The experiment consisted of selected cotton herbicides [Envoke (trifloxysulfuron) at 0.15 oz/a, Staple (pyrithiobac) at 0.8 oz/a, and Cotoran (fluometuron) at 1.2 qt/a applied alone and in combination with Dual II Magnum at 1.33 pt/a. An untreated check was also included but used for visual comparisons and as a yield figure estimator only, and was not included in analysis of data. Weeds evaluated in Alexandria included pitted morningglory (*Ipomoea lacunosa* L.), palmer amaranth (*Amaranthus palmeri S.Wats.*), hemp sesbania (*Sesbania exaltata* (Raf.) Rydb. Ex A. W. Hill), and barnyardgrass (*Echinochloa crus-galli* (L.) Beauv.), while at St. Joseph weeds included pitted morningglory, redroot pigweed (*Amaranthus retroflexus* L.), hemp sesbania, and barnyardgrass. Experiments were conducted in a randomized complete block design with three replications at Alexandria and four replications at St. Joseph. Treatments were applied with a tractor mounted compressed air sprayer in Alexandria and a CO_2 back-pack sprayer at St. Joseph using 15 GPA. POST applications of glyphosate were made to each treatment at Alexandria as needed. POST applications of Envoke and Select (clethodim) were made at St. Joseph at the conclusion of the experiment. Soil type at these respective locations was a Norwood silt loam and Commerce silt loam. Visual weed control was determined 14 and 28 d after treatment, but only the final rating interval data is reported. Seed cotton yield was collected at both locations and expressed as a multiplier of the untreated check at St. Joseph. Data were subjected to GLM analysis and means separated using p-diff at the 0.05 level of significance.

With respect to visual weed control at Alexandria 28 DAT, Cotoran controlled pitted morningglory 90%, which was equal to Staple (83%) and better than Envoke (70%). Results for palmer amaranth, hemp sesbania, and barnyardgrass control indicated no differences between treatments and all were controlled from 79 to 85%, 80 to 90%, and 73 to 81% respectively. The addition of Dual II Magnum increased control of pitted morningglory from 77 to 85% and barnyardgrass from 58 to 93%, but did not affect the control of palmer amaranth and hemp sesbania.
At St. Joseph 28 DAT, Cotoran controlled hemp sesbania 95% which was better than both Staple and Envoke (81%). Cotoran also controlled barnyardgrass 91% which was better than Envoke (83%) and equal to Staple (84%). The addition of Dual II Magnum increased control of hemp sesbania from 82 to 89% and barnyardgrass from 78 to 96%, but did not increase control of morningglory or redroot pigweed. At St. Joseph, an increase in yield was observed following co-applications of herbicides evaluated and Dual II Magnum. The addition of Dual II Magnum increased yield from 3.9 to 7.7 times greater than the untreated check. In addition, Staple provided yield 7.7 times greater than the untreated check which was equal to Cotoran (6.2) and was greater than Envoke (3.6). At Alexandria, no differences were noted between all treatments evaluated, resulting in an average yield of 3000 lbs. sc/A. This outcome may be due to the fact that POST applications of glyphosate were applied to each treatment when needed. For all treatments evaluated at both locations, no indications of crop injury were present.

CONVENTIONAL HERBICIDE SYSTEMS FOR DARK TOBACCO. W.A. Bailey, T.W. Lax, and R.A. Hill; Department of Plant & Soil Sciences, University of Kentucky, Princeton, KY 42445.

ABSTRACT

Herbicide options for dark tobacco are limited to sulfentrazone (Spartan®), clomazone (Command®), pendimethalin (Prowl®), napropamide (Devrinol®), pebulate (Tillam®), and sethoxydim (Poast®). Questions from tobacco growers regarding herbicide performance resulted in research being conducted to compare crop response and weed control from available herbicides. Research was conducted in 2005 at the Murray State University Research Farm in Murray, KY. Plots were conventional tillage and arranged in a randomized complete block design with 4 replications of treatments. Treatments included Spartan 4F (12 oz/A) preemergence (PRE), Command 3ME at 2.67 pt/A PRE, Spartan 4F (12 oz/A) plus Command 3ME (2.67 pt/A) PRE, Prowl 3.3EC (3.6 pt/A) preplant incorporated (PPI), Prowl 3.3EC (3.6 pt/A) PPI followed by (fb) Spartan 4F (12 oz/A) PRE, Tillam 6E (2.67 qt/A) PPI, Devrinol 50DF (4 lb/A) PPI, Tillam 6E (2.67 qt/A) plus Devrinol 50DF (4 lb/A) PPI, and an untreated check. Herbicides were applied within 48 hrs prior to transplanting 'Narrowleaf Madole' dark fire-cured tobacco. All plots were cultivated twice early in the season. Crop injury from herbicide treatments was mild (≤10%) and was seen as temporary stunting from Prowl fb Spartan. Late-season control of large crabgrass was best with Spartan plus Command or treatments that contained Prowl. Common ragweed control was best with treatments that contained Command or Devrinol, while *Ipomoea* morningglory species were controlled most effectively with treatments that included Spartan. Dark fire-cured tobacco yield ranged from 1392 to 1745 lb/A and was highest with Spartan plus Command or Tillam plus Devrinol treatments.

ENVOKE AND PERMIT PERFORMANCE IN DARK TOBACCO. W. A. Bailey; Department of Plant & Soil Sciences, University of Kentucky, Princeton, KY 42445.

ABSTRACT

Herbicide options for weed control in dark tobacco are limited to sulfentrazone, clomazone, pendimethalin, napropamide, pebulate, and sethoxydim. Pre-transplant combinations of sulfentrazone and clomazone are the most popular herbicide systems in dark tobacco production. However, inadequate control of certain weed species has been observed with this system when dry conditions or heavy rainfall occur following application. Currently, no herbicides are registered for postemergence control of broadleaf weeds or nutsedge that may escape sulfentrazone plus clomazone applications. Experiments were conducted in 2003 and 2004 at the University of Kentucky Research and Education Center near Princeton, KY and at the Murray State University Research Farm near Murray, KY to evaluate crop tolerance and weed control from the sulfonylurea herbicides trifloxyfulfuron-sodium (Envoke™) and halosulfuron-methyl (Permit™). Each herbicide was applied postemergence over-the-top (POT) or postemergence-directed (PD) at two application rates. POT applications were made 1 month after transplanting and PD applications were made 2 months after transplanting. Application rates were 0.067 and 0.1 oz/A for Envoke and 0.67 and 1 oz/A for Permit. Either herbicide applied POT caused crop injury and plant height reductions at 1 wk after treatment (WAT). However, tobacco appeared to recover by 3 WAT. Permit appeared to be slightly more injurious to tobacco than Envoke. Crop tolerance to PD applications was much more acceptable. Late-season weed control was also more effective with PD applications, most likely due to late weed emergence that occurred between the time of POT and PD applications. Control of *Ipomoea* morningglory species was best with Permit PD (88 to 93%). Yellow nutsedge control was also best with Permit PD at 1 oz/A. Neither herbicide effectively controlled horsenettle. Although there were no significant differences in total dark tobacco yield, there were trends toward lower yield with tobacco that received POT applications of either herbicide. Leaf quality index and gross revenue/A were significantly lower with Permit POT at Princeton.

MANAGING SMALL GRAINS COVER CROPS IN COTTON T. A. Baughman, J. C. Reed, Jr., and W. G. Carter III; Texas A&M University Agricultural Research and Extension Center, Vernon, TX 76384

ABSTRACT

Loss of seedling cotton to blowing sand is always a concern to many growers in the Rolling Plains of Texas. This along with interest in methods to reduce production cost has led to questions on ways to incorporate conservation tillage into their current production practices. However, due to potential damage from blowing winds on many soils in this region some type of cover crop must be established during the fallow period for a conservation tillage system to work. This leads to concern over loss of moisture and subsequent yield reductions as the result of the establishment and growth of the cover crop. Previous research had indicated that a successful conservation tillage system could be developed with the incorporation of a modified cover crop system (2-rows of wheat or rye planted in the crop middles). This research along with crop insurance concerns led to questions on the effects of cover crop termination timing on cotton yields. Experiments were established in the Rolling Plains at the Texas Agriculture Experiment Station near Chillicothe, TX. Plot size was 8, 40-inch rows wide by 100 feet long and consisted of four replications. Paired rows of wheat or rye were planted in standing cotton stalks on October 18, 2002; November 13, 2003; and October 5, 2005. Termination timings consisted of 0 (boot stage), 10%, 25%, 50%, 75%, and 100% heading stage and prior to planting.

Rye growth progressed from boot to 100% heading in 24 to 41 days. Wheat growth reached the boot stage later than rye in all three years but took less time to progress from boot to 100% heading (19 to 21 days). Rye generally performed better as a cover crop and produced more early and late season growth than wheat. Cotton lint yields were similar between wheat and rye in two of three years. Cotton lint yields were extremely low in 2003 due to dry weather. Yields were higher in 2003 with no cover crop compared to where a cover crop was planted irregardless, of termination timing. Yields were only reduced with the 100% heading and the prior to planting treatments in 2004 when compared to no cover crop. Termination timings did not affect cotton yields in 2005. This research along with previous research indicates that cover crops can be effectively used in a dryland cotton production system within the Rolling Plains region of Texas. Cotton yields have only been reduced one year in six when the cover crop was terminated by 50% heading. In addition, the benefits of a cover crop (lost time, labor, investment, and crops) most likely outweigh the years in which yields are reduced from the planting of a cover crop.

EVALUATION OF CARFENTRAZONE-ETHYL FOR BROADLEAF WEEDS CONTROL IN WHEAT CROP. S.D. Sharma[1], S.S. Punia[2], R.K. Malik[2] and M. Singh[1], [1]University of Florida, IFAS, Citrus Research and Education Center, Lake Alfred, FL and [2]CCS Haryana Agricultural University, Hisar, India

ABSTRACT

The study was conducted to evaluate carfentrazone considering risk of resistance development and to examine a new chemical for broadleaf weed control in wheat crop. Field experiments were conducted for three years (2002-03 to 2004-05) at CCS Haryana Agricultural University, Regional Research Station Karnal, India in wheat cv. PBW-343 in a randomized block design, replicated thrice in a plot size of 5.4 x 2.1 m^2. Wheat crop was sown between 29th November to 4th December and harvested in the second week of April during these years. The soil of the experimental field was sandy clay loam in texture having pH 8.1 and organic carbon 0.35%. Treatments of carfentrazone 40 DF were applied at 15, 20, 25, 30, 35 and 40 g a.i./ha; metsulfuron at 4 g a.i. /ha and sulfosulfuron at 25 g a.i./ha and were compared with each other, weedy and weed free plots. All the herbicides were applied at 35 days after sowing by knapsack sprayer with flat fan nozzle delivering 300 L water/ha volume.

The field was infested with *Convolulus arvensis, Coronopus didymus, Rumex spps, Melilotus alba*, and *Phalaris minor*. Broadleaf weed plants became necrotic few days after the application of herbicide carfentrazone and were dead with in few days. Carfentrazone had some scorching effect on leaves of wheat crop which later on recovered and have no effect on the grain yield. Increasing rate of carfentrazone from 15 g to 40 g a.i./ha increased the percent control of broadleaf weeds from 75 to 90 % which was at par with 2,4-D and metsulfuron. Weed population and dry weight of broadleaf weeds also confirm with the similar observations as of percent weed control. Grain yield and number of tillers were significantly higher under sulfosulfuron, due to the effective control of *Phalaris minor*, and weed free treatments than carfentrazone, 2,4-D and metsulfuron treatments. However, during the third year of study, clodinafop was sprayed in the whole experiment for the control of *P. minor* including the weedy plot to differentiate the effect of broadleaf weed population on the growth and yield parameters of wheat crop. Number of tillers and grain yield under carfentrazone treatments were significantly higher than weedy plots however there was no significant difference among carfentrazone treatments. In an experiment conducted at farmers field carfentrazone controlled *Malwa* spp. which is not controlled by any other broadleaf herbicide. Carfentrazone can be a good alternate herbicide to 2,4-D and metsulfuron for broadleaf weed control.

Acknowledgment: Authors extend their thanks to CCS Haryana Agricultural University, Regional Research Station, Karnal, India for providing the physical facilities to conduct the experiments and to the University of Florida, Citrus Research and Education Center, Lake Alfred, USA for providing the facilities to get the print of poster presentation.

THE VALUE OF RESIDUAL HERBICIDES IN LIBERTYLINK COTTON. L.V. Gilbert, P.A. Dotray, J.W. Keeling, and J.D. Everitt; Texas Agricultural Experiment Station and Texas Tech University, Lubbock

ABSTRACT

LibertyLink varieties were available to cotton growers for the first time in the 2004 growing season. In 2005, LibertyLink varieties were planted on approximately 340,000 acres or 2.43% of the total cotton acres planted in the United States. Texas (291,000 acres), Mississippi (13,794 acres), and Arkansas (12,827 acres) were the leading states where varieties were planted (5% of the total acres planted in Texas, 1.14% in Mississippi, 1.27% in Arkansas). Acreage should increase in other states once adapted varieties become available. In LibertyLink cotton, Ignite (glufosinate-ammonium) may be used postemergence-topical (POST) to control weeds. Ignite has limited systemic mobility because of its rapid activity in susceptible plants. Previous studies have shown that LibertyLink cotton has exceptional tolerance up to 8-fold the labeled rate when applied throughout the growing season. Because Ignite does not control weeds once it is absorbed in the soil, herbicide efficacy is based solely on foliar uptake. To achieve season-long weed control, sequential applications of Ignite are needed throughout the growing season. Since weed emergence generally occurs season-long, especially after rainfall and irrigation events, it is possible that two Ignite applications at 40 ounces per acre per application could be used by mid-season. The use of residual herbicides in a LibertyLink cotton system may be necessary to achieve season-long weed control. Research was conducted in the Texas High Plains from 2003 to 2005 to investigate the benefits of residual herbicides in a LibertyLink cotton weed management system.

Field studies were conducted using traditional small plot practices. Plots were four rows by thirty feet in length. Herbicides were applied using a carrier volume of 10 gallons per acre. A CO_2–pressurized backpack or a compressed-air tractor-mounted boom sprayer were used for all applications. Planting dates were typical for the Texas Southern High Plains. Varieties planted were Fibermax 958 LL and Fibermax 966 LL. Weed control ratings were recorded approximately 2 weeks and 4 weeks after POST applications using a scale of 0 (no control) to 100% (complete control). Experimental design was a randomized complete block with three replications per location.

Ignite plus Staple (pyrithiobac) early-postemergence (EP) followed by (fb) Ignite plus Staple mid-postemergence (MP) and Staple preemergence (PRE) fb sequential Ignite applications (EP fb MP) controlled Palmer amaranth (*Amaranthus palmeri)* and devil's-claw (*Proboscidea louisianica)* at least 95%. This control was more effective than two applications of Ignite without a residual herbicide. Cinch (metolachlor) plus Staple, Direx (diuron) plus Staple, or Cinch plus Cotoran (fluometuron) PRE fb Ignite plus Staple MP did not improve Palmer amaranth and devil's-claw control over Ignite (EP fb MP) applied alone. Ignite plus Staple EP fb Ignite plus Staple MP and Staple PRE fb sequential Ignite applications (EP fb MP) in two studies and Staple PRE fb Ignite plus Staple EP in one study controlled ivyleaf morningglory (*Ipomoea hederacea*) more effectively than Ignite (EP fb MP) applied alone. Cinch plus Staple, Direx plus Staple, or Cinch plus Caparol (prometryn) plus Staple PRE fb Ignite plus Staple EP did not improve ivyleaf morningglory control over Ignite (EP fb MP) applied alone. Caparol PRE fb sequential applications of Ignite POST controlled lanceleaf sage (*Salvia reflexa*) at least 96%. Caparol PRE fb Ignite MP controlled lanceleaf sage less than 77%.

In studies over multiple locations and several years, the use of a residual herbicide in a LibertyLink cotton system improved weed control in most instances. Though sequential Ignite applications made to small weeds is effective, the need for timely applications on multiple weed flushes would make control with an Ignite alone system very challenging.

IGNITE 280 HERBICIDE: PERFORMANCE OF NEW HIGH-LOAD FORMULATION AND EXTENDED RATES FOR THE SOUTHEAST AND MID-SOUTH REGIONS. J.M. Rosemond, C.R. Bell, S.B. Garris, K.W. Vodraska and H.S. Young, Bayer CropScience, Research Triangle Park, NC

ABSTRACT

Ignite 280 herbicide (Glufosinate-ammonium) is a new formulation which contains 2.34 lbs ai./gal (280g/l) of glufosinate for use in the LibertyLink Cotton System. This is a higher load active ingredient compared to the previous Ignite formulation containing 1.67 lbs ai/gal. Field Research conducted across the Southeast and Mid-South cotton growing regions indicate that Ignite 280 performs equivalent to or better than Ignite in mixing, spraying and efficacy. Ignite 280 currently has the same use patterns as Ignite with the exception of the rate difference due to the formulation change. The rates for Ignite 280 are 22 and 29 oz/a depending on the target species and size. Sequential applications of 22 oz/a followed by an additional 22 oz/a are also reflected in the new formulation. A total of 58 oz/a may be applied per season, with a single application not to exceed 29 oz//a.

Several states have requested a 24(c) registration for Ignite 280 herbicide which would allow the application of Ignite 280 in LibertyLink cotton at an increased rate and an increased number of applications. Increasing the rate of Ignite 280 per application to 43 oz/A (0.8 lbs active) would enhance the control of certain species such as goosegrass and Palmer amaranth. An increase in the overall per acre use rate would also allow for flexibility in situations where rainfall or equipment problems may prevent the grower from making timely applications.

The ability for the grower to make an additional application of Ignite 280 at the full labeled rate would be extremely useful if weeds emerge after the second application late in the season. A third application would allow growers to make an application with the ease and convenience of an over-the-top application as opposed to the much slower and labor-intensive process of directing conventional herbicides.

Studies conducted this season indicate that the increased use rate of up to 43 oz/A was successful in controlling larger weed sizes such as crabgrass, pigweed species, and morningglory species.

This paper will summarize the results of university cooperators trails evaluating Ignite 280 in both a systems approach and rate and timing trial from across the Southeast and Mid-South cotton growing regions.

IGNITE 280 HERBICIDE: PERFORMANCE OF NEW HIGH-LOAD FORMULATION AND EXTENDED RATES FOR THE SOUTHWEST AND WESTERN REGIONS. W.Perkins, M.Ehlhardt, M.Jameniz and G.Schwarzlose, Bayer CropScience, RTP, NC

ABSTRACT

Ignite 280 herbicide (Glufosinate-ammonium) is a new formulation which contains 2.34 lbs ai/gal (280g/l) of glufosinate for use in the LibertyLink Cotton System. This is a higher load active ingredient compared to the previous Ignite formulation containing 1.67 lbs ai/gal. Research conducted across the Southwest and Western cotton growing regions indicate that Ignite 280 performs equivalent to or better than Ignite in mixing, spraying and efficacy. Ignite 280 currently has the same use patterns as Ignite with the exception of the rate difference due to the formulation change. The rates for Ignite 280 are 22 and 29 oz/a depending on the target species and size. Sequential applications of 22 oz/a followed by an additional 22 oz/a are also reflected in the new formulation. A total of 58 oz/a may be applied per season, with a single application not to exceed 29 oz//a.

Several states have requested a 24(c) registration for Ignite 280 herbicide which would allow the application of Ignite 280 in LibertyLink cotton at an increased rate and an increased number of applications. Increasing the rate of Ignite 280 per application to 43 oz./a (0.8 lbs active) would enhance the control of certain species such as pigweed and Palmer amaranth. An increase in the overall per acre use rate would also allow for some flexibility in the situation where rainfall or equipment problems may prevent the grower from making timely applications.

The ability for the grower to make an additional application of Ignite 280 at the full labeled rate would be extremely useful if weeds emerge after the second application late in the season. A third application of Ignite 280 over-the-top would be much more efficient than the process of post-directing a conventional layby herbicide.

Studies conducted this season indicate that the increased use rate of up to 43 oz/a were successful in controlling larger weed sizes such as Devils Claw and Morningglory spp. A nice rate response is also noted when the higher rates of Ignite 280 are applied to weeds at the labeled height.

This paper will summarize the results of university cooperators trails evaluating Ignite 280 in both a systems approach and rate and timing trial from across the Southwest and Western cotton growing regions.

GLYPHOSATE STEWARDSHIP PROGRAMS IN ROUNDUP READY COTTON. W.K. Vencill, Univeristy of Georgia, Athens.

ABSTRACT

Field studies were conducted inField studies were conducted at the Southwest Georgia Branch Experiment Station near Plains, GA and at the Plant Sciences Farm near Athens, GA to examine weed management systems to improve glyphosate (Roundup) efficacy and weed resistance management. These studies examined weed management systems including pendimethalin (Prowl) or diuron (Direx) followed by one or two applications of glyphosate and glyphosate tank mixed with either metolachlor (Dual) or pyrithiobac (Staple) and applied to cotton at the four to five leaf stage. Palmer amaranth (*Amaranthus palmeri*) was the primary target weed. These studies indicated that the addition of one preemergence material reduced the need for a second glyphosate application with the added benefit of having a herbicide with another mechanism of action applied that could provide Palmer amaranth control. Systems containing pendimethalin provided better Palmer amaranth control than those containing diuron.

EVALUATION OF KIH-485 WEED CONTROL PROGRAMS IN ROUNDUP READY® COTTON (*GOSSYPIUM HIRSUTUM*). D.M. Dodds, D.B. Reynolds, M.T. Kirkpatrick, J.A. Huff, and J.T. Irby; Department of Plant and Soil Sciences, Mississippi State University, Mississippi State, MS 39762.

ABSTRACT

KIH-485 is a new preemergence (PRE) herbicide, under development by Kumiai Chemical Industry Co. Ltd, for use in corn (*Zea mays*) and other crops. The mode of action of KIH-485 is thought to be similar to metolachlor; however, KIH-485 is believed to be a new chemistry with use rates 8- to 10-times lower than those of metolachlor. Previous research examining KIH-485 efficacy in corn is available. Research conducted by Texas A&M has shown use of KIH-485 at rates of 500 g/ha provide 90% control of Texas panicum (*Panicum texanum*), 98% control of Palmer amaranth (*Amaranthus palmeri*), and 93 to 97% control of velvetleaf (*Abutilon theophrasti*) nine weeks after treatment with no significant corn injury. Although previous research regarding the use of KIH-485 in field corn is available, little data are available concerning use of KIH-485 in other crops. Recent increases in the use of metolachlor in cotton production has resulted in interest in KIH-485. Therefore, this research was conducted to evaluate efficacy and crop tolerance in cotton.

Research was conducted at the Black Belt Branch Experiment Station (BBES) near Brooksville, MS and at the Plant Science Research Center (PSRC) near Starkville, MS in 2005. DP 444 BG/RR and ST 4892 BG/RR cotton was planted at BBES and PSRC, respectively, at a seeding rate of 128,500 seeds per hectare. All herbicide applications were made with a CO_2-powered backpack sprayer at 140 L/ha. The following PRE treatments were evaluated: KIH-485 at 125, 166, and 250 g ai/ha; and s-metolachlor at 1070 and 2141 g ai/ha. Postemergence (POT) treatments evaluated were as follows: KIH-485 at 125, 166, and 250 g ai/ha; s-metolachlor at 2141 g ai/ha; KIH-485 + glyphosate at 100 g ai/ha + 877 g ae/ha; KIH-485 + glyphosate at 125 g ai/ha + 877 g ae/ha; s-metolachlor + glyphosate at 2007 g ai/ha + 877 g ae/ha; metolachlor + glyphosate at 2107 g ai/ha + 877 g ae/ha; pendimethalin + glyphosate at 841 g ai/ha + 877 g ae/ha; and glyphosate at 877 g ae/ha. Visual efficacy ratings were taken 7 weeks after PRE applications and 4 weeks after POT applications. Seed cotton yield was collected at the end of the growing season. Efficacy and seed cotton yield data were analyzed and means separated at the 0.05 significance level.

All PRE applications resulted in less than 8% cotton injury 6 weeks after treatment (WAT) and declined over time. POT applications of KIH-485 resulted in 8 to 16% injury 2 WAT; however, cotton injury 4 WAT was less than 4%. PRE applications of KIH-485 provided significantly greater barnyardgrass (*Echinochloa crus-galli*) and large crabgrass (*Digitaria sanguinalis*) control than when applied POT with 96 to 98% control compared to 46 to 73%. Barnyardgrass and large crabgrass control with POT applications of KIH-485 was greatest when tankmixed with glyphosate. PRE applications of KIH-485 provided significantly greater control of eclipta (*Eclipta prostrata*) compared to POT with 80 to 95% control for PRE applications compared to less than 40% control for POT applications. Palmleaf morningglory (*Ipomoea wrightii*) control was significantly greater (>90%) when glyphosate was combined with a residual herbicide. KIH-485 and s-metolachlor provided less than 65% control of palmleaf morningglory regardless of application timing. Seed cotton yields were significantly reduced when KIH-485 was applied alone. This reduction was likely from weed competition due to the poor control achieved on emerged weeds with KIH-485 alone. Addition of glyphosate to POT applications of KIH-485 increased seed cotton yields 600 to 800 kg/ha. This increase in yield is probably due to the higher control achieved with the glyphosate compenent of the POT treatment. Highest seed cotton yields were obtained with glyphosate combined with a residual herbicide. These data indicate that further research regarding the use of KIH-485 in cotton is warranted.

EFFECT OF DENSITY AND INTERFERENCE PERIOD OF ROUNDUP READY SOYBEAN INFESTATION IN ROUNDUP READY COTTON. D.R. Lee, D.K. Miller and M. Mathews; Louisiana State University, St. Joseph, LA.

ABSTRACT

Field studies were conducted at the Northeast Research Station in St. Joseph, La. under weed free conditions to evaluate competitiveness of Roundup Ready soybean as a weed in a Roundup Ready cotton crop. In a density study, ‘DP 5644 RR’ soybean was planted approximately 2 inches beside ‘PM 1218 RR’ cotton and thinned after emergence to densities of 0, 2, 4, 8, 16, 32, and 64 plants per 40 row ft (0, 0.05, 0.1, 0.2, 0.4, 0.8, and 1.6 plants per row ft) and allowed to compete season-long. In an interference period/removal timing study, ‘DP 5644 RR’ soybean was planted approximately 2 inches beside ‘PM 1228 RR’ cotton and thinned to a density of 64 plants per 40 row ft after emergence. Soybean was allowed to compete for 0, 1, 2, 3, 4, 5, 6, 7, or 8 wk and season-long. Soybean was manually removed at each removal timing. The study areas were kept weed-free throughout the season with glyphosate applications through a hooded sprayer. Crop yield was determined following mechanical harvesting. Both experiments were designed as a randomized compete block with four replications. Data were subjected to regression analysis.

Significant soybean competition with the cotton crop occurred at very low densities with a yield reduction of 7.6 and 14.6% observed for a soybean density of 0.1 and 0.2 plants per row ft, respectively. Higher densities increased competitiveness of soybean as a cotton yield loss of 44.8 and 53.8% was observed with 0.8 and 1.6 soybean plants per row ft, respectively. Analysis indicated an expected soybean yield loss of 32.2 and 50.4% if soybean densities of 0.5 and 1 plant per row ft, respectively, are allowed to compete with cotton season-long.

Soybean interference at a density of 1.6 plants per row ft with cotton for a period of 1 and 2 weeks after emergence resulted in yield loss of 7.2 and 10.9%, respectively. Allowing soybean to compete with cotton for a period of 4 weeks after emergence resulted in a yield loss of 18.2%. Competition for 8 weeks and season-long reduced cotton yield 32.7 and 61.9%, respectively.

Based on results, Roundup Ready soybean appears to be a very strong competitor with Roundup Ready cotton. Further research is needed to address impact of additional parameters including effects on harvest efficiency, cotton grades, and insect infestations.

EFFICACY AND CROP TOLERANCE OF MON 3539 ALONE OR TANK-MIXED WITH INSECTICIDES ON ROUNDUP READY FLEX COTTON. S.T. Kelly, D.K. Miller and M.S. Mathews. LSU AgCenter, Winnsboro, LA 71295.

ABSTRACT

Two experiments were initiated at the Northeast Research Station near St. Joseph, LA in 2005 to evaluate Roundup Ready Flex cotton tolerance and weed control with MON 3539 compared to Roundup WeatherMax® and to evaluate MON 3539 tank-mixes for tolerance and weed control. Soil type at this location was a silt loam. Plots were two rows (40 inches) wide and 30 feet long. Experiment design was a randomized complete block with four replications. All treatments were applied using a CO_2 back pack sprayer calibrated to deliver 15 gallons per acre.

Treatments in the tolerance experiment included MON 3539 and Roundup WeatherMax each applied at 0.75 and 1.125 lb ae/A to cotton at 1-3 lf, 6-7 node, and 12-14 leaf growth stage. Each rate was also applied twice to separate plots to simulate an overlap situation. A comparison treatment of Staple (1.2 oz/A), Envoke (0.1 oz/A), and Direx + MSMA (1 + 2 lb ai/A, respectively) was also applied overtop or post-directed at the previously mentioned cotton stages. Cotton injury was evaluated 5 days after each application (DAT) using a 0 to 100 scale with 0 equalling no injury and 100 equalling complete death. Application dates were: May 27 (1-3 leaf), June 10 (6-7 node), and July 4 (12-14 leaf). No cotton injury was observed with any treatment applied to 1-3 leaf cotton. Envoke caused the greatest injury (15%) applied to 6-7 node cotton with no differences observed between glyphosate formulations. When applied to 12-14 lf cotton, either rate of Roundup WeatherMax caused injury (up to 20%), but only with the simulated overlap treatments. Greatest injury observed with MON 3539 was 1% and less. Cotton yield ranged from 2140 to 2500 lb/A with no differences between glyphosate formulations.

The tank-mix experiment evaluated MON 3539 in combination with several commonly used insecticides and mepiquat chloride (Pix®). All plots received an application of MON 3539 (22 oz/A) + acephate (0.33 lb ai/A) at the 1-3 leaf cotton stage. MON 3539 was applied at 22 oz/A in all cases. Other treatments included: MON 3539 followed by (fb) MON 3539 + Pix (8 oz/A) + Centric (2 oz/A); Cotoran (1.2 lb ai/A) PRE, MON 3539 + Bidrin (0.4 lb ai/A) fb MON 3539 + Pix (8 oz/A) + Centric (2 oz/A); MON 3539 + Dual Magnum (1 pt/A) + Bidrin (0.4 lb/A) fb MON 3539 + Pix (8 oz/A) + Centric (2 oz/A); MON 3539 fb MON 3539 + Dual Magnum (1 pt/A) + Pix (8 oz/A) + Centric (2 oz/A); and MON 3539 + Bidrin (0.4 lb/A) + Staple (0.6 oz/A) fb MON 3539 + Valor (2 oz/A) post-directed. All treatments made after the 1-3 leaf cotton stage were applied to two to five inch weeds. Weeds evaluated included barnyardgrass (*Echinochloa crus-galli*), johnsongrass (*Sorghum halepense*), redroot pigweed (*Amaranthus retroflexus*), hemp sesbania (*Sesbania exaltata*), sicklepod (*Senna obtusifolia*), pitted morningglory (*Ipomoea lacunosa*) and entireleaf morningglory (*Ipomoea hederacea*). Weed control was evaluated 14 days after the 12-14 leaf (layby) application using a 0 to 100 scale with 0 equalling no control and 100 equalling complete death. No differences were observed in weed control with all weeds being controlled at least 93% indicating that none of the insecticides or Pix caused reductions in weed control with MON 3539. Cotton was not injured by any treatment when evaluated 14 days after the 12-14 leaf application. Cotton yield ranged from 2280 to 3311 lb/A. Greatest yield was with MON 3539 + acephate fb MON 3539 fb MON 3539 + Pix + Centric applied at 1-3 leaf cotton with 2 over-the-top applications to two to five inch weeds, respectively. Only MON 3539 + acephate fb MON 3539 + Bidrin + Staple fb MON 3539 + Valor yielded less than the previously mentioned treatment (2280 lb/A).

Overall, cotton was equally tolerant to MON 3539 and Roundup WeatherMax, except when overlapped on 12-14 leaf cotton. Also, MON 3539 applied in combination with acephate, Bidrin, Pix, Centric, Dual Magnum, and Staple did not cause cotton injury, nor was weed control reduced by tank-mixing these products.

EVALUATION OF SEQUENCE, INSECTICIDE, AND PLANT GROWTH REGULATOR CO-APPLICATION IN ROUNDUP READY FLEX COTTON. D.K. Miller, R. Bagwell, E. Burris, E.L. Clawson, S.T. Kelly, B.R. Leonard, A.M. Stewart, and M.S. Mathews, LSU AgCenter, Baton Rouge, LA.

ABSTRACT

Field studies were conducted at the Northeast Research Station in St. Joseph, La. under weed free conditions to evaluate tolerance of Roundup Ready Flex cotton to co-application of Sequence with insecticide and plant growth regulator. A randomized complete block design with a factorial treatment arrangement of cotton growth stage (pinhead square or first bloom), herbicide treatment (Sequence at 1.64 lb ae/A alone or plus Mepex Gin Out at 0.022 lb ai/A), and insecticide (Acephate at 0.5 lb ai/A, Battery at 0.1 lb ai/A, Baythroid at 0.033 lb ai/A, Bidrin at 0.4 lb ai/A, Capture at 0.062 lb ai/A, Centric at 0.047 lb ai/A, Curacron at 1.0 lb ai/A, Denim at 0.01 lb ai/A, Diamond at 0.58 lb ai/A, Dimethoate at 0.25 lb ai/A, Intruder at 0.028 lb ai/A, Karate Z 0.033 lb ai/A, Lannate at 0.4 lb ai/A, Larvin at 0.6 lb ai/A, Mustang Max at 0.022 lb ai/A, Prolex at 0.016 lb ai/A, Steward at 0.11 lb ai/A, Tracer at 0.75 lb ai/A, Trimax at 0.047 lb ai/A, Vydate at 0.4 lb ai/A, or no insecticide) with four replications was used. Treatments were applied to each 2 row 6.67' x 12' plot with a tractor mounted compressed air sprayer delivering 15 GPA. Parameters measured included visual injury 5 and 14 days after treatment (DAT), cotton height 10 DAT, seedcotton yield, and cotton maturity as measured by percent first harvest (twice picked after defoliation at 60% open boll). Data were subjected to ANOVA and means separated using LSD at the 0.05 level of significance.

A three-factor interaction was noted for cotton injury response 5 and 14 DAT. At 5 DAT, co-application with insecticides Acephate, Battery, Baythroid, Bidrin, Capture, Centric, Denim, Karate Z, Larvin, Mustang Max, Prolex, Steward, Tracer, Trimax, or Vydate responded similarly to when no insecticide was co-applied regardless of growth stage or herbicide treatment factor. At pinhead square, insecticides Curacron (22%) and Lannate (18%) co-applied with Sequence alone and insecticides Curacron, Diamond, Dimethoate, Intruder, and Lannate co-applied with Sequence plus Mepex Gin Out (12 to 47%) resulted in injury greater than when no insecticide was co-applied. Injury for these respective insecticide co-applications was greater with addition of Mepex Gin Out to Sequence compared to Sequence applied alone. At first bloom, insecticides Curacron and Lannate co-applied with Sequence alone or plus Mepex Gin Out resulted in 12 to 23% injury, which was greater than when no insecticide was co-applied. Injury for Lannate co-application was greater with addition of Mepex Gin Out to Sequence compared to Sequence applied alone. Insecticides Curacron and Lannate co-applied with Sequence alone and insecticides Curacron, Diamond, Dimethoate, Intruder, and Lannate co-applied with Sequence plus Mepex Gin Out resulted in greater injury when applied at pinhead square compared to first bloom.

At 14 DAT, insecticides Acephate, Baythroid, Bidrin, Capture, Centric, Denim, Karate Z, Larvin, Prolex, Steward, or Tracer responded similarly to when no insecticide was co-applied regardless of growth stage or herbicide treatment factor. At pinhead square 14 DAT, insecticides Curacron (10%) and Lannate (13%) co-applied with Sequence alone and insecticides Battery (5%), Curacron (28%), Diamond (12%), Dimethoate (13%), Intruder (7%), Lannate (30%), Mustang Max (6%), Trimax (7%), or Vydate (6%) co-applied with Sequence plus Mepex Gin Out resulted in injury greater than when no insecticide was co-applied. Injury for all these respective insecticide co-applications was greater with addition of Mepex Gin Out to Sequence compared to Sequence alone. At first bloom, injury of no greater than 1% was observed with all co-applications. Insecticides Curacron and Lannate co-applied with Sequence alone and insecticides Battery, Curacron, Diamond, Dimethoate, Intruder, Lannate, Mustang Max, Trimax, or Vydate co-applied with Sequence plus Mepex Gin Out resulted in greater injury when applied at pinhead square compared to first bloom.

Averaged across insecticide factor, cotton height 10 DAT was reduced with Mepex Gin Out addition to Sequence compared to Sequence alone at pinhead square (57 vs 51 cm) but not at first bloom (81 cm). Averaged across herbicide treatment and insecticide factors, seedcotton yield was greatest with treatment at first bloom compard to pinhead square (2400 vs 2260 lb/A). Averaged across growth stage and insecticide factors, seedcotton yield was greater when Mepex Gin Out was not co-applied with Sequence (2390 vs 2270 lb/A). Averaged across growth stage factor, insecticides Curacron with Sequence alone (75%) and insecticides Trimax (80%), Karate Z (81%), Intruder (78%), Bidrin (80%) and Tracer (81%) co-applied with Sequence plus Mepex Gin Out resulted in maturity delays compared to when no insecticide was co-applied (84 and 88%). Addition of Mepex Gin Out to Sequence resulted in maturity differences in comparison to Sequence applied alone for insecticides Curacron (84 vs 75%), Intruder (78 vs 85%) , and Bidrin (80 vs 90%). Averaged across insecticide factor, percent first harvest was greater with addition of Mepex Gin Out to Sequence compared to Sequence applied alone at pinhead square (85 vs 82 %) but not at first bloom (84 vs 85 %).

Cotton response to co-applications including insecticides Curacron and Lannate with Sequence alone and all insecticides indicated with injury at 5 and 14 DAT with Sequence plus Mepex Gin Out was greater at pinhead square compared to first bloom growth stage. Addition of Mepex Gin Out to Sequence/insecticide co-application resulted in greater injury than co-application of Sequence/insecticide alone at pinhead square but not first bloom growth stage. Seedcotton yield was maximized with co-application occuring at first bloom growth stage and when Mepex Gin out was not co-applied with Sequence, regardless of insecticide application.

EVALUATION OF GLYPHOSATE, INSECTICIDE, AND PLANT GROWTH REGULATOR CO-APPLICATION IN ROUNDUP READY FLEX COTTON. D.K. Miller, R. Bagwell, E. Burris, E.L. Clawson, S.T. Kelly, B.R. Leonard, A.M. Stewart, and M.S. Mathews, LSU AgCenter, Baton Rouge, LA.

ABSTRACT

Field studies were conducted at the Northeast Research Station in St. Joseph, La. under weed free conditions to evaluate tolerance of Roundup Ready Flex cotton to co-application of Mon 3539 with insecticide and plant growth regulator. A randomized complete block design with a factorial treatment arrangement of cotton growth stage (pinhead square or first bloom), herbicide treatment (MON 3539 at 0.75 lb ae/A alone or plus Mepex Gin Out at 0.022 lb ai/A), and insecticide (Acephate at 0.5 lb ai/A, Battery at 0.1 lb ai/A, Baythroid at 0.033 lb ai/A, Bidrin at 0.4 lb ai/A, Capture at 0.062 lb ai/A, Centric at 0.047 lb ai/A, Curacron at 1.0 lb ai/A, Denim at 0.01 lb ai/A, Diamond at 0.58 lb ai/A, Dimethoate at 0.25 lb ai/A, Intruder at 0.028 lb ai/A, Karate Z 0.033 lb ai/A, Lannate at 0.4 lb ai/A, Larvin at 0.6 lb ai/A, Mustang Max at 0.022 lb ai/A, Prolex at 0.016 lb ai/A, Steward at 0.11 lb ai/A, Tracer at 0.75 lb ai/A, Trimax at 0.047 lb ai/A, Vydate at 0.4 lb ai/A, or no insecticide) with four replications was used. Treatments were applied to each 2 row 6.67’ x 12’ plot with a tractor mounted compressed air sprayer delivering 15 GPA. Parameters measured included visual injury 5 and 14 days after treatment (DAT), cotton height 10 DAT, seedcotton yield, and cotton maturity as measured by percent first harvest (twice picked after defoliation at 60% open boll). Data were subjected to ANOVA and means separated using LSD at the 0.05 level of significance.

A three-factor interaction was noted for cotton injury response 5 DAT. Co-application with insecticides Acephate, Baythroid, Centric, Denim, Diamond, Intruder, Karate Z, Larvin, Mustang Max, Prolex, Steward, Tracer, Trimax, or Vydate responded similarly to when no insecticide was co-applied regardless of growth stage or herbicide treatment factor. At pinhead square, insecticides Battery, Curacron, or Lannate co-applied with MON 3539 alone and insecticides Capture, Curacron, or Lannate co-applied with MON 3539 plus Mepex Gin Out resulted in 3 to 9% injury, which was greater than when no insecticide was co-applied. Injury response to co-application of insecticides Battery (4 vs 0%), Capture (0 vs 8%), or Lannate (9 vs 3%) was significantly different comparing MON 3539 applied alone to co-application with Mepex Gin Out. At first bloom, insecticides Curacron, Dimethoate, or Lannate co-applied with MON 3539 alone and insecticides Bidrin, Curacron, or Lannate co-applied with MON 3539 plus Mepex Gin Out resulted in 4 to 13% injury, which was greater than when no insecticide was co-applied. Injury response with co-application of insecticides Bidrin (1 vs 13%), Curacron (7 vs 4%), or Dimethoate (4 vs 1%) was significantly different comparing MON 3539 alone to co-application with Mepex Gin Out. Significant differences in cotton injury response to co-application based on pinhead square compared to first bloom growth stage were noted for Battery co-applied with MON 3539 alone (4 vs 1%), Bidrin co-applied with MON 3539 plus Mepex Gin Out (0 vs 13%), Capture co-applied with MON 3539 plus Mepex Gin Out (8 vs 1%), Dimethoate co-applied with MON 3539 alone (0 vs 4%), and Lannate co-applied with MON 3539 alone (9 vs 4%) or MON 3539 plus Mepex Gin Out (3 vs 6%). At 14 DAT, cotton injury for any treatment was no greater than 4% with no differences noted among treatment factors evaluated. Averaged across growth stage and herbicide treatment factors, cotton height 10 DAT with addition of Mepex Gin Out was reduced compared to MON 3539 applied alone (74 vs 70 cm). Seedcotton yield and cotton maturity as measured by percent first harvest were not affected by any treatment factor evaluated.

In conclusion, cotton injury from MON 3539/insecticide/Mepex Gin Out co-application observed initially at 5 DAT was transient and no greater than 4% 14 DAT with no differences noted for any factors evaluated. Cotton height 10 DAT was negatively affected by addition of Mepex Gin Out to MON 3539 compared to MON 3539 applied alone regardless of growth stage at application or insecticide co-application. Seedcotton yield and crop maturity were unaffected by co-applications evaluated.

ROUNDUP READY FLEX COTTON RESPONSE TO GLYPHOSATE. D.K. Miller and M.S. Mathews, LSU AgCenter Northeast Research Station, St. Joseph, LA.

ABSTRACT

Field studies were conducted at the Northeast Research Station in St. Joseph, La. under weed free conditions to evaluate tolerance of Roundup Ready Flex cotton to Mon 3539 and other formulations of glyphosate. A randomized complete block design with a factorial treatment arrangement of glyphosate formulation (Mon 3539, Roundup Weathermax, Touchdown Total, Glyphos Xtra, or Glyphos) and application rates (1.125 (1x) or 2.25 (2x) lb ae/A with four replications was used. The 1.125 lb ae/A rate is the maximum amount allowed per ground application with labeled glyphosate formulations in Roundup Ready Flex cotton. Treatments were applied to each 2 row 6.67' x 12' plot at the first bloom growth stage with a tractor mounted compressed air sprayer delivering 15 GPA. All plots received an initial application of MON 3539 at 0.75 lb ae/A at the 2 to 3 leaf growth stage. Parameters measured included visual injury 5, 14, and 30 days after treatment (DAT), seedcotton yield, and cotton maturity as measured by percent first harvest (twice picked after defoliation at 60% open boll). Data were subjected to ANOVA and means separated using LSD at the 0.05 level of significance.

An interaction of glyphosate formulation and application rate was noted for cotton injury response 5 and 14 DAT. At 5 DAT, Glyphos Xtra applied at a 2X rate of 2.25 lb ae/A resulted in 18% visual injury, primarily in the form of leaf necrosis, which was greater than the 1X rate of the herbicide and all other formulations applied at either rate (1 to 4%). At 14 DAT, greatest injury of 7% was again observed with the 2X rate of Glyphos Xtra compared to no greater than 1% for all other treatments. Initial visual injury was transient as by 30 DAT no visual response to glyphosate formulations was noted. Earlier visual injury was not manifested in yield reduction as seedcotton yield was similar among all glyphosate formulations (2740 to 2913 lb/A) and unaffected by application rate (2792 to 2859 lb/A). Effects on cotton maturity, as measured by percent first harvest, were not observed for any treatment (83 to 88%).

Glyphosate formulations evaluated in this study, with the exception of Glyphos Xtra applied at a 2X rate, resulted in minimal initial injury similar to MON 3539 when applied to Roundup Ready Flex cotton. Based on yield and maturity measurement, Roundup Ready Flex cotton appears tolerant to glyphosate formulations evaluated in this study.

MANAGEMENT OF PALMER AMARANTH IN ROUNDUP READY FLEX^{TM} COTTON. C.L. Main, M.A. Jones, and E.C. Murdock. Department of Entomology, Soils, and Plant Sciences, Clemson University, Florence, SC.

ABSTRACT

Registration of a new glyphosate-resistant cotton with extended glyphosate-resistance (RRF) during reproductive growth (Roundup Ready® Flex, MON88913), allows for topical application of glyphosate from crop emergence until seven days prior to harvest. The Flex system provides the flexibility to tank-mix glyphosate with other postemergence cotton herbicides, such as pyrithiobac and trifloxysulfuron, to increase control of troublesome weeds. Objectives of this research were; 1) Evaluate cotton and weed response to topical applications of glyphosate alone and with residual products in RRF cotton, 2) determine the effect of early season weed interference in RRF cotton, and 3) determine what combinations, both number and timing, of glyphosate and glyphosate + residual herbicide applications provide the best weed control and preserve cotton yield.

Field studies were conducted in 2004 and 2005 at the Pee Dee Research and Education Center near Florence, SC. Soil preparation included disking and smoothing of the soil followed by bedding prior to planting. Planting dates for the three studies were (1) June 1, 2004 and (2) May 19, 2005. Cotton (Event no. MON88913) was seeded at 4 seed/ft of row. The experimental design was a randomized complete block with four replications of individual treatments. Plots were 30 to 40 ft long and four 38-in rows wide and all data was collected from the two center rows. Clemson University Cooperative Extension Service recommendations were followed for management of fertility and insect pests. Treatments were applied using a compressed air sprayer calibrated to apply 15-20 gallon per acre of spray solution. Layby applications were made with a hooded sprayer calibrated to deliver 20 gallon per acre. Single applications of the potassium salt of glyphosate (0.75 lb/A) were applied to 4-, 6-, 8-, 10-, and 12-leaf cotton. Sequential glyphosate applications were made to cotton at 4- and 8-leaf; 4- and 10-leaf; 4- and 12-leaf; 6-and 10-leaf; 6- and 12-leaf; 8- and 12-leaf; 4-, 8-, and12-leaf; 4-, 6-, 8-, and 10-leaf; 4-, 6-, 8-, and 12-leaf; 4-, 8-, 10-, and 12-leaf; 4-, 6-, 8-, 10-, and 12-leaf stages. A local standard treatment of pendimethalin (1.0 lb ai/A) + fluometuron (1.0 kg) PRE followed by pyrithiobac (1.0 oz) POST and prometryn (0.5 lb) + MSMA (2.0 lb) at LAYBY, and an untreated check were included for comparison. Cotton was harvested at maturity with spindle picker modified for small plot research.

Visual estimates of weed control were recorded prior to harvest. Foliar chlorosis, necrosis, and plant stunting were considered when making the visual evaluations using a scale of 0 to 100% with 0 = no weed control and 100 = complete weed control. Data were analyzed using the MIXED procedure of SAS and means were separated by Fisher's Protected LSD (P=0.05).

No cotton injury was observed with any glyphosate or glyphosate + residual herbicide application past the 4th true leaf stage. Fluometuron, alachlor, and S-metolachlor provided excellent PRE control of Palmer amaranth. Any treatment combination with multiple POST glyphosate applications provided essentially complete control of Palmer pigweed. Single glyphosate applications from the 4 to 12 leaf cotton stage provided inconsistent weed control and allowed for competitive losses. The addition of a PRE herbicide reduced early season Palmer amaranth interference. However, multiple POST glyphosate applications were needed to maintain adequate control levels throughout the growing season. Single glyphosate applications provided variable cotton lint yield. Consistent yield preservation was observed with most multiple glyphosate applications, and optimum weed control and lint yield were achieved with 3 glyphosate applications in each study. Applying a residual herbicide at 4 or 8 leaf cotton preserved yield and provided consistent Palmer amaranth control.

Reliance on glyphosate as a sole means of weed control is not recommended due to the develpoment of glyphosate-resistant weeds. More than one glyphosate application is needed to preserve cotton yield potential and prevent late season weed escapes from replenishing the soil seed bank.

ROUNDUP READY FLEX COTTON RESPONSE TO WEED CONTROL SYSTEMS. R.R. Dobbs[1], N.W. Buehring[1], M.P. Harrison[1] and Anthony Mills[2]. [1]North Mississippi Research and Extension Center, Verona, MS 38879l; [2]Monsanto Company, Collierville, TN 38017.

ABSTRACT

A study was conducted on a Catalpa silty clay loam soil at Verona, MS to determine timing, number of MON 3539 (glyphosate) postemergence (POST) applications required for effective weed control; and whether the addition of soil residual herbicides applied preemergence (PRE) or POST, or post directed applications of MON 3539 enhanced weed control and yield.

Three applications of MON 3539 based on weed sizes with the first POST application to 1 to 3 inch weeds Fb two repeat applications when weeds were 3 to 5 inches or four MON 3539 applications at 2, 5, 7 and 11 weeks after planting (WAP) provided grass and sicklepod control >90% at 8 and 14 WAP and were the highest yield treatments with lint yields of 1124 and 1159 lb/acre, respectively. Cotoran (fluometuron) applied PRE Fb two MON 3539 applications; Prowl H2O (pendimethalin) or Sequence (glyphosate + S-metolachlor) applied POST 6 WAP; and Dual Mangum (S-metolachlor) applied PRE or POST at 6 or 11 WAP in combination with three MON 3539 POST applications did not improve sicklepod control, grass control or yield. Increasing the MON 3539 rate from 0.75 to 1.0 lb ae/acre with the first application 3 WAP Fb a repeat application that was delayed from 6 WAP to 7 WAP Fb an 11 WAP application or delaying the first application until 5 WAP Fb repeated applications 7 and 11 WAP provided good weed control (>80%) 8 and 14 WAP but had 12 to 25% lower yield than 3 or 4 MON 3539 sequential applications applied either at 3, 6, and 11 WAP or 2, 5, 7 and 11 WAP. Delaying the first MON 3539 application to 5 WAP Fb an 11 WAP application resulted in at least 80% weed control 8 and 14 WAP but yield was reduced by 18%. MON 3539 as a post directed application at layby did not improve weed control and yield compared to a POST layby application. These preliminary results indicate that the first MON 3539 application should be made when weeds are no larger than 3 inches tall with subsequent applications made when weeds are no larger than 5 inches tall. Delaying the first applications until weeds are taller than 3 inches and using high rates provided good weed control but resulted in 12 to 25% yield reduction.

PREPLANT HORSEWEED (*CONYZA CANADENSIS*) AND RUSSIAN THISTLE (*SALSOLA IBERICA*) BURNDOWN IN COTTON. J.D. Everitt and J.W. Keeling, Texas Agricultural Experiment Station, Lubbock.

ABSTRACT

Russian thistle (*Salsola iberica*) and horseweed (*Conyza canadensis*) are two winter annual weeds that are troublesome to Texas Southern High Plains producers, especially in reduced till and no-till fields. With reduced tillage practices increasing in popularity, growers must use herbicides to control these weeds. The objectives of these trials were to: 1) evaluate 2,4-D, Clarity, and Roundup WeatherMax applied at varying rates and growth stages for horseweed and Russian thistle control, and 2) compare horseweed and Russian thistle control following Gramoxone Max, ET, Ignite, and Roundup WeatherMax.

Two studies, conducted in 2005 at the Texas Agricultural Experiment Station near Lubbock, evaluated 2,4-D (0.50 and 1.0 lb ai/A), Clarity (0.125 and 0.25 lb ai/A), and Roundup WeatherMax (0.75 lb ae/A) applied at 1 to 3 inch, 4 to 6 inch, and 6 to 12 inch weed growth stages in April and early May. Gramoxone Max (0.25 lb ai/A), Ignite (0.52 lb ai/A), and ET (0.003 lb ai/A) were compared to Roundup WeatherMax at 4 to 6 inch tall weeds only. All treatments were applied using a CO_2 backpack sprayer calibrated to deliver 10 gpa. Weed control was evaluated 7, 14, and 28 days after treatment (DAT).

2,4-D (at 0.50 and 1.0 lb ai/A) and Clarity (0.25 lb ai/A) controlled 1 to 3 inch Russian thistle >90%, and was more effective than Roundup WeatherMax (80%). However, at the 4 to 6 inch and 6 to 12 inch weed stages, control declined with 2,4-D and Clarity while control with Roundup WeatherMax was 97 to 100%. 2,4-D (at 0.50 and 1.0 lb ai/A), Clarity (at 0.25 lb ai/A), and Roundup WeatherMax controlled 1 to 3 inch horseweed 90 to 92%. Horseweed control declined with both 2,4-D and Clarity as weed size increased; however, Roundup WeatherMax controlled 4 to 6 inch and 6 to 12 inch horseweed 93 and 99%, respectively. Gramoxone Max, ET, and Roundup WeatherMax controlled 4 to 6 inch Russian thistle 97 to 100% when applied 3 weeks before planting. Roundup WeatherMax and Gramoxone Max controlled 4 to 6 inch horseweed 92 to 95% 14 DAT; however, significant regrowth occurred 28 DAT and control declined with Gramoxone Max (70%). Ignite controlled horseweed 77%, while ET was less effective, (40% control of 4 to 6 inch horseweed). Overall, 2,4-D is an effective and economical option for early spring control of both Russian thistle and horseweed. Late emerging Russian thistle may also be controlled with Gramoxone Max, Roundup WeatherMax, or ET.

POTENTIAL OF RESIDUAL HERBICIDES FOR HORSEWEED (CONYZA CANADENSIS) CONTROL IN COTTON. S.G. Matthews[1], M.R. McClelland[2], K.L. Smith[3], J.L. Barrentine[2], G.M. Griffith[2], and M.B. Kelley[3]. University of Arkansas Cooperative Extension Service, Blytheville[1]; University of Arkansas Department of Crop, Soil, and Environmental Sciences, Fayetteville[2]; University of Arkansas, Monticello[3].

ABSTRACT

Glyphosate-resistant horseweed continues to be a threat to conservation-tillage cotton in Arkansas. Research funded by the Arkansas State Cotton Committee and Cotton Incorporated in 2004 helped us begin to determine effective horseweed management programs. The best approach to control the resistant horseweed populations and other winter weeds was to apply 2,4-D or dicamba (Clarity) in a tank mixture with glyphosate 28 days preplant. However, 2,4-D and dicamba have 21- to 30-d plantback restrictions, and horseweed emergence during the interval from application of those herbicides until planting can cause infestations at or right after planting. Therefore, it is desirable to have a herbicide with residual activity to prevent horseweed germination. Herbicides that have shown promise for residual horseweed control in research in the mid-South include prometryn (Caparol), diuron (Direx), and flumioxazin (Valor). The objective of research in 2005 was to evaluate these and other residual herbicides for activity on glyphosate-resistant horseweed in preplant burndown programs in cotton.

Four experiments were conducted at Osceola (Mississippi Co.), three at Proctor (Crittenden Co.), one at Horseshoe Lake (Crittenden Co.), and one at Rivervale (Poinsett Co.) in Arkansas on fields with glyphosate-resistant horseweed. Each experiment was conducted as an RCB with four replications and a plot size of 6.3 to 12.6 by 30 ft. Fall treatments were applied November 17 to 27, 2004, and spring treatments were applied March 24 to 31. Horseweed plants averaged 5 to 12 inches tall at the spring applications. Environmental conditions in February were cool and dry; March was very cool and wet; and early April was cool and dry, becoming warm and dry later in the month. The normal spring flush of horseweed emergence did not occur until very late April to early May.

Suprend, a mixture of trifloxysulfuron and prometryn, applied at 1 lb ai/A in the fall (November) showed excellent promise for residual control of horseweed through April. Control with Suprend alone (91 to 100%) equaled control with Suprend plus glyphosate or paraquat or followed by a spring application of dicamba or paraquat (94 to 100%). In one experiment at Osceola, Envoke (trifloxysulfuron) applied in the fall at 0.0023, 0.00473, and 0.00705 lb ai/A controlled horseweed 69, 70, and 89% in mid-April. Control with the 0.00705 lb/A rate alone was equal to control with any of the rates mixed with glyphosate or paraquat. Control with Envoke at 0.0053 lb/A + glyphosate was 80, 54, and 93% at three other locations. Valor, which has been reported to have good residual horseweed activity when applied in the fall, failed to control horseweed when applied alone (0 to 60%). However, it should be noted that there was minimal germination of horseweed until late spring – after these experiments were terminated. Caparol (prometryn) and Prowl H2O (pendimethalin) were added to glyphosate plus dicamba, which controlled horseweed 88 to 92%, masking any effect the residual herbicides may have had, especially with the low emergence of horseweed in the early spring. This was also true of diuron, linuron, fluometuron, and metolachlor.

Suprend, probably because of its trifloxysulfuron component, has great potential for control of glyphosate-resistant horseweed. More work on rates of trifloxysulfuron is needed, and both herbicides need to be evaluated under conditions of high spring germination of horseweed. Horseweed control with glyphosate + dicamba applied in the spring was not enhanced by the addition of most other residual herbicides this year. Again, without a heavy flush of spring germination, their potential may not have been evident. In years when spring emergence of horseweed is pronounced, residual herbicides may be of use.

BENEFITS OF WINTER WEED MANAGEMENT WITH VALOR® SX HERBICIDE. R.E. Jones, J.R. Etheridge, B.R. Corbin and C.M. Henderson; Valent USA Corporation, Greenville, MS.

ABSTRACT

VALOR® SX (flumioxazin) herbicide by Valent U.S.A. Corporation is currently approved for use in soybean (Glycine max) and peanut (Arachis hypogaea) pre-emergence and for use on cotton (Gossypium hirsutum) as a post-directed herbicide. It is also approved as a pre-plant burn-down herbicide in a number of crops. VALOR® SX can be used in combination with labeled burn-down herbicides to control emerged weeds and provide residual weed control prior to crop emergence. Spring-planted crops grown where VALOR® SX was applied the previous fall were observed to be greener and more robust than crops grown in other areas.

A trial was designed to determine what agronomic benefits a fall application of VALOR® SX has on crops planted the following spring. VALOR® SX at 2 oz pr/A + Roundup (glyphosate) at 1 pt pr/A was applied to plots on November 19, 2003 and November 17, 2004, compared to untreated plots. Plot size was 15 x 30 feet with 3 replications. Roundup at 1 qt pr/A was applied to all plots on April 2, 2004 and March 31, 2005 to kill all vegetation at planting. Spring crops were planted with a commercial no-till planter into plots of each treatment on April 19, 2004 and April 18, 2005. Soil samples were collected and soil temperatures were measured on the day of planting in both years. Soil samples were analyzed for nitrogen content by an independent laboratory. Plots were kept weed free after planting. Plant height was measured on May 11, 2004 and May 25, 2005. Dry weights were obtained by weighing ten plants from each replicate of each treatment on May 11, 2004 and May 11, 2005 (May 25, 2005 for cotton and rice).

Winter weed management with VALOR® SX gave several benefits. Soil temperature at planting was increased by 12 degrees F in 2004 and 10 degrees F in 2005, which allowed faster crop emergence in the fall-applied VALOR® SX treatment. Soil in fall VALOR® SX plots had better tilth, which gave better soil to seed contact, resulting in more uniform plant size and fewer skips in the row. Corn, wheat, sorghum, and soybeans were significantly taller for one of two years. Corn, wheat, sorghum, soybean and cotton had significantly higher dry weights in the fall-applied VALOR® SX treatment for one or both years. Fall-applied VALOR® SX increased soil nitrogen in 2004 for a net gain of 34 lbs of nitrogen per acre, with a value of $17.00/acre. Nitrogen value was based on a cost of ammonium nitrate at $340.00/ton. Chemical drift from an adjacent farm in the spring of 2005 reduced the impact of winter vegetation on nitrogen content in 2005. Warmer soil temperatures and no weed canopy in the fall-applied VALOR® SX plots allowed the soil to dry faster which would allow earlier planting of spring crops.

EFFECT OF CHLOROPHENOXY-ROUNDUP WEATHERMAX® TANKMIXES ON GLYPHOSATE-RESISTANT HORSEWEED [*CONYZA CANADENSIS* (L.) CRONQ.]

E.J. Jones[1], D.H. Poston[1], G.D. Wills[1], and R.E. Mack[2]; [1]Delta Research and Extension Center, Stoneville, MS and [2]Helena Chemical Co., Memphis, TN.

ABSTRACT

Glyphosate is a nonselective, broad-spectrum, postemergence herbicide which is effective for preplant burndown of existing weeds before planting of the next cropping cycle. Since the year 2000, there have been confirmed reports of the rapid spread of glyphosate-resistant horseweed [*Conyza canadensis* (L.) Cronq.] in the northeast, north central and mid-south areas of the United States. Glyphosate-resistant horseweed was confirmed in Mississippi in 2003. In 2005, studies were conducted in Washington County, MS to combine various selective herbicides with the broad-spectrum herbicide, glyphosate, for the additional control of glyphosate-resistant horseweed.

Glyphosate was applied over-the-top to 10-to 20-inch-tall horseweed at the rate of 12 oz in water at 15 gpa alone and in combination with the chlorophenoxy herbicides as shown in Table 1. Treatments were replicated four times in a randomized complete block design. Efficacy was determined by visual ratings at 1, 2, 3, 5, 7, and 10 weeks after treatment (WAT) whereby 0 = no control and 100% = complete kill of shoots.

Horseweed control with glyphosate alone was 34% at 1 WAT and continually decreased to 10% at 10 WAT. The most effective combination with glyphosate was with BW III at 32 oz/A resulting in 86% control at 1 WAT, reaching a maximum of 93% control at 3 WAT, and maintaining up to 90% control at 10 WAT. The next most effective combination was with the addition of HM 2020 at 32 oz/A resulting in 85% control at 1 WAT and increasing to 89% control at 5, 7, and 10 WAT.

The addition of ALB 40 was most effective at 6 oz/A resulting in 81% control at 1 WAT, reaching 83% control at 3 WAT, and decreasing to 70% control at 10 WAT. The addition of Clarity was most effective at 6 oz/A with 83% control at 1 WAT, maintaining up to 84% control through 5 WAT, and decreasing to 70% control at 10 WAT.

The results of this study show that selective herbicides can be applied in combination with the broad-spectrum herbicide, Roundup WeatherMax to control glyphosate-resistant horseweed.

Table 1. Chlorophenoxy herbicides and rates applied.

ALB 40	Dicamba based herbicide, proprietary blend of dicamba acid and inert ingredients. Albaugh, Inc. (4 and 6 oz/A)
BW III	2,4-D and Dicamba, Chlorophenoxy herbicide. Albaugh, Inc. (24 and 32 oz/A)
Clarity	Substituted benzoic acid, diglycolamine salt of 3,6-dichloro-o-anisic acid. BASF Co. (4 and 6 oz/A)
HM 2020	Chlorophenoxy herbicide; proprietary blend of surfactants, emulsifiers, chlorophenoxy ester and benzoic acid. Helena Chemical, Co. (32 oz/A)

EMERGENCE PATTERNS AND RESIDUAL WEED CONTROL WITH SEQUENCE.

C.H. Koger, USDA-ARS, Crop Genetics and Production Research Unit, Stoneville, MS; D.H. Poston, T.W. Eubank, and V. Nandula, Delta Research and Extension Center, Mississippi State University, Stoneville, MS; D.K. Miller, Louisiana State University Ag Center, St. Joseph, LA; and J.W. Wilcut, North Carolina State University, Raleigh, NC.

ABSTRACT

Non-residual activity of glyphosate, reduced tillage, and adoption of early planted, early maturing crops such as soybean [*Glycine max* L. Merr] has resulted in an increase in annual grasses. Most annual grasses are capable of emerging throughout the growing season and those present at time of harvest reduce harvest efficiency, seed quality and sometimes yield. Grasses that are present at time of harvest and those that emerge after harvest often produce seed and contribute to increasing the weed seed bank. The objectives of this research were to document the emergence patterns of annual grasses common to crop production systems of the lower Mississippi River Alluvial flood plain and determine the length of residual grass activity of Sequence and Prowl H2O.

A no-crop, non-irrigated field study was conducted on a Bosket silt loam soil (30% sand, 57.9% silt, 11.7% clay, 1% OM, pH 6.14) at the Mississippi State University Delta Research and Extension Center in 2005. The field had been in continuous no-till, early-planted Roundup Ready soybean production each of the 8 years prior to 2005. Annual grass pressure was extremely high. Sequence (2.25 lb glyphosate acid + 3 lb *S*-metolachlor/gallon) at 2, 2.5, 3, or 3.5 pints/Acre or Prowl H2O (3.8 lb pendimethalin/gallon) at 1.58 pints/Acre were applied preemergence (PRE) on April 21, 2005. A no herbicide was included. Additional treatments included no PRE or all rates of Sequence or Prowl H2O PRE followed by (fb) Gramoxone Inteon (2 lb paraquat/gallon) at 2 quarts/Acre + 1% v/v crop oil concentrate at 8 days after PRE (DA-PRE), 8 fb 15 DA-PRE, 8 fb 15 fb 22 DA-PRE, or 8 fb 15 fb 22 fb 29 DA-PRE. All treatments were applied with an air-driven tractor mounted sprayer calibrated to deliver 15 GPA at 38 psi with flat-fan XR11002VS nozzles. Composite grass counts were collected from two 1-m^2 quadrats per plot at 8, 15, 22, 29, 36, and 46 DA-PRE applications. Control of individual grass species [barnyardgrass (*Echinochloa crus-galli*), southwestern cupgrass (*Eriochloa gracilis*), and browntop millet (*Brachiaria ramosa*)] was rated at 46 DA-PRE.

Grass emergence began in early May, with optimal emergence in late May to early June. Optimal emergence was attributed to timely rainfall events during late May to early June. Minimal grass emergence occurred when the daytime soil temperatures were below 90° Fahrenheit. Sequence, regardless of rate, and Prowl H2O provided approximately 4 wks of residual grass control. Sequence at 3 and 3.5 pints/Acre provided better residual grass control than Prowl H2O at 46 DA-PRE applications**.** Sequence at more than 2 pints/Acre and Prowl H2O controlled barnyardgrass > 80% at 46 DA-PRE applications. Prowl H2O controlled southwestern cupgrass and browntop millet better than Sequence. Sequence applied early POST (late-April to early-May) in soybean should control the bulk of grass flushes until canopy closure to soybean harvest. Sequence applied prior to this window may dissipate prior to emergence of the bulk of annual grasses. Sequence and Prowl H2O provided excellent residual control of annual grasses, and will help to reduce annual grass infestations in Roundup Ready crops.

IMPACT OF SIMULATED DRIFT RATES OF GLYPHOSATE IN CONVENTIONAL COTTON ON LINT YIELD AND FIBER QUALITY. S.P. Nichols, H.R. Robinson, C.E. Snipes and T. Evans, Delta Research and Extension Center, Mississippi State University, Stoneville, MS 38776.

INTRODUCTION

Currently, greater than 95% of the cotton grown in Mississippi is glyphosate-resistant. In addition, acreage of glyphosate-resistant soybeans and corn is increasing in the state. Non glyphosate-resistant cotton planted in the vicinity of glyphosate-resistant crops is at risk of glyphosate drift or misapplication. The potential of decreased boll retention, delayed maturity, and yield loss due to glyphosate applied is amply documented in the literature. Heightened precautions are needed to reduce misapplication of glyphosate to conventional cotton through spray drift or spray tank contamination. In the unfortunate event of a misapplication of glyphosate to conventional cotton, producers are often faced with the decision of whether to keep the injured crop or to replant. Research to better predict yield loss from varying rates of glyphosate misapplications would be beneficial in making replant decisions. The objectives of this study are to determine conventional cotton yield response to glyphosate applied and two growth rates, the relationship of glyphosate injury to yield loss in conventional cotton and to evaluate other indicators of glyphosate injury in conventional cotton (discoloration, height, fruit retention, percent injury, etc.)

MATERIALS AND METHODS

Field trials were conducted at the Delta Research and Extension Center, Stoneville, MS in 2002, 2003, 2004 and 2005. Conventional cotton varieties SG 747, FM 966, PHY 355 and DPL 393 were planted into conventionally prepared seedbeds on April 23, 2002, May 1, 2003, April 1, 2004 and April 27, 2005, respectively. All cultivars were drill planted with a seeding rate of approximately 5 seeds foot^{-1}. The soil type at the experimental site was a Bosket very fine sandy loam (fine-loamy, mixed, thermic Mollic Hapludalf). Nitrogen was applied prior to planting in the form of 32% UAN (urea and ammonium nitrate solution) at a N rate of 110 lb acre^{-1}. Treatments were arranged in a randomized complete block design with four replications. Plots were 4 rows wide by 40 feet long.

Treatments consisted of varying rates of Roundup UltraMax applied at the 2-leaf and 6-leaf growth stages and Bueno 6 at a rate of 2 lb ai acre^{-1} at the 2-leaf growth stage. An untreated plot was also included throughout the study.

Data collected included crop injury, plant height and first fruiting node. Plant mapping data was taken in 2003, 2004 and 2005 at season's end. Plant mapping variables included plant height, node number of the lowest sympodial branch, total main stem nodes, number of sympodia with bolls in the first position, and percentage of total bolls in the first position.

Post harvest yield data included seed cotton yield, lint yield and gin turnout. Lint samples were sent to Starlab, Inc. in Knoxville, TN for lint quality analysis. Fiber characteristics reported include micronaire, length, uniformity, strength and color.

RESULTS AND DISCUSSION

Simulated drift rates of glyphosate applied to conventional cotton at the 2-leaf growth stage had no effect on lint yield two out of three years even at the highest treatment rates, although a downward trend was observed both years.* In 2004, simulated drift rates of 0.12, 0.24, and 0.48 lb ai/acre glyphosate reduced lint yields by 22, 31, and 79%, respectively, compared to the untreated check. When applied at the 6-leaf growth stage, simulated drift rates of 0.24 and 0.48 lb ai/acre glyphosate reduced lint yields all three years of the study. Yield losses ranged from 12 to 28% for simulated drift rates at 0.24 lb ai/acre and 31 to 70% for 0.48 lb ai/acre. Additionally, a 2.0 lb ai/acre rate of MSMA did not reduce lint yield in two out of three years. In 2004, lint yield was reduced 14% by this treatment.

Based on yield reduction, conventional cotton was more sensitive when applications occurred at the 6-leaf timing compared to the 2-leaf timing. Visual injury tended to overestimate yield loss, as injury symptoms observed at the lower application rates did not result in a reduction of lint yield. Crop and environmental conditions at around the time of application appeared to influence the level of injury and yield reduction. No adverse differences were observed in fiber quality due to treatments.

*Data included in figures for 2005, however, data are not discussed due to excessive variability as a result of Hurricane Rita.

EFFECT OF THE DRIFT CONTROL ADJUVANTS HM 2005B AND HM 9752 ON EFFICACY AND DROPLET SIZE OF GLYPHOSATE APPLIED WITH TEEJET® EXTENDED RANGE SPRAY NOZZLES.**G.D.** Wills[1], J.E. Hanks[2], E.J. Jones[1], and R.E. Mack[3]; [1]Delta Research and Extension Center, [2]USDA-ARS Application Production and Technology Research Unit, Stoneville, MS, and [3]Helena Chemical Co., Memphis, TN.

ABSTRACT

A field and laboratory study was conducted to determine the effect of the drift control adjuvants HM 2005B and HM 9752 each at 9 lb/100 gal on the efficacy and spray droplet size of glyphosate as formulated without surfactant as Roundup D-Pak® and with surfactant as Roundup WeatherMax® as applied with the TeeJet® Extended Range 110015VS spray nozzle. The description of these drift control adjuvants and the rates applied are shown in Table 1.

In the field study, glyphosate was applied at 0.4 lb ai in 10 gallons per acre which is less than the recommended rate of 1 lb ai/A in order to detect any increase or decrease in efficacy due to the addition of the drift control adjuvants. Each glyphosate formulation was applied alone and with each drift control adjuvant using a tractor-mounted sprayer at 40 psi with eight nozzles spaced 19 inches apart along the boom. Field applications were over-the-top to four rows each of three-trifoliolate-stage non-Roundup Ready® soybeans [*Glycine max* (L.) Merr.], 'Pioneer 9594' spaced 38 inches apart, 40 feet long and interspaced with 8-to 12-inch-tall barnyardgrass [*Echinochloa crus-galli* (L.) Beauv.], 8- to 10-inch-tall pitted morningglory (*Ipomoea lacunosa* Lag.), 4- to 6-inch-tall prickly sida (*Sida spinosa* L.), and 10- to 12-inch-tall velvetleaf (*Abutilon theophrasti* Medik.). Treatments were replicated four times in a randomized complete block design. Efficacy was determined by visual ratings 2 weeks after treatment (WAT) whereby 0 = no control and 100% = complete kill of shoots.

In the laboratory study, droplet size was determined at the rate of 1 lb ai glyphosate in 10 gallons per acre for each spray mixture using an Insitec Measurement Systems® laser particle analyzer at 40 psi, the same pressure as was used in the field study. Droplet size was determined as the percentage of the spray volume resulting in fine highly driftable droplets less than 141 microns (<141 µ) in diameter. Droplet size determinations were replicated three times in a randomized complete block design.

Data were subjected to analyses of variance. Means were separated using Fisher's Protected Least Significant Difference (LSD) at P = 0.05.

In the field study at 2 WAT, percent soybean injury and percent weed control of the four weedy species in this study using glyphosate formulated without surfactant with no adjuvant was 68 to 85%, with HM 2005B was 84 to 89% and with HM 9752 was 90 to 96%. Using glyphosate formulated with surfactant, the percent plant injury/ weed control without an adjuvant was 81 to 90%, with HM 2005B was 90 to 98% and with HM 9752 was 89 to 95%.

In the laboratory study, the percent of the spray volume in fine highly driftable spray droplets (< 141 µ) using glyphosate formulated both without and with surfactant with no drift control adjuvant was 47 and 48% and was reduced with the addition of HM 2005B to 33 and 39% and with the addition of HM 9752 to 39 and 24%, respectively.

Table 1. Drift control adjuvants and rates applied.

HM 2005B	Proprietary blend of polysaccharide polymer, modified guar gum, ammonium sulfate and potassium phosphate. (9 lb/100 gallons)
HM 9752	Proprietary blend of polysaccharide polymer, modified guar gum and ammonium sulfate. (9 lb/100gallons)

ASSESSING VARIABILITY IN CONTROL OF *AMARANTHUS PALMERI* AND *IPOMOEA LACUNOSA* BY GLYPHOSATE. L.A. Farno, D.R. Shaw, and W.A. Givens; Department of Plant and Soil Sciences, Mississippi State University, Mississippi State, MS 39762.

ABSTRACT

Weed control with glyphosate varies between and even within species. In particular, several of the *Amaranthus* species, particularly Palmer amaranth (*Amaranthus palmeri* S.) and pitted morningglory (*Ipomoea lacunosa* L.) have tremendous variability in their response to glyphosate. The objective of this study is to determine the inherent variability in Palmer amaranth and pitted morningglory control by glyphosate.

Pitted morningglory was planted in styrofoam cups that contained a 1:1 v/v mixture of peat:soil. Difficulties were experienced in Palmer amaranth germination; thus results for this species are not available. Plants were sprayed with five rates of glyphosate at the two- to four-leaf stage and assessed at two and four weeks after treatment. Rates were a control, the labeled rate (0.77 lb ae/A), and 0.5, 0.25, and 0.125X of the labeled rate. At two weeks after treatment glyphosate efficacy was assessed on a percent control. At four weeks after treatment percent fresh weight reduction was determined.

There were differences between the five rates for both the visual rating and fresh weight reduction. The pitted morningglory label rate, 0.5X rate and 0.25X rate produced higher control and fresh weight reduction compared to the 0.125X glyphosate rates, but there were no differences between these three rates. From the results of the initial rate titration study, the “X” rate that will be used for pitted morningglory for the remaining phases of this study will be the 0.5X label rate (0.39 lb ae/A).

Phase 2 of this study assess the variability of Palmer amaranth and pitted morningglory to glyphosate. Plants will be sprayed with a control rate, label rate, and the “X” rate determined in Phase 1. Phase 3 will assess the environmental influence on variability. High and low temperatures and relative humidity will be evaluated as variables in separate experiments. Phase 4 will assess second generation variability. Those plants surviving in Phase 2 will be allowed to continue to grow and proceed through their reproductive cycle. Seed produced will be collected, and progeny will be evaluated for level of tolerance to glyphosate using the same methods as described above. Phase 5 will mine the data in the Monsanto database and determine the species exhibiting the greatest variation in control. Statistical testing will be conducted, not focused on differences in level of control, but more specifically on differences in the variance in control between species.

THE RESPONSE OF PITTED MORNINGGLORY BIOTYPES AND WEEDY RELATIVES FROM SOUTHERN STATES TO GLYPHOSATE. I.C. Burke[1], K.N. Reddy[1], C.T. Bryson[1], and C.H. Koger[2]. [1]USDA-ARS SWSRU, Stoneville, MS, 38776, [2]USDA-ARS CGPRU, Stoneville, MS 38776.

ABSTRACT

Considerable variability in the control of pitted morningglory (*Ipomoea lacunosa* L.) has been observed with glyphosate. Consequently, seed of multiple pitted morningglory biotypes were collected from eight southeastern states during the fall of 2003 and 2004 to evaluate the response of 55 different biotypes of pitted morningglory to a single sublethal rate of glyphosate under greenhouse conditions. Soil was a mixture of a Bosket sandy loam (Mollic Hapludalfs) and commercial potting mix at 1:1, v/v. For each study, seed of each biotype were sown separately in 30- by 45-cm trays and 8 plants were transplanted to 5- by 8-cm plastic pots upon emergence. At the 5-to-6 leaf stage, 4 plants of each biotype were treated with 0.42 kg ae/ha glyphosate. Control ratings were taken at 14 days after treatment (DAT), and the above ground biomass was harvested and fresh weight recorded. Plants were oven dried for a minimum of 72 h at 60 C, and dry weights were recorded. The study was repeated three times. Percent control was calculated as % control = 100 x (non-treated dry weight – treated dry weight)/non-treated dry weight. Other *Ipomoea* species included for comparison purposes were cypressvine morningglory (*I. quamoclit* L.), IPOQU; ivyleaf morningglory [*I. hederacea* (L.) Jacq.] spp. *Hederacea*, IPOHE; palmleaf morningglory (*I. wrightii* Gray), IPOWR; purple moonflower (*I. turbinata* Lag), CLYMU; and scarlet morningglory (*I. coccinea* L.), IPOCC.

There was considerable variability in pitted morningglory biotype response to glyphosate, with a greater than 50 percentage point difference between the most and least tolerant biotypes, regardless of evaluation method. Furthermore, no pitted morningglory died in response to glyphosate. Injury was typical of glyphosate and was characterized by a chlorosis of the shoot meristematic region 4 to 6 DAT. No further symptoms developed with any pitted morningglory biotype, although different levels of stunting were observed both in 14 DAT ratings and dry weights. There were differences in ranking between visual control ratings and percent control calculated from dry weights, although relatively less tolerant and relatively more tolerant biotypes ranked similarly. Environmental effects could cause the variability observed in the pitted morningglory biotypes with intermediate levels of tolerance. There was variability in the response of pitted morningglory to glyphosate, and that variability did not correlate with any plant morphological character. The results of this study demonstrate that a population containing more than one biotype of pitted morningglory could respond variably to treatment of glyphosate. Inconsistent reports on the control of pitted morningglory with glyphosate could be attributable to different biotypes of this troublesome weed. Further investigations are in progress to elucidated the causes for differential response to glyphosate among biotypes.

FALL APPLICATIONS OF GLYPHOSATE CONTROL ALLIGATORWEED AND REDVINE. A.B. Burns and B.J. Williams. LSU AgCenter, Baton Rouge, LA.

ABSTRACT

Perennial weeds such as alligatorweed (*Alternanthera philoxeroides* (Mart.) Griseb.) and redvine (*Brunnichia ovata* (Walt.) Shinners) are becoming more problematic as Louisiana producers adopt conservation tillage practices. Studies were established in the fall of 2003 near Monroe, La to evaluate fall applications of herbicides for alligatorweed control. The field was planted to rice in 2002 and 2004 and fallowed in 2003 and 2005. During the fallow years the field was disked 2-3 times, leveled and cultivated. The field was not tilled during the cropping years. In the first study several phenoxy herbicides and glyphosate were applied on September 15, 2003. Alligatorweed control was evaluated monthly from March to October in 2004 and in April and September of 2005. In a second study the effect of glyphosate, glyphosate plus 2,4-D and glyphosate plus triclopyr application timing was evaluated. In the fall of 2002 a study was established near Crowville, La to evaluate fall applications of herbicides for redvine control. The field was planted to cotton in 2001 and 2003 and planted to corn in 2002 and 2004. The field was prepared for planting in the fall by clipping stalks and re-hipping within two weeks of harvest. Cotton was harvested early in 2003. As a result the field was prepared for planting by early September and presented an opportunity to investigate sequential fall programs. The plots from 2002 (12, 40-inch rows) were reduced to 4 row plots and treated with dicamba, glyphosate or not treated in late September of 2003. A second study was established in the fall of 2004 to evaluate the effect glyphosate application timing and rate on redvine control. Two replications were near Crowville, La and two replications were near Saint Joseph, La. Picloram at 0.56 kg/ha and 1.12 kg/ha glyphosate resulted in the best alligatorweed control. Dicamba, 2,4-D, triclopyr and picloram at 0.28 kg/ha resulted in 70% or lower alligatorweed control. Synergistic responses were not identified when glyphosate was tank mixed with dicamba, 2,4-D, triclopyr or picloram. Glyphosate applied alone resulted in excellent alligatorweed control for as much as two years after application. Control was best from mid-September to early-October, and was considerably lower with mid-October application timings. Tank mixing glyphosate with either 2,4-D or triclopyr did not improve alligatorweed control. In many cases, especially with a mid-October application, alligatorweed control was reduced when glyphosate was mixed with 2,4-D or triclopyr compared to glyphosate alone. After 6 months, redvine control was similar for glyphosate at 2.24 and 4.48 and 2.24 kg/ha dicamba. Triclopyr resulted in the lowest redvine control. Glyphosate at 4.48 kg/ha, 2.24 kg/ha dicamba and 2.24 kg/ha glyphosate plus 1.12 kg/ha dicamba controlled redvine 95, 85 and 80% one year after application. The remaining treatments resulted in 50% or lower redvine control. Glyphosate at 2.24 kg/ha applied in late-September of 2002 and 2003 resulted in redvine control in 2004 equal to or better than single or multiple applications of 2.24 kg/ha dicamba or 4.48 kg/ha glyphosate. In April of 2005, 2.24, 3.36, and 4.48 kg/ha glyphosate applied September 15, 2004 resulted in similar levels of redvine control. The best control from 2.24 kg/ha from glyphosate was observed from mid-September to mid-October. Timing had little effect on redvine control with 4.48 kg/ha glyphosate. By September, treatments began to separate demonstrating the need for at least 3.36 kg/ha glyphosate. These results show that glyphosate at higher rates control redvine as well as 2.24 kg/ha dicamba. Glyphosate at 4.48 kg/ha resulted in the most consistent and long term redvine control from single applications. Still, 2.24 kg/ha applied each fall may be the best approach for managing redvine. Overall, fall applications of glyphosate appear to be very promising for controlling alligatorweed and redvine. Research suggests that glyphosate applications should be made between September 15 and October 15 when conditions are favorable for growth and enough regrowth has occurred for good coverage.

EFFICACY OF TANK-MIX COMBINATIONS OF ASULAM AND TRIFLOXYSULFURON ON RHIZOME JOHNSONGRASS CONTROL IN SUGARCANE. C.D. Dalley, E.P. Richard, Jr; USDA-ARS Sugarcane Research Laboratory, Houma, LA 70360.

ABSTRACT

Perennial johnsongrass is a major weed problem for sugarcane growers in Louisiana. For many years the herbicide asulam has been the only herbicide recommended for selective control of rhizome johnsongrass in Louisiana sugarcane. Some activity on johnsongrass has been observed following postemergence applications of the newly registered herbicide, trifloxysulfuron. Experiments were conducted to evaluate the efficacy of postemergence applications of trifloxysulfuron in combination with asulam on johnsongrass control. Potted johnsongrass plants that had matured to the point of producing rhizomes, were treated in spring 2005, with asulam applied at 0.45 and 0.9 kg ai/ha with and without trifloxysulfuron at 8 g ai/ha). After application, johnsongrass plants were subjected to simulated rainfall (3.8 cm in 15 min) at 1, 3, 6, and 24 hours after treatment (HAT), or to no simulated rainfall. Johnsongrass heights were measured at 2, 4 and 8 weeks after treatment (WAT). Destructive measurements of root, shoot, and rhizome weights and rhizome length were taken at 4 and 8 WAT. Trifloxysulfuron alone reduced whole plant dry weight by 18% at 8 WAT, while asulam applied alone at 0.45 kg/ha reduced johnsongrass biomass by 35%. Combinations of asulam and trifloxysulfuron reduced biomass 54%. Asulam applied at 0.9 kg/ha reduced johnsongrass biomass by 57% and by 80% when combined with trifloxysulfuron at 8 WAT. These results suggest an additive effect on johnsongrass control. Trifloxysulfuron did not improve rainfastness of asulam, and a rainfree period of 24 hours or more was required to elicit maximum response of johnsongrass to asulam, while only 3 hours was required for trifloxysulfuron. In 2003, 2004, and 2005 field studies were conducted to evaluate johnsongrass control in heavily infested sugarcane fields at the USDA-ARS Ardoyne Farm in Schriever, LA. In 2003 and 2004 asulam was applied (0, 0.9, 1.8, and 2.5 kg/ai ha) with and without trifloxysulfuron (0 and 16 g ai/ha) with a standard rate of asulam (3.7 kg/ha) included for comparison. In 2005, asulam was applied at 0, 1.8, 2.5, and 3.7 kg/ha) with and without trifloxysulfuron (0 and 16 g/ha) along with sequential applications of asulam (2.5 followed by 2.5 kg/ha) and asulam (2.5 kg/ha) followed by asulam plus trifloxysulfuron (1.8 kg/ha plus 16 g/ha). Plots were evaluated for johnsongrass control and sugarcane yield. Addition of trifloxysulfuron increased johnsongrass control in 2004 and 2005 but not in 2003. Adding trifloxysulfuron to asulam applications increased yield in one of three years. In 2005, sequential applications of asulam provided the highest levels of johnsongrass control and resulted in the highest yield. Sequential applications of asulam followed by asulam plus trifloxysulfuron provided equal control but lower sugarcane yield compared to the sequential asulam applications. When averaged across asulam rate, trifloxysulfuron increased johnsongrass control by 16% and increased sugar yield by 14%. The combination of asulam and trifloxysulfuron would be most beneficial when only a single application is being planned in fields heavily infested with johnsongrass.

ALTERNATIVE CROPS FOR FALLOWED SUGARCANE FIELDS. J.M. Boudreaux, J.L. Griffin, C.A. Jones, L.M. Etheredge, Jr., and M.E. Salassi. Louisiana State University AgCenter. Baton Rouge, LA.

ABSTRACT

In sugarcane, three to five harvests are made from a single planting after which the stubble is destroyed and fields are fallowed and prepared for replanting. The fallow period usually starts in April and sugarcane is replanted in August or September. During the fallow period weed control programs are implemented to control perennial weeds which have become problematic over the multi-year crop cycle. Successful weed control in the fallow period is critical to reducing weed populations in the first crop production year. Costs associated with the fallow period include land preparation, herbicides, and seed and return on investment is not realized until the crop is harvested at the end of the following year. There is considerable interest in planting an alternative crop during the summer fallow period as a means to generate additional income, as long as the crop does not jeopardize either weed control or timely planting of sugarcane.

A field study was conducted in 2005 at the Sugarcane Research Station in St. Gabriel, Louisiana, to evaluate the feasibility of growing corn or soybeans during the sugarcane fallow period compared with a conventional tillage non-crop system. For both the crop and non-crop treatments sugarcane stubble was destroyed in the fall and rows were formed to prepare for stale seedbed planting. ‘Dekalb 69-71 RR BT’ corn was planted March 7 on sugarcane beds spaced 72 inches apart using a 36 inch row spacing (two rows per bed). Atrazine and Roundup Original Max® were used during the growing season to control weeds. Recommended soil fertility practices based on a soil test were followed. Corn was harvested August 8 and yield was 138.4 bushels/A. ‘Asgrow 4403 RR’ soybeans were planted April 14 on sugarcane beds using a 16 inch row spacing (three rows per bed). Roundup Original Max® was applied at planting and as needed during the growing season. Insect and disease management followed LSU AgCenter recommendations. Soybean was harvested on September 9 and yield was 24.4 bushels/A. For the non-crop fallow treatment weeds were controlled on an as needed basis using Roundup Original Max®. On September 7 ‘HoCP 96-540’ sugarcane was planted and preemergence herbicide was applied.

Results showed that corn and soybeans can be grown during the sugarcane fallow period utilizing traditional sugarcane beds without delaying the planting of sugarcane or negatively affecting the planting operation. Weed control was not sacrificed when RR corn or soybeans was grown in fallow compared with the conventional non-crop system. Based on economic analysis, production of corn during the fallow sugarcane period resulted in a net gain of $105.27/A compared with $28.66/A net gain for soybeans. The traditional non-crop fallow program resulted in a net loss of $49.57/A. Compared with the conventional non-crop fallow program, shoot population 37 d after planting was reduced when sugarcane followed corn, but not when sugarcane followed soybeans. Reduced shoot population when sugarcane followed corn may or may not affect sugarcane production the first year, and this will be determined in 2006. Alternative crops are slowly gaining popularity among sugarcane farmers as a means to generate additional revenue, but there are concerns as to the added risks, time requirements, and overall economic benefit.

EVALUATION OF HEXAZINONE AND DIURON COMBINATIONS FOR PREEMERGENCE WEED CONTROL IN FLORIDA SUGARCANE. C.R. Rainbolt, Everglades Research and Education Center, University of Florida, Belle Glade, FL 33430.

ABSTRACT

Four studies were established near Belle Glade, FL in 2005 to evaluate combinations of hexazinone and diuron for preemergence weed control in Florida sugarcane. DuPont K4, a commercial premixture of hexazinone is currently registered for use in Louisiana, Texas, and Florida sugarcane; however, the majority of sugarcane in Florida is grown on high organic matter soils and the current maximum labelled rate of 4 lb/A may not provide adequate weed control. The objective of these studies was to evaluate weed control and crop safety with a range of hexazinone and diuron rates and ratios on muck soils. All four studies were established in ratoon sugarcane. Cultivars were Studies 1, 3, and 4, were in sugarcane cultivar CP80-1743, and study 2 was in CP89-2143. All four studies included K4 at 4lb/A, K4 at 6 lb/A, K4 at 8 lb/A, K4 at 10 lb/A, K4 at 4 lb/A + Sencor at 1 lb/A, K4 at 6 lb/A + Prowl H2O at 3.5 qt/A, K4 at 4lb/A + Direx at 2.5 lbs/A, and K4 at 6 lb/A + Direx at 2.5 lbs/A. Studies 1 and 2 also included Prowl H2O at 2.6 qt/A + Aatrex at 3 qt/A + Evik at 1 lb/A and studies 3 and 4 included Prowl H2O at 3.5 qt/A + Aatrex at 4 qt/A + Evik at 0.25 lb/A. Treatments were applied to sugarcane between 14 and 16 inches tall on March 15 in study 1, March 29 in study 2, and April 11 in studies 3 and 4. Studies 1, 2, and 3 were cultivated by the grower prior to herbicide applications. Study 4 was not tilled.

At study 1, alligatorweed (*Alternanthera philoxeroides*) was controlled 18 to 48% 22 days after treatment (DAT) and 15 to 33% 34 DAT. Common purslane (*Portulaca oleracea*) was controlled 89 to 95% 50 DAT. Fall panicum (*Panicum dichotomiflorum*) control was above 90% with all treatments 22 and 34 DAT. By 50 DAT, fall panicum control was highest (73 to 86%) with K4 at 6 lb/A + Prowl H2O at 3.5 qt/A, K4 at 4lb/A + Direx at 2.5 lbs/A, K4 at 6 lb/A + Direx at 2.5 lbs/A, and Prowl H2O at 2.6 qt/A + Aatrex at 3 qt/A + Evik at 1 lb/A. Crop injury was 5 to 6% with K4 at 10 lb/A, K4 at 4 lb/A + Direx, and K4 at 6 lb/A + Direx 10 DAT, but was no longer visible 34 DAT.

In study 2, all treatments controlled common lambsquarters (*Chenopodium album*) 95% or greater at 18 and 32 DAT. Control of alexandergrass (*Urochloa plantaginea*) was 94 to 99% 18 DAT. At 32 and 47 DAT, alexandergrass control was 88 to 91% with Prowl H2O at 2.6 qt/A + Aatrex at 3 qt/A + Evik at 1 lb/A and 80% with K4 at 6 lb/A + Prowl H2O at 3.5 qt/A. Crop injury was more severe in study 2 and ranged from 9 to 15% 18 DAT and 6 to 13% with all treatments containing K4. Crop injury tended to be more severe with higher rates and treatments that contained additional Direx.

Studies 3 and 4 were established in adjacent fields in which one was cultivated (study 3) and the other was not tilled prior to herbicide application. Crop injury was similar at both sites and ranged from 3 to 10% 14 DAT. In study 3, fall panicum control was 80% or greater with all treatments except K4 at 4 and 8 lb/A 25 DAT. By 39 DAT, fall panicum control was highest (60 to 68%) with K4 at 4 lb/A + Sencor at 1 lb/A, K4 at 4lb/A + Direx at 2.5 lbs/A, and K4 at 6 lb/A + Direx at 2.5 lbs/A. Alexandergrass control ranged from 63 to 80% 25 DAT and was not significantly different between treatments. K4 at 4 lb/A + Sencor at 1 lb/A, K4 at 6 lb/A + Direx at 2.5 lbs/A, Prowl H2O at 3.5 qt/A + Aatrex at 4 qt/A + Evik at 0.25 lb/A controlled alexandergrass 53% or more 39 DAT. In study 4, fall panicum and giant bristlegrass (*Setaria magna*) were controlled 89 to 96% by all treatments 14 DAT. Giant bristlegrass control was 93% or higher with all treatments 39 DAT. 39 DAT fall panicum control was highest (65 to 73%) with K4 at 10 lb/A, K4 at 6 lb/A + Prowl H2O at 3.5 qt/A, K4 at 6 lb/A + Direx at 2.5 lbs/A, and Prowl H2O at 3.5 qt/A + Aatrex at 4 qt/A + Evik at 0.25 lb/A.

Crop injury following K4 application occurred at all sites. However, it was temporary and less severe in studies 1, 3, and 4, compared to study 2. This is possibly due to study 2 being the only site with the cultivar CP89-2143. At early evaluations control of fall panicum and alexandergrass was similar among most treatments. However, at later evaluations control tended to be greatest with higher rates of K4, K4 in combination with Sencor, and K4 + Direx.

WEED CONTROL IN GRAIN SORGHUM. M.T. Bararpour, L.R. Oliver, C.E. Brewer, N.V. Goldschmidt, and J.L. Alford; Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville.

ABSTRACT

Grain sorghum (*Sorghum bicolor*) is an important feed crop grown in Arkansas. Field studies were conducted in 2003 through 2005 at the Agricultural Experiment Station, Pine Tree, AR, to evaluate new experimental and present herbicides and tank-mix combinations for weed control in grain sorghum. The plot area was tilled in both fall and spring and fertilized with 400 lb of NPK (0-20-20) prior to planting (May) and 200 lb of N on June. To insure uniform weed infestations, seed of Palmer amaranth (*Amaranthus palmeri*), prickly sida (*Sida spinosa*), broadleaf signalgrass (*Brachiaria platyphylla*), and pitted (*Ipomoea lacunosa*) and entireleaf morningglory (*Ipomoea hederacea var. integriuscula*) were broadcast over the area. The experimental design was a randomized complete block with 24 treatments and four replications. Treatments, with rates in lb ai/A, were as follows (Bicep II Magnum and Dual II Magnum rates were 2.2 and 1.27, respectively; rate of Agri-Dex was 1%.): 1) Bicep II Magnum (atrazine/metolachlor) at emergence followed by (fb) Aatrex (atrazine) at 0.4 + Agri-Dex at 4-leaf grain sorghum (GS); 2) Aatrex at 2 + Agri-Dex at emergence; 3) Aatrex at 1.6 + Agri-Dex (0.5%) at emergence fb Prowl (pendimethalin) at 3.3 (2-leaf GS) fb Clarity (dicamba) at 0.25 (4-leaf GS); 4) Dual II Magnum (s-metolachlor) + Peak (prosulfuron) at 0.027 + Agri-Dex at emergence; 5) Dual II Magnum + Callisto (mesotrione) at 0.125 + Agri-Dex at emergence; 6) Dual II Magnum PRE fb Aatrex at 2 + Agri-Dex at 2-leaf GS; 7) Dual II Magnum PRE fb Aatrex at 1.6 + Clarity at 0.25 (2-leaf GS); 8) Dual II Magnum PRE fb Aatrex at 1.6 + Peak at 0.027 + Agri-Dex at 2-leaf GS; 9) Dual II Magnum PRE fb Peak at 0.027 + Agri-Dex at 2-leaf GS; 10) Dual II Magnum PRE fb Callisto at 0.125 + Agri-Dex at 2-leaf GS; 11) Bicep II Magnum PRE; 12) Bicep II Magnum PRE fb Aatrex at 0.4 + Agri-Dex at 4-leaf GS; 13) Bicep II Magnum PRE fb Clarity at 4-leaf GS; 14) Bicep II Magnum PRE fb Peak at 0.027 + Agri-Dex at 4-leaf GS; 15) Bicep II Magnum PRE fb Callisto at 0.125 + Agri-Dex at 4-leaf GS; 16) Outlook (dimethenamid-P) at 0.75 PRE fb Aatrex at 1.6 + Agri-Dex at 2-leaf GS; 17) Guardsman (dimethenamid-P/atrazine) at 2.5 PRE; 18) Bicep II Magnum PRE fb Gramaone Max at 0.47 + AG-98 at 14-inch GS; 19) Bicep II Magnum PRE fb Aim (carfentrazone) at 0.008 + AG-98 at 14-inch GS; 20) Dual II Magnum + Atrex at 1 PRE fb Aatrex at 1 + Agri-Dex at 4-leaf GS; 21) Facet (quinclorac) at 0.375 PRE; 22) Facet + Aatrex at 0.5 + Agri-Dex at 2-leaf GS; 23) weed-free-check; and 24) weedy-check.

Callisto caused the greatest injury at 57% (reduced to 15% at the end of season) and 38% (reduced to 3%) 2 weeks after treatment when applied at grain sorghum emergence and at two-leaf GS, respectively. All herbicides provided excellent (90 to 100%) control of pitted and entireleaf morningglory and prickly sida. Palmer amaranth control was >90% from all herbicide applications except for Facet (PRE) at 78%. Broadleaf signalgrass control was >90% from most herbicides except for Aatrex, Aatrex fb Prowl fb Clarity, and Dual II Magnum + Peak. Very early postemergence (at GS emergence) applications of Aatrex failed to provide greater than 79% control of broadleaf signalgrass by the end of season.

Palmer amaranth, prickly sida, broadleaf signalgrass, and pitted and entireleaf morningglory interference reduced grain sorghum yield 52% as compared to weed-free check. The five best herbicide treatments in terms of grain sorghum injury and yield and weed control were Facet (PRE), Guardsman (PRE), Dual II Magnum (PRE) fb Aatrex + Clarity (at 2- leaf grain sorghum), Outlook (PRE) fb Aatrex + Agri-Dex (at 2-leaf grain sorghum), and the standard treatment of Dual II Magnum + Aatrex (PRE) fb Aatrex + Agri-Dex (at 4-leaf grain sorghum). These treatments provided 4349, 4349, 4218, 4156 and 4153 lb/A of grain sorghum yield, respectively.

DICLOSULAM AND IMAZAPIC COMBINATIONS FOR WEED CONTROL IN GEORGIA PEANUT.
A.M. Wise*, T.L. Grey*, E.P. Prostko*, T.W. Webster**, and W.K. Vencill*. *University of Georgia Crop and Soil Science Dept. and **USDA/ARS, 115 Coastal Way, Tifton GA 31794.

ABSTRACT

Florida beggarweed (*Desmodium tortuosum*), sicklepod (*Senna obtusifolia*), wild poinsettia (*Euphorbia heterophylla*), Palmer amaranth (*Amaranthus palmeri*), and morningglories (*Ipomoea* spp.) remain troublesome weeds in strip- and conventional tillage systems. These five weeds accounted for half of the top ten most troublesome peanut weeds in the state of Georgia and many are troublesome adjacent peanut growing states in the Southeast US. Diclosulam was first registered in 2000 for PPI and PRE application and is effective for control of Florida beggarweed, bristly starbur, common cocklebur (*Xanthium strumarium*), tall morningglory (*Ipomoea purpurea)*, and palmer amaranth. Control of yellow and purple nutsedges with diclosulam is variable. Imazapic was registered in 1996 for POST application in peanut and provides effective control of yellow and purple nutsedges, sicklepod, wild poinsettia, and palmer amaranth. Variable control of Florida beggarweed and bristly starbur often occurs with imazapic. Diclosulam and imazapic have crop rotational restrictions due to carryover issues, especially with cotton. The objectives of this study were to determine the effect of diclosulam and imazapic combinations on peanut weed control and yield in cropping situations.

Field studies were conducted at Plains and Tifton Georgia in 2003, 2004, and 2005. Peanut was planted using standard practices, treatments were arranged as a 2 x 5 factorial in a randomized complete block. The first factor was rate of diclosulam (0.0 and 0.035 kg ai/ha) and the second factor was rate of imazapic (0.0, 0.018, 0.035, 0.049, 0.070 kg ai/ha). Data collected included peanut yield and weed control for sicklepod, tall morningglory, wild poinsettia, Florida beggarweed, and Palmer amaranth.

Data were combined for analysis in SAS. The 2-way interactions between diclosulam and imazapic rates were not significant for any variable. Therefore, data for the main effects of imazapic were combined and analyzed across diclosulam treatments, and data for the main effects for diclosulam were combined and analyzed across imazapic treatments. When combined across imazapic rate, when no diclosulam was included in the system, morningglory, wild poinsettia, Florida beggarweed, and Palmer amaranth control was 75% or less. When diclosulam was included, control of these species improved to greater than 78%. In contrast, across the diclosulam rate when imazapic was not included in the system, control of all weed species was <50%. Florida beggarweed control improved linearly with increased imazapic rate ranging from 60 to 85%. The efficacy of imazapic and diclosulam applications indicates that combinations of these two herbicides are more efficient for controlling weeds and thus improving yields.

WINTER WEED CONTROL PROGRAMS FOR TEXAS RICE (*Oryza sativa* L.) PRODUCTION. W.D. Nanson, S.W. Willingham, G.N. McCauley, and J.M. Chandler; Texas Agricultural Experiment Station, Texas A&M University, College Station, TX 77843.

ABSTRACT

Studies were established in the fall of 2004 at the Texas Agricultural Experiment Stations at Eagle Lake and Beaumont, Texas to evaluate winter weed control programs for Texas rice (*O. sativa*) rice production. The herbicides evaluated were clomazone at 1.0 lb ai/A in Eagle Lake and 1.25 lb/A in Beaumont, flumioxazin at 2.5 oz/A, glyphosate at 1.0 lb/A, glufosinate at 0.5 lb/A, prosulfuron at 0.5 oz/A, and 2,4-D at 1.0 lb/A. Three application times used were fall (October), winter (December), and spring (February). Treatments were applied with a backpack CO_2 sprayer at 15 GPA with a four-nozzle spray boom. Weed control was evaluated visually (0-100%) at two, four, and eight weeks after application (WAA). Monocot families included in the study were *Poaceae* and *Iridaceae*. Dicot weed families included were *Asteraceae*, *Fabaceae*, *Polygonaceae*, *Brassicaceae*, *Apiaceae*, *Oragraceae*, *Rubiaceae*, and *Campanulaceae*.

In the fall, clomazone + flumioxazin and clomazone + prosulfuron provided >95% control of all weed species at 8 WAA, but clomazone + prosulfuron didn't provide adequate volunteer rice control. The winter application of glyphosate + flumioxazin had a >95% control for all winter weed species 8 WAA. In the spring, single glufosinate and glyphosate applications didn't provide adequate rescuegrass (*Bromus catharticius* Vahl) control in Eagle Lake or winter broadleaves control in Beaumont, but all single and sequential applications of glyphosate + flumioxazin provided excellent weed control. Emerging broadleaf signalgrass (*Brachiaria platyphylla* Griseb. Nash) at Eagle Lake and barnyardgrass (*Echinochloa crus-galli* L. Beauv.) in Beaumont were not adequately controlled with any treatment prior to planting. Winter broadleaf control was >90% with all treatments that contained glyphosate + flumioxazin and clomazone + prosulfuron followed by glyphosate. Clomazone + prosulfuron, clomazone + flumioxazin, and all treatments with glyphosate applied in February provided >90% control of emerging broadleaf signalgrass (*Brachiaria platyphylla* Griseb. Nash) in Beaumont.

NEW ALLIGATORWEED [*Alternanthera philoxeroides* (Mart.) Griseb] CONTROL PROGRAMS FOR TEXAS RICE. S.D**.** Willingham, W.D. Nanson, G.N. McCauley, and J.M. Chandler, Texas Agricultural Experiment Station, Texas A&M University, College Station, TX 77845.

ABSTRACT

Field studies were conducted in 2005 to evaluate herbicide programs for the control of alligatorweed and its effect on yield in rice production. Studies were located in grower's fields near Eagle Lake, Garwood, and Ganado, TX where alligatorweed populations were adequate. Applications of penoxsulam at 0.031 kg ai/ha alone and in combination with propanil at 3.3 kg/ha or triclopyr at 0.21 kg/ha and propanil + triclopyr were made early-postemergence (EPOST) when rice was at the 3 leaf rice stage and alligatorweed was 7.6 to 12.7 cm tall and late postemergence (LPOST) when rice was at the 4-5 leaf stage and alligatorweed at 10.2 to 17.7 cm tall. Additional LPOST treatments included combinations of bispyribac-sodium at 0.028 kg/ha, propanil, triclopyr, bensulfuron at 0.027 kg/ha, quinclorac at 0.33 kg/ha, and penoxsulam. Treatments were applied with a CO_2 pressurized backpack sprayer and visual alligatorweed control ratings (0-100%) and yield were subjected to analysis of variance. Means were separated using Fisher's protected LSD at the 10% level.

Penoxsulam and penoxsualm + triclopyr at EPOST provided >81 and 86% control at 2 and 4 weeks after treatment (WAT) respectively, and continued until the end of season with penoxsulam + triclopyr. By 7 WAT control was reduced to <72% with penoxsulam alone. When applied LPOST treatment results were similar except penoxsualm control declined to <73% by 4 WAT. Penoxsualm + propanil and propanl + triclopyr provided <68% season long. When these treatments were applied LPOST results were similar, <62% with propanil + penoxsulam and <69% with propanil + triclopyr. Bispyribac-sodium provided <76% control alone. The addition of propanil reduced control to <61% however; the addition of triclopyr increased control to >87% for alligatorweed all season. Bensulfuron and quinclorac + propanil LPOST provided <55% control at 2 WAT and < 66% 7WAT. Yield ranged from 9521 to 6791 kg/ha and penoxsulam + tryclopyr treatment yielded only significantly higher than bensulfuron treatment.

Overall alligatorweed control was achieved with Grasp alone and increased with the addition of Grandstand. Grandstand increased control in tankmixes however; Stam reduced control in tankmixes indicating possible antagonism with Grasp. Regiment also provided control only when mixed with Grandstand but not alone or when mixed with Stam.

POSTEMERGENCE CONTROL OF NEW PROBLEM BRAUDLEAF WEEDS IN RICE. A.T. Ellis and R. E. Talbert, University of Arkansas, Fayetteville, AR 72701.

.ABSTRACT

Studies were conducted in 2004 and 2005 to evaluate the efficacy of broadleaf postemergence rice herbicides for the control of cutleaf groundcherry (*Physalis angulata* L.), pitted morningglory (*Ipomoea lacunosa* L.), sicklepod (*Senna obtusifolia* L.), Palmer amaranth (*Amaranthus palmeri* S. Watts), and pale smartweed (*Polygonum lapathifolium* L.). Herbicide applications were made at an early (EPOST) and late (LPOST) postemergence timing.

Both EPOST and LPOST treatments of acifluorfen, carfentrazone-ethyl, propanil, imazethapyr, quinclorac, and triclopyr controlled cutleaf groundcherry (>90%) 3 weeks after treatment (WAT). Carfentrazone-ethyl, triclopyr, and 2,4-D consistently controlled pitted morningglory (>90%) 3 WAT at both application timings. Early postemergence applications of bispyribac-sodium, quinclorac, and 2,4-D controlled sicklepod (>85%). Applications of the quinclorac, triclopyr, and 2,4-D were the only treatments to control sicklepod (>85%) at the LPOST timing. Palmer amaranth was controlled (>90%) 3 WAT with EPOST applications of acifluorfen, carfentrazone-ethyl, propanil, penoxsulam, and 2,4-D. Palmer amaranth was controlled (>94%) at the LPOST timing with 2,4-D. Early postemergence applications of acifluorfen, carfentrazone-ethyl, and LPOST applications of 2,4-D controlled pale smartweed (75 to 89%) 3 WAT.

COMMON COCKLEBUR TEMPORAL EMERGENCE IS INFLUENCED BY TILLAGE AND CANOPY FORMATION. M.J. Oliveira, J.K. Norsworthy, P. Jha, M.S. Malik, and S.K. Bangarwa; Department of Entomology, Soils, and Plant Science, Clemson University, Clemson, SC 29634.

ABSTRACT

Experiments were conducted in 2003, 2004, and 2005 at Pendleton, SC, to determine the emergence period of common cocklebur in tilled and no-tilled plots in the absence and presence of soybean. Common cocklebur emergence initiated on April 21, May 10, and May 1, normally following the first tillage operation, and continued until August 12, October 29, and October 23 of 2003, 2004, and 2005, respectively. Total emergence in tilled plots was always numerically greater than no-tilled plots, regardless of crop presence or absence. Common cocklebur emergence in tilled plots in the absence of soybean was significantly greater than in the presence of soybean in 2003 and 2005 and numerically greater in 2004. Total emergence in no-tilled plots in the absence of soybean was statistically greater than its presence in 2004 and numerically greater in 2003 and 2005. Common cocklebur had at least three major periods of emergence, with the greatest occurring in tilled plots for all years. In 2003, emergence periods only occurred in tilled plots, with the greatest occurring in July. Conversely, in 2004, two emergence periods occurred in no-tilled plots in late June and July, with minimal emergence later in the season. In 2005, emergence in tilled and no-tilled plots occurred until soybean intercepted approximately 60% of the available light. Later emergence in 2005 only occurred in the absence of soybean, occurring in late July and August in tilled plots and in early July and late August in no-tilled plots. Minimal emergence occurred in the absence of soybean in 2005 after August, except for a small peak in no-tilled plots in early October. These data indicate that common cocklebur emergence is sensitive to and negatively affected by the absence of tillage and presence of a developing crop canopy. Altering planting dates to allow for enhanced crop groundcover occurrence prior to common cocklebur emergence should improve the effectiveness of weed management regimes in soybean and other spring planted crops.

AN UPDATE ON HERBICIDE RESISTANCE IN TENNESSEE. T.C. Mueller, L.E. Steckel, J.S. McElroy, and T.C. Teuton; Department of Plant Sciences, Knoxville, TN 37996.

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ABSTRACT

Reduced sensitivity of weeds to various herbicides remains at the economic and biological forefront of modern agriculture. Horseweed resistant to glyphosate still remains a major issue in many parts of Tennessee. Additionally, ryegrass with possible resistance to Osprey and Palmer pigweed with possible resistance to glyphosate were also investigated.

Horseweed not controlled by glyphosate is the most serious weed problem based on the number of acres infested. This has resulted in more interest in farmers using residual herbicides. Glufosinate (Ignite) was shown to provide good horseweed control, as long as the temperature was >60F. Other research also showed the paraquat (Gramoxone Inteon) activity on horseweed was enhanced when an additional herbicide that inhibits photosystem II was added. The presence of horseweed has heightened farmer's awareness of other herbicide resistance weeds, and unfortunately has also prompted many producers to abandon no-tillage systems in place of tillage to kill established vegetation.

Ryegrass with resistance to diclofop (Hoelon) has been present in Tennessee for several years. In 2005, seed were collected from a field with suspected resistance to mesosulfuron (Osprey). This population was examined for resistance to Osprey and to Hoelon, as well as two other populations; one known to be susceptible to both herbicides and one known to be resistant to Hoelon. Ryegrass plants were grown in a 90:10 sand:peat mixture and the greenhouse research used standard screening protocols. Each herbicide was applied at ¼ , ½, 1, 2, and 4 times the normal application dosage for Osprey (4.75 oz/acre) and Hoelon (2 pints/acre). Appropriate surfactants were added to each application, which was made when ryegrass was 10-14 cm in height. No Osprey resistance was documented, but the suspected population (and also the Hoelon-Resistant) were resistant to Hoelon. This lack of Osprey resistance reinforces the importance of confirming herbicide resistance under controlled conditions.

Palmer pigweed with reduced sensitivity has been investigated in Tennessee since 2003. Results in 2003 and 2004 were "inconclusive". In 2005, several field sites in western Tennessee were examined for reduced sensitivity of palmer pigweed (*Amaranthus palmeri*) to glyphosate. A total of four field locations were examined, with two being probable "resistant" (R), locations and two being known "susceptible" (S). Glyphosate as RoundupWeatherMAX was applied at 11, 22, 44, and 88 fl oz (½, 1, 2, and 4X) to 15-20 cm tall palmer pigweed. Data collected included weed counts prior to spraying, visual evaluations of weed control, and weed counts 14 DAT. Palmer pigweed populations were greater at locations with glyphosate tolerance. Palmer pigweed survived at both tolerant locations, with greater survival at lower glyphosate rates. Greenhouse studies of the two tolerant populations compared to a susceptible one indicated reduced glyphosate sensitivity by a 2X factor. To provide insight into the mechanism of tolerance, shikimate concentrations were determined in plants from both R and S populations. Differential shikimate levels after glyphosate application would indicate that EPSPS was not being affected in those plants exhibiting tolerance. There was no difference in shikimate levels of the tolerant compared to the susceptible palmer pigweed plants. This confirmed new weed species with reduced sensitivity to glyphosate warrants further investigation as to effective control methods, the basis for the observed tolerance, and weed biology of the tolerant ecotype.

DATA MINING AS A COMPONENT OF PRODUCT STEWARDSHIP: A CASE STUDY WITH COMMON RAGWEED. T.S. Willard and D.W. Abbott. Monsanto Company, West Monroe, LA; and The Modeling Agency, The Woodlands, TX.

ABSTRACT

Data mining offers the opportunity to discover interesting knowledge about herbicide performance. This knowledge may be hidden within large amounts of data from experiments with varying objectives. Data mining can identify important factors that impact herbicide performance and rank their importance.

Data mining is an iterative process that includes defining the question, retrieving data, preparing data, modeling data, interpreting results, and evaluating the model. We chose to investigate the performance of Roundup® agricultural herbicides on common ragweed (*Ambrosia artemisiifolia*) over time. Data from experiments conducted by Monsanto personnel in the United States in 1992 to 2003 were retrieved – over 10,000 rows of data from 434 experiments. Summary tables and graphs were built to begin to understand the information. The process began to focus on a more refined question: what factors are influencing unexpected product failures. The data set was then focused on treatments containing one application of a Roundup agricultural herbicide at the labeled rate for the weed size, in corn and soybean locations, and 13–49 days after treatment (DAT). This focused data set was about 500 rows of data from approximately 150 experiments. To prepare the data for modeling, groups of data were formed using segmentation and clustering analysis for individual variables such as product rates, DAT, and time of application.

Preliminary modeling indicated that environmental conditions were important factors but detailed environmental data were limited in the data set. Additional weather data were gathered from Meridian Environmental Technology, Inc. for years 2001 to 2003. Additional modeling indicates extreme temperatures and cloud cover reduce the effectiveness of Roundup agricultural herbicides on common ragweed. This is a relatively small data set and the results are preliminary. The extreme temperatures and cloud cover may be causal or just related to poor performance. More investigation is needed. Nevertheless, data mining tools can be valuable in sorting through, focusing on, and identifying factors affecting herbicide performance that may have otherwise been overlooked.

EFFECT OF TILLAGE AND HERBICIDE INPUTS ON EMERGENCE AND CONTROL OF TROPICAL SPIDERWORT (*COMMELINA BENGHALENSIS*). D.O. Stephenson, IV; University of Arkansas, Keiser, AR; B.J. Brecke and K.C. Hutto; University of Florida, Jay, FL.

ABSTRACT

Research was initiated in 2005 at the West Florida Research and Education Center in Jay, FL. Three preplant tillage regimes were investigated: moldboard plow, strip-tillage, and para-tillage. Six herbicides treatments were investigated that were applied preemergence, postemergence to 4-leaf cotton, postemergence to 8-leaf cotton, and/or postemergence-directed. Herbicide applied included diuron, fluometuron, glyphosate, and *S*-metolachlor. Results indicate that moldboard plow reduced tropical spiderwort biomass by at least 50% compared to para- and strip-tillage 5, 11, and 17 weeks after planting (WAP). Herbicide treatments that contained diuron, fluometuron, and/or *S*-metolachlor provided at least 85% control of tropical spiderwort 11 and 17 WAP. Sequential applications of glyphosate controlled tropical spiderwort 50 to 60% 11 and 17 WAP. No differences in seed cotton yield were observed regardless of tillage or herbicide treatment. Data indicates that excellent control can be attained when glyphosate is tank-mixed with *S*-metolachlor postemergence and diuron postemergence-directed in a tropical spiderwort management program.

GLYPHOSATE RESISTANT HORSEWEED MOVES FROM THE COTTON FIELDS INTO SOYBEANS IN CRITTENDEN COUNTY ARKANSAS. M. Hamilton, R.C. Scott, J. Osborne, and J. McFarland; Cooperative Extension Service, University of Arkansas, Little Rock, AR.

ABSTRACT

Glyphosate resistant horseweed has been spreading across several counties in north eastern Arkansas over the past few years. Until recently this spread was most prevalent in no-till and reduced tillage cotton fields. However, as the weed becomes more common it is occurring as a pest in soybean. A study was conducted to search for a single herbicide tank mix partner that could be applied in-crop for the control of horseweed. Herbicides evaluated included: Classic, Flexstar, FirstRate, Python, Scepter, Blazer, Storm, and Basagran. Of all herbicides evaluated, only 0.3 oz/A of FirstRate controlled horseweed 60%, all others were rated below 50% control at 4 weeks after treatment. Herbicide programs for horseweed control will be required. Future research will focus on burndown and pre-plant programs for horseweed control.

UTILIZING REMOTE SENSING AS A TOOL TO EVALUATE VARIOUS PLANT GROWTH REGULATOR TIMING TECHNIQUES IN COTTON PRODUCTION. M.T. Kirkpatrick, D.M. Dodds, J.A. Huff, J.T. Irby, and D.B. Reynolds; Plant and Soil Science, Mississippi State University, Mississippi State, MS 39759.

ABSTRACT

The use of remote sensing can be effectively utilized to easily acquire information about the vegetative growth and development of a crop. The implications of this technology can be to allow for timely data collection as well as the ability to spatially monitor plant growth and development throughout an entire field. Since management of vegetative growth of cotton is necessary for cotton production using plant growth regulators (PGR), an easy and affective method to differentiate spatial variability of cotton growth is essential. This is important because current plant growth monitoring techniques are often time consuming and only take an average of the field. A study was designed to determine whether remotely sensed data could accurately depict vegetative growth of cotton, and if PGR applications could be based on these data. PGR recommendations based on NDVI (normalized difference vegetative index) calculated from multi-band aerial imagery were compared to various commonly used techniques. The study was conducted over a three year period from 2003 to 2005 at two locations, which were the Blackbelt Research Farm in Brooksville, MS and the Mississippi State North Research Farm in Starkville, MS. The test was designed as a split-plot design with four replications. The main plot was variety and the split-plot was PGR scheduling technique. The two varieties used were DP 555BR, which exhibits a more rank growth characteristic and DP 444BR, which exhibits a more subdued growth habit. The PGR treatments that were utilized were: Low rate multiple (LRM) (4 fl oz/A pinhead square, fb 4 fl oz/A two wks later, fb 12 fl oz/A at visible white flower), several different single application treatments, which included early (pinhead square) low rate (4 fl oz/A), low rate late season (4 fl oz/A at visible white flower), high rate late season (16 fl oz/A), application based on the MEPRT computer program, based on NDVI (early and 2wks later if needed based NDVI value), and based on NDVI plus plant height. An untreated check was also included in the study. Periodic multi-band aerial imagery was collected for each study site throughout each growing season. Plant measurements such as total plant height, top five node length, total nodes, and NAWF (nodes above white flower) were collected before and after PGR applications and as close to aerial imagery dates as possible. The results of the study indicated that there was a high plant height to NDVI correlation for cotton at Brooksville and Starkville over the three year study (>71% and >76%, respectively). The results also indicated PGR treatment differences in plant height and top five node length reduction. PGR timing treatments that were applied early and more than once (LRM, MEPRT, NDVI, and NDVI + plant height treatments) resulted in significantly higher plant height and top five node length reduction. Variety and year differences were also observed with higher growth with DP 555 and higher growth occurring in 2004 than other years due to increased rainfall. Application scheduling using the MEPRT program resulted in significantly higher seed cotton yield than all single application treatments. Furthermore, early and multiple applications tended to result in higher seed cotton yields than single applications. Based on this study NDVI calculated from aerial imagery can aid in differentiating vegetative growth cotton. This may be beneficial for enabling a producer to make site-specific applications of PGR based on cotton growth. The use of remotely sensed data incorporated with the computer aided MEPRT program may provide an even more effective application technique.

PALMER AMARANTH (*AMRANTHUS PALMERI*) MANAGEMENT IN COTTON. J. A. Kendig, R. L. Nichols, J. W. Heiser and P. M. Ezell, University of Missouri Delta Center, Portageville, MO 63873 and Cotton Incorporated, Raleigh, NC, 27513.

ABSTRACT

Palmer amaranth is a difficult-to-control weed in cotton. Use of glyphosate in glyphosate-resistant cotton is a valuable tool in cotton weed management. However, glyphosate has not fully solved the problem of Palmer amaranth control. Palmer amaranth was a troublesome weed before Roundup Ready crops were available, and certain populations were resistant to herbicides with the ALS (acetolactate synthase) mode of action. Reasons often cited for incomplete control of Palmer amaranth in Roundup Ready cotton include: Palmer amaranth's rapid rate of growth, capacity to emerge throughout the growing season, and the reduction in the use of herbicides with soil-residual activity. Glyphosate has only post emergence activity and is selective to reproductive growth in the currently-available Roundup Ready cultivars only through the 4th true leaf stage. Although glyphosate is frequently applied four or more times in Roundup Ready cotton, after the 5th true leaf stage glyphosate must be applied as a post directed treatment to avoid the possibility of fruit loss. In 2006, Roundup Ready Flex® cotton will offer the ability to make over-the-top glyphosate applications until seven days before harvest. Roundup Ready Flex cotton might have offered the solution to Palmer amaranth control in cotton, except for the recent discovery of glyphosate-resistant Palmer amaranth.

A common recommendation to improve the efficacy of weed management in Roundup Ready cotton and to reduce the number of glyphosate treatments needed to control Palmer amaranth is to integrate herbicides with soil-residual activity into the program. This recommendation also has the goal of slowing or preventing the development of weed resistance to glyphosate. Intensive but expensive programs of pre-emergence herbicides, combination of glyphosate with residual, tank-mix partners applied as early post emergence treatments, and use of layby treatments will usually result in excellent Palmer amaranth control. However, inexpensive programs that significantly improve Palmer amaranth control by adding only one or a few herbicides to a glyphosate-based program have not been identified.

Three sets of studies were done in 2001-2003. The objective was to determine if the addition of herbicides with soil-residual activity at a single timing would significantly improve Palmer amaranth control. Cotton weed management was modeled as a three-treatment program, and independent sets of studies were done to determine the effects of soil-active herbicides applied as pre-emergence treatments (timing 1), as tank-mix partners with early post emergence treatments of glyphosate (timing 2), and as post-directed treatments at layby (timing 3). Because the effects of single timings within a program are obscured if the other two treatments are either highly effective or highly ineffective, a novel approach was used. In each of the three studies, blanket treatments, intended to provide a moderate level of Palmer amaranth control were made at two of the three timings, and the test herbicide treatments were applied at the remaining timing. In the studies of pre-emergence herbicide options, early post emergence bromoxynil treatments were used in bromoxynil-resistant cotton followed by a layby-directed application of fluometuron + MSMA. In the early post emergence studies, pendimethalin was applied pre-emergence, and fluometuron + MSMA was applied at layby. In the layby experiments, pendimethalin was applied pre-emergence followed by an over-the-top application of glyphosate in Roundup Ready cotton.

A number of pre-emergence and pre-plant incorporated herbicides provided good early-season Palmer amaranth control, but by late season, control was generally inadequate. Fomesafen, applied as a pre-emergence treatment, and fluometuron + norflurazon were among the better treatments. Postemergence applications of s-metolachlor, tank-mixed with glyphosate sometimes provided good Palmer amaranth control. However, in site-years when activating rainfall did not occur, metolachlor did not improve control. Residual layby treatments generally provided similar, excellent control when they were applied at favorable cotton-weed height differentials, but inadequate control when the crop was not at least 2-4 inches taller than the target weeds. In other research, slight differences have been observed, with flumioxazin, oxyfluorfen and fomesafen being slighty better than diuron, prometryn and fluometuron as layby treatments; however the results from this study support recommendations that height differential is more important than the chemical chosen. In summary, no single herbicide provided a dependable, significant improvement in Palmer amaranth control, compared with that provided by glyphosate alone. When high populations of Palmer amaranth are present, residual chemistries may need to be added at more than one timing, to achieve significant improvements in control.

COMPARATIVE TOLERANCE OF ROUNDUP READY AND ROUNDUP READY FLEX COTTON TO GLYPHOSATE. J.A. Huff, J.T. Irby, D.M. Dodds, M.T. Kirkpatrick, and D.B. Reynolds, Mississippi State, MS.

ABSTRACT

The introduction of Roundup Ready cultivars, in 1997, revolutionized cotton production. Due to glyphosate's low cost, ease of use, and activity on a broad spectrum of weeds, it has become one of the most popular herbicides in the world. While Roundup Ready cotton is currently available, the labeled application timing is restricted to before the fifth true leaf. Glyphosate applied after the fifth leaf stage can cause decreased boll retention resulting in severe yield reductions.

To combat this issue, new advancements have been made to allow producers a wider window of glyphosate application. Roundup Ready Flex cotton will be introduced in March, 2006. Roundup Ready Flex offers a wider window of application timing without the risk of yield loss. The current Roundup Ready Flex label allows for a season long maximum of 5.3 qt/A with a maximum of 44 oz/A between layby and 60% open bolls. Applications can be made up to seven days before harvest.

The objective of this research was to determine the effect of glyphosate rate and application timing on Roundup Ready Flex cotton yield and fruit partitioning as compared to current Roundup Ready cotton. In 2005, experiments were conducted at Leland, Greeenwood, Starkville, and Brooksville, MS and in 2004 an experiment was conducted in Brooksville. Two varieties of cotton, MON 171 ERR (Flex) and ST 4892 RR, were planted in two rows, 6.3 ft wide by 40 ft long on 38 in rows. Glyphosate was applied at 22 and 44 oz/A (0.75 and 1.5 lb ae/A). Each rate was applied at application timings of 3-, 3- followed by (fb) 6-, 3- fb 6- fb 9-, and 3- fb 6- fb 9- fb 12-leaf cotton growth stage to both cotton varieties. An untreated check was also kept weed free for comparison.

Data were colleted using box mapping and machine harvested yield. Box mapping data were taken from a 10 ft section of a row from each plot. Seed cotton was harvested by node and fruiting position from each fruiting site. These data showed a variety by application timing interaction. The data show that yields for Roundup Ready Flex were unaffected by application timing or rate with yields not differing from the untreated check. Yields for ST 4892 RR were affected by application timings after the 6th leaf. ST 4892 RR showed an increase in yield partitioning in 3rd position bolls and upper nodes at the later application timings where Roundup Ready Flex did not. Although increases in seed cotton yield were observed at higher nodes and at the outer fruiting positions in ST 4892 RR the plant was unable to completely compensate for fruit lost in the bottom of the plant in position one bolls. Theses results suggest that Roundup Ready Flex cotton shows great promise for allowing a much wider window for glyphosate applications when compared to current Roundup Ready varieties.

COMPARISON OF PROWL H2O® TO OTHER DINITROANALINE AND CHLOROACETAMIDE HERBICIDES IN TRANSGENIC COTTON WEED CONTROL SYSTEMS. J.T. Irby, D. B. Reynolds, M.T. Kirkpatrick, D.M. Dodds and J.A. Huff. Mississippi State University, Mississippi State, MS.

ABSTRACT

Due to the utilization of early postemergence treatments of Roundup (glyphosate) on Roundup Ready® cotton, the use of preemergence residual herbicides has declined. Without using residual herbicides, problems such as shifts in weed populations or weed resistance may arise. Since glyphosate has no residual activity, tank mixtures with residual herbicides are commonly utilized. Therefore, cotton tolerance must be determined when applying residual herbicides such as Prowl (pendimethalin) and Dual Magnum (s-metolachlor) with glyphosate as postemergence applications on transgenic cotton.

Experiments were conducted at the Black Belt Branch Experiment Station in Brooksville, MS. The soil consists of a silty clay loam. The transgenic cotton variety planted was DP 444 BR in 12.6 by 40 feet plots. A two factor factorial experiment arranged in a randomized complete block design was used with each treatment being replicated four times. The two factors analyzed were application timing and herbicide treatment. Applications were made at preemergence and 4-leaf application timings. Herbicide treatments were Roundup Original Max® (4.5 lb ae glyphosate /G) at 22 oz/A applied in combination with each of the following: Prowl H2O® 3.8EC at 1.6 pt/A, 3.2 pt/A, and 6.4 pt/A; Prowl 3.3 EC® at 1.8 pt/A, 3.6 pt/A, and 7.2 pt/A; and Dual Magnum® 7.62 EC at 1.33 pt/A. Applications were made through a compressed air hooded sprayer system with an output rate of 15 gallons per acre. Visual injury ratings were recorded 7, 14, and 28 days after each application. At harvest, treatments were box mapped in order to determine boll partitioning on the plant. In each plot, a 10 foot section was harvested and bolls were counted and weighed by node position on the plant and boll position on each node. From the box mapping data, yield totals were calculated in lbs/A.

Both formulations of pendimethalin resulted in significant crop injury. Prowl H2O® and Prowl EC resulted in 25 to 29 and 28 to 56% crop injury, respectively, 7 days after treatment (DAT). Glyphosate alone and tank mixed with Dual resulted in only 3 to 6% injury 7 DAT. No injury was visible 28 DAT for the 1X rate of Prowl H2O® whereas 10% injury was still apparent for the Prowl 3.3 EC® at the 1X rate. Prowl H2O® and Prowl 3.3 EC® caused deformity of plants (interruption of growth at the apical meristem). However, no significant difference in yield or in boll partitioning was found. This study shows that labeled residual herbicides can be applied postemergence to cotton with low occurrences of injury. Utilizing these herbicides as postemergence applications could add residual activity to Roundup Ready® cotton systems; however, further research needs to be conducted in order to properly assess the injury that may occur, particularly with treatments such as pendimethalin, which are not currently labeled for postemergence use, but which would offer an economical alternative if available.

WEED CONTROL PROVIDED BY RESIDUAL AND NON-RESIDUAL COTTON LAYBY HERBICIDES.
M. Saini, A.J. Price, C.H. Koger, J.W. Wilcut, D. Miller, and E.van Santen. Auburn University, Auburn, AL, USDA-ARS, Auburn, AL, USDA-ARS, Stoneville, MS, N.C. State University, Raleigh, NC, Louisiana State University, St. Josephs, LA, and Auburn University, Auburn, AL.

ABSTRACT

Field studies were conducted in four states to evaluate weed control provided by glyphosate applied alone or followed by glyphosate, glufosinate, and MSMA applied alone or mixed with different residual LAYBY herbicides. Herbicide treatments included glyphosate EPOST alone or followed by: 1) glyphosate, 2) glufosinate, or 3) MSMA alone or tank mixed with one of the following residual herbicides: a) carfentrazone-ethyl at 0.3 kg ai/ha, b) diuron at 1.12 kg ai/ha, c) flumioxazin at 0.07 kg ai/ha, d) fluometuron at 1.12 kg ai/ha, e) lactofen at 0.84 kg ai/ha, f) linuron at 0.56 kg ai/ha, g) oxyfluorfen at 1.12 kg ai/ha, h) prometryn at 1.12 kg ai/ha, or i) prometryn + trifloxysulfuron at 1.12 kg ai/ha + 10 g ai/ha. In Mississippi, glyphosate or glufosinate applied POST following glyphosate EPOST (two applications) improved barnyardgrass, coffee senna, hemp sesbania, johnsongrass, and prickly sida control ≥ 28 percentage points compared to glyphosate EPOST alone (one application). Glyphosate EPOST fb glufosinate POST increased pitted mornigglory control 61 percentage points compared to glyphosate EPOST alone and provided superior control of hemp sesbania compared to glyphosate EPOST fb glyphosate POST and glyphosate EPOST fb MSMA POST. When averaged across residual POST herbicides glufosinate containing treatments provided a 14 percentage point higher pitted morningglory and 22 percentage point higher hemp sesbania control compared to treatments containing glyphosate. MSMA containing treatments provided 14 percentage points lower barnyardgrass and 12 percentage points higher pitted morningglory control compared to treatments containing glyphosate. Additionally, glyphosate POST mixed with any of the nine residual herbicides improved barnyardgrass control 26 percentage points in one comparison, pitted morningglory control ≥ 15 percentage points in nine comparisons and hemp sesbania control ≥ 35 percentage points in eight comparisons compared to glyphosate applied alone. Glufosinate POST mixed with any of the nine residual herbicides improved hemp sesbania and pitted morningglory control ≥ 16 percentage points in two and one comparison respectively compared to glufosinate POST alone, while barnyardgrass control did not increase. MSMA POST mixed with any of the nine residual herbicides increased pitted morningglory control 13 percentage points in nine comparisons and hemp sesbania control ≥ 30 percentage points in nine comparisons. When applied alone, all residual herbicides were ineffective in controlling barnyardgrass. In Louisiana, glyphosate, glufosinate, or MSMA applied POST following glyphosate EPOST improved ivyleaf morningglory, pitted morningglory, and redroot pigweed control ≥ 42 percentage points compared to glyphosate EPOST alone. Additionally, averaged across residual POST herbicides, treatments containing glyphosate, glufosinate, or MSMA provided similar control of all weeds evaluated. At the two North Carolina locations, average weed control values were strikingly similar regardless of the non-residual herbicide used, with treatments containing flumioxazin being most effective and linuron the least of the nine residual treatments. At the Rocky Mount location, glyphosate and glufosinate applied POST following glyphosate EPOST improved pitted morningglory control ≥ 46 percentage points compared to glyphosate EPOST alone; whereas MSMA applied POST following glyphosate EPOST did not improve pitted morningglory control. Averaged across residual POST herbicide treatments, MSMA containing treatments provided 9% less pitted morningglory control compared to glyphosate or glufosinate containing treatments. At the Kinston location, Glyphosate, glufosinate, or MSMA applied POST following glyphosate EPOST improved pitted morningglory control ≥ 19 percentage points in all cases, compared to glyphosate EPOST alone. Additionally, averaged across residual POST herbicides, treatments containing MSMA provided 6 and 7 percentage points less pitted morningglory control compared to glyphosate and glufosinate respectively. Glyphosate POST mixed with any of the nine residual herbicides improved pitted morningglory control ≥ 14 percentage points in nine comparisons compared to glyphosate POST alone. Similarly, glufosinate and MSMA also improved pitted morningglory control when mixed with residual herbicides compared to when applied alone. In general, at all locations, treatments containing MSMA provided lower average control compared to those containing glyphosate or glufosinate and residual herbicides applied alone provided inadequate control compared to those including a glyphosate, glufosinate, or MSMA. Overall, within 315 of 567 comparisons (55%), when a residual herbicide was added, weed control increased. With the addition of barnyardgrass at the Mississippi location, the problematic weeds at all locations were hemp sesbania and pitted morningglory.

PINOXADEN – A NEW POSTEMERGENCE GRAMINICIDE FOR WHEAT AND BARLEY. M.J. Urwiler, B.W. Minton, B.D. Black, and Don Porter, Syngenta Crop Protection, Greenville, NC.

ABSTRACT

Pinoxaden is a new selective herbicide discovered by Syngenta Crop Protection and being developed for the control of annual grass weeds in wheat and barley. Pinoxaden is a novel grass active compound from the chemical class phenylpyrazolin and is formulated with the safener cloquintocet-mexyl. Pinoxaden is taken up primarily through leaves of treated grasses and then translocated basipetally and acropetally in plants. At a use rate of 60 g ai/ha, Pinoxaden effectively controls wild oat, (*Avena fatua),* foxtails (*Setaria* species), Italian ryegrass *(Lolium multiflorum),* Persian darnel *(Lolium persicum),* barnyardgrass (*Echinochloa crus-galli*), as well as several other annual grasses. Pinoxaden has excellent crop safety to all varieties of spring wheat, winter wheat and barley. Results from wheat and barley tolerance trials indicate crop safety is maintained even at double the use rate without any negative effect on grain yields. Pinoxaden can be applied in the fall or spring from the 2-leaf stage up to the pre-boot stage of crops. Pinoxaden can be tank-mixed with broadleaf herbicides for flexible one-pass grass and broadleaf weed control in wheat and barley crops. Results from plant-back trials following Pinoxaden applications show no rotational crop limitations the following growing season. Pinoxaden has a very favorable toxicological and ecotoxicological profile. Based on its broad grass weed control spectrum, excellent crop safety, and flexibility of use, Pinoxaden will become a new standard for grass weed control in wheat and barley crops.

KIH-485 POTENTIAL IN SOUTHERN ROW CROPS. P.J. Porpiglia, O. Watanabe, and M. Kurtz; Kumiai America, White Plains, NY and Y. Yamaji and H. Honda; Kumiai Chemical Industry Co. Ltd. Tokyo Japan.

ABSTRACT

KIH-485 was discovered and patented by Kumiai and Ihara Chemical Cos. Ltd., Tokyo, Japan. KIH-485 is under development in the USA by Kumiai America for use as a broad-spectrum pre-emergence herbicide in corn, soybean and possibly other crops. After three years of field testing, high activity has been confirmed on numerous annual grasses and broadleaf weeds. Testing has primarily focused on US corn growing regions. Targeted use rates for KIH-485 have been adjusted for soil texture and appear to be between 125 g. ai/ha for light or sandy soils to 250 g. ai/ha for heaver or clay soils. In field tests compared to the commercial standards s-metolachlor and acetochlor, KIH-485 has demonstrated equal or better weed control activity at rates of approximately 12 and 10 percent of these two standards, respectively, on an active ingredient basis. In 2004 and 2005, research was expanded to cotton and several other crops. Cotton was found to have pre-emergence tolerance to KIH-485 in limited testing. KIH-485 appears particularly suited to several major agronomic row crops grown in the southern region due to its broad weed control, application flexibility and full-season residual activity. Analytical studies and field bioassays have shown KIH-485 to have a field half-life between 30 and 40 days depending on environmental conditions. Much of this work is ongoing and will be further described as results become available. KIH-485 has also demonstrated tolerance in winter wheat at somewhat reduced rates compared to corn, soybean and cotton. However, in wheat, troublesome grasses, such as *Lolium* spp. show high sensitivity. Although early in development, there appears to be several major opportunities for KIH-485 in southern row crops. Future work will continue to examine and define the southern weed spectrum, crop tolerance, rotation crop sensitivity and other key environmental qualities of this new molecule.

TOPRAMEZONE: A NEW ACTIVE FOR POSTEMERGENCE WEED CONTROL IN CORN.
P.D. Vaculin, R.M. Porter, J.E. Orr, J.A. Immaraju and W.B. O'Neal, AMVAC Chemical Corporation, Newport Beach, CA.

ABSTRACT

Bahiagrass and hybrid bermudagrass are the most commonly grown forages in Florida. Weeds, such as the smutgrass species, often invade these forages, resulting in forage loss, reduced grazing, and lower calf weaning weight. Hexazinone is the only herbicide available for smutgrass control in forages. Small smutgrass (*Sporobolus indicus*) is controlled with at least 0.84 kg ai/ha hexazinone, while at least 1.12 kg/ha hexazinone is necessary to control giant smutgrass (*Sporobolus indicus* var. *pyramidalis*). These hexazinone rates have been shown to cause chlorotic conditions on bahiagrass within 20 days after treatment (DAT) (Mislevy et al. 1999). This chlorotic condition is followed by a change to a dark green color, which is darker than bahiagrass that is not treated with hexazinone (Mislevy et al. 1999). The effect of hexazinone application on bahiagrass yield and quality during this period of injury remains unknown. Additionally, information on the effect of hexazinone on hybrid bermudagrass yield is limited. Therefore the objective of this research was to determine the short-term effect of hexazinone application on forage yield and quality of bahiagrass and hybrid-bermudagrass.

Experiments were conducted in 2005 at the University of Florida, with the north site located at Gainesville and the south-central site located at Ona. Hexazinone was applied in mid-June at 0, 0.28, 0.56, 1.12, and 2.24 kg ai/ha to 'Pensacola' bahiagrass and 'Tifton-85' hybrid bermudagrass in 3.1 by 3.1 m plots; treatments were replicated four times. A backpack calibrated to deliver 281 L/ha was used to apply herbicide treatments. Biomass was measured by clipping a known area from each plot 14, 28, 42, 56, and 84 DAT. A sub-sample was measured from each plot, which was used to determine % dry matter and forage quality (forage quality results are not available at this time). Percent dry matter was used to determine the total forage yield per hectare.

Topramezone is a novel 4-HPPD inhibitor herbicide for postemergence weed control in corn (*Zea mays* L.). AMVAC Chemical Corporation has licensed from BASF AG exclusive rights for this usage in North America. Topramezone is effective against the major broadleaf weed species, and also active against several grass weed species common to US and Canadian corn production. This compound is formulated as a 2.8 lb ai/gal suspension concentrate (SC). Topramezone has been field tested for several years in numerous industry and university research programs. These trials have demonstrated that topramezone at rates of 0.011 to 0.016 lb ai/A applied with recommended spray additives such as methylated seed oil and nitrogen fertilizer source, provides excellent weed control coupled with exceptional tolerance to all types of corn. Topramezone will be used as a sequential application to preemergence soil applied treatments or in a total postemergence program in mixtures with other herbicides. Topramezone was reviewed as part of a Joint Review with the US Environmental Protection Agency and the Canadian Pest Management Regulatory Agency. The agencies concluded that the use of topramezone and its end use product in accordance with the label does not entail an unacceptable risk of harm to man or the environment. The crop tolerances of topramezone and EPA registration for uses in field corn, seed corn, sweet corn and popcorn were received in August 2005. Topramezone will be marketed under the brand name Impact in the USA and Canada. Impact herbicide will be launched and available for commercial use during the 2006 corn season.

GRAMOXONE INTEON®: BURNDOWN FOR THE 21st CENTURY. E.W. Palmer, J.C. Holloway, B.D. Black, B.W. Minton, C.L. Foresman, and C.A Sandoski. Syngenta Crop Protection, Inc., Greensboro, NC 27419.

ABSTRACT

Syngenta Crop Protection is introducing a new paraquat formulation, Gramoxone Inteon®. Gramoxone Inteon® was registered by the EPA on August 17th, 2005 and first sales occurred in late 2005.

Gramoxone Inteon® is a new user-friendly formulation that contains a novel alginate wall technology and alerting agent and provides unrivaled speed of activity. This new formulation contains two pounds active ingredient per gallon and is formulated as a soluble liquid (SL). Application rates range from 1.0 to 4.0 pints per acre (0.28 – 1.12 kg ai/ha) for burndown weed control with 2.5 to 3 pints per acre (0.7 – 0.84 kg ai/ha) being the most common use rate range. Gramoxone Inteon® will have extensive tank-mix flexibility including application with residual herbicides. Gramoxone Inteon® may be applied early pre-plant, or pre-emergence in cotton and is rainfast upon drying, normally within 30 minutes of application.

Gramoxone Inteon® is an important burndown herbicide that provides fast activity and is a key component in the fight against resistant weeds. Data from several University and internal trials indicate excellent activity on winter weeds such as horseweed (*Conyza canadensis*), annual bluegrass (*Poa annua*), Carolina geranium, (*Geranium carolinianum*), henbit (*Lamium amplexicaule*), and cutleaf eveningprimrose (*Oenothera laciniata*). These data also indicate excellent control of winter wheat (*Triticum aestivum*) when utilized as a cover crop to prevent soil erosion.

Gramoxone Inteon® is a breakthrough, user-friendly formulation that delivers fast weed control with an alternative mode-of-action that will be critical for managing weed resistance.

COMPARISON OF IMAZETHAPYR AND IMAZAMOX AS EITHER PRIMARY OR SALVAGE HERBICIDES IN IMIDAZOLINONE-RESISTANT RICE. J.W. Heiser, J.A. Kendig, C.L. Smith, and P.M. Ezell, Division of Plant Sciences, University of Missouri Delta Research and Extension Center, Portageville, Mo. 63873, R.J. Smeda, Division of Plant Sciences, University of Missouri-Columbia, Columbia, Mo. 65211

ABSTRACT

Imazethapyr is currently used in imidazolinone-resistant (IR) rice (*Oryza sativa*) as the primary herbicide for the selective control of red rice (*Oryza sativa*) (a weedy biotype of commercial rice) and several other weeds. Unfortunately, red rice can hybridize with IR rice and acquire herbicide resistance. Current recommendations are for sequential, early postemergence imazethapyr applications. However, if there is a herbicide failure, labeling prohibits additional imazethapyr applications. Complete control of red rice is needed to minimize the possibility of selecting herbicide resistant plants. Currently, imazamox has a special local need (24c) registration for a clean-up or salvage application. Imazethapyr and imazamox have several similarities. However, current thought is that imazethapyr should be used for routine, early postemergence (“primary”) application, and imazamox should be reserved for “salvage” situations.

A factorial arrangement of four primary treatments, four salvage treatments, and two herbicide scenarios were tested in 2003 and 2004 at the University of Missouri Delta Research and Extension Center Lee Farm. The primary treatments were: 1) Preemergence (PRE) only; 2) mid-postemergence only (MPOST) 4-5 leaf rice; 3) PRE followed by (fb) MPOST; and 4) Early postemergence (EPOST) 2-3 leaf rice fb MPOST. Treatments 1 and 2 were intended to result in a salvage situation while the latter two programs were label recommendations. Salvage treatments were applied at: 1) approximately 3 days preflood; 2) approximately 7 days postflood; 3) preflood fb postflood; and 4) no salvage treatment. To compare the two herbicides, imazethapyr was used as the primary herbicide fb imazamox as the salvage, or imazamox was used as the primary fb imazethapyr as the salvage.

Imazethapyr and imazamox were applied at 0.07 kg/ha and 0.044 kg/ha respectively. Postemergence treatments were applied with 0.25% V/V nonionic surfactant (NIS), and a blanket application of aciflourfen + NIS was made at the 4-5 leaf stage to control legume weeds. Treatments were applied using CO_2-back-pack spray equipment, 8002 flat-fan spray nozzles, and an application volume of 187 l/ha at approximately 160 kPa pressure. Standard rice production practices were followed. Plots were 2.25 by 4 m and the experimental design was a randomized complete block with four replications. Data were subjected to an analysis of variance with years considered a random factor and means were separated using a Fisher’s protected LSD at the 5% significance level.

Without a salvage application, PRE only treatments resulted in less than 50% red rice control. Mid-POST only treatments resulted in less than 60% red rice control. Early-POST fb MPOST treatments resulted in 88% or better red rice control, while PRE fb MPOST treatments resulted in less than 85% control. Imazethapyr resulted in better control than imazamox in all primary alone treatments excluding PRE only. No treatment which did not include a salvage application resulted in greater than 90% red rice control. Imazethapyr PRE fb imazamox at all salvage timings resulted in greater than 90% red rice control. All PRE-only and MPOST-only treatments benefited from a salvage application; however, EPOST fb MPOST treatments were not statistically improved by a salvage application. When imazamox was applied PRE fb MPOST, control increased from 67% to 95, 96, and 98% when a salvage application of imazethapyr was applied at the preflood, postflood and both salvage timings respectively. Two salvage applications of imazamox following imazethapyr PRE fb MPOST improved control 16% while single applications at either preflood or postflood only increased control 14 and 12% respectively. While these two salvage treatments did not statistically improve weed control, numerical improvements in red rice control may be important due to the need to prevent outcrossing.

These results indicate that current recommendations of two pre-planned applications at EPOST fb MPOST timings of imazethapyr, fb imazamox as a salvage clean up (when needed) are appropriate. Imazamox generally did not provide as much control as imazethapyr when used as the primary herbicide at currently recommended timings. These data suggest that imazamox should not replace imazethapyr as the primary herbicide in imidazolinone-resistant rice.

WEED MANAGEMENT WITH GLYPHOSATE AND COMPLIMENTARY HERBICIDES IN ROUNDUP READY FLEX COTTON. D.M. Scroggs[1], D.K. Miller[2], J.L. Griffin[3], P.R. Vidrine[1], A.M. Stewart[1], and M.S. Mathews[2]. LSU AgCenter, Alexandria[1], St. Joseph[2], and Baton Rouge[3], LA.

ABSTRACT

Experiments were conducted in 2005 at both the Dean Lee and Northeast Research Stations in Alexandria and St. Joseph, La, respectively, to evaluate weed control with glyphosate and complimentary herbicides in Roundup Ready Flex cotton. The experiment consisted of a factorial arrangement of PRE programs (no PRE or Cotoran (fluometuron) PRE at 2.4 pt/A) and POST MON 3539 (glyphosate at 22 oz/A) programs (1-sequentially at 3lf fb 7lf fb 14lf OT; 2-sequentially at 3lf fb 7lf OT; 3-sequentially at 7lf OT fb 14 lf PD; 4-sequentially at 7 lf fb 14 lf OT). Weeds evaluated in Alexandria included pitted morninglory (*Ipomoea lacunosa*), smellmelon (*Cucumis melo*), barnyardgrass (*Echinochloa crus-galli*), browntop millet (*Panicum ramosum*), johnsongrass (*Sorghum halepense*), palmer amaranth (*Amaranthus palmeri*), and hophornbeam copperleaf (*Acalypha ostryifolia*). Weeds evaluated at St. Joseph consisted of barnyadgrass, hemp sesbania (*Sesbania exaltata*), johnsongrass, pitted morningglory, redroot pigweed (*Amaranthus retroflexus*), and sicklepod (*Senna obtusifolia*). Experiments were conducted in a randomized complete block design with three replications at Alexandria and four replications at St. Joseph. Treatments were applied with a tractor mounted compressed air sprayer in Alexandria and a CO_2 back-pack sprayer in St. Joseph at 15 GPA. Soil type at these respective locations was a Norwood silt loam and Commerce silt loam. Cotton was planted May 17 and 13 for these respective sites. Visual weed control was determined 14, 28, and 56 d after the last POST application, but only the final rating interval data is reported. Seed cotton yield was determined at both locations. Data were subjected to GLM analysis and means separated using p-diff at 0.05 level of significance.

With respect to visual weed control, a benefit to the addition of a PRE herbicide was not observed for most weeds evaluated. In addition, for the majority of weeds evaluated only minimal differences were noticed between POST glyphosate application timings. Also, at Alexandria, when compared to applications of 7lf OT and 14lf PD or OT, it was essential to have a 3 lf OT application for adequate grass control. With respect to yield at Alexandria, the addition of a PRE herbicide greatly increased yield. This PRE benefit was not evident in the visual weed control ratings and may be reflective of late season grass competition. Also at Alexandria, compared to applications of 7 lf OT and 14 lf PD or OT, an EPOST 3 lf OT application was needed to obtain optimum yield. Based on yield determinations at St. Joseph, there were no benefits to the addition of a PRE herbicide and there were also no differences noted between glyphosate application timings.

EFFECT OF WEED MANAGEMENT ON YEILD AND FRUTING POSITION OF ROUND UP READY FLEX COTTON John K. Haas , Michael Patterson and Dale Monks Auburn University, Auburn, AL And Wilson Faircloth USDA-ARS, Dawson, GA

ABSTRACT

Roundup Ready Flex cotton will be commercially available to growers in 2006. Alabama growers need information about this new technology under their growing conditions and weeds. Field trials were conducted at the Prattville Experiment Field, Prattville, AL and the Field Crops Unit, Shorter, AL in 2005 to evaluate the effect of different weed management systems on yield and fruiting position of Roundup Ready Flex Cotton. Individual treatments consisted of Round up Weather Max (RWM) at a rate of 0.9lbs ai/ac either alone, used with a pre-emergence, or tank mixed with other post herbicides: Three different treatments of Round up Weather Max at a rate of 0.9lbs ai/ac at weed growth stages of 2-3”, 4-6”, and 7-9”. RWM tank mixed with different insecticides and growth regulators. Cotoran applied pre followed by (fb) RWM + Staple at 2-3” weeds fb RWM at 4-6” weeds. Cotoran + Staple pre fb RWM at 2-3” weeds. RWM at 2-3” weeds fb Envoke + NIS fb RWM at 2-3” weeds. RWM + Staple at 2-3” weeds fb Envoke + NIS at 2-3” weeds fb RWM at 2-3” weeds. RWM + Dual Magnum at 2-3” weeds fb Envoke + NIS at 2-3” weeds. Prowl pre fb RWM at 2-3” weeds. Treatments were applied to plots 4 rows (36 in) and 25 ft long in a spray volume of 15 gpa. Treatments were replicated four times. Box mapping was done from 10 ft of the middle right row of each plot.

Seed cotton yields varied from 754 lbs/ac to 3654 lbs/ac at Prattville and from 1420 lbs/ac to 3130 lbs/ac at Shorter. Overall yields at both locations were similar except for the delayed application of glyphosate at Shorter which was lower than at Prattville. Delayed weed control tended to reduce yields by decreasing boll counts and weights at node 7. Although boll counts and weights varied at different nodes due to the treatments, the cotton compensated for this by producing bolls at higher nodes. The data shows that the addition of Staple to the glyphosate fb Envoke appeared to adversely affect yield and fruiting at both locations. Cotoran pre fb glyphosate did not adversely affect yield or fruiting at either location.

EFFECT OF PLANTING DATE ON RESPONSE OF COTTON TO ENVOKE Griff M. Griffith, Jim L. Barrentine, and Marilyn R. McClelland, Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR

ABSTRACT

Envoke (trifloxysulfuron) is a sulfonylurea herbicide labeled for postemergence use in conventional and transgenic cotton. Glyphosate tends to be weak on morningglory (*Ipomoea*) and nutsedge (*Cyperus*) species, and Envoke is an option to control these weeds and to provide residual activity not available with glyphosate. Since Roundup Ready Flex® technology will be limiting in 2006, there is still the need for postemergence cotton herbicides. Cotton response to postemergence over-the-top applications of Envoke has been erratic in Arkansas, and field studies were initiated to determine the effects of temperature and soil moisture on cotton response to Envoke.

Planting dates were used in an attempt to observe cotton response under different climatological conditions. Experiments were conducted in 2004 and 2005 on a silt loam soil at Marianna, AR. The experimental design was a split plot with four replications. Main plots were planting dates. In 2004, April 19, May 4, and May 18 represented an early, optimum, and late planting date for Arkansas cotton. In 2005 cotton was planted on April 9, April 13, and April 27. Subplots were herbicide treatments [none; Envoke at 0.007 lb ai/A (1X); Envoke at 0.014 lb ai/A (2X); and Staple (pyrithiobac) at 0.062 lb/A]. Herbicides were applied over-the-top when cotton in each planting date had seven leaves. Data collected included soil moisture, photosynthesis measurments, and visual cotton injury symptoms at 7, 14, and 21 days after application. Cotton growth and development was monitored by COTMAN. Data were analyzed by ANOVA, and means were separated with a protected LSD at P=0.05.

In 2004, cotton planted at the first planting date (April 19) was injured 14% by Envoke at the 1X rate and 18% by the 2X rate 7 days after treatment, significantly higher than injury at the May planting dates (2 to 4%). Although visual injury symptoms were transient, the 2X rate of Envoke caused a slight reduction in nodal development and delayed cutout compared to cotton in the other treatments. Only the main effects, planting date and herbicide treatment, were significant for cotton yield. Averaged over planting dates, seedcotton yield was reduced by the 2X rate of Envoke (2920 lb/A), compared to yield of untreated cotton or cotton treated with Envoke at the 1X rate or Staple (3200 to 3340 lb/A). Yield was also significantly lower for cotton planted in April than that planted May 4 or May 18. Although temperatures were generally cooler at planting in April than in May, soil moisture and temperature conditions in among the planting dates did not differ sufficiently at herbicide application in 2004 to separate moisture and temperature effects on Envoke activity.

Environmental conditions in 2005 were different than environmental conditions in 2004. In 2004, there was adequate moisture throughout the year, which produced higher yields than the dry, hot conditions in 2005. Cotton planted at the early and middle planting dates was injured 15 and 19%, respectively, by Envoke applied at the 1X rate. Envoke applied at the 2X rate injured cotton 29 and 30%, respectively, for cotton planted at the early (Ap 9) and middle (Ap 13) planting dates. Cotton injury in the late planting date (Ap 27) only reached 3 to 10% for Envoke applied at the 1 to 2X rates. Only the main affect of planting date was significant for seedcotton yield. Averaged over herbicide rates, yield was significantly lower for the April 9 planting date (1924 lb/A) than the April 13 (2397 lb/A) or the April 27 (2096 lb/A) planting dates. Although soil moisture was significantly different for applications in each planting date, there is no indication that levels of cotton injury are dependent upon soil moisture at the time of application.

GERMINATION AND EMERGENCE OF HORSEWEED (*CONYZA CANADENSIS*) AND ITS CONTROL UTILIZING TILLAGE AND HERBICIDES. T.W. Eubank[1], D.H. Poston[1], C.H. Koger[2], V. Nandula[1], D.B. Shaw[3], and D.B. Reynolds[3]. [1]Delta Research and Extension Center, Mississippi State University, Stoneville, MS 38776; [2]USDA-ARS Crop Production and Genetics Research Unit, Stoneville, MS 38776, [3]Mississippi State University, Mississippi State, MS 39762. (159)

ABSTRACT

The widespread adoption of glyphosate-tolerant crops and the advent of glyphosate-resistant horseweed (*Conyza canadensis* (L.) Cronq.) have created a need for research investigating alternative measures of control for this troublesome weed.

Field studies were conducted in 2003-2005 at the Delta Research and Extension Center in Stoneville, MS to: 1) assess horseweed emergence in field studies in relation to temperature and environmental conditions; 2) evaluate the impact of herbicide and tillage on horseweed populations; and 3) determine the most effective chemical burndown options for emerged horseweed populations.

All studies were conducted using a randomized complete block design. Delta King 4763RR soybeans were planted and April 25 for postemergence studies using a 40-cm row spacing. Plots were 3 x 12 m. Treatments were made using a tractor-mounted sprayer applying 140 L/ha @ 38 psi with Teejet XR11002VS nozzles. Yield was determined by harvesting the two center rows of each plot and soybean yield was adjusted to 13% moisture.

<u>Horseweed Emergence</u>: Data from horseweed emergence studies indicate that the bulk of horseweed germinates in the fall during the months of September through November and as late as May. Cold temperatures during the months of December and January tend to suppress germination, as do higher temperatures in June and July. Growth-chamber studies found similar results as horseweed germinated best (61%) when temperatures were near 20 – 25 C and were significantly reduced (32%) under cooler temperatures (18/12 C).

<u>Impact of tillage and chemical removal at various timings</u>: Studies suggest that a tillage event as late as November may not sufficiently control later emerging horseweed seedlings. In the field, tillage in March reduced horseweed populations 90% compared to 50, 70, and 80% with tillage in September, November, and January, respectively. Overall horseweed removal by chemical or tillage methods was most effective in March. These findings indicate that fall tillage will reduce the level of horseweed infestations, but follow-up chemical applications will still be required to remove flushes that emerge following tillage. Tillage can effectively remove existing horseweed and bury seed beneath the soil surface. Burying horseweed seed as shallow as 0.25 cm in the growth-chamber studies inhibited emergence more than 95% and burial at depths of 0.5 cm or deeper completely eliminated emergence.

<u>Glyphosate-based programs</u>: Glyphosate @ 0.85 kg ae/ha provided only 60 to 74% horseweed control 4 WAT. The addition of 2,4-D or Clarity to glyphosate treatments increased control to greater than 90%. Although glyphosate did not completely control resistant horseweed plants, plants were stunted and competition was reduced. When glyphosate burndown were combined with 2 in-season glyphosate applications, soybean yields were similar to the treatments that provided the best horseweed control. More than 15 horseweed plants per square meter were required to reduce yields compared to the best treatments when glyphosate-based burndown programs were used.

<u>Paraquat-based programs</u>: Horseweed plants treated with paraquat quickly recovered and by 4 WAT paraquat alone (0.85 kg ai/ha) provided only 55% control. Paraquat + Sencor was the only treatment that provided greater than 90% horseweed control and was consequently the highest yielding treatment. Paraquat + Clarity produced similar yields but did not provide equivalent weed control. Because of the quick recovery, paraquat-treated plants were more competitive with soybeans. Soybean yield was reduced more than 30 bu/acre when more than 15 paraquat-treated plants were allowed to compete with soybean for 4 weeks.

<u>Glufosinate-based programs</u>: Glufosinate @ 0.48 kg/ha applied when the air temperature was 26 degrees C provided 96% horseweed control and soybean yields were similar with all glufosinate-based treatments evaluated. It should be noted, however, that applications made under cooler temperatures have not provided the same level of control.

GLUFOSINATE ANTAGONIZES POSTEMERGENCE GRAMINICIDES. A. P. Gardner and A. C. York; Department of Crop Science, North Carolina State University. Raleigh, NC

ABSTRACT

Liberty Link cotton, commercialized in 2004, is resistant to the non-selective herbicide glufosinate-ammonium. Previous research has indicated timely application is vital to achieve control of annual grasses. Grasses that are not treated in a timely manner will be larger than the optimum size and therefore more difficult to control. Thus, we conducted experiments to investigate the interactions that may occur if post-emergence graminicides were used with glufosinate to supplement annual grass control. Previous research has determined that antagonism commonly occurs when post-emergence graminicides are mixed with other herbicides. Two experiments were conducted in North Carolina in 2004 and 2005 to determine the potential for antagonism with combinations of glufosinate and graminicides and also to determine how to alleviate negative interactions should they exist.

Fallow field sites were selected with populations greater than 300 plants/m^2 of large crabgrass, broadleaf signalgrass, and/or goosegrass. Treatments were applied to grasses 10 to 20 cm tall to simulate a late herbicide application. Control was estimated visually 7, 14, 21 and 28 days after treatment applications. Rating data were then arcsine transformed and subjected to ANOVA, and means were separated using Fisher's protected LSD test at P=0.05.

The first experiment was conducted at five locations in 2004 and 2 locations in 2005. The objectives were to determine if interactions occur with mixtures of a graminicide and glufosinate, to compare responses with four graminicides, and to determine if negative interactions could be alleviated by increasing the graminicide rate. Treatments consisted of a factorial arrangement of graminicides, graminicide rates, and glufosinate rates. Graminicides included quizlofop-p-ethyl, fluazifop-p-butyl, sethoxydim, and clethodim. Graminicide rates were 0, 1X, and 1.5X, with the X rate denoting the manufacturers' suggested use rate. The glufosinate rates were 0 and 468 g ai/ha. A crop oil concentrate was added to each treatment at 1% (v/v). Additional treatments included glufosinate alone and glufosinate with crop oil concentrate. In 2004 and 2005, all graminicides applied alone controlled annual grasses at least 85% 28 days after application. Reduced control (7 to 58%) was noted when glufosinate was mixed with all graminicides. However, glufosinate reduced control by fluazifop in 2004 less than it reduced control by the other graminicides. Results were mixed in 2005, with aryloxyphenoxypropionates being affected more at one location while the cyclohexanediones were affected more at the second location. All graminicide plus glufosinate mixtures were antagonistic according to the Colby procedure. Antagonism was not alleviated by increasing the graminicide rate by 50%.

The second experiment was conducted in four locations. The objectives of this study were to determine if antagonism with tank mixtures could be alleviated by sequential application, and also to determine the application order and waiting interval between applications necessary to alleviate antagonism. Treatments were a factorial arrangement of graminicides, glufosinate rates, and application timings. The graminicides were fluazifop-p-butyl and clethodim at the manufacturers' suggested use rate. Glufosinate rates were 0 and 468 g/ha. Application timings included the following: graminicides applied 1, 3 or 5 days before glufosinate; graminicides mixed with glufosinate; and graminicides applied 1, 3, 5, or 7 days after glufosinate. All graminicide treatments included a crop oil concentrate at 1% (v/v). Control by clethodim was greater than fluazifop, 77% and 69% respectively, when applied alone. Antagonism was alleviated by applying the graminicides 3 or 5 days before glufosinate or 7 days after glufosinate. Control was reduced when graminicides were applied 1 day before glufosinate, tank mixed with glufosinate, or applied 1, 3, or 5 days after glufosinate.

SEEDHEAD SUPPRESSION OF ANNUAL GRASSES WITH LATE-SEASON HERBICIDE APPLICATIONS. N.V. Goldschmidt and L.R. Oliver; Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR 72704.

ABSTRACT

Red rice (*Oryza sativa*) and barnyardgrass (*Echinochloa crus-galli*) are problem weeds in rice fields. A standard method for control is rotation to Roundup Ready soybean and glyphosate applications. However, if 100% control is not obtained, weeds that escape treatment are allowed to grow, reproduce, and add seeds to the weed seedbank. Late-season herbicide applications may be effective in reducing the seed production potential of red rice and barnyardgrass. The objective was to evaluate the effects of late-season glyphosate (Roundup WeatherMax), fluazifop (Fusilade), and clethodim (Select) applications on seed production and seedbank potential of red rice and barnyardgrass in a Roundup Ready soybean system.

The study was conducted in 2004 and 2005 in two producers' fields chosen for natural uniform infestations of red rice and barnyardgrass. The experiment was a randomized complete block utilizing a three-factor factorial treatment structure with four replications. Group IV maturity Roundup Ready soybean seed was planted into 6- by 9-m plots. Plot integrity was maintained through 2005. Initial soil cores were taken and repeated at the conclusion of the study to monitor the soil weed seedbank. The labeled rates of glyphosate, fluazifop, and clethodim were 0.75 lb ae/A, 0.188 lb ai/A, and 0.125 lb ai/A, respectively, and quarter, half, and full rates were applied twice to plots, once when annual grasses begin flowering and again 20 days later. All plots were oversprayed at V3 soybean with 0.75 lb/A glyphosate to reduce potential for weed interference. Visual ratings of the efficacy of applied herbicides relating to weed control, interference, and seedhead suppression were taken at 14-day intervals after first flowering treatment. Prior to harvest, three 1-m^2 samples per plot were taken to determine seed and biomass production. Analysis of variance was performed with years combined due to a lack of year by treatment interaction.

A full rate of glyphosate applied once suppressed red rice seedheads 100% both years, while a full rate applied sequentially suppressed barnyardgrass seedheads only 81%. Both grasses needed sequential applications of fluazifop to effectively reduce seed production. Fluazifop suppressed red rice and barnyardgrass seedheads 95 and 76%, respectively, when the full rate was applied sequentially. Full rates of clethodim applied twice gave less red rice and barnyardgrass seedhead suppression at 82 and 59%, respectively. By the second year, one application of the full rate of glyphosate reduced barnyardgrass seed production 100%. However, two full rates of fluazifop applied sequentially were necessary for the same level of barnyardgrass seed reduction.

These data suggest that late-season herbicide applications are an effective and economical method for controlling grass escapes, providing late-season seedhead suppression, and reducing the soil seedbank.

POSTEMERGENCE ANNUAL BLUEGRASS CONTROL IN CREEPING BENGRASS PUTTING GREENS. T.G. Willis*, A.G. Estes, L.B. McCarty. Clemson University, Department of Horticulture, Clemson, SC. 29634-0319.

ABSTRACT

Creeping bentgrass (*Agrostis palustris* subsp. *stolonifera*) is a popular C3 turfgrass utilized as golf course putting green surfaces. During high summer temperatures, creeping bentgrass becomes stressed and more susceptible to weed invasion. Annual bluegrass (*Poa annua* ssp. *reptans*) is a very common and troublesome weed in creeping bentgrass putting greens. Annual bluegrass is lighter in color and a noxious seedhead producer disrupting the playability and aesthetic value of putting greens. Options for selective postemergence annual bluegrass control in creeping bentgrass are limited. In order to shift the competitive advantage to bentgrass, plant growth regulators (PGRs) are often used. PGRs are also used to suppress annual bluegrass seedheads improving the playability of the putting surface and reducing reproduction of the annual bluegrass.

A study was conducted in 2005 on a golf course in Salem, South Carolina to evaluate postemergence annual bluegrass control in creeping bentgrass putting greens. The study was conducted from February through December 2005. Individual treatments (common name, rate in kg ai/ha) included; Velocity (bispyribac-sodium, 0.01), Prograss (ethofumesate, 0.455), Primo MAXX (trinexapac-ethyl, 0.035), Trimmit (paclobutrazol, 0.223), Embark T&O (mefluidide, 0.112), Cutless (flurprimidol, 0.14), and Proxy (ethephon, 3.04). Tank-mixed treatments (rate in kg ai/ha) included; Velocity + Trimmit (0.03 + 0.112), Velocity + Primo MAXX (0.01 + 0.035), Prograss + Primo MAXX (0.455 + 0.035), Trimmit + Primo MAXX (0.223 + 0.035), Embark T&O + Primo MAXX (0.112 + 0.035), Cutless + Primo MAXX (0.14 + 0.035), and Proxy + Primo MAXX (3.04 + 0.035). Treatments were applied monthly with the exception of the Velocity and Velocity + Primo MAXX treatments which were applied every 10 days. Treatment applications were initiated on 18 February 2005 and continued through 15 May 2005, stopped during summer, and resumed 12 September 2005.

Turfgrass quality, annual bluegrass injury, and bentgrass injury were rated every two weeks and annual bluegrass seedhead suppression was rated in late spring and early summer when most evident. Turfgrass quality was visually rated on a scale from 1-9 with 1 = dead turf, 9 = excellent turf, and 7 = minimum acceptable turf. Annual bluegrass and bentgrass injury was visually rated on a scale from 0-100% with 30% = maximum level of acceptable injury. Annual bluegrass seedhead suppression was visually rated as a percentage of ground cover on a scale from 0-100%.

Prograss and Velocity + Trimmit provided ≥ 40% annual bluegrass injury on 31 May 2005. Prograss reduced turfgrass quality below the minimum acceptable range when applied in spring. Spring applications of Embark T&O and Embark T&O + Primo provided ≥ 20% annual bluegrass injury. Although turf quality was reduced following applications of Embark T&O and Embark T&O + Primo, these remained above the minimum acceptable range. Spring applications of Velocity and Embark T&O provided ≥ 80% annual bluegrass seedhead suppression while ≥ 90% was achieved by spring applications of Proxy, Proxy + Primo, and Velocity + Trimmit.

Fall applications of Prograss, Prograss + Primo, Velocity + Primo, and Trimmit + Primo provided ≥ 10% annual bluegrass injury with no reduction in turfgrass quality. Fall applications of Embark T&O and Embark T&O + Primo provided ≥ 10% annual bluegrass injury with a 6 and 15% reduction in turfgrass quality. Bentgrass injury following Embark T&O + Primo applications was 40% less than when Embark T&O was applied alone.

In conclusion, spring applications of Velocity + Trimmit provided the greatest amount of annual bluegrass injury with no reduction in turfgrass quality. However, when turfgrass quality was previously evaluated, a reduction was observed following Velocity + Trimmit applications indicating that the 0.03 kg ai/ha may be too aggressive where annual bluegrass populations are high. Spring applications of Velocity, Proxy, Proxy + Primo, and Velocity + Trimmit provided the greatest amount of seedhead suppression with no reduction in turfgrass quality. Fall applications of Prograss, Prograss + Primo, and Velocity + Primo provided the greatest amount of annual bluegrass injury with no reduction in turfgrass quality.

ALTERNATIVE HERBICIDES FOR CONTROLLING IMAZETHAPYR-RESISTANT RED RICE AND CARRYOVER EFFECTS. B.A. Pearson, N.R. Burgos, J.A. Bullington, and V.K. Shivrain; Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR 72704.

ABSTRACT

Gene flow has recently become an issue with the introduction of Clearfield rice into commercial rice production. Clearfield rice can crossbreed relatively easily with red rice and produce hybrids, which inherit imazethapyr (Newpath) resistance. The persistence of Newpath-resistant red rice hybrids in rice production can make red rice management more difficult. One method suggested to reduce hybrid populations is the use of a soybean rotation following Clearfield rice production. Soybean herbicides may effectively control red rice, even those with Newpath resistance.

Studies were established at the University of Arkansas Cotton Branch Research Station in Marianna, AR, and the University of Arkansas Rice Research and Extension Center in Stuttgart, AR, in 2005 to evaluate options for controlling Newpath-resistant red rice in soybean. The project consisted of two experiments, one comparing single herbicide applications and one comparing sequential herbicide applications. Eleven soybean herbicides were evaluated for efficacy, applied alone and in tankmixes. Herbicides were applied at recommended rates. Both experiments were laid out in a completely randomized block design with four replications.

Most herbicides gave 90% red rice control or better in both locations. Dual Magnum, Outlook, Canopy XL or any tankmixes containing either of these, were the better preemergence treatments. Applied alone, Dual Magnum, Outlook, and Canopy XL showed 88 to 98% control. Sencor applied alone was less effective (55 to 77%) than when applied with another herbicide. Python provided the lowest overall control, from 0 to 56%, when applied alone. Treflan and Sencor showed different levels of efficacy at each location, due mainly to differences in pH and soil type.

Postemergence herbicide efficacy also varied at each location when applied without a preemergence herbicide. At Stuttgart, Roundup was the only effective herbicide for red rice control (93%), while Select (40%), Assure II (9%), and Fusion (6%) were not effective. However, at Marianna, all four herbicides showed 95-100% control. This was primarily due to soybean canopy closure, which was achieved early in the season at Marianna, but not at Stuttgart. The lack of canopy closure at Stuttgart allowed the red rice to grow back from herbicide injury, while the canopy closure at Marianna inhibited further weed growth after postemergence herbicide application.

Following Clearfield rice with a soybean rotation using appropriate herbicide combinations is effective in controlling Newpath-resistant hybrid red rice. Careful consideration should be given when choosing herbicides, as not all soybean herbicides were effective in controlling resistant hybrids. Proper cultural practices, in conjunction with a good herbicide program, could help Clearfield technology continue to be beneficial for producers in the future.

EFFECT OF SAMPLING AND INTERPOLATION METHODS ON WEED MAPPING ACCURACY. W.A. Givens, D.R. Shaw, and J.L. Harvill; Mississippi State University, Mississippi State, MS 39762.

ABSTRACT

The ability to manage different parts of a field according to need at that particular site in the field is the basic concept of precision agriculture. One practice that site-specific applications could be justified is weed management since it has been established that weeds often occur in patches across agricultural landscapes. Weed patchiness presents the opportunity to reduce herbicide use while maintaining satisfactory weed control if areas with low or no weed infestations can be identified. However, to take advantage of these new technologies, there must be a way of accurately producing weed distribution maps that can be used to develop site-specific herbicide recommendations. The objective of this study was to evaluate two traditional sampling techniques for their ability to create accurate weed maps. The two techniques evaluated were the W- and Z-shaped sampling technique.

The data for this study were collected at the Black Belt Branch Experiment Station, Brooksville, MS. A 70 x 70 m study area was located in a production soybean and divided into 1-m quadrats. At each quadrat, weed species present and density of each weed species was recorded. The two sampling techniques were simulated using this dataset. For each sampling technique, 10 sample points were collect along each transect. Once the sampling was completed, the sampling scheme was rotated 30º and the sampling event was performed again. This was repeated in 30º increments for one full rotation of the sampling scheme, yielding 12 sampling events for each sampling scheme. Weed maps of horsenettle (*Solanum carolinense* L.), yellow nutsedge (*Cyperus esculentus* L.), and broadleaf signalgrass [*Brachiaria platyphylla* (L.) Griseb.] were generated from the sampling events using the interpolators inverse distance weighted to the power of 2 (IDW2) and ordinary kriging.

Results show that kriging produced the most accurate results for each species independent of sampling scheme with mean prediction errors of 0.020 versus -0.027 for kriging and IDW2 respectively. However, results also show that interpolated values produced from IDW2 have a slightly higher precision than those produced by kriging, with root mean squared error (RMS) values of 3.141 versus 3.183, respectively. Weed maps interpolated using the Z-shaped sampling method in general tended to interpolate weed population values more accurately than those interpolated using the W-shaped sampling method, with mean prediction errors of 0.036 versus -0.043, respectively. The best results for each species were obtained using the: W-shaped sampling method and IDW2 for horsenettle, W-shaped sampling method and kriging for yellow nutsedge, and Z-shaped sampling method and IDW2 for broadleaf signalgrass.

HORSEWEED (CONYZA CANADENSIS MAGAGEMENT. C.L. Smith, J.A. Kendig, R.L. Nichols*, J.W. Heiser, and P.M. Ezell. University of Missouri-Delta Center, Portageville, MO, 63873. *Cotton Incorporated, Cary, NC, 27513.

ABSTRACT

Glyphosate-resistant horseweed (*Conyza canadensis*) was found in Missouri in 2002, and now infests many cotton fields in the bootheel region. There have been numerous questions regarding the use of preplant residual herbicides, burndown timing with respect to horseweed germination, and the risk of injury from preplant 2,4-D and dicamba.

Two studies were implemented in 2005; one was to determine the effectiveness of fall and spring preplant residual herbicides and the other study evaluated the effect of burndown timing on horseweed numbers, as well as crop safety of preplant applications of 2,4-D and dicamba. The preplant study was a factorial combination of three application timings (November, January and March) and eight herbicide treatments; pendamethalin at 1.68 kg ai/ha, simazine at 1.12 kg ai/ha, fluometuron at 1.12 kg ai/ha, linuron at 1.12 kg ai/ha, diuron at 1.12 kg ai/ha, oxyfluorfen at 0.28 kg ai/ha, flumioxazin at 0.07 kg ai/ha and an untreated check. All residual herbicide treatments and controls received an application of glyphosate at 0.84 ae/ha and 2, 4-D at 1.12kg ai/ha. Horseweed in these studies was susceptible to normal glyphosate rates. Horseweed control was rated on 5/20/05 and horseweed stand counts were taken 5/27/05.

The second study evaluated horseweed control and cotton injury with growth regulator burndown herbicides at seven bi-monthly application timings between February 15th and May 4th. This study was a factorial design consisting of 2,4-D and dicamba with 3 different rates of each herbicide: 0.5, 1, and 2 times the labeled rate for each. Horseweed stands were determined before cotton planting. Cotton was evaluated for growth-regulator type symptoms and harvested for yield determination.

Data were subjected to analysis of variance and means separated using Fisher's LSD at α=0.05. Stand counts were square-root transformed before analysis. Plot size was 2.2 by 7.6 m and the study was conducted using standard small plot weed science methodology, including CO_2-pressurized backpack sprayers, XR8002 flat fan nozzles calibrated to deliver 187 L/ha at approximately 160kPa.

In the preplant residual study, horseweed control at planting increased with later application timings. Applications averaged <50% control across all fall treatments. However, a spring application in March provided > 90% control across all treatments. Differences within treatments were found, with diuron and flumioxazin providing greatest control, and pendamethalin and oxyfluorfen providing the least control. Despite control differences among treatments, the treatment containing no residual compounds was found to provide greater or equal control than treatments that did contain a residual product. Cotton yield was not affected by preplant treatments.

In the burndown timing study, applications that were made before March 15th had significantly higher horseweed populations than applications made after March 15th. For both 2,4-D and dicamba, the populations were reduced equally for 1X and 2X rates, however the 0.5X rates had higher populations than the 1X and 2X rates. Late April applications of 2,4-D showed growth regulator injury symptoms of up to 20%, whereas dicamba treatments showed no injury.

There were no yield differences between herbicide rates. However, there were differences across application timings. April applications had significantly higher lint yield when compared to applications made earlier in the season. Early season applications also had higher horseweed populations than the two April applications. This indicates that applications made too early in the season can allow for increased competition and a reduction in yield. Applications made too late however may cause injury to the crop, especially when using 2,4-D.

ASSESSMENT OF BARNYARDGRASS (*ECHINOCHLOA CRUS-GALLI*) CONTROL OPTIONS FOR CREEPING RIVER GRASS (*ECHINOCHLOA POLYSTACHYA*). R.M. Griffin, E.P. Webster, W. Zhang, C.T. Leon, S.L. Bottoms, and J.B. Hensley. Louisiana State University AgCenter, Baton Rouge, LA

ABSTRACT

Two field studies were conducted near Crowley, Louisiana from 2004 to 2005 to determine the most effective barnyardgrass [*Echinochloa crus-galli* (L.) Beauv.] herbicide program for control of creeping river grass [*Echinochloa polystachya* (Kunth) A.S. Hitchc.]. Soil was a Crowley silt loam. Plots consisted of eight 19-cm spaced rows, 5 m long. Clearfield 'CL-161' rice (*Oryza sativa* L.) was drill-seeded at 112 kg/ha on May 16 and April 9 in 2004 and 2005, respectively. Creeping river grass control was visually estimated 7 days after final herbicide treatment (DAT) and continued weekly until 49 DAT on a scale of 0 to 100%. The experimental design for both studies was a randomized complete block with four replications.

The first study included postemergence (POST) herbicide programs: 208 g ai/ha cyhalfop early POST (EPOST) fb 315 g/ha cyhalofop late POST (LPOST), 22 g ai/ha bispyribac EPOST fb 22 g/ha bispyribac LPOST, 66 g ai/ha fenoxaprop EPOST fb 86 g/ha fenoxaprop LPOST, 70 g ai/ha imazethapyr EPOST fb 70 g/ha imazethapyr LPOST and 50 g ai/ha penoxsulam mid-POST (MPOST). Each herbicide application was evaluated with and without 448 g ai/ha clomazone preemergence (PRE). Herbicide applications were applied with a CO_2-pressurized backpack sprayer delivering 140 L/ha at 186 Kpa. The herbicide program that included clomazone PRE fb sequential POST cyhalofop applications controlled creeping river grass 85%. Herbicide programs that had similar control included two POST cyhalofop applications and programs containing two applications of imazethapyr. Averaged across herbicide programs, creeping river grass control was 81 to 84% at 7 to 21 DAT. This control was probably due to increased activity of the herbicides applied to small actively growing plants. At 28 DAT, control of creeping river grass decreased to 77% and to 63% at 49 DAT.

The second study included PRE herbicide programs: 448 g/ha clomazone PRE, 448 g/ha clomazone plus 420 g ai/ha quinclorac PRE, 448 g ai/ha pendimethalin plus 420 g/ha quinclorac delayed PRE (DPRE), 70 g/ha imazethapyr PRE, and 175 g ai/ha mesotrione PRE. Each herbicide application was followed by a MPOST application of 314 g/ha cyhalofop. The herbicide programs containing clomazone PRE, pendimethalin plus quinclorac DPRE, or imazethapyr PRE controlled creeping river grass 78 to 81%. Averaged across herbicide programs, creeping river grass control was 78 to 82% at 7 to 35 DAT. At 42 DAT, control of creeping river grass decreased to 71% and at 49 DAT control decreased to 67%.

A greenhouse study was conducted at Louisiana State University in Baton Rouge during 2005 to evaluate herbicides for control of creeping river grass. Treatments included: 1260 g ae/ha glyphosate, 497 g/ha glufosinate, 314 g/ha cyhalofop, 22 g/ha bispyribac, 70 g/ha imazethapyr, 86 g/ha fenoxaprop/S, 560 g/ha quinclorac, 46 g/ha fenoxaprop/S plus 40 g/ha fenoxaprop, 50 g/ha penoxsulam, and 3361 g/ha propanil. The experimental design was a completely randomized design with eight replications. The study was repeated. Twelve creeping river grass stolons, arranged in three rows of four, were planted in 30 by 20 by 15-cm containers. The stem segments were oriented vertically and placed into the soil so that the node was covered and the stem was slightly exposed. The stolons was allowed to grow for 21 days to the two- to three-leaf stage. Treatments were applied with a backpack sprayer as previously described. Visual control ratings and fresh weight biomass were taken at 14 and 28 DAT.

At 14 DAT, glyphosate and glufosinate controlled creeping river grass 89 and 78%, respectively. Control was less than 61% for all other herbicides evaluated. Glyphosate and fenoxaprop/S reduced fresh weight biomass to 41 and 52%; respectively, of the nontreated. At 28 DAT, glyphosate controlled creeping river grass 91%. All other herbicide treatments controlled creeping river grass below 80%. Glyphosate reduced fresh weight biomass to 19% of the nontreated. Quinclorac was the only treatment to exhibit an increase in biomass over the nontreated with a 24% increase.

Producers can select between a conventional or Clearfield rice production system to manage creeping river grass. Creeping river grass was managed with herbicide programs containing POST applications of cyhalofop or imazethapyr as well as programs containing clomazone and imazethapyr PRE or pendimethalin plus quinclorac DPRE. Total POST herbicide programs can be used to manage creeping river grass; however, these herbicides must be applied to small actively growing creeping river grass. The addition of herbicides with residual activity may provide control of other weeds and as a result increase rice yield. It is important to manage populations of this weed to prevent a negative impact on future rice production.

WEED MANAGEMENT IN NARROW-ROW ROUNDUP READY FLEX COTTON. D.G. Wilson Jr. and A.C. York; North Carolina State University, Raleigh, NC.

ABSTRACT

There is a renewed interest in narrow-row cotton production with the commercialization of a mechanical picker capable of spindle-picking cotton planted to 15-inch row configurations. Herbicide-resistant cotton is a necessary component in narrow-row cotton culture. Switching to narrow rows eliminates the ability to cultivate and use post-directed herbicides; therefore only preemergence and postemergence-over-the-top applications will be used. However, with earlier canopy closure obtained in 15-inch cotton, there may be a possibility to reduce herbicidal inputs. Roundup Ready Flex cotton will be commercially available in 2006, and it offers producers the ability to use topical applications of glyphosate until seven days prior to harvest. To date, a weed management system has not been determined in narrow-row Roundup Ready Flex cotton.

Trials were conducted in Clayton and Rocky Mount, North Carolina during the 2004 and 2005 growing seasons to evaluate weed management strategies in 15-inch Roundup Ready Flex cotton. The use of preemergence (PRE) herbicides, timings of glyphosate applications, and possible tank mixes with glyphosate were investigated. Weeds that were evaluated included a typical mix of both broadleaf and annual grasses that occur in North Carolina. Species included broadleaf signalgrass, goosegrass, fall panicum, large crabgrass, tall morningglory, entireleaf morningglory, smooth pigweed, and Palmer amaranth. The PRE options consisted of either Prowl 3.3EC at 2.4 pt/A tank-mixed with Cotoran at 1 qt/A or Staple at 0.8 oz/A, or no PRE. If no PRE was applied, there was a one-leaf application Roundup WeatherMax at 22 fl oz/A. Mid-POST treatments consisted of a four-leaf application of Roundup WeatherMax at 22 fl oz/A if a PRE was applied. In the absence of a PRE, the Mid-POST treatments were applied at six-leaf and included Roundup WeatherMax applied alone or tank-mixed with Dual Magnum at 1.3 pt/A or Staple at 0.8 oz/A. Late-POST treatments were applied to 11-leaf cotton and consisted of Roundup WeatherMax at 22 fl oz/A or Envoke at 0.1 oz/A applied alone or Roundup WeatherMax at 22 fl oz/A tank-mixed with Staple at 0.8 oz/A.

Annual grass control was at least 97% for all treatments when evaluated mid-season in both years. However, late-season annual grass control in 2004 was 94% when glyphosate only was applied during the growing season compared to 98 to 100% control when a PRE or Dual Magnum were added into the system. In 2005, late-season annual grass control was at least 99% for all treatments. Mid-season annual morningglory control in 2004 was at least 91% for all treatments. However, in 2005, when PRE herbicides were added into the system annual morningglory control was better than when glyphosate alone or glyphosate plus Staple was applied alone to one-leaf and six-leaf cotton. Late-season annual morningglory control was at least 95% for all treatments in both years. Pigweed control was at least 99% when evaluated at mid- and late-season for all treatments in both years. Herbicide applications of glyphosate or Envoke made to cotton after canopy closure did not aid in weed control in either year due to adequate control early in the season. There were no lint yield differences among treatments in both years. Two herbicide applications in narrow-row Roundup Ready Flex cotton were sufficient in these studies.

WEED CONTROL AND PHYSIOLOGICAL BEHAVIOR WITH SELECTED HERBICIDES AS INFLUENCED BY RAINFASTNESS. W.J. Everman[1], W.E. Thomas[1], J.W. Wilcut[1], and C.H. Koger[2]
[1]North Carolina State University Raleigh, NC 27606 and [2]USDA-ARS Stoneville, MS 38776.

ABSTRACT

Data are limited about rainfastness of Ignite, Ignite 280, Roundup Original, and the new glyphosate formulations Roundup WeatherMax and Touchdown Total. Palmer amaranth (*Amaranthus palmeri*) and pitted morningglory (*Ipomoea lacunosa*) are troublesome and competitive weeds in southern row crops. Ignite provides excellent control of pitted morningglory and other annual morningglory species while glyphosate provides excellent control of pigweed species. The objectives for this research were to determine if rain-free period affects target site inhibition and efficacy, determine if larger morningglories and Palmer amaranth are more tolerant to glyphosate and glufosinate formulations, respectively. An additional objective was to correlate the efficacy of glufosinate and glyphosate formulations as influenced by weed growth stage and the rain-free period with target site inhibition. Trials with a randomized complete block design were conducted in the greenhouse in Raleigh, NC in 2005 and were repeated in time. Treatments were arranged in a factorial treatment arrangement with factorial options of weed size (1-2 leaf and 4-6 leaf morningglory; 3 inch and 8 – 12 inch amaranth), rainfall timing (0, 0.25, 0.5, 1, 4, 8, and 24 hours after herbicide application), and herbicide treatment (Roundup Original at 2 pt/A plus NIS 0.25%v/v, Roundup WeatherMax at 1.36 pt/A, Touchdown Total 1.44 pt/A, Ignite 2.07 pt/A, and Ignite 280 at 1.43 pt/A). Rates of glyphosate formulations are the same (0.75 lb ae/A) and glufosinate formulations are the same (lbs ai/A). Visual weed control ratings were taken 7, 14, and 21 days after application. Leaf tissue was collected for analysis of ammonia accumulation and shikimic acid analysis. Control of both weed species was greatest when no rain occurred after application for all glyphosate and glufosinate formulations. Both Ignite formulations provided near 100% control of 1-2 leaf pitted morningglory and 3 inch Palmer amaranth with a rain-free period of 8 hours. Control of larger morningglories with Ignite formulations was reduced when a rain event occurred within 30 minutes of application. Control of 8-12 inch Palmer amaranth with Ignite and Ignite 280 was approximately 50 and 80%, respectively when rainfall occurred within 1 hour with maximum control (90%) when rainfall occurred 24 hours after application. Control of pitted morningglory with all glyphosate formulations increased as time interval for initial rainfall event increased. Control of 4-6 leaf pitted morningglory with glyphosate was less than 60% when a rainfall event occurred within 4 hours after application. Palmer amaranth control with all glyphosate formulations was 100% when a rainfall event occurred 30 minutes or 8 hours after application for 3 inch and 8-12 inch, respectively. As weed size increased for both weeds, a longer rain-free time period was required, particularly for glyphosate formulations. Target site inhibition with glufosinate and glyphosate formulations was related to weed control. Shikimic acid and ammonia accumulation increased as the rain-free period increased. Ammonia accumulation increased linearly as the initial rainfall was delayed with pitted morningglory, however in Palmer amaranth ammonia levels remained similar at all rainfall intervals. In 1-2 leaf morningglory there was a trend for greater shikimic acid accumulation with Roundup WeatherMax than Roundup Original and Touchdown Total for rainfall events after 0.25 hour. Glyphosate formulations were not significantly different in level of shikimic acid accumulation in both weed species; however greater accumulation was observed with longer rain-free periods. Pitted morningglory and Palmer amaranth showed a size response to applications of glyphosate and glufosinate with a 24 hour rain-free period needed for maximum control of morningglory with glyphosate and Palmer amaranth with glufosinate. These data suggest that rainfastness is affected by the weed species in question and size of weeds at the time of application. Therefore the influence of environmental growing conditions on rainfastness by weed species interactions should also be investigated.

INTERFERENCE OF PURPLE NUTSEDGE (*CYPERUS ROTUNDUS* L.) IN LOUISIANA SUGARCANE.
L.M. Etheredge, Jr., J.L. Griffin, C.A. Jones, and J.M. Boudreaux. Louisiana State University AgCenter. Baton Rouge, LA.

ABSTRACT

Over the past few years, nutsedge has become problematic in Louisiana sugarcane fields. This is likely due to the poor control of nutsedge from glyphosate products applied during the summer fallow period prior to planting of sugarcane in August and September and also to the limited herbicide options available for use in the crop. The possibility of cultivation as a control measure is not available since the sugarcane row top is not disturbed over the multi-year crop cycle. Research was conducted in August 2005 to evaluate purple nutsedge interference with sugarcane. One study evaluated growth response of sugarcane to varying purple nutsedge tuber densities and the other study compared the competitiveness of sugarcane varieties with purple nutsedge. For both studies in which experiments were repeated, 7-gallon pots with a surface area equivalent to 1 ft^2 were used and were placed outside under a drip irrigation watering system. In the density study, 0, 1, 2, 4, 8, and 16 purple nutsedge tubers were planted per pot along with one sugarcane seed piece of the variety ‘LCP 85-384’. In the other study, the sugarcane varieties, LCP 85-384, ‘L 97-128’, ‘Ho 95-988’, and ‘HoCP 96-540’, were subjected to purple nutsedge interference (0 and 4 tubers/pot). Both studies were terminated 62 days after planting and purple nutsedge tubers were counted and shoot and root biomass for both sugarcane and nutsedge were measured. Results from both studies showed that purple nutsedge is very competitive with sugarcane even at low initial tuber densities. An initial density of 4 tubers per pot ($4/ft^2$) changed to around 115 tubers per pot 62 days after planting. LCP 85-384 sugarcane was competitive with purple nutsedge when the initial density was 1 or 2 tubers per pot. With 4 purple nutsedge tubers per pot, however, sugarcane growth was severely limited and sugarcane shoot dry weight was reduced around 64%. Averaged across the four sugarcane varieties, an initial density of 4 tubers per pot decreased sugarcane height around 20%, shoot population around 50%, and shoot dry weight around 60%. In one of two experiments, L 97-128 was more competitive with purple nutsedge than LCP 85-384, Ho 95-988, or HoCP 96-540. Findings emphasize the importance of using viable sugarcane seed for planting and the need for soil moisture and warm temperatures that promote bud germination and rapid emergence and growth of sugarcane shoots. Use of efficacious soil applied herbicide would enhance the competitiveness of sugarcane. Other ongoing research indicates that purple nutsedge is most detrimental to sugarcane at the time of planting in August and September. Once the sugarcane crop has become established its early emergence in the spring prior to that of purple nutsedge and its ability to produce rapid growth and shading suggests that sugarcane will be much more competitive than other agronomic crops.

SOYBEAN ROW WIDTH AND GLYPHOSATE TIMING INFLUENCE SICKLEPOD SURVIVAL AND FECUNDITY. P. Jha, J.K. Norsworthy, M.S. Malik, S. Bangarwa, and M.J. Oliveira; Department of Entomology, Soils, and Plant Science, Clemson University, Clemson, SC 29634.

ABSTRACT

Field experiments were conducted at Pendleton, SC, in 2004 and 2005 to study the effect of soybean row width and glyphosate timing on sicklepod survival and fecundity. Delta Pine 7220 RR soybean was planted in 19-cm width rows at 432,000 seeds/ha and 97-cm width rows at 340,000 seed/ha on June 15, 2004 and June 22, 2005. Experiments were conducted in a split plot design with soybean row width as the main factor and glyphosate timings as the sub-factor. The test area contained a natural infestation of sicklepod. Glyphosate was applied at 840 g ae/ha at the V3; V6; V3 and V6; and V3, V6, and R2 stages of soybean. Colored tooth picks were placed beside each sicklepod that emerged in the center 1 m^2 of each plot. Seedlings were separated into three cohorts. The first cohort was comprised of plants that emerged from planting through the V3 stage of soybean. The second cohort was comprised of plants that emerged between the V3 to V6 stage of soybean, and the third cohort was comprised of plants that emerged after the V6 stage of soybean until the end of the growing season. Sicklepod survival and light interception by soybean was monitored throughout the growing season. Sicklepod biomass, seed production, germination, and viability were determined along with soybean yields.

During 2004, an average of 83 and 53 plants/m^2 emerged in cohort 1 and cohort 2, respectively. During 2005, cohort 1 had an average of 237 plants/m^2, whereas 30 plants/m^2 emerged in cohort 2. Averaged over 2004 and 2005, sicklepod survival from cohort 1 in narrow rows following a single glyphosate application at the V3 stage was 6%, while 12% survival followed the V6 timing. Sicklepod survival in wide rows averaged 13 and 12% following the V3 and the V6 application, respectively. Sequential applications at the V3 followed by V6 stage of soybean resulted in 1% survival in narrow rows and 4% in wide rows. An additional application at the R2 stage had no additional advantage in reducing sicklepod survival, likely because of the effectiveness of earlier applications and dense soybean canopy which hindered coverage of small stature seedlings. Sicklepod survival declined with the later emerging cohorts compared to cohort 1. A single application at the V3 stage resulted in total production of 975 seeds/m^2 compared to 31 seeds/m^2 following sequential applications at the V3 and V6 stage in 2004. No sicklepod plants produced seeds in any of the glyphosate application treatments in 2005. Averaged over years, sicklepod from cohort 1 in non-treated plots produced 7,270 seeds/m^2 in wide rows and 3,955 seeds/m^2 in narrow rows. In 2004, non-treated sicklepod from cohort 2 produced 510 seeds/m^2 in narrow rows compared to 1,640 seeds/m^2 in wide rows. No sicklepod seed were produced by plants that emerged after the V3 stage of soybean in 2005. Sicklepod plants that emerged after the V6 stage of soybean failed to produce seed in either year.

TOBACCO RESPONSE TO SIMULATED IRRIGATION CONTAMINATION. R.J. Richardson, I.C. Burke, W.J. Everman and J.W. Wilcut, Crop Science Department, North Carolina State Univ., Raleigh, NC 27695.

ABSTRACT

Much of the North Carolina irrigation supply originates from relatively small ponds with a minimal buffer area from surrounding agricultural production. Tobacco is also a common rotational crop in North Carolina and may be sensitive to off-target herbicide movement from other crops. Therefore, research was conducted to evaluate the potential for tobacco injury from simulated contamination of irrigation water with atrazine, mesotrione, and glyphosate.

Visible tobacco injury was not observed with glyphosate treatments, but was observed with atrazine and mesotrione. Injury was 8 to 10% with simulated atrazine contamination at 282 and 564 ppb and was 41 to 60% with rates of 2,250 to 4,500 ppb. Injury from mesotrione treatments did not differ by treatment and was 18 to 24%.

Nontreated tobacco dry weight was 18.3 g in the atrazine trial and decreased with increasing atrazine rate to 13.3 g with 4,500 ppb. In the mesotrione trial, nontreated dry weight was 15.8 g and decreased to 10.8 g with simulated contamination of 211 ppb mesotrione. Increasing glyphosate rate also reduced tobacco dry weight. Dry weight of the nontreated was 19.2 g and decreased to 17.7 g with the highest rated of 4,500 ppb. In general, reduced tobacco growth was well correlated to increasing rates of atrazine, mesotrione, and glyphosate with r^2 values of 0.65, 0.83, and 0.73, respectively.

In this research, increasing rates of atrazine, mesotrione, and glyphosate resulted in decreased tobacco dry weights. This indicates that crop injury could occur under favorable conditions when irrigation water is contaminated with these herbicides. However, biologically active water may reduce herbicide availability and longevity, as compared to the tap water used in this trial. Therefore, future research should be conducted with biologically active water to determine herbicide concentrations that could result in crop injury in “real life” situations.

INTRODUCTION OF ORTHOSULFAMURON (IR-5878) FOR USE IN MID-SOUTH RICE. C.T.Leon, E.P. Webster, R.C. Scott, and A.T. Ellis; Isagro-USA, Madison, MS, Department of Agronomy, Baton Rouge, Cooperative Extension Service, University of Arkansas, Lonoke, AR, University of Arkansas, Fayetteville, AR.

ABSTRACT

Orthosulfamuron (IR-5878) is a sulfamoylurea herbicide currently being developed by Isagro for use in rice (*Oryza sativa* L.). Orthosulfamuron is formulated as a 50 WG and will be labeled for use at 0.067 lb ai/A (2.1 oz product/A). In combination with currently labeled herbicides, orthosulfamuron improves control of troublesome broadleaves, aquatics, and sedges commonly found in rice fields. In addition, orthosulfamuron fits well in both conventional and herbicide tolerant rice cultivars with excellent crop safety. Orthosulfamuron has been tested in ten locations in Arkansas, Louisiana, Mississippi, and Missouri from 2003 to 3005. Small plot trials were conducted using an RCB design. Applications were made using a CO_2 pressurized backpack sprayer.

At 35 days after (da) final herbicide treatment, control of hemp sesbania [*Sesbania exaltata* (Raf.) Rydb. Ex A. W. Hill], eclipta (*Eclipta prostrata* L.), pitted morningglory (*Ipomoea lacunosa* L.), and rice flatsedge (*Cyperus iria* L.) was 76 to 98%. Alligatorweed [*Alternanthera philoxeroides* (Mart.) Griseb.] control was 40 to 93%. Alligatorweed control was optimized following clomazone or in a tank mixture with quinclorac. Although incomplete control was obtained, alligatorweed plants remained stunted and until the rice was able to tiller and create a height differential and therefore obtain a competitive advantage. At 50 da final herbicide treatment, hemp sesbania, eclipta, and rice flatsedge control was 83 to 99%. Barnyardgrass [*Echinochloa crus-galli* (L.) Beauv.], Amazon sprangletop [*Leptochloa panicoides* (Presl) Hitchc.], and broadleaf signalgrass [*Brachiaria platyphylla* (Griseb.) Nash] control were most affected by the application timing of clomazone, quinclorac, propanil, or pendimethalin.

The application flexibility and level of crop safety delivered by orthosulfamuron will be a valuable asset for Mid-south producers. For optimum performance, orthosulfamuron will be recommended at 0.067 lb ai/A (2.1 oz product/A) applied EPOST to MPOST. For season long rice weed control, orthosulfamuron may be used in combination with other rice herbicides such as clomazone, quinclorac, imazethapyr, and propanil. Registration of orthosulfamuron is expected in early 2007.

ANNUAL BLUEGRASS CONTROL PROGRAMS DURING PERENNIAL RYEGRASS OVERSEEDING. D.B. Ricker, J.B. Willis, and S.D. Askew; Virginia Tech, Blacksburg, VA.

ABSTRACT

Changing seasons in the transition zone force bermudagrass turf into winter dormancy. Winter overseeding of perennial ryegrass (*Lolium perenne* L.) into dormant bermudagrass turf provides a year-round green playing surface. Unfortunately, management practices creating an adequate seed bed and seeding timing enhance annual bluegrass (*Poa annua*) germination. Temperatures during late fall seeding are ideal for a flush of annual bluegrass growth prior to overseeded turf establishment. Developing annual bluegrass control programs during winter overseeding reduces the need for further herbicide treatments to control potential annual bluegrass infestations.

Two separate field trials in Blacksburg, VA were conducted in the fall of 2005 to evaluate the most effective annual bluegrass control program during overseeding. Trial 1 and 2 were conducted on vertically mowed Riviera bermudagrass turf overseeded with perennial ryegrass at 280 kg/ha on September 29, 2005 and August 22, 2005, respectively. Trial 1 was a RCBD with 5 treatments. Treatments included trifloxysulfuron at 0.02 kg/ha plus prodiamine at 1.17 L/ha applied on August 05, 2005 followed by prodiamine at 1.17 L/ha, 6 months after treatment (MAT) or not, trifloxysulfuron at 0.02 kg/ha plus prodiamine at 2.34 L/ha treated on September 29, 2005, a nontreated/no overseed, and a control was also included. Trial 2 was a RCBD with 9 treatments and 1 nontreated control. Treatments included trifloxysulfuron at 0.02 or 0.04 kg/ha and rimsulfuron at 0.14 kg/ha all applied 21, 14, or 10 days prior to overseed. Treatment dates were August 1st, 8th, and 15th of 2005, respectively. Visually estimated annual bluegrass control, perennial ryegrass cover, and perennial ryegrass injury were rated as a percentage 6 MAT for trial 1 and 7, 14, 21, 28, 56 days after treatment (DAT), and 6 MAT for trial 2.

Trifloxysulfuron at 0.02 kg/ha plus prodiamine at 2.34 L/ha applied on September 29, 2005 controlled annual bluegrass 95% 6 WAT in trial 1. Trifloxysulfuron at 0.04 kg/ha 10 days prior to overseeding controlled annual bluegrass 88% 6 MAT in trial 2. No perennial ryegrass injury occurred in trial 1 but injury between 10 and 13% occurred with all treatments 21 and 14 days prior to overseeding in trial 2. Perennial ryegrass cover was not affected for both trials.

In trial 1, all three treatments were effective for annual bluegrass control during winter overseeding. In trial 2, trifloxysulfuron at 0.04 kg/ha 10 days prior to overseeding controlled annual bluegrass better than all other treatments. Further spring evaluations are required to assess annual bluegrass control during the spring growth season.

ALS HERBICIDES FOR SEEDED BERMUDAGRASS ESTABLISHMENT. J.B. Willis, D.B. Ricker, and S.D. Askew. Virginia Tech, Blacksburg, VA.

ABSTRACT

As seeded bermudagrass (SB) (*Cynodon dactylon*) varieties continue to perform well in variety trials, more fine turf managers are considering SB for fairways and athletic fields. Riviera SB has cold-tolerance, wear-tolerance, color, and quality characteristics equivalent to popular vegetative varieties. SB popularity has created need for weed control options during establishment. Acetolactate synthase (ALS) inhibiting herbicides have been labeled for use on established bermudagrass. However, these herbicides have not been applied to seedling bermudagrass, before uniform stolon development. ALS herbicides would prove useful for weed control during SB establishment if safe to young SB. The objective of these studies where to evaluate ALS herbicides applied 1 and 3 weeks after seeding (WAS) SB safety and smooth crabgrass (*Digitaria ischaemum*) control.

Three trials were conducted in Blacksburg, VA at the Virginia Tech Golf Course. Before trial initiation, existing Kentucky bluegrass (*Poa pratensis*) fairway was controlled with multiple applications of glyphosate. Trial areas were then core-aerated and vertically mown each in two directions and Riviera SB was sown at 43.56 lb/A pure live seed. Trials were seeded June 7, 2004, May 20, 2005, and June 15, 2005 for trial 1, 2, and 3, respectively. Treatments were arranged in a 2 by 6 factorial with one nontreated comparison. The 2 application timings were 1 and 3 weeks after seeding (WAS) and 6 herbicides are flazasulfuron (0.50 oz ai/A), foramsulfuron (0.50 oz ai/A), metsulfuron (0.50 oz ai/A), rimsulfuron (0.50 oz ai/A), sulfosulfuron (0.50 oz ai/A), and trifloxysulfuron (0.42 oz ai/A). Experimental design was randomized complete block with 4 replications. Plot size was 6 by 9 ft and experiments were maintained as fairway with cutting height of 3/4 inch. Turf cover, injury, and smooth crabgrass control ratings were visually estimated at 6 and 9 WAS. Nontreated treatment was deleted from analysis to stabilize variance, appropriate main effects and interactions were separated using SAS procedure GLM, alpha = 0.05.

Trial and application effects were not significant and were pooled. Trifloxysulfuron and flazasulfuron caused more injury than all other herbicides and significantly reduced turf cover 9 WAS. Rimsulfuron caused unacceptable SB injury 6 WAS but injury subsided by 9 WAS. Likewise, percent cover was significantly reduced from rimsulfuron applications 6 WAS, however, SB recovered from injury and cover was not significantly lower than other treatments. Sulfosulfuron and metsulfuron caused moderate injury 6 WAS, which did not significantly reduce turf cover at 6 or 9 WAS. Foramsulfuron was among the safest herbicides having low levels of injury and high cover ratings relative to other treatments. Overall injury in the form of chlorosis can be tolerated as long as no reduction of SB cover is sustained. Flazasulfuron and trifloxysulfuron controlled smooth crabgrass greater than 90%. Metsulfuron and rimsulfuron suppressed smooth crabgrass allowing for better SB establishment despite injury from these products. In conclusion foramsulfuron and sulfosulfuron are safe to apply 1 and 3 WAS, causing very little chlorosis and no reduction in turf cover. Flazasulfuron, metsulfuron, rimsulfuron, and trifloxysulfuron are not safe to use 1 and 3 WAS due to significant injury and reduction in cover. Flazasulfuron, metsulfuron, rimsulfuron, and trifloxysulfuron significantly controlled smooth crabgrass, however injured bermudagrass and reduced cover when applied 1and 3 WAS.

SEASHORE PASPALUM (PASPALUM VAGINATUM) RESPONSE TO TRINEXAPAC- ETHYL TANK MIX COMBINATIONS WITH FLURPRIMIDOL. F.C. Waltz, Jr., J.L. White Jr., and T.R. Murphy, The University of Georgia, Griffin, GA 30223.

ABSTRACT

Over the past 40 years, the use of plant growth regulator (PGRs) to reduce shoot growth have been reported to lessen the effects of mowing, reduce labor costs, aid in maintaining difficult areas, improve worker safety, reduce organic waste, and improve plant water conservation. Seashore paspalum (*Paspalum vaginatum* Swartz) is a prostrate, salt tolerant grass that is indigenous to tropical and coastal areas worldwide. This grass can be irrigated with salt and brackish water and tolerates drought and low mowing heights used on golf course fairways and sports fields. Because of these attributes, improved cultivars of seashore paspalum have been recently released for use in the southern United States and tropical areas of the world. There is minimal published research on the response of seashore paspalum to common PGRs.

For acceptance in the turf market PGRs must suppress vertical shoot growth, without adversely inhibiting root growth, lateral stolon development, or cause objectionable discoloration (injury). Previous research on bermudagrass (*Cynodon* spp.) has reported "moderate" discoloration from single PGR applications lasting 2 to 4 weeks. Since height suppression typically lasts 4 to 6 weeks, multiple applications are necessary during the growing season and long-term discoloration is undesirable. Also, duration of height suppression has been shown to be rate dependent, with shorter effects at lower rates. Therefore, tank mix combinations of PGRs at below label rates may provide acceptable growth suppression without discoloration.

During summers of 2004 and 2005, a study was initiated to investigate the effect of repeated PGR tank mix combinations on 'Sea Isle 1' seashore paspalum. Plots were 5 feet x 10 feet in a randomized complete block design with 3 replications. Using a CO_2 backpack sprayer set to deliver 25 gpa, treatments were applied on July 1 both years with two sequential applications 28 day apart, for a total of three applications. The plots were maintained similar to a sports field, mowed twice weekly at ¾-in, and irrigated to prevent drought stress.

Treatments included two rates of trinexapac-ethyl (4.0 and 6.0 oz product/acre), 3 rates of flurprimidol (4.0, 6.0, and 8.0 oz product/acre), and all tank mix combinations. A nontreated control was also included.

Turfgrass quality, a visual assessment including turfgrass color, canopy density, texture, and overall health, was evaluated on a 1 to 9 scale, 1= poor quality or dead turf and 9= high quality, healthy turf, 7 was considered minimally acceptable. Turfgrass color was evaluated by several methods. Visual color was rated on a 1 to 9 scale, 1= brown, dead turf and 9= dark green grass, 7 was considered minimally acceptable. The Spectrum Technologies Turf Color Meter (TCM 500) was used to objectively assess color. In 2005, color was also measured using digital imaging technology.

Using a Toro walk-behind reel-type mower set at ¾ inch, clippings were collected from a 17 $feet^2$ area centered in the plots. Percent clipping reduction was calculated after clippings were dried and weighed.

At the rates tested, multiple applications of flurprimidol and trinexapac-ethyl, alone or in tank mix combination, were non-injurious to seashore paspalum. No injury was observed at any of the two-year rating dates. Turfgrass quality, visual color, and TCM 500 color ratings were acceptable (≥ 7) for all treatments, including the control, both years. The trend from digital color analysis was that treatments containing the 6.0 oz/acre rate of trinexapac-ethyl had darker green color.

In general, as the total amount of PGR applied to the turfgrass increased, the greater the clipping reduction compared to the nontreated. Similar to the digital color analysis, treatments with 6.0 oz/acre of trinexapac-ethyl had a repressive trend on clipping weights. Tank mix combinations of flurprimidol at 4.0 or 6.0 oz/acre and 6.0 oz/acre trinexapac-ethyl reduced clippings 38% to 90% below the nontreated plots.

This research showed that seashore paspalum vegetative growth can be effectively reduced over an extended period with flurprimidol and trinexapac-ethyl. Tank mix combinations of these PGRs can substantially reduce clippings without decreasing aesthetic qualities.

SEASHORE PASPALUM RESPONSE TO TRINEXAPAC-ETHYL TANK-MIX COMBINATIONS WITH FLAZASULFURON. T.R. Murphy and F.C. Waltz, Jr., Crop and Soil Sciences, The University of Georgia, Griffin, GA 30223

ABSTRACT

A study was conducted in 2005 in Griffin, GA to determine if flazasulfuron applied alone or tank-mixed with trinexapac-ethyl would regulate the vegetative growth and seedhead emergence of seashore paspalum (*Paspalum vaginatum,* ‘Sea Isle I’).

Flazasulfuron (25WDG) at 0.25, 0.5, 1.0 and 1.5 oz. product/ac and trinexapac-ethyl (Primo Maxx) at 11.0 fl. ozs. product/ac was applied alone or as a tank-mix. Metsulfuron (Manor) at 0.5 oz. product/ac + trinexapac-ethyl at 11.0 fl. ozs./ac was also included for comparison purposes. A nonionic surfactant at 0.25% v/v was added to all treatments. Treatments were applied on May 26, and again to the same plots on June 22 and July 20, 2005. Plots were mowed at a height of 0.5 in. and irrigated as needed. Data collected included seashore paspalum injury, seedhead suppression from a non-mowed area of each plot and weekly clipping weights. Clipping weights were summed across four weekly clipping time periods and are presented as cumulative dry weight reduction relative to the untreated check at 30 d intervals after each application.

Seashore Paspalum Injury. Flazasulfuron and trinexapac-ethyl applied alone or as a tank-mix, and metsulfuron + trinexapac-ethyl did not adversely injure seashore paspalum. At most evaluations injury was $\leq$ 15% for all treatments. An exception occurred at 21 d after the second, or June 22, application. At this evaluation, injury ranged from 16 to 23% when flazasulfuron at rates that ranged from 0.25 to 1.5 oz./ac was tank-mixed with trinexapac-ethyl. Injury was transitory, and no injury from any treatment was apparent by 28 d after the second application.

Seashore Paspalum Dry Weights. Flazasulfuron at rates that ranged from 0.25 to 1.5 oz./ac reduced cumulative clipping weights 16 to 59% at 30 d after the first application (DAFA), 26 to 55% at 30 d after the second application (DASA) and 18 to 35% at 30 d after the third application (DATA). Tank mixes of trinexapac-ethyl + flazasulfuron reduced clipping weights 33 to 56% more than flazasulfuron applied alone at the various evaluation intervals. With the exception of the 30 DAFA evaluation, trinexapac-ethyl applied alone was as effective as trinexapac-ethyl + flazasulfuron and trinexapac-ethyl + metsulfuron tank-mixes in reducing clipping weights. At this evaluation, trinexapac-ethyl + flazasulfuron at rates $\geq$ 0.5 oz./ac reduced clipping weights an average of 14% more than trinexapac-ethyl applied alone.

Seedhead Suppression. Flazasulfuron at rates $\leq$ 0.5 oz/ac, trinexapac-ethyl and trinexapac-ethyl + metsulfuron did not effectively suppress (< 60%) seashore paspalum seedhead emergence. At 30 DAFA, flazasulfuron at rates $\geq$ 1.0 oz./ac provided $\geq$ 80% seedhead suppression; however, at subsequent evaluations suppression was < 70%. At 30 DAFA, there was no difference in seedhead suppression between flazasulfuron at rates $\geq$ 1.0 oz./ac applied alone or tank-mixed with trinexapac-ethyl.

At 30 DASA and 30 DATA, the addition of trinexapac-ethyl to flazasulfuron improved seedhead suppression over that obtained with flazasulfuron applied alone. Only flazasulfuron at 1.5 oz./ac + trinexapac-ethyl provided > 80% seedhead suppression at 30 DATA.

FLAZASULFURON FOR CHAMBERBITTER CONTROL IN TURFGRASS. K.C. Hutto, B.J. Brecke and J.B. Unruh; University of Florida, Milton, FL 32583.

ABSTRACT

Research was conducted in a golf course rough (mixed stand of turfgrass that consisted of bahiagrass, bermudagrass, and centipedegrass maintained at 3 in.) to evaluate the efficacy of flazasulfuron applied alone or in tank mixtures for chamberbitter control. None of the treatments injured the turfgrass. Acceptable levels of control (at least 80%) were obtained with 3.0 oz/A flazasulfuron + 2 pt/A Trimec Southern (2,4-D + MCPP + dicamba), 3.0 oz/A flazasulfuron applied alone, and 2 pt/A Confront (triclopyr + clopyralid), 36 days after treatment (DAT). Tank mixtures containing 3.0 oz/A flazasulfuron controlled chamberbitter at least 80%, 59 DAT. Flazasulfuron applied alone as well as 2 pt/A Confront controlled chamberbitter better than 1.5 oz/A flazasulfuron + 1.5 fl oz/A Quicksilver (carfentrazone), 59 DAT. Flazasulfuron + 2,4-D, flazasulfuron applied alone, and 2 pt/A Confront all provided greater chamberbitter control compared to 1.5 oz/A flazasulfuron + 1.5 fl oz/A Quicksilver, 71 DAT. Flazasulfuron applied at 3.0 oz/A was comparable to 2 pt/A Confront throughout the course of the study. Greater chamberbitter control was achieved when 3.0 oz/A flazasulfuron was tank-mixed with 4 pt/A SpeedZone (2,4-D + MCPP + dicamba + carfentrazone) or 1.5 fl oz/A Quicksilver compared to using 1.5 oz/A flazasulfuron with these tank mixtures, 71 DAT. Applying 3.0 oz/A flazasulfuron alone or in tank mixtures proved to be an effective method of controlling chamberbitter in turfgrass.

CENTIPEDEGRASS TOLERANCE TO MESOTRIONE AND ATRAZINE APPLIED DURING SEEDED ESTABLISHMENT. J.S. McElroy[1], G.K. Breeden[1], R.H. Walker[2], and J. Belcher[2]; [1]University of Tennessee, Knoxville; [2]Auburn University, Auburn, AL.

ABSTRACT

Mesotrione is currently undergoing evaluation for use in the turfgrass market. Initial data indicates that fully developed centipedegrass is tolerant to mesotrione. No information is available regarding tolerance of seedling centipedegrass to mesotrione. Historically, atrazine is most often used during the establishment of centipedegrass from seed for control of annual weeds such as crabgrass (*Digitaria* spp.). Tank-mixing of mesotrione with photosynthesis inhibiting herbicides such as atrazine have been shown to be synergistic. Research was conducted to evaluate the effect of atrazine and mesotrione on centipedegrass photosystem II (PSII) efficiency, and to evaluate the herbicides both alone and in mixture on turf ground cover development.

Research evaluating the effect of mesotrione and atrazine alone on PSII efficiency of centipedegrass was conducted in a greenhouse environment. Approximately 50 seeds were seeded per 10 cm diameter pot. Treatments were applied 2 weeks after emergence of the first seedling (approximately 7 to 10 days after seeding). Treatments included mesotrione at 0.035, 0.07, 0.14, and 0.28 kg/ha and atrazine at 0.28, 0.56, 1.12, and 2.24 kg/ha. PSII efficiency was measured with a pulse-modulated fluorometer under light-adapted conditions. Mesotrione alone at the highest rate of 0.28 kg/ha reduced PSII efficiency at 7 days after treatment (DAT), but no visual injury symptoms were seen and PSII efficiency normalized by 14 DAT. No other mesotrione alone treatments reduced PSII efficiency. All atrazine treatments (0.28 to 2.1 kg/ha) reduced PSII efficiency of centipedegrass for 28 days. Due to the physiological injurious nature of atrazine on centipedegrass, combined with previous reports of atrazine-mesotrione synergism, it was decided that further field evaluations should evaluate either 0.28 or 0.56 kg/ha.

Research evaluating the effect of mesotrione and atrazine, applied alone or in combination, on centipedegrass ground cover was conducted in Knoxville, TN and Auburn, AL in 2005. Due to limited space, only Knoxville will be discussed. Ground was tilled, leveled, and compacted for seeding using common ground preparation methods. Centipedegrass was seeded at a rate of 48 kg seed/ha. Treatments were applied 2 weeks after emergence, approximately 24 to 28 days after seeding. Treatments included atrazine at 0.56 kg/ha, mesotrione at 0.035, 0.07, 0.14, and 0.28 kg/ha, and the four rates of mesotrione tank-mixed with atrazine at 0.56 kg/ha. Atrazine and atrazine + mesotrione containing treatments reduced centipedegrass ground cover greater than mesotrione alone treatments at every rating date regardless of rate. Similarly, tank-mixtures of mesotrione at 0.14 or 0.28 kg/ah plus atrazine reduced ground cover greater than atrazine alone at 21 DAT, but not 7 or 49 DAT. Mesotrione alone treatments reduced ground cover less than the non-treated at 7 DAT, but not 21 or 49 DAT. All treatments reached >90% cover by 49 DAT, however ground cover in were statistically less in atrazine containing treatments. Mesotrione can be safely applied to centipedegrass during seeded establishment, but safety of atrazine tank-mixtures are questionable.

CONTROL OF VARIOUS BROADLEAF WEEDS IN TURF WITH MESOTRIONE. G. K. Breeden and J. S. McElroy, University of Tennessee.

ABSTRACT

Some broadleaf weeds are more difficult to control than others. Often multiple applications are needed to control some of the more difficult to control broadleaves. Mesotrione is a new herbicide that is currently being adapted to the turfgrass market. Mesotrione has activity on both grasses and broadleaf weeds. As this herbicide is being adapted data is needed for rate, timing, and multiple applications for both weed control and turf tolerance. Field research was initiated in 2005 to evaluate postemergence applications of mesotrione for broadleaf weed control.

Research was conducted in Rockford and Oak Ridge, TN in 2005. Treatments were arranged using a randomized complete block design with 4 replications. Herbicides were applied with a CO_2 pressurized sprayer and a 4 ft. boom with a pressure of 26 PSI and 11002XR flat fan nozzles. Single postemergence applications included were mesotrione at 0.187 and 0.25 lb ai/a, and Trimec Classic (25.93% 2,4-D + 6.93% MCPP + 2.76% dicamba) at 1.19 lb ai/a. Sequential applications were mesotrione at 0.125 and 0.187 lb ai/a, and Trimec Classic at 0.595 lb ai/a. The second application was applied 3-4 weeks after the initial application.. All mesotrione treatments contained 0.25 % v/v NIS. Experimental units were 5 ft. by 10ft. Weed control and turf injury were evaluated visually utilizing a 0% (no weed control or turf injury) to 100% (complete weed control or turf injury) scale.

Less than 10% tall fescue (*Festuca arundinacea*) injury was observed at anytime by any herbicide treatment at Rockford. Single applications of mesotrione at 0.187 and 0.25 lb ai/a provided unacceptable control (<50%) of both white clover (*Trifolium repens*) and ground ivy (*Glechoma hederacea*) at 3 weeks after the sequential (WAS) application. Sequential applications of mesotrione at 0.125 lb ai/a controlled white clover 75% at 3 WAS. Trimec Classic at 1.19 lb ai/a in a single application, Trimec Classic applied sequentially at 0.595 lb ai/a, and mesotrione applied sequentially at 0.187 lb ai/a controlled white clover >90 % at 3 WAS. Trimec Classic at 1.19 lb ai/a in a single application, Trimec Classic applied sequentially at 0.595 lb ai/a, and mesotrione applied sequentially at 0.125 and 0.187 lb ai/a controlled ground ivy >90 % at 3 WAS. Mesotrione injury (<40 %) to bermudagrass (*Cynodon dactylon*) was observed at Oak Ridge during the trial, however bermudagrass was able to recover quickly. A single application of mesotrione at 0.187 provided unacceptable control (<60 %) of both white clover and dandelion (*Taraxacum officinale*) at 3 WAS. Mesotrione in a single application at 0.25 lb ai/a provided < 78% control of both white clover and dandelion at 3 WAS. Sequential applications of mesotrione at 0.125 lb ai/a controlled white clover 84% at 3 WAS. Trimec Classic at 1.19 lb ai/a in a single application, Trimec Classic at 0.595 lb ai/a applied sequentially, and mesotrione at 0.187 lb ai/a applied sequentially controlled white clover >95 % at 3 WAS. A single application of Trimec Classic at 1.19 lb ai/a, Trimec Classic at 0.595 lb ai/a applied sequentially, and mesotrione at 0.125 and 0.187 lb ai/a applied sequentially provided excellent control (100 %) of dandelion at 3 WAS. Sequential applications of mesotrione provided better control of white clover, dandelion, and ground ivy than single applications. Ground ivy and dandelion control with sequential applications of mesotrione was equal to applications of Trimec Classic.

EFFECT OF TANK MIXTURES ON PROSTRATE KNOTWEED AND FALSE GREEN KYLLINGA CONTROL WITH FLAZASULFURON. S.D. Askew, J.B. Willis, and D.B. Ricker; Virginia Tech, Blacksburg, VA; and M. D. Grove; ISK Biosciences, Houston, TX.

ABSTRACT

Flazasulfuron is a new sulfonylurea herbicide that will soon be registered for use in U.S. turfgrass markets. Flazasulfuron provides rapid control of perennial ryegrass, tall fescue and other cool-season grasses, as well as, control of sedge and various broadleaf weeds. Although much is known about how flazasulfuron performs in turfgrass when applied alone, few studies have evaluated tank mixture combinations with flazasulfuron and other herbicides. Studies were conducted near Richmond and Martinsville, VA to evaluate flazasulfuron alone or mixed with various broadleaf herbicides for prostrate knotweed (*Polygonum aviculare*) control and flazasulfuron applied sequentially or with various preemergence and postemergence grass herbicides for false green kyllinga (*Kyllinga gracillima*) control.

Studies were conducted as randomized complete block designs with four replications on golf course roughs. Prostrate knotweed was evaluated at one site at Hanover Country Club (HCC), near Richmond and false green kyllinga control was evaluated at three sites; two at HCC and one at Chatmoss Country Club(CCC) near Martinsville, VA. Treatments for prostrate knotweed control included a 2 X 7 factorial arrangement of flazasulfuron at 1.0 and 1.5 oz/A applied in all combinations with the following tank mix options: nothing, quinclorac (Drive™) at 1.0 lb/A, triclopyr + clopyralid (Confront™) at 1.5 pt/A, 2,4-D + dicamba + MCPP + carfentrazone (Speedzone™) at 4 pt/A, carfentrazone (Quicksilver™) at 1.5 fl oz/A, metsulfuron (Manor™) at 0.5 oz/a, and primisulfuron at 1.0 oz/A. Initial treatments for prostrate knotweed were applied on April 28, 2005. False green kyllinga treatments included dithiopyr (Dimension™ Ultra) at 20 oz/A, prodiamine (Barricade™) at 2.3 lb/A, pendimethalin (Pendulum Aquacap™) at 4.2 pt/A, Drive™ at 1.0 lb/A, and fenoxaprop (Acclaim Extra™) at 3.5 oz/A all applied alone or mixed with flazasulfuron at 1.5 oz/A. Comparison treatments included a nontreated control, flazasulfuron applied twice at 1.5 or 3.0 oz/A, halosulfuron (Manage™) at 1.0 oz/A, and MSMA applied twice at 40 oz/A. Initial treatments for false green kyllinga were applied on June 7 and 30, 2005 at HCC and August 12, 2005 at CCC.

Broadleaf herbicides did not reduce flazasulfuron efficacy for prostrate knotweed control. Flazasulfuron controlled prostrate knotweed 75% early season and 80% late season. Initial control was increased by addition of Speedzone™ or Quicksilver™ but late season control was equivalent between treatments. False green kyllinga control was consistent between the three locations and data were pooled. Flazasulfuron applied twice at either rate and MSMA applied twice completely controlled false green kyllinga while Manage™ applied once did not. Any tank mix combination that contained flazasulfuron controlled false green kyllinga at least 98% in a single treatment, except flazasulfuron + Drive, which controlled false green kyllinga 90%. Tank mix herbicides did not control false green kyllinga greater than 30% when flazasulfuron was not included. These data suggest that sedge and broadleaf control with flazasulfuron is unlikely to be reduced by tank mixtures with the herbicides evaluated.

WEED CONTROL AND BERMUDAGRASS RESPONSE TO ALS-INHIBITING HERBICIDES APPLIED IN MIXTURES WITH BROADLEAF HERBICIDES. S.D. Askew, D.B. Ricker, and J.B. Willis, Virginia Tech, Blacksburg, VA.

ABSTRACT

Flazasulfuron, foramsulfuron, sulfosulfuron, and trifloxysulfuron are new sulfonylurea herbicides for use in turfgrass. Like most ALS-inhibiting herbicides, these products have a high degree of selectivity and are seldom effective on all weeds. Turfgrass practitioners desire to control all weeds with minimal treatments and often resort to tank mixtures of multiple herbicides to broaden the spectrum of weed control. Although a wealth of knowledge on effectiveness of the aforementioned products has been gained over the past few years, few studies have evaluated these products in tank mixtures with broadleaf herbicides. Thus, studies were conducted in Blacksburg, VA to evaluate effectiveness of flazasulfuron, foramsulfuron, sulfosulfuron, and trifloxysulfuron applied alone or combined with several broadleaf herbicides for weed control and response of four bermudagrass cultivars.

The study was conducted on a research fairway maintained at 5/8 inch at the Turfgrass Research Center in a randomized complete block design with four replications. The site consisted of 16 large plots that comprised four 1-yr-old bermudagrass cultivars arranged randomly within four blocks. Thus, bermudagrass cultivars served as replication in this study. The four sulfonylurea herbicides and tank mixtures were arranged as a split plot with four sulfonylurea herbicides as main plots and 15 subplots arranged in a two by seven factorial plus a nontreated control. The subplots were comprised of two sulfonylurea rates (low and high) and seven tank mixture options. These sixty treatments were randomly arranged with split plot structure in replications 1, 2, 3, and 4 on ‘Riviera’, ‘Yukon’, ‘Princess 77’, and ‘Savannah’ bermudagrasses, respectively. Data were analyzed in SAS to evaluate the split plot structure; however, a separate analysis was conducted with the four sulfonylurea herbicides as replication to test the main effect of bermudagrass cultivar. Sulfonylurea herbicide rates included flazasulfuron at 1.0 and 1.5 oz/A, foramsulfuron at 8.5 and 17 fl oz/A, sulfosulfuron at 1.0 and 1.5 oz/A, and trifloxysulfuron at 0.33 and 0.56 oz/A. Tank mix options included nothing, quinclorac (Drive™) at 1.0 lb/A, triclopyr + clopyralid (Confront™) at 1.5 pt/A, 2,4-D + dicamba + MCPP + carfentrazone (Speedzone™) at 4 pt/A, carfentrazone (Quicksilver™) at 1.5 fl oz/A, metsulfuron (Manor™) at 0.5 oz/a, and primisulfuron at 1.0 oz/A. Treatments were applied on May 17, 2005 and NIS was included at 0.25 % v/v as appropriate. Data included visually estimated control of smooth crabgrass (*Digitaria ischaemum*), large crabgrass (*D. sanguinalis*), annual bluegrass (*Poa annua*), and corn speedwell (*Veronica arvensis*) and bermudagrass injury and cover.

Crabgrass was the predominant weed in this study and tended to influence bermudagrass cover and turfgrass quality. Those herbicides that controlled large and smooth crabgrass tended to improve bermudagrass cover and quality the most. The main effect of sulfonylurea herbicide was strongly significant for both crabgrass control and bermudagrass cover. These herbicides can be ranked from highest to lowest crabgrass control in the following order: trifloxysulfuron> flazasulfuron> sulfosulfuron> foramsulfuron. Only three instances of reduced weed control by tank mixtures were noted. These occurred with annual bluegrass control and were flazasulfuron + Drive™, sulfosulfuron + Confront™, and sulfosulfuron + Manor™. Corn speedwell, large crabgrass, and smooth crabgrass control were not decreased by the various tank mixtures compared to sulfonylurea herbicides alone; however, cool-season grasses like annual bluegrass may be antagonized by some tank mixtures, especially hormone-type broadleaf herbicides like Confront™ and Speedzone™.

POSTEMERGENCE HERBICIDE EFFECTS ON ESTABLISHMENT OF SEEDED BERMUDAGRASS TURF. T.A. Murphree and C.A. Rodgers; Seeds West Inc., Maricopa, AZ; K. Umeda and G.W. Towers; University of Arizona Cooperative Extension, Phoenix, AZ.

ABSTRACT

The new planting and establishment of seeded bermudagrass can be a challenge because of competition with grass and broadleaf weeds. Postemergence (POST) herbicides can be used to help control weeds in seeded bermudagrass, but most POST herbicide are limited to applications made after the second mowing due to the risk of injury to immature bermudagrass. Many new herbicides can be applied POST but safety of early timing has not been fully determined for applications during establishment of seeded bermudagrass. The objective of this study was to determine how soon POST herbicides can be applied safely to newly seeded bermudagrass.

This study was performed in 2004 and 2005 at the University of Arizona Maricopa Agricultural Center, located in Maricopa, AZ. POST herbicide applications were made to bermudagrass cv. Princess 77 which was planted at 1 lb/1000 ft^2. Treatments for the study were foramsulfuron at 0.019 and 0.054 lb ai/A, trifloxysulfuron at 0.0094 and 0.028 lb ai/A, sulfosulfuron at 0.065 and 0.188 lb ai/A, flazasulfuron at 0.018 and 0.047 lb ai/A, rimsulfuron at 0.024 and 0.063 lb ai/A, chlorsulfuron at 0.046 and 0.138 lb ai/A, metsulfuron at 0.0094 and 0.024 lb ai/A, halosulfuron at 0.062 lb ai/A, diclofop at 0.75 and 1.0 lb ai/A, quinclorac at 0.75 lb ai/A and dithiopyr at 0.18 lb ai/A. Herbicide treatments were applied at three timings which were 14, 21, and 35 days after planting (DAP). Plot size was 3 by 5 feet and all treatments were applied using a CO_2 backpack sprayer calibrated to deliver 103 GPA. Herbicide injury evaluations for each timing were made at 2, 4, and 6 weeks after treatment.

For most rating dates the year by herbicide by timing interactions were significant therefore years were analyzed separately. Injury to bermudagrass was most severe when herbicides were applied at 14 DAP. In 2004, at 2 WAT diclofop at both rates and flazasulfuron and chlorsulfuron at the high rate were most injurious (37 to 60%). The high rate of sulfosulfuron and metsulfuron and the low rate of chlorsulfuron, halosulfuron, and dithiopyr caused noticeable injury (20 to 33%). At 4 WAT, injury from most treatments decreased. At 6 WAT, all treatments were safe except for chlorsulfuron which still showed injury (20%). At 21 DAP, early ratings showed that sulfosulfuron and diclofop at both rates and chlorsulfuron, quinclorac, and dithiopyr showed injury (up to 28%). At 4 WAT, only chlorsulfuron at the high rate caused significant injury (22%). By 6 WAT, the bermudagrass did not show any injury.

In 2005 at the 14 DAP timing and when rated 2 and 4 WAT, sulfosulfuron at both rates and chlorsulfuron and metsulfuron at the high rate were most injurious (30 to 48%). By 6 WAT, chlorsulfuron at the high rate was the only treatment which caused injury (22%). At 21 DAP, at the early rating date sulfosulfuron, chlorsulfuron, and flazasulfuron at both rates and metsulfuron at the high rate showed significant injury (up to 35%). By 4 WAT only chlorsulfuron at the high rate showed unacceptable injury (32%). At 6 WAT, all treatments were safe.

In both years at 35 DAP good safety was observed for all herbicide treatments at all rating dates. These data suggests that at labeled rates foramsulfuron, rimsulfuron, and trifloxysulfuron could be applied safely to seeded bermudagrass cv. Princess 77 at all application timings observed in this study. Results from this study also indicate that seeded bermudagrass cv. Princess 77 can tolerate most of the above herbicide applications under optimum growing conditions after a period of time.

WEED CONTROL DURING SPRIG ESTABLISHMENT OF PATRIOT BERMUDAGRASS. B.W. Compton, J.B. Willis, D.B. Ricker, S.D. Askew, Virginia Tech, Blacksburg, VA.

ABSTRACT

Patriot bermudagrass is one of the newer vegetative bermudagrass (C*ynodon dactylon)* cultivars and was released commercially in 2003. This cultivar is selected for its excellent winter hardiness, vigorous growth, early spring green up, spring dead spot resistance, and overall turfgrass quality ratings. Turfgrass managers are adopting this variety and information will be needed to aid weed control efforts during establishment. The effect of herbicides on Patriot growth and establishment is currently unknown. In addition new sulfonylurea herbicides are available that may improve weed control spectrum during sprig establishment. The objective of these studies were to determine weed control options for establishing sprigged Patriot and evaluate its response to various herbicides applied pre- and post sprigging.

One field study was conducted in Blacksburg, VA to evaluate effects of the following herbicides on Patriot bermudagrass: oxadiazon (Ronstar™ 2G), quinclorac (Drive™), foramsulfuron (Revolver™), trifloxysulfuron (Monument™), metsulfuron (Manor™), MSMA, and 2,4-D + dicamba + MCPP + MSMA (Trimec™ Plus.) These herbicides were applied at timings relative to bermudagrass sprigging**.** The bermudagrass was sprigged on July 19th and oxadiazon (112 kg/ha and 168 kg/ha) and quinclorac (0.033 kg/ha and 1.12 kg/ha) treatments were applied on July 26th. Subsequent postemergence treatments were made on August 2nd consisting of foramsulfuron (1.8 L/ha), trifloxysulfuron (0.033 kg/ha), flazasulfuron (0.213 kg/ha), metsulfuron (0.067 kg/ha), foramsulfuron + metsulfuron, trifloxysulfuron + metsulfuron, and flazasulfuron+ metsulfuron.

Applications of oxadiazon (168 kg/ha), flazasulfuron, and flazasulfuron + metsulfuron reduced coverage of Patriot to 40, 40, and 45%, respectively one month after sprigging. Otherwise, all herbicides were sufficiently safe for application to newly-sprigged Patriot bermudagrass. Late season bermudagrass cover ratings were equivalent between treatments or dependent on weed control. All sulfonylurea herbicides controlled large crabgrass, yellow nutsedge, hairy galinsoga, and barnyardgrass at least 90% except metsulfuron. MSMA and Trimec™ Plus controlled the four weeds at least 85% 6 WAIT.

TOLERANCE OF PALMETTO® ST. AUGUSTINEGRASS AND COMMON CENTIPEDEGRASS TO SEVERAL POSTEMERGENC HERBICIDES. D. Taverner, R.E. Strahan, D.J. Lee. LSU AgCenter, Baton Rouge, LA 70803.

ABSTRACT

Several new herbicides have been registered for use in turfgrass that inhibit acetolactate synthase (ALS). Sulfonylurea and sulfonamide families inhibit the ALS enzyme, preventing the production of three essential amino acids which result in stunting and slow death in susceptible plants. Most of these herbicides are registered or will be registered for use on bermudagrass. However, in the Gulf Coast region of the United States many residential and commercial turfgrass areas utilize St. Augustinegrass and centipedegrass. Herbicides are often applied to manage weed problems and maintain turf quality. The low toxicity and low use rates of ALS inhibiting herbicides make them ideal for use in areas with excessive human traffic. This experiment was conducted to determine the tolerance of several new ALS inhibiting herbicides to common centipedegrass and Palmetto® St. Augustinegrass. The herbicides were compared to standard postemergence herbicides commonly utilized on those grasses.

Two studies were conducted at the Burden Research Center in Baton Rouge in 2005 to determine St. Augustinegrass and centipedegrass tolerance to several new ALS inhibiting herbicides. Established Palmetto® St. Augustinegrass and common centipedegrass were fertilized and mowed according to standard accepted practices. Irrigation was applied as needed to prevent stress. The studies were initiated on August 5.

In the centipedegrass trial, sethoxydim and clethodim standards were applied in 14 day intervals. In the St. Augustinegrass trial, asulam was applied in 21 day intervals. For both studies, flazasulfuron, bispyribac, sulfosulfuron, and trifloxysulfuron were applied in 21 day intervals. Herbicides were applied either once, twice, or 3 times in the study. Plot sizes were 40 x 60 inches. Herbicides were applied with a CO_2 pressurized backpack sprayer equipped with 80003 XR flat fan nozzles that delivered 25 GPA at 25 psi.

The centipedegrass study was a randomized complete block (RCB) design with 30 treatments total. The St. Augustinegrass study was a RCB with 25 total treatments. Quality ratings were collected weekly. The plots were rated on a 1 to 9 scale with 9 being highest quality and 1 being no turf. A rating of 5 was considered minimally acceptable quality. Data were subjected to analysis of variance (P=0.05) and means were separated using Fisher's Protected LSD.

Centipedegrass was very tolerant of flazasulfuron, sulfosulfuron, and standard centipedegrass herbicides: sethoxydim and clethodim. Acceptable centipedegrass quality was observed following one or two applications of bispyribac at 1.3 oz/A. However, unacceptable centipedegrass quality occurred following three bispyribac applications at the 1.3 oz/A rate. A single application of bispyribac at 2.6 oz/A maintained acceptable quality. Two or more applications of bispyribac at 2.6 oz/A reduced centipedegrass quality to unacceptable levels. Centipedegrass was sensitive to all applications of trifloxysulfuron during the evaluation period.

St. Augustinegrass was sensitive to most sequential herbicide treatments in the study. Flazasulfuron treated plots maintained acceptable quality levels only in single applications at 3 and 4.5 oz. Asulam treated plots were only acceptable after a single application. Bispyribac treated plots maintained acceptable quality levels after single applications at 1.3 and 2.6 oz rates. Only single applications of trifloxysulfuron maintained acceptable ratings. All treatments of sulfosulfuron were acceptable.

HYBRID KENTUCKY BLUEGRASS TOLERANCE TO PRE- AND POSTEMERGENCE APPLIED HERBICIDES. T.C. Teuton, C.L. Main, J.C. Sorochan, J.S. McElroy, and T.C. Mueller. University of Tennessee, Knoxville, TN; Clemson University, Florence, SC; University of Tennessee, Knoxville, TN; University of Tennessee, Knoxville, TN; University of Tennessee, Knoxville, TN.

ABSTRACT

Field studies were conducted near Knoxville, TN in 2004 to evaluate the response of ‘Thermal Blue' a new heat tolerant Kentucky bluegrass hybrid to preemergence (PRE) and postemergence (POST) herbicide applications. Thermal Blue exhibited significant injury with all PRE herbicides tested when applied at seeding; dithiopyr, oryzalin, oxadiazon, pendimethalin, prodiamine, quinclorac, and trifluralin. Quinclorac applied PRE showed the least injury (81 %) 25 weeks after treatment (WAT). Established Thermal Blue exhibited tolerance to ten postemergence ALS herbicides applied at 1 and 2X the normal use rates; bispyribac-sodium, chlorosulfuron, foramsulfuron, halosulfuron, imazapic, imazaquin, metsulfuron, rimsulfuron, sulfosulfuron, and trifloxysulfuron. Foramsulfuron and trifloxysulfuron at 87 g ai ha-1 and 35 g ai ha-1 showed 36 and 26% injury 5 WAT. However, at 10 WAT the greatest injury (7%) occurred with trifloxysulfuron at 36 g ai ha-1. Established Thermal Blue also displayed excellent tolerance to four postemergence graminicides applied at 0.5, 1, and 2X normal use rates. Unacceptable injury (>15%) was observed with clethodim (1 and 2X) at 280 and 560 g ai ha-1, fluazifop (2X) at 420 g ai ha-1 and sethoxydim (2X) at 630 g ai ha-1. However, at 10 WAT the greatest injury (14%) occurred with clethodim at 560 g ai ha-1. Overall, Thermal Blue is very susceptible to preemergence herbicides and precaution should be used when applying these products at seeding. Thermal Blue has excellent tolerance to many postemergence herbicides; however manufacturers suggested use and application rates for Kentucky bluegrass apply and should be followed carefully.

TOLERANCE OF AN ANNUAL BLUEGRASS (POA ANNUA) BIOTYPE TO FENARIMOL. G.M. Henry, A.C. Hixson, and F.H. Yelverton; North Carolina State University, Raleigh, NC.

ABSTRACT

Annual bluegrass (*Poa annua* L.) is one of the most problematic weed species on high maintenance turfgrass. Its lime green color contrasts that of desired turfgrass species, giving the turf a blotchy, mottled appearance and disrupting the overall color uniformity. Fenarimol (Rubigan™ A.S. Turf and Ornamental) is a highly effective locally systemic fungicide that is labeled for the control of a number of economically important turfgrass diseases. However, fenarimol is also labeled for the control of *Poa annua* in overseeded bermudagrass greens and tees. Annual bluegrass is adaptable to many environments. Its genetic diversity varies widely, differing in populations occurring over as little as 3 m^2 area. Broad genetic diversity plus the selection pressure of a single herbicide family over time contribute to the potential for herbicide tolerance. A suspected tolerant *Poa annua* population had been treated with fenarimol during the onset of winter dormancy in bermudagrass for the past six consecutive years at the Desert Mountain Golf Club in Scottsdale, AR. After investigating application practices, application dates, and cultural methods, the suspected *Poa annua* tolerant biotype was collected in the spring of 2004. Plants were obtained from the tees of several different holes and transplanted into the greenhouse and grown to maturity. Mature seeds were removed from the plants as they ripened and placed into storage. Dose-response experiments were conducted to determine the level of tolerance of the collected biotype and a susceptible biotype to fenarimol. Ten seedlings with a root length of at least 4 mm were placed on a Petri dish containing 25 ml of herbicide agar solution and incubated for 7 days in the growth chamber at 15/25º C on a 10-hr photoperiod. Fenarimol assay concentrations consisted of a non-treated check and 0.125, 0.25, 0.5, 1, 2, 4, 8, 16, and 32 mmol treatments. Each treatment was replicated four times and randomized in the growth chamber to account for confounding factors. Shoot and root length measurements (mm) were taken at 0, 3, and 7 days after seedling transfer to agar plates. Data were subjected to analysis of variance and tested for goodness of fit to linear and quadratic functions. Dose-response curves suggest that the tolerant *Poa annua* biotype was less sensitive to fenarimol than the susceptible biotype. A 4-6-fold increase in tolerance to fenarimol was observed when comparing *Poa annua* root growth to the susceptible biotype at the three highest fenarimol assay concentrations 3 and 7 days after seedling transfer to the agar plates. The presence of fenarimol tolerant annual bluegrass, in addition to previously documented biotypes tolerant to several herbicide classes, may indicate a need for the integration of resistance management into golf course management practices.

CERTAINTY RATE, TIMING, AND TANKMIXTURES FOR VIRGINIA BUTTONWEED (*DIODIA VIRGINIANA*) CONTROL. D. Mack**,** R.E. Strahan, and D.J. Lee. LSU AgCenter, Baton Rouge, LA 70803.

ABSTRACT

Virginia buttonweed (Diodia virginiana L.) is a perennial herbaceous dicot weed in turfgrass systems in the Southeastern United States. Virginia buttonweed has become an increasingly serious weed due to its vegetative reproduction traits and a lack effective chemical control measures. It is a prolific seed producer and can withstand most herbicide treatments. Research was initiated to evaluate the efficacy of Certainty (sulfosulfuron), broadleaf herbicide + Certainty tank-mixes and Certainty/broadleaf herbicide programs including sulfosulfuron for Virginia buttonweed control in Louisiana turfgrass.

Field experiments were conducted at the Burden Research Center in Baton Rouge, LA in 2005 to evaluate Virginia buttonweed control with Certainty, Certainty+ broadleaf herbicide tank-mixes, and Certainty/Escalade (2,4-D + fluroxypyr + dicamba) programs. Herbicides were applied with a CO2 pressurized backpack sprayer equipped with 11003 XR flat fan nozzles that delivered 26 GPA at 23 psi. Certainty was evaluated alone or tank-mixed with Escalade, Trimec Plus (2,4-D + Dicamba + MCPA +MSMA), Spotlight (fluroxypyr), and Confront (triclopyr + clorpyralid) and as part of a management program with Escalade. All applications with Certainty included 0.25% non-ionic surfactant. Experiment was conducted on marginal quality irrigated Tifway 419 with a heavy natural infestation of Virginia buttonweed. Plots were mowed as needed to maintain 1.5 inch height. Plot size was 4 ft x 7 ft. Visual ratings of percent buttonweed control and turf injury were conducted weekly. The experiment was conducted as a randomized complete block with 4 replications. Data were subjected to analysis of variance (P=0.05) and means were separated using Fisher's LSD

Two applications of Certainty applied 4 weeks apart provided no Virginia buttonweed control 65 DAI. Percent control was similar for sequential applications of Escalade, Spotlight, and Confront applied alone or tank-mixed with Certainty (65 to 88%). However, sequential applications of Trimec Plus applied alone or tank-mixed with Certainty provided less than 35% control at the conclusion of the trial. In a program approach, Certainty followed by Escalade followed by Certainty followed by Escalade provided excellent control (95%) which was similar to Escalade followed by Certainty followed by Escalade followed by Certainty (91%). The Certainty/Escalade programs were successful because the later Escalade or Certainty applications provided good control of seedling buttonweed that emerged in the plots after the perennial plants were injured or destroyed by the initial applications. Spotlight applied sequentially alone or tank-mixed with Certainty gave similar control (81 and 88%) as the two Certainty/Escalade programs. Seedling buttonweed emerged through the destroyed perennial plants and caused a late season reduction in control in plots that received only two herbicide applications in the study. The Certainty/Escalade programs were successful because the later Escalade or Certainty applications provided good control of seedling buttonweed that emerged in the plots.

TANK MIIXTURES FOR CRABGRASS AND GOOSEGRASS CONTROL WITH FORAMSULFURON. B.W. Compton, J.B. Willis, D.B. Ricker, and S.D. Askew, Virginia Tech, Blacksburg.

ABSTRACT

Goosegrass (*Eleusine indica*) and Smooth crabgrass (*Digitaria ischaemum*) are summer annuals dispersed throughout the southern United States. These are two major problematic weeds in bermudagrass fairways. Few single herbicide treatments produce acceptable control for both weeds. Foramsulfuron controls goosegrass effectively but is only marginal for crabgrass control. The objective of this research was to evaluate the efficacy of tank mixtures of foramsulfuron with various postemergence herbicides for large crabgrass and goosegrass control.

Two randomized complete block design trials were conducted with four replications to evaluate the following herbicide combinations on goosegrass and crabgrass control: foramsulfuron 1.28 L/ha + 1.28 L/ha, foramsulfuron 1.9 L/ha, foramsulfuron 1.9 L/ha + quinclorac 1.12 kg/ha, foramsulfuron 1.83 L/ha + trifloxysulfuron 0.02 kg/ha, quinclorac 1.12 kg/ha, and trifloxysulfuron 0.02 kg/ha. Both trials were conducted on fairway height established bermudagrass. The goosegrass trial was located in Danville, and the large crabgrass trial was located in Blacksburg, VA.

Foramsulfuron applied sequentially or mixed with quinclorac or trifloxysulfuron controlled large crabgrass 83 to 90% and equivalent to quinclorac (90%). Foramsulfuron or trifloxysulfuron applied alone did not control crabgrass acceptably. Foramsulfuron controlled goosegrass at least 82% regardless of tank mixture or sequential treatment. Quinclorac and trifloxysulfuron applied alone did not control goosegrass. Tank mixtures of foramsulfuron with quinclorac or trifloxysulfuron are not detrimental to goosegrass or crabgrass control. Foramsulfuron controls large crabgrass up to 6 weeks after treatment better when tank mixed with quinclorac or trifloxysulfuron. In order to obtain adequate control of both weed species, quinclorac or trifloxysulfuron can be tank mixed with foramsulfuron.

CERTAINTY RATE, TIMING, AND TANKMIXTURES FOR DALLISGRASS CONTROL. R.E. Strahan, D. Taverner, and D.J. Lee. LSU AgCenter, Baton Rouge, LA.

ABSTRACT

Dallisgrass (*Paspalum dilatatum*) is one of the most difficult weeds to manage because it tolerates most selective herbicides. Standard herbicide treatments MSMA + Sencor and repeated applications of MSMA usually provide only moderate success. No single selective herbicide application has been able to control this troublesome perennial because of the enormous supply of carbohydrates in its short stubby rhizomes and extensive anchoring root system. Certainty (sulfosulfuron) is a new herbicide manufactured by Monsanto that was released for use in southern turfgrass in 2005. The herbicide provides excellent control of several sedge species and johnsongrass (*Sorghum halapense*). Research was conducted in 2005 to investigate the activity of Certainty herbicide on dallisgrass infesting bermudagrass turf.

A dallisgrass control experiment was conducted at Burden Research Center in Raceland, LA on marginal quality, non-irrigated bermudagrass. The area tested had a heavy natural population of dallisgrass. The purpose of this experiment was to evaluate Certainty efficacy on dallisgrass applied alone, tank-mixed with MSMA, and as component of a dallisgrass management program. The treatments were Certainty at 1.25 oz/A fb a four week sequential, Certainty at 1.25 oz/A + MSMA at 43 oz/A fb a four week sequential, MSMA fb Certainty (1.25, 2.0, 5.0, or 10.0 oz/A) fb MSMA program, and MSMA fb Revolver at 0.065 lb fb MSMA program. Program applications occurred in two week intervals. The study was initiated on June 15. Herbicides were applied with a CO_2 pressurized backpack sprayer equipped with 11003 XR flat fan nozzles that delivered 26 GPA at 23 psi. All applications with Certainty included 0.25% non-ionic surfactant. Plots were mowed as needed to maintain 1.5 inch height. Plot size was 4 ft x 7 ft. Visual ratings of percent dallisgrass control and turf injury were conducted weekly. The experiment was conducted as a randomized complete block with 4 replications. Data were subjected to analysis of variance (P=0.05) and means were separated using Fisher's LSD

Acceptable turfgrass injury was observed for all treatments in the study. Sequential applications of Certainty provided seed-head suppression early in the trial but eventually provided 0% dallisgrass control 65 days after initial (DAI) treatment. Similar levels of control were observed from two applications of Certainty + MSMA, MSMA fb Certainty (1.25, 2.0, 5.0, or 10.0 oz) fb MSMA, and MSMA fb Revolver fb MSMA programs (69 to 83% control). Although not significantly different, there was a trend of increased control with MSMA fb Certainty fb MSMA programs as Certainty rates increased.

TRIFLOXYSULFURON FOR BROADLEAF WEED CONTROL IN TURFGRASS. D.B. Ricker, J.B. Willis, S.D. Askew; Virginia Tech, Blacksburg, VA. and R.J. Keese; Syngenta Professional Products, Carmel, IN.

ABSTRACT

Trifloxysulfuron-sodium is the active ingredient in Monument™ 75DF and is a sulfonylurea herbicide that inhibits acetolactate synthase in susceptible weed species. Trifloxysulfuron is labeled for use on bermudagrass and zoysiagrass turf and is an effective transition aid for overseeded bermudagrass as well as a broadleaf, sedge, and grass control option. Currently, trifloxysulfuron is labeled to control only 9 broadleaf weeds, most requiring tank mixtures or repeated treatments for acceptable control. The objective of this study is to evaluate trifloxysulfuron for the control of other broadleaf weeds and the potential to increase broadleaf control when tank mixed with CGA136872 (primisulfuron).

This study was conducted at three locations. Locations 1 and 2 were conducted in Blacksburg, VA on Riviera and Yukon bermudagrass turf and location 3 was conducted at the Hanover CC, Ashland, VA on Tifsport bermudagrass. Location 1 was infested with annual sowthistle (*Sonchus oleraceus*), dandelion (*Taraxacum officinale*) and knawel (*Scleranthus annuus*). Location 2 was infested with bull thistle (*Cirsium vulgare*), corn speedwell (*Veronica arvensis*), dandelion, redstem filaree (*Erodium cicutarium*), and white clover (*Trifolium repens*). Location 3 had prostrate knotweed (*Polygonum aviculare*). The experimental design for all locations was a RCBD with 4 replications and 7 treatments, including 1 nontreated control. Treatments included trifloxysulfuron at 0.19 oz/A plus CGA 136872 (primisulfuron) applied once, trifloxysulfuron at 0.33 oz/A or 0.56 oz/A, and metsulfuron at 0.50 oz/A, applied once or twice at 3 week intervals. Visually estimated initial and final bermudagrass cover, bermudagrass injury, and weed control was collected 3, 4, 6, and 8 weeks after treatment (WAT).

Metsulfuron at 0.50 oz/A controlled knawel greater than 90% 4 WAT and 100% 8 WAT, regardless of sequential treatment. All treatments controlled dandelion greater than 80%, 4 WAT and greater than 75%, 8 WAT. Repeated trifloxysulfuron and metsulfuron treatments controlled redstem filaree 100%, regardless of rate, 6 and 8 WAT. Repeated trifloxysulfuron treatments controlled corn speedwell 100%, regardless of rate, 6 and 8 WAT. All metsulfuron treatments controlled prostrate knotweed 100%, 6 and 8 WAT. No significant bermudagrass injury occurred at any of the trial locations.

Sequential trifloxysulfuron treatments effectively controlled corn speedwell and redstem filaree. Trifloxysulfuron plus primisulfuron did not increase weed control for any of the weeds evaluated. The products applied alone or as a tank mixtures did not injure bermudagrass turf.

INVESTIGATION OF HANDHELD CHLOROPYLL METERS FOR TURFGRASS EVALUATION. T.C. Teuton, M.S. Harrell, C.L. Main, D.W. Williams, and T.C. Mueller; University of Tennessee, Knoxville, TN; University of Kentucky, Lexington, KY; Clemson University, Florence, SC; University of Kentucky, Lexington, KY; University of Tennessee, Knoxville, TN.

ABSTRACT

Turfgrass quality, color, and other factors such as chlorosis are often used as indicators of overall turfgrass health. However, there is high variability within and among these factors due to the subjective nature of evaluators. The use of a hand-held chlorophyll meter has increased but their scientific validity has not been widely accepted. The objectives of the research were 1) determine if hand-held chlorophyll meter indices correlate with subjective evaluations of color and quality of three varieties of Kentucky bluegrass (Poa pratensis L.) and (P. arachnifera Torr. x P. pratensis L.) and two varieties of tall fescue (Festuca arundinaceae Schreb.), 2) establish if chlorophyll meters could detect differences between grass species/varieties, 3) determine the number of chlorophyll meter readings needed for diminishing returns to minimize CV's, and 4) determine if chlorophyll meters could be used to quantify turfgrass injury on Kentucky bluegrass. Apollo, Dura Blue, Dynasty, KY 31, and Thermal Blue were evaluated for color, quality, and CM-1000 indices (800 observations for each grass) at the University of Tennessee trial gardens and plant science farm in Knoxville, TN in 2004. In a separate experiment at the plant science farm in 2004 and 2005, Thermal Blue was treated with clethodim, fluazifop, diclofop-methyl, and sethoxydim at 1/2, 1 and 2x the normal use rates and injury, quality, and CM-1000 indices were recorded. Pearson's correlation coefficient for color and quality were linear in relationship to chlorophyll index ($r=0.81$, $p<0.0001$ and $r=0.82$, $p<0.001$). The number of observations required to minimize the CV for any grass type was determined to be >80 observations. However, many researchers may choose to use only 5 to 10 observations since all grasses had coefficients of variation of < 7.6% for 5 observations. Chlorophyll meters were able to detect herbicide injury. However, visual injury data had lower LSD values at the 5% level of significance. Chlorophyll meters will not take the place of visual observations, however they an easy, effective tool to use for objective measurements and may produce less variation among evaluators.

PLANT GROWTH REGULATOR EVALUATION ON ‘G-2’ CREEPING BENTGRASS. F.W. Totten*, J. Toler, L.B. McCarty: Department of Horticulture, Clemson University, Clemson, SC. 29634-0319.

ABSTRACT

Creeping bentgrass (*Agrostis palustris* Huds.) is considered a superior putting and playing surface; however, being a C3 plant grown in the SEUSA, it requires higher maintenance. As maintenance costs increase, plant growth regulator (PGR) usage on bentgrass has gained in popularity, i.e. reducing mowing frequency, *Poa annua* L. seedhead and population suppression, and potential root enhancement. The objective of this study was to evaluate plant growth regulators with various modes of action on ‘G-2’ creeping bentgrass, and observe responses (e.g., turf injury, turf quality, growth regulation, tissue reduction, and rooting) to these treatments.

The study was performed for 12 weeks from April to June, 2005 on Clemson University’s ‘G-2’ creeping bentgrass research plot. The study evaluated trinexapac-ethyl, prohexadione-calcium, uniconazole-P, paclobutrazol, ethephon, and selected tank mixes. Rates included: trinexapac-ethyl at 0.44 and 0.87 L/ha, prohexadione-calcium at 1.5 and 2.5 kg/ha, uniconazole-P and paclobutrazol at 0.58 and 1.2 L/ha, and ethephon at 19 L/ha. A total of three applications were made on 21 day intervals beginning 4 April.

Clippings were harvested at 4, 8, and 12 weeks after initial treatment (WAIT) using a walk mower set to a 3.2mm height. Clipping weights for all PGR treatments were compared to untreated plots to calculate percent clipping reductions. Turf height was evaluated prior to second and third application dates using a TurfCheck prism gauge. Turf quality was rated visually on 14 day intervals using a 1-9 scale, where 1=poor, 9=excellent, and <7=unacceptable. ‘G-2’ creeping bentgrass injury was evaluated weekly. Injury was rated visually on a scale from 0-100% with 30=maximum level of acceptable injury. Root cores were harvested at the completion of the study and analyzed for root dry weight.

The greatest amount of injury (~10%) observed was with trinexapac-ethyl + paclobutrazol tank mix. All injury observed was below the maximum unacceptable threshold of 30%. All injury observed occurred following the initial application, however, turf fully recovered by 3 WAIT.

The most effective treatment at reducing height was prohexadione-calcium + uniconazole-P tank mix. Turf height was reduced 30% from untreated. Ethephon exhibited residual growth regulation, as compared to trinexapac-ethyl. Prohexadione-calcium + trinexapac-ethyl, prohexadione-calcium + uniconazole-P, and trinexapac-ethyl + paclobutrazol combinations were most effective at reducing clipping yield 8 WAIT. Reductions ranged from 49 to 63%.

Similar root dry weights to the untreated check were observed for all treatments with the exception of ethephon. Ethephon reduced root dry weight 39% from the untreated check.

This study will be repeated in spring 2006. Future research will vary rates and timings of products alone and combinations on other cool and warm-season turfgrasses, continue to evaluate clipping control and rooting with products alone and combinations, and continue to evaluate other PGR chemistries for turfgrass usage.

TRACKING OF FLAZASULFURON, FORAMSULFURON, AND METSULFURON ON CREEPING BENTGRASS. J.B. Willis, D.B. Ricker, and S.D. Askew, Virginia Tech, Blacksburg.

ABSTRACT

Sulfonylurea herbicides may injure sensitive turfgrass when dislodged from treated areas and deposited by mower tires or foot traffic, known as tracking. Foramsulfuron (Revolver^{TM} .188 SC) has caused tracking when deposited onto creeping bentgrass while metsulfuron (Manor^{TM} 60DF) has not, in previous Virginia Tech research. Foramsulfuron and metsulfuron represent a high and low tracking potential, respectively. Flazasulfuron (Flazasulfuron 25DF) is under evaluation for registration in the US, its potential to track is not known. Research has not been previously conducted to evaluate the effect of time after treatment on likelihood of creeping bentgrass injury from tracked herbicide. In addition, little is known about the ability of flazasulfuron to track when dislodged and deposited on creeping bentgrass. The objectives of these studies were to evaluate the ability of flazasulfuron, foramsulfuron, and metsulfuron to cause injury when tracked onto creeping bentgrass 6, 24, and 72 hours after treatment (HAT), and to quantify the intensity and potential length of visible injury from tracked flazasulfuron.

Five field studies were conducted in Blacksburg, VA in 2004 and 2005. Experimental design was randomized complete block, with three replications for each trial. For the "timing trials" a 5 by 3 factorial arrangement of treatments was used with 5 herbicide treatments; flazasulfuron at 0.5, 1.5 and 3.0 oz product/A, foramsulfuron at 17.4 fl oz product/A, and metsulfuron at 1 oz product/A, and 3 tracking timings; 6, 24, and 72 HAT. The "distance trials" had three treatments; flazasulfuron at 0.5, 1.5 and 3.0 oz product/A, tracked 24 HAT, both experiments included a nontreated comparison. Creeping bentgrass was established in strips adjacent to perennial ryegrass. Six by six foot perennial ryegrass plots were treated, and at the specified time, a triplex-greens mower was driven through the treated area and across a 6 by 6 foot (timing) or a 6 by 50 foot (distance) creeping bentgrass plot. The 6 hr tracking timing was in the afternoon with dry turfgrass while all other timings were in the morning with dew present. No irrigation or rainfall occurred on plots for at least 4 days after treatment (DAT). Appropriate interactions and main effects were separated using SAS procedure GLM.

Only foramsulfuron caused significant reduction in color due to tracking when tracked 6 HAT on dry turfgrass, indicating that moisture must be present on treated surfaces for most herbicide to track onto and reduce color ratings of creeping bentgrass. When tracking 24 HAT, increasing flazasulfuron rates between 0.5 and 3.0 oz/A caused a noticeable decrease in turf color when assessed 10 and 20 DAT. Foramsulfuron caused tracks at all tracking timings while flazasulfuron only caused significant color reduction when tracked 24 HAT. Tracking metsulfuron never significantly injured creeping bentgrass. At 10 DAT, tracked flazasulfuron caused visible tracks on creeping bentgrass an average of 5 to 14 feet from the treated plot as rate increased from 0.5 to 3.0 oz/A. Based on a tire circumference of 3 feet, flazasulfuron at 3 oz/A tracked 4.5 tire revolutions.

Since the typical use rate of flazasulfuron is 1.5 oz/A, it can be reasoned that flazasulfuron is less likely to cause tracks than foramsulfuron but more likely than metsulfuron. These data indicate that tracking of sulfonylurea herbicides is dependent on herbicide rate, time of tracking relative to herbicide treatment, presence of moisture on treated surfaces, and sensitivity of neighboring grasses to the herbicide in question.

DEVELOPMENT OF AN ONLINE WEED IDENTIFICATION KEY AND TURF MANAGEMENT PROGRAM IN NORTH CAROLINA. B.L. Robinson, G.G. Wilkerson, J.J. Reynolds, J.J. Levine, F.H. Yelverton, E.J. Erickson, L.S. Warren, T. Gannon, and C. Reynolds. North Carolina State University, Raleigh

ABSTRACT

TurfFiles is one of the largest turfgrass dedicated, database-driven websites in the southern region. The CENTERE and the North Carolina Turfgrass Foundation fund the site to provide public access to information from NCSU turfgrass scientists. Turffiles has recently undergone significant revisions and developments. Two such additions have been the creation of a web-based decision support system to aid in weed identification of key turf weeds, as well as a management program that supplies cultural and herbicidal control measures. Through the use of an extensive collection of photographs, written descriptions, line drawings, and a modified dichotomous key, users are able to identify weed and turf specimens. The decision aid includes 30 individual species of turf and weedy grasses, 51 broadleaf species, and 6 sedge species. The weed management decision aid displays cultural and chemical weed control options, and provides data from over 320 NCSU herbicide trials that were conducted from 1997 through 2005. Treatments are ranked by level of control, and only registered rates of registered chemicals are displayed. The decision aid also lists environmental restrictions, seasonal rate restrictions, and other precautions and warnings particular to the recommended herbicides. Typical users of the TurfFiles website are turf professionals, homeowners, students, and extension personnel. Recent additions and revisions to the site include the new Google-powered search engine, and the development of e-mailed turf alerts. Future additions and revisions include an extension focused Turf Blog, and a new decision aid that will help users identify turf diseases, as well as changes to the website layout and functionality.

USE OF HERBICIDES TO CONTROL KING RANCH BLUESTEM (*BOTHRICHLOA ISCAEMUM)* IN TURF GRASS R.D. Havlak, W.J. Grichar, A.J. Jaks, K.D. Brewer, D.H. Drozd, and B. Klesel. Texas Cooperative Extension—San Antonio, Texas; Texas Agricultural Experiment Station—Beeville, Texas.

ABSTRACT

A field study was conducted at the Texas Agricultural Experiment Station in Beeville, Texas during the fall 2004 and spring 2005 growing seasons to evaluate 22 turfgrass-labeled herbicides as well as herbicide combinations for control of King Ranch Bluestem (*Bothriochloa ischaemum*). The fall season application ratings were poor for all treatments. The spring application ratings showed fair to good control (65-80%) with monosodium acid methanearsonate (MSMA), MSMA (2 applications-10 days apart), MSMA + imazaquin (Image), MSMA + metribuzin (Sencor), MSMA + quinclorac (Drive), MSMA + trifloxysulfuron (Monument), and MSMA + foramsulfuron (Revolver). Poor (25-50%) control was obtained by asulam (Asulox), Monument, Revolver, fenoxaprop-ethyl (Acclaim Extra), Revolver + Sencor, Revolver + Image, and Revolver + atrazine (AAtrex). Little or no (0-15%) control with the spring application was found with Drive, flazasulfuron (Katana), sulfosulfuron (Certainty), Image, metsulfuron-methyl (Manor), ethofumesate (Prograss), Image + Manor, and Drive + Sencor.

SILVERY THREAD (*BRYUM ARGENTEUM*) MOSS CONTROL ON BENTGRASS PUTTING GREENS.
Fred H. Yelverton, Travis W. Gannon, and Leon S. Warren; North Carolina State University, Raleigh, NC.

ABSTRACT

Silvery thread moss (*Bryum argenteum*) has become an increasing weed problem of putting greens possibly due to lower mowing heights and discontinued use of mercury-based fungicides. The consequence of moss invasion is reduced turfgrass quality as well as a nonuniform putting surface. Silvery thread moss encroachment occurs first in thin and weak turf including crowns of undulated putting greens which suffer from repeated scalping and spreads to remaining areas readily by sexual and asexual reproduction.

Control measures for silvery thread moss in bentgrass putting greens have been researched minimally due to the recent spread of the problem. Previous research suggests silvery thread moss can be suppressed in golf course putting greens with iron and nitrogen-containing fertilizers as well as with chlorothalonil.

Research trials were initiated to evaluate carfentrazone on bentgrass putting greens for silvery thread moss control. Carfentrazone has recently received registration and is available alone or in mixes with broadleaf herbicide materials. Trials were initiated in May 2004 and included one, two, or three applications of carfentrazone (Quicksilver 1.9 EW) applied at 1.03 or 2.06 fl oz per acre. Sequential applications were applied three weeks after the previous application. Additional research trials were initiated in July 2005 evaluating carfentrazone alone or with a non-ionic surfactant. Application rates evaluated in 2005 included 6.7 or 12.7 fl oz per acre applied once or twice. Each trial included two applications of chlorothalonil applied at 174.2 fl oz per acre.

At four weeks after initial application in 2004, single applications of carfentrazone (1.03 or 2.06 fl oz per acre) were providing less than 5% control while two or three applications were providing minimal control ranging from 30 – 40%. Additionally, two applications of chlorothalonil provided no control at four weeks after initial treatment. At eight weeks after initial treatment, three applications of carfentrazone provided 10 – 20% silvery thread moss control while other treatments provided no control.

In 2005 trials, one or two applications of carfentrazone (6.7 fl oz/a) provided 38 and 100% control, respectively, at four weeks after initial treatment. At six weeks after initial treatment, one application (6.7 fl oz/a) provided 50% silvery thread moss control while two applications provided 100% control. One or two applications of carfentrazone (12.7 fl oz/a) provided 100% silvery thread moss control while two applications of chlorothalonil provided 75% control. The addition of a non-ionic surfactant increased silvery thread moss control, although it was not consistent across all trials.

Additionally, research trials were initiated that evaluated one or two applications of carfentrazone (6.7 or 12.7 fl oz per acre applied alone or with non-ionic surfactant) for bentgrass tolerance on A1, A4, L93 and Crenshaw bentgrass. No bentgrass phytotoxicity was observed at any time. These data indicate carfentrazone provides a viable option for silvery thread moss control in bentgrass putting greens.

DOLLARWEED (*Hydrocotyle spp.*) AND VIRGINIA BUTTONWEED (*Diodia virginiana*) CONTROL IN BERMUDAGRASS TURF WITH VARIOUS POSTEMERGENT HERBICIDES. A.G. Estes and L.B. McCarty: Department of Horticulture, Clemson University, Clemson, SC 29634.

ABSTRACT

Dollarweed and Virginia buttonweed are two hard-to-control weeds common in moist to wet turf sites. Dollarweed is propagated from seed, rhizomes, and tubers while Virginia buttonweed is propagated by seed, roots and stem fragments. Due to their reproductive potential, controlling these two weeds becomes challenging. Therefore, in the summer of 2005, two studies were conducted to evaluate the efficacy of several sulfonylurea herbicides alone and in tank combinations with carfentrazone against these two weeds.

Treatments for the studies included: Monument 75 DF at 0.03 lb ai/A, Monument at 0.03 lb ai/A + Quick Silver 1.9 L at 0.03 lb ai/A, Manor 60 DF at 0.02 lb ai/A, Manor at 0.02 lb ai/a + Quick Silver at 0.03 lb ai/A, Revolver 0.19 SC at 0.04 lb ai/A, Revolver 0.04 lb ai/A + Quick Silver at 0.03 lb ai/A and Atrazine 4L at 1.0 lb ai/A+ Banvel 4L at 0.125 lb ai/A, + Manor at 0.02 lb ai/A. Ratings taken throughout the studies included Dollarweed and Virginia Buttonweed control on a 0 to100% scale, where 0 = no control and 100 = complete control. In addition, 'Tifway' Bermudagrass (*Cynodon dactylon x transvaalensis*) phytotoxicity was rated on a 0 to 100% where 0 = no injury and 100 = dead turf and 30 was deemed the maximum acceptable level of injury. Initial treatment for the dollarweed study was on June 16, 2005. Initial treatment for the Virginia buttonweed study was June 16, 2005 with a sequential application on August 2, 2005.

Dollarweed control on July 1, 2005 (15 day after treatment) was > 90 percent from atrazine + Banvel + Manor, with Monument alone, Monument + Quick Silver, and Manor alone, and Manor + Quick Silver providing ~ 80 percent control. On August 2, 2005 (47 DAT) all treatments provided > 90 percent dollarweed control. This was after a single application and control was season long.

Virginia buttonweed control on July 1, 2005 (15 DAT) was ~ 70% control from the atrazine + Banvel + Manor treatment, with all other treatments providing < 60 percent control. On August 2, 2005 (47 DAT) ~ 80 percent control was provided by Monument + Quick Silver, with all other treatments providing < 70 percent control. After a sequential application on August 2, 2005, Virginia buttonweed control on September 20, 2005 (49 DAST) indicated Monument + Quick Silver was providing greatest control at ~ 75 percent control, with all other treatments providing < 70 percent control.

Future research at Clemson University will be to investigate new and existing herbicides for dollarweed and Virginia buttonweed control including adjusting rates and timings of treatments. In addition, we will evaluate the efficacy of various herbicide combinations.

MESOTRIONE FOR WEED CONTROL IN WARM- AND COOL-SEASON TURF. Travis W. Gannon, Fred H. Yelverton, and Leon S. Warren; North Carolina State University, Raleigh, NC.

ABSTRACT

Much research has recently been completed investigating the applications of mesotrione for weed control in warm- and cool-season turfgrass environments. Research trials were initiated to investigate select annual grass control and turfgrass tolerance with mesotrione applied at various timings.

Research trials were initiated in early April to investigate preemergent smooth crabgrass control with mesotrione and included July treatments to evaluate postemergent crabgrass control. At the July application, smooth crabgrass averaged two tillers. Evaluated treatments included mesotrione (4 SC) applied at 0.31 or 0.62 lb ai/a and postemergent treatments included a non-ionic surfactant. Applied preemergent, mesotrione did not provide smooth crabgrass control. However, applied postemergent, mesotrione (0.31 or 0.62 lb ai/a) provided 78 and 95% smooth crabgrass control, respectively at four weeks after treatment. Further, at eight weeks after treatment, the same treatments provided 71 and 86% control, respectively. In a separate trial initiated at the same time, 0.33 or 0.5 lb ai/a mesotrione applied postemergent provided 73 or 90% smooth crabgrass control, respectively, at four weeks after treatment and 60 or 83% control, respectively, at eight weeks after treatment.

Evaluated preemergent for goosegrass control, 0.31 or 0.62 lb ai/a mesotrione provided 25 or 50% goosegrass control, respectively, mid-August. By mid-September control remained at 25 and 44% control, respectively. In a separate trial initiated at the same time, 0.33 or 0.5 lb ai/a mesotrione applied preemergent provided 38 and 20% goosegrass control, respectively, mid-August while control decreased by mid-September. Applied early postemergent to goosegrass averaging two leaves, one application of mesotrione (0.19 or 0.25 lb ai/a) provided 11 and 38% control, respectively, at four weeks after treatment while control decreased at eight weeks after treatment. Two applications (0.19 or 0.25 lb ai/a) provided 60 and 75% control, respectively at four and eight weeks after treatment.

Tolerance trials were also initiated to investigate the tolerance of tall fescue to mesotrione applied at spring or fall seeding as well as applied to established bermudagrass, centipedegrass, St. Augustinegrass, and tall fescue. With mesotrione applied (0.15, 0.2, 0.25 lb ai/a) at spring seeding and six weeks after seeding, no reductions in tall fescue cover were observed, compared to the nontreated. With mesotrione (0.25 or 0.5 lb ai/a) applied to established tall fescue or centipedegrass, no significant phytotoxicity was observed. However, when applied to established bermudagrass or St. Augustinegrass, phytotoxicity (20 – 30%) was observed. These data indicate mesotrione will provide a measure for selective weed control in warm and cool season turfgrass environments.

BERMUDAGRASS CONTROL IN CENTIPEDEGRASS WITH TRICLOPYR COMBINATIONS. J.L. White Jr., F.C. Waltz Jr., and T.R. Murphy, The University of Georgia, Griffin, GA 30223

ABSTRACT

Bermudagrass (*Cynodon dactylon* (L.) Pers.) can be a problematic weed in centipedegrass (*Eremochloa ophiuroides* (Munro)Hack.) for homeowners, sod producers, and landscapers. Bermudagrass can be difficult to control because of its deep rhizomes and its aggressive growth habit. Several postemergence herbicides can temporarily suppress bermudagrass growth, but repeated applications are needed for long-term control.

Field studies were conducted in Griffin, GA to evaluate the effectiveness of triclopyr and sethoxydim combinations to suppress bermudagrass in centipedegrass. Three herbicide applications were applied to a established centipedegrass stand at 4 week intervals starting on June 27, 2005. The single and tank mix herbicide rates were sethoxydim (0.28 lb ai/a), triclopyr (0.5 lb ai/a), triclopyr (1 lb ai/a), sethoxydim (0.28 lb ai/a) + triclopyr (0.5 lb ai/a), and sethoxydim (0.28 lb ai/a) + triclopyr (1 lb ai/a). A non-treated control was also included. Treatments were applied to 5 feet by 10 feet plots with a CO_2 backpack sprayer set to deliver at 25 gpa.. The study was replicated four times in a randomized complete block design.

Weekly measurements of turfgrass color and turfgrass quality were taken using a 1-9 scale where 1= dead brown turfgrass, 6 = minimally acceptable turfgrass, and 9 = dark green turfgrass. Other assessments included percent bermudagrass density and control and Virginia buttonweed control.

At the rates tested, multiple applications of sethoxydim and sethoxydim + triclopyr provided bermudagrass suppression 53 days after sequential applications. In general, these treatments were noninjurious to centipedegrass. However at two weeks after the second application, triclopyr at 1 lb ai/a and tank mix combinations had a maximum injury of 15%. Bermudagrass control was improved with multiple applications, however, the addition of triclopyr to sethoxydim increased bermudagrass control at only one rating date after the first application. Following subsequent treatments, there was no improvement on bermedagrass control when triclopyr was tank mixed with sethoxydim. Applied at four week intervals, season-long Virginia buttonweed control was achieved with any treatment containing either rate of triclopyr.

From this one-year study it is difficult to determine the multi-year effectiveness of sethoxydim and triclopyr tank mix combinations. Since centipedegrass had good tolerance to the tank mix combination, sethoxydim and triclopyr may be used when bermudagrass and broadleaf weeds are present in a centipedegrass stand.

REVOLVER AND MSMA FOR DALLISGRASS CONTROL IN BERMUDAGRASS TURF. L.R. Hubbard, A.G. Estes and L.B. McCarty; Department of Horticulture, Clemson University, Clemson, SC 29634.

ABSTRACT

Dallisgrass (*Paspalum dilatatum*) is a clumping perennial grass weed common in turf areas. Dallisgrass produces unsightly seedheads in the summer and disrupts the uniformity of the turf. The purpose of this research was to investigate summer versus fall application timings of Revolver (foramsulfuron) and MSMA for postemergence dallisgrass control in bermudagrass turf.

In the summer and fall of 2004 and 2005, four studies were conducted by Clemson University on bermudagrass golf course rough in Sunset, SC, investigating postemergence dallisgrass control. Treatments were applied with a CO2 backpack sprayer calibrated at 40 GPA, at 31 PSI, using 8003 flat fan spray tips. Plot sizes measured 2.0 m by 3.0 m. Treatments were replicated three times. Treatments were identical for all four studies. Treatments included: Revolver (foramsulfuron, 0.19 SC) at 0.09 lb ai/A (0 fb 7 DAI); Revolver at 0.09 lb ai/A (0 fb 14 DAI); Revolver at 0.09 lb ai/A (0 fb 21 DAI); MSMA (6.0 SC) at 1.5 lb ai/A (0 fb 7 DAI); MSMA at 1.5 lb ai/A fb Revolver at 0.09 lb ai/A (7 + 28 DAI); Revolver + MSMA at 0.09 lb ai/A + 1.5 lb ai/A (0 fb 7 DAI) fb Revolver at 0.09 lb ai/A (28 DAI); and Revolver + MSMA at 0.09 lb ai/A + 1.5 lb ai/A (0 fb 7 DAI). Initial applications were made on July 6, 2004; September 21, 2004; July 19, 2005 and September 7, 2005. All treatments received non-ionic surfactant at 0.25% V/V.

Visual ratings for summer 2004 applications were taken 7, 14, 21, 42, 63, 84, 105 and 126 DAI. Visual ratings for fall 2004 applications were taken 7, 28, 49 and 63 DAI. Visual ratings for summer 2005 applications were taken 14, 21, 28, 49, 56, 63, 70, 84 and 112 DAI. Visual ratings for fall 2005 applications were taken 7, 14, 21, 35 and 63 DAI. Ratings for dallisgrass control were based on a scale of 0-100%, with 0% representing no control and 100% representing complete control. Ratings for bermudagrass injury were based on a scale of 0-100%, with 0% representing no damage and 100% representing dead turf.

MSMA applied initially, followed by Revolver at 7 and 28 DAI, provided continuous excellent (>90%) Dallisgrass control 21 - 84 DAI in summer and 35 - 63 DAI in fall. A previous study showed Revolver applied initially, followed by MSMA at 7 DAI, provided only minimal control early (45 % at 21 DAI) and very poor long-term control (8% at 49 DAI). All treatments including both Revolver and MSMA provided excellent (>90%) Dallisgrass control at 63 DAI in summer and fall. Bermudagrass injury was acceptable (< 30%) with all treatments, during the entire rating period, for all 4 studies.

Future research will continue screening new and experimental herbicides, applied with and without MSMA, for dallisgrass activity. Research with herbicides in this study will continue to evaluate additional combinations and timings. Future research will examine staggered treatment timings with MSMA followed by various sulfonylurea herbicides.

DALLISGRASS CONTROL WITH MSMA AND TIMINGS OF SULFOSULFURON AND FORAMSULFURON. L.S. Warren[1], T.R. Murphy[2], T.W. Gannon[1] and F. H. Yelverton[1]; [1]Crop Science Department, North Carolina State University, Raleigh, NC 27695-7620 and [2]Crop and Soil Sciences, University of Georgia, Griffin, GA 30223-1797.

ABSTRACT

Trials were conducted in NC and GA to study the effects of sulfosulfuron and combinations of msma with sulfosulfuron or foramsulfuron on dallisgrass control in common bermudagrass. NC treatments were initiated on May 2, 2005 at Garner Country Club and applied at 97.5 gpa. GA treatments were initiated on May 24, 2005 at Cabin Creek Golf Club and applied at 75 gpa. Dallisgrass plot coverage at the NC and GA locations was 70% and 50%, respectively, at trial initiation.

The following two treatments consisted of two applications spaced 6 wk apart: 1) sulfosulfuron at 1.25 oz/A per application and 2) sulfosulfuron at 1.25 oz/A tank mixed with msma at 2 lb ai/A per application. Four treatments consisted of 2 lb ai/A msma followed by (fb) a 2-wk interval sequential of sulfosulfuron at rates of 1.25, 2.5, 5 and 10 oz/A fb a 2-wk interval sequential of 2 lb ai/A msma. One NC treatment included 2 lb ai/A msma fb a 2-wk interval sequential of foramsulfuron at 1 oz/1000 ft^2 fb a 1-wk interval sequential of 2 lb ai/A msma. This GA treatment was applied at 2-wk intervals. There was also a nontreated check. Sulfosulfuron received a nonionic surfactant at 0.25% v/v. The msma formulations used in NC and GA contained surfactant, so no extra was added.

Dallisgrass control data are presented from visual observations taken 2, 4, 6, 8, 12 and 16 WA initial application. Data are pooled over locations when appropriate, with means separated using Fisher's Protected LSD at P = 0.05.

Two applications of 1.25 oz/A sulfosulfuron did not control dallisgrass (<4%) at either location. At 2 WAIT, one application of msma or the sulfosulfuron + msma tank mix provided 34 to 42% dallisgrass control in NC and 61% control in GA. By 4 WAIT, the msma applications had been fb the various sulfosulfuron rates of 1.25, 2.5, 5 and 10 oz/A. At the GA location, none of the sequential sulfosulfuron treatments added to msma increased control over the initial sulfosulfuron + msma tank mix. Dallisgrass control ranged from 60 to 66% for these treatments. There was a sulfosulfuron rate response at the NC location. Msma fb 10 oz/A sulfosulfuron provided 63% dallisgrass control, while the msma treatment fb 1.25 oz/A sulfosulfuron controlled dallisgrass 35%. A possible explanation for the reduced control in NC with the 1.25 oz/A rate of sulfosulfuron was the below average temperature in May. The average temperature for all May applications was 72.5^{o}F in 2005, while the historical average temperature for the month is 82.4^{o}F. The sulfosulfuron label states that best activity occurs in warm, moist conditions. All sequential treatments consisting of msma fb sulfosulfuron or foramsulfuron fb msma were completed by 6 WAIT. At both locations, 89% dallisgrass control was observed with msma fb foramsulfuron fb msma. Msma fb 10 oz/A sulfosulfuron fb msma provided 84% control, which was greater than the 76 to 77% dallisgrass control provided by msma fb 1.25 or 2.5 oz/A sulfosulfuron fb msma. One application of the sulfosulfuron + msma tank mix resulted in only 9% dallisgrass control at this time. All treatments were completed by 8 WAIT, with a 1-inch rain falling 12 hr after the last GA application. Two applications of the sulfosulfuron + msma tank mix treatment provided 87% dallisgrass control at both locations. Similar control of 54 to 68% was observed with all treatments consisting of msma fb sulfosulfuron or foramsulfuron fb msma except when the sulfosulfuron rate was 2.5 oz/A (43%). This low control could not be explained. At 12 WAIT, 85% dallisgrass control occurred in NC with the sulfosulfuron + msma tank mix applied twice. Msma fb foramsulfuron fb msma resulted in 44% control, and all remaining treatments provided <19% control. In GA, similar dallisgrass control occurred (60 to 65%) with the sulfosulfuron + msma tank mix applied twice and msma fb foramsulfuron fb msma. All treatments consisting of msma fb sulfosulfuron fb msma resulted in 40 to 44% control except when the sulfosulfuron rate was 2.5 oz/A (19% dallisgrass control) which could not be explained. Final dallisgrass control in NC at 16 WAIT was best (78%) with the tank mix of sulfosulfuron + msma applied twice. Msma fb foramsulfuron fb msma provided 30% control, and all remaining treatments resulted in <17% control. In GA, similar dallisgrass control of 51 to 61% was recorded with the tank mix of sulfosulfuron + msma applied twice and also msma fb foramsulfuron fb msma. All msma fb sulfosulfuron fb msma treatments resulted in 36 to 40% dallisgrass control except when the sulfosulfuron rate was 2.5 oz/A (8%) and could not be explained.

ADSORPTION AND DEGRADATION OF ^{14}C-SIMAZINE IN SOILS FROM TWO DEPTHS IN AGED TURFGRASS SYSTEMS. A.C. Hixson, J.B. Weber, W. Shi, F.H. Yelverton, and T.W. Rufty; North Carolina State University, Raleigh, NC

ABSTRACT

Soil adsorption and degradation of ^{14}C-simazine [6-chloro-*N*,*N'*-diethyl-1,3,5-triazine-2,4-diamine] in soils from aged turfgrass systems was monitored for 4 months, using sterile and nonsterile soil microcosms. Triazine herbicides such as simazine are subject to higher mobility in alkaline, sandy soils commonly associated with coastal golf course fairways. These experiments investigate mechanisms of pesticide fate in turfgrass soils with increasing levels of organic matter, and answers to concern of pesticide groundwater contamination in turfgrass areas. Soils from coastal turfgrass systems of three different ages and adjacent native pine areas were sampled by intact coring techniques. A factorial design with soil treatments (sterile and non-sterile), soil depths (0-5 and 5-15 cm), and turfgrass system ages (5, 21, and 95 years) as variables was employed. Simazine biological degradation estimated by $^{14}CO_2$ evolution was similar at both depths only in the oldest turfgrass system. $^{14}CO_2$ evolution decreased with increasing soil depth in the two younger soil systems. After 16 weeks, bound residues accounted for 21, 15, and 23% of the applied radioactivity in non-sterile surface soil from the 5, 21, and 95-year-old turfgrass systems, respectively. In addition, 73 (5 yrs.), 77 (21 yrs.), and 54% (95 yrs.) was recovered as $^{14}CO_2$, indicating significant cleavage of the triazine ring. Bound residues increased to 42% of the applied radioactivity in the subsoil of the 95-year-old soil, but remained similar for the other two soil systems. In the absence of biological degradation, simazine became primarily adsorbed to soil particles the older two systems with 45 (21 yrs.) and 63% (95 yrs.) of the applied simazine recovered in the bound fraction after 16 weeks of incubation. Little $^{14}CO_2$ (< 12%) evolved from any soil from adjacent pine areas during the 16-week incubation period. Simazine biologically degraded slower and adsorbed more to the surface soil with increasing turfgrass system age. Conversely, simazine biologically degraded more readily in younger turfgrass systems with less adsorption to soil particles. As turfgrass systems age and organic matter levels increase, potential for simazine leaching into groundwater decreases.

WEED CONTROL WITH AMINOPYRALID IN SOUTH CAROLINA PASTURES. J.K. Norsworthy and W.N. Kline, III; Department of Entomology, Soils, and Plant Science, Clemson University, Clemson, SC 29634; Dow AgroSciences, Duluth, GA 30096.

ABSTRACT

Aminopyralid is a new herbicide molecule (pyridine carboxylic acid) being developed by Dow AgroSciences. Aminopyralid will be marketed for rangeland and pasture vegetation management as Milestone^{TM} (2 lb ae/gal) for control of invasive and noxious weeds and other broadleaf plants. Aminopyralid is the first residual herbicide to be registered under the Reduced Risk Pesticide Initiative of the EPA. Additionally, a mixture of aminopyralid (0.33 lb ae/gal) and 2,4-D (2.67 lb ae/gal) will soon be marked by Dow AgroSciences to provide even a broader spectrum of weed control. Six trials were conducted in South Carolina pastures from 2003 to 2005 to determine the degree of weed control and spectrum that cattlemen could expect from aminopyralid alone and aminopyralid plus 2,4-D compared to currently available products. Aminopyralid was effective in controlling Carolina falsedandelion, fragrant cudweed, Cherokee rose, Carolina geranium, prickly lettuce, horseweed, Carolina horsenettle, musk thistle, common pokeweed, and cutleaf eveningprimrose. Aminopyralid plus 2,4-D was effective in controlling all weeds in which aminopyralid alone was effective against, except Cherokee rose which was not included in any trails containing aminopyralid plus 2,4-D. Aminopyralid plus 2,4-D was superior to aminopyralid alone in controlling mexicantea, blue vervain, and buckhorn plantain. Generally, weed control with aminopyralid plus 2,4-D was equivalent to that achieved with Grazon P+D^{TM} (pricloram plus 2,4-D). Aminopryalid alone or with 2,4-D will provide cattlemen a much needed option for weed control in South Carolina regions in which Grazon P+D is currently not marketed.

IMPACT OF HEXAZINONE OND FORAGE BIOMASS AND QUALITY. B.A. Sellers and J.A. Ferrell. University of Florida-IFAS Range Cattle Research and Education Center and Agronomy Department, Ona, FL 33865; University of Florida-IFAS Agronomy Department, Gainesville, FL 32611.

ABSTRACT

Bahiagrass and hybrid bermudagrass are the most commonly grown forages in Florida. Weeds, such as the smutgrass species, often invade these forages, resulting in forage loss, reduced grazing, and lower calf weaning weight. Hexazinone is the only herbicide available for smutgrass control in forages. Small smutgrass (*Sporobolus indicus*) is controlled with at least 0.84 kg ai/ha hexazinone, while at least 1.12 kg/ha hexazinone is necessary to control giant smutgrass (*Sporobolus indicus* var. *pyramidalis*). These hexazinone rates have been shown to cause chlorotic conditions on bahiagrass within 20 days after treatment (DAT) (Mislevy et al. 1999). This chlorotic condition is followed by a change to a dark green color, which is darker than bahiagrass that is not treated with hexazinone (Mislevy et al. 1999). The effect of hexazinone application on bahiagrass yield and quality during this period of injury remains unknown. Additionally, information on the effect of hexazinone on hybrid bermudagrass yield is limited. Therefore the objective of this research was to determine the short-term effect of hexazinone application on forage yield and quality of bahiagrass and hybrid-bermudagrass.

Experiments were conducted in 2005 at the University of Florida, with the north site located at Gainesville and the south-central site located at Ona. Hexazinone was applied in mid-June at 0, 0.28, 0.56, 1.12, and 2.24 kg ai/ha to ‘Pensacola’ bahiagrass and ‘Tifton-85’ hybrid bermudagrass in 3.1 by 3.1 m plots; treatments were replicated four times. A backpack calibrated to deliver 281 L/ha was used to apply herbicide treatments. Biomass was measured by clipping a known area from each plot 14, 28, 42, 56, and 84 DAT. A sub-sample was measured from each plot, which was used to determine % dry matter and forage quality (forage quality results are not available at this time). Percent dry matter was used to determine the total forage yield per hectare.

INFLUENCE OF HERBICIDE AND APPLICATION TIMING ON RHIXOMA PEANUT YIELD. J.A. Ferrell, B.A. Sellers, C.R. Mudge, and C.A. Smith; University of Florida, Gainesville and Ona, FL.

ABSTRACT

Rhizoma peanut (*Arachis glabrata* Benth.) is one of the few high quality legume forages that will persist in Florida. Rhizoma peanut hay is valued by horse and cattle producers, but weeds reduce its quality and value. Herbicides are often required for weed control, but it is not known which herbicides can be applied without causing injury and yield loss. Herbicides were applied to the rhizoma peanut cultivars 'Florigraze' and 'Arbrook' in 2004 and 2005 at 3 or 21 days after clipping (DAC). Dicamba + 2,4-D was highly injurious at both application timings, while hexazinone was most injurious when applied at 21 DAC for both cultivars. However, no herbicide applied at 3 DAC resulted in yield loss for either cultivar. When applied at 21 DAC, dicamba + 2,4-D reduced yield by 41 and 22% of Florigraze and Arbrook cultivars, respectively compared to the non-treated control. Similarly, hexazinone (0.28 and 0.56 kg/ha) reduced yield by at least 50 and 36% of Florigraze and Arbrook cultivars, respectively compared to the non-treated control. Applications of 2,4-D alone reduced Florigraze yield by 41% compared to the non-treated control, but Arbrook yield was not affected by this herbicide. Florigraze appeared to be more sensitive to all herbicides with regard to visual injury and forage yield. Applications of imazapic, imazamox, and 2,4-DB did not result in visual injury or yield loss at either application timing for either cultivar.

MACRO-MORPHOLOGICAL ANALYSIS OF PITTED AND COTTON MORNINGGLORY POPULATIONS FROM EIGHT SOUTHERN STATES. C.T. Bryson, I.C. Burke, and K.N. Reddy, USDA-ARS, Southern Weed Science Research Unit, Stoneville, MS 38776.

ABSTRACT

Morningglories are very important weeds in row crops and other agricultural and non-agricultural areas in the southeastern U.S. Seed of pitted morningglory (*Ipomoea lacunosa* L.), cotton morningglory (*Ipomoea cordatotriloba* Dennst.) and a fertile hybrid (*Ipomoea* x *leucantha* Jacq.) were collected from eight southeastern states during the fall in 2003 and 2004. Ten morningglory plants per biotype (1 plant/pot) were grown in a greenhouse during 2005 at Stoneville, MS. Data from individual live and dried plants were recorded including leaf size, leaf dry weight, flower size, flower color, number of nodes to first elongated internode, and other morphological characteristics. The average size of first four fully expanded leaves and dry weights overlapped among pitted, hybrid, and cotton morningglory biotypes. Leaf size ranged from 8.6 to 14.7, 10.3 to 14.5, and 8.8 to 22.6 mm^2 for pitted, hybrid, and cotton morningglories, respectively. Average dry weight of the first four true leaves was 0.02 to 0.04, 0.03 to 0.04, and 0.03 to 0.04 g for pitted, hybrid, and cotton morningglories, respectively. The number of nodes below first internode elongation did not differ significantly among pitted, hybrid, and cotton morningglory biotypes. Flower size also varied within species and among pitted, hybrid, and cotton morningglory biotypes. Flower diameter was generally larger in cotton morningglory (14.6 to 19.3 mm) compared to pitted morningglory (13.7 to 17.2 mm), while hybrid morninglorry flower size (14.3 to 19.3) was intermediate to pitted and cotton morningglories. Leaf shape on mature vines varied from entire to deeply lobed after the 10-leaf stage in pitted, hybrid, and cotton morningllories; however, leaves in some pitted morningglory were never lobed. Corolla color was consistently white for pitted morningglory and lavender for cotton morningglory. Hybid morningglory corolla color was white, pink, and lavender. These results indicate that some morphological traits overlap and other traits differ among pitted morningglory, hybrid morningglory and cotton morningglory populations in the southeastern U.S.

FIELD SANDBUR (*Cenchrus Incertus* Curtis) CONTROL AND FORAGE TOLERANCE WITH PRE AND POST HERBICIDES. M.E. Matocha and P.A. Baumann, Texas Cooperative Extension, College Station, TX 77843.

ABSTRACT

Field sandbur is an annual or short lived perennial weed found throughout the southern United States in turf, pastures and rangeland. Field sandbur seed produce spines which can injure skin, cling to clothing and animal hair, and reduce quality of forages due to its' unpalatability. Field studies were conducted in 2005 in Brazos County to evaluate control of field sandbur (*Cenchrus incertus* Curtis) and to determine forage tolerance to PRE (preemergence) and POST (postemergence) herbicides. The field sandbur efficacy studies were conducted in southern Brazos county on a sand soil type with a pH of 6.7 and organic matter of 1.5%. Plots were 3.1 m by 4.6 m in size and were arranged in a randomized complete block design with 3 replications. The forage tolerance study site was located in northern Brazos County on a sand soil with a pH of 5.4 and organic matter of 1.5%. Visual assessments were made on a 0-100 scale where 0 = no weed control or crop injury, and 100 = total weed control or plant death. The forage tolerance plots were 3.1 m by 6.1 m with 4 replications and utilized a randomized complete block design. Application was made to all studies with a CO_2 backpack sprayer calibrated at 187.1 L/ha with 8003 DG flat fan spray nozzles. Forage injury evaluations were made including percent chlorosis, and percent growth reduction. Fresh forage weights were collected and converted to dry matter yields.

The efficacy studies evalulated combinations of both PRE and POST products for control of field sandbur. PRE treatments included diuron(Karmex®), pendimethalin(Prowl® H_20), S-metolachlor(Dual II Magnum®), and terbacil(Sinbar®). POST products evaluated included nicosulfuron(Accent®), metsulfuron-methyl(Ally XP®), imazapic(Plateau®), imazapic + glyphosate(Journey™) , and flucarbazone(Everest®). Excellent PRE control (87-98%) of field sandbur was observed with diuron at 1.6 lb a.i./A and pendimethalin at 1.59 kg ai/ha and 3.19 kg ai/ha at 102 DAT. Nicosulfuron applied POST to sandbur that averaged 7.6 cm in height provided good to excellent control of sandbur (82 and 92%) at 0.053 and 0.070 kg ai/ha rates, respectively, at 22 DAT. Other treatments that provided good to excellent control (88-96%) in the study included imazapic at 0.039-0.066 kg ai/ha plus glyphosate at and 0.079-0.131 kg ai/ha, respectively. Lastly, flucarbazone at 0.030-0.060 kg ai/ha achieved 83-92% EPOST control at 22 DAT.

Treatments evaluated in a separate POST study included several rate combinations of nicosulfuron + metsulfuron methyl. Additional treatments include nicosulfuron + metsulfuron methyl + diuron, and imazapic applied alone. Application was made to field sandbur that averaged 3 inches in height. Nicosulfuron at 0.044, 0.055, and 0.066 kg ai/ha plus metsulfuron methyl at 0.007, 0.009, and 0.011 oz. a.i./A, respectively, provided 88-92% control of field sandbur at 23 DAT. The addition of diuron at 0.897 kg ai/ha to the low and high rate combinations of nicosulfuron + metsulfuron methyl at offered enhanced control of field sandbur (100%). Imazapic applied at 0.070 kg ai/ha controlled 87% of field sandbur at 23 DAT.

A forage tolerance study was conducted to evaluate crop injury to Coastal bermudagrass (*Cynodon dactlyon*). Treatments consisted of combinations of nicosulfuron + metsulfuron methyl, diuron, and imazapic. Application was made to Coastal that ranged from 7.6-25.4 cm in height. The rates applied were identical to the aforementioned field sandbur POST study. Nicosulfuron + metsulfuron methyl applied at all rates caused no injury to bermudagrass at 7 DAT. Additionally, the inclusion of diuron to the low and high rate combinations of nicosulfuron + metsulfuron methyl resulted in significant chlorosis at 7 DAT. However, the injury was temporary and forage yields taken at 55 DAT revealed no significant yield loss. Imazapic applied at 0.070 kg ai/ha did not result in a significant reduction in forage yield.

CONTROL OF LEATHERY RUSH (*JUNCUS CORIACEUS*) AND PATH RUSH (*JUNCUS TENUIS*) IN PASTURES. J.M. Taylor, J.D. Byrd Jr., and B.K. Burns. Department of Plant and Soil Sciences, Mississippi State University, Mississippi State, MS 39762.

ABSTRACT

A pasture study was initiated on April 15, 2004 in Oktibbeha County, MS to evaluate herbicide treatments for control of well established leathery rush and path rush. The study initiated again on separate plots May 11, 2005. The treatments were applied with a CO_2 backpack sprayer delivering 25 gallons per acre. The treatments were as follows: 2 or 4 pt/A 2,4-D amine (Weedar 64 3.8 EC) or a sequential treatment of 2 pt/A followed by (fb) 2 pt/A 4 weeks after the initial treatment (WAIT), 20 or 40 fl oz/A 2,4-D ester (Salvo 5 EC) or 20 fl oz/A fb 20 fl oz/A 4 WAIT, 4 or 8 pt/A picloram + 2,4-D amine (Grazon P+D 2.54 EC) or 4 pt/A fb 4 pt/A 4 WAIT, 3 or 6 pt/A picloram + fluroxypyr (Surmount 2.15 EC) or 3 pt/A fb 3 pt/A 4 WAIT, 2 or 4 pt/A dicamba + 2,4-D amine (Weedmaster 3.8 EC) or 2 pt/A fb 2 pt/A 4 WAIT, 1 oz/A metsulfuron + 4 pt/A 2,4-D amine + dicamba (Cimarron Max 75 DF + 3.9 EC), 1.33 oz/A sulfosulfuron (Maverick 75 DF), 1.5 lb/A hexazinone (Velpar 75 DF), 2 pt/A imazapic + glyphosate (Journey 2.25 L), 2% volume to volume (v/v) glyphosate (Roundup Pro 4 L), and the untreated check. A non-ionic surfactant at 0.25% v/v was added to all treatments except the Roundup Pro treatment. Leathery rush control based on visual ratings was not very high initially, with Roundup Pro providing the highest control of 42% at 4 WAIT averaged over both experiments. All other treatments provided 27% or less control. Control was higher with all treatments at 6 WAIT with the maximum level of control at 63%. By 12 WAIT, Roundup Pro was still providing the highest control of 78%. Other treatments which provided the same level of control were 4 pt/A Weedar 64, 4 pt/A Weedmaster or 8 pt/A Grazon P+D (72%). There was no difference between Weedar 64 treatments (63 to 71%). The sequential treatment of Salvo provided greater control than the 20 oz/A single application (57% compared to 45%). The 8 pt/A or 4 pt/A fb 4 pt/A treatments of Grazon P+D controlled leathery rush 62 to 71% which was better than control with 4 pt/A (54%). Weedmaster at 4 pt/A or 2 pt/A fb 2 pt/A provided better control than 2 pt/A (66 to 72% compared to 48%). Cimarron Max controlled leathery rush 63%, Velpar 50%, Journey 52% and Maverick 22%. No control was observed with the Surmount treatments. At 15 WAIT, 4 pt/A Weedmaster and Roundup Pro controlled leathery rush the highest with 78% control. Other treatments providing similar control were Weedar 64 treatments (65 to 73%), 2 pt/A fb 2 pt/A Weedmaster (76%), 8 pt/A or 4 pt/A fb 4 pt/A Grazon P+D (66 to 73%), 40 oz/A Salvo (63%) and Cimarron Max (63%). All other treatments provided leathery rush control of 60% or less. Also averaged over both experiments, path rush was controlled 90% by Roundup Pro at 6 WAIT. Journey and Velpar provided similar control of 83 and 75%, respectively. Treatments which controlled path rush 60 to 64% were 4 pt/A or 2 pt/A fb 2 pt/A Weedmaster, or 8 pt/A or 4 pt/A fb 4 pt/A Grazon P+D. At 12 WAIT, Roundup Pro and Journey still provided the highest control of 90%. Treatments with similar control were 8 pt/A or 4 pt/A fb 4 pt/A Grazon P+D (78 to 86%), Velpar (85%), 4 pt/A Weedmaster (83%), 20 oz/A fb 20 oz/A Salvo, 4 pt/A or 2 pt/A fb 2 pt/A Weedar 64 (80%), and Cimarron Max (78%). Weedar 64 at 2 pt/A, 20 or 40 oz/A Salvo, 2 pt/A or 2 pt/A fb 2 pt/A Weedmaster, or 4 pt/A Grazon P+D provided 50 to 74% control of path rush. Maverick or Surmount controlled path rush 18% or less. These data indicate that selective pasture herbicides containing 2,4-D will control or suppress leathery rush and path rush equal to a non-selective glyphosate treatment. While not as active on leathery rush, Velpar and Journey will control path rush. Also, this study indicated that more than one year may be required for complete control.

AMINOPYRALID: A NEW HERBICIDE FOR INTEGRATED PASTURE RENOVATION PROGRAMS.

P.L. Burch, R.A. Masters, W.W. Witt, and E.S. Hagood; Dow AgroSciences, Christiansburg, VA and Lincoln, NE, University of Kentucky, Lexington, KY, and Virginia Polytechnic Institute and State University, Blacksburg, VA.

ABSTRACT

Aminopyralid is a new systemic herbicide developed by Dow AgroSciences specifically for use on rangeland, pasture, rights-of-way, such as roadsides for vegetation management, Conservation Reserve Program acres, non-cropland, and natural areas. Formulations include Milestone™ and ForeFront™ R&P herbicides. Milestone is formulated as a liquid containing, 2 lbs ae/gal of aminopyralid as a salt. ForeFront R&P is also formulated as a liquid containing 0.33 lbs ae aminopyralid + 2.67 lbs ae 2,4-D/gal. The herbicides have postemergence activity on established broadleaf plants and provide residual control of later emerging susceptible plants. The objective of this summary is to evaluate the performance of aminopyralid containing products (Milestone™ and ForeFront™ R&P) on key pasture weeds in the mid-Atlantic region of the USA and to evaluate the forage response and animal grazing behavior following control of competing weeds.

Milestone alone controls many important primary weeds in mid-Atlantic pastures including: tall ironweed, Canada thistle, broadleaf dock, musk thistle, plumeless thistle, and wingstem. The addition of 2,4-D in the ForeFront R&P formulation provides broad spectrum control that includes: plantain, dandelion, and buckbrush. Secondary weeds that emerged after application and were controlled by aminopyralid containing products include: horsenettle and cocklebur. Primary and secondary weeds can impede animal grazing and reduce available forage.

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UTILIZATION OF AMINOPYRALID FOR BROADLEAF WEED CONTROL. G. K. Breeden, J. S. McElroy, and G. N. Rhodes, Jr., University of Tennessee.

ABSTRACT

Limited weed control options have existed for pasture, hay, roadsides, and right-of ways that consist of cool season grasses. Over the past few years herbicide development in these areas has increased. Aminopyralid is a new herbicide that has been developed as another option for use in these areas. It was reviewed and registered under EPA as a reduced risk herbicide due to the environmental profile of aminopyralid. The low use rate (0.047 to 0.109 lb ai/a) is one of the features that helped get it the reduced risk status. Many of the other herbicides labeled in these areas are applied in pints or quarts per acre. With this being a new herbicide field research was initiated in 2005 to evaluate postemergence applications for broadleaf weed control.

Research was conducted at Sweetwater and Knoxville, TN in 2005. The experiments were replicated 4 times in a randomized complete block design. Experimental units were 10 ft. wide by 30 ft. long. Treatments included in this research were 2,4-D Ester (1 qt/A), aminopyralid (3, 5, and 7 oz/a), GF-1004 (1.5, 2, and 2.5 pt/a), and Escort (0.25 oz/a). Herbicides were applied in a water carrier volume of 15 GPA with a CO_2 pressurized sprayer. Weed control and crop injury were evaluated visually utilizing a 0 (no weed control or crop injury) to 100 (complete control of all weeds or crop) % scale.

No cool season grass injury was observed at anytime by any herbicide treatment except Escort. Escort injured tall fescue (*Festuca arundinacea*) 30% at 4 weeks after application (WAA). This injury decreased through out the rest of the experiment. At Sweetwater, TN aminopyralid at 3, 5, and 7 oz/a and GF-1004 at 1.5, 2.0, and 2.5 pt/a controlled musk thistle (*Carduus nutans*) ≥ 99% at 4 WAA. 2,4-D Ester at 2 pt/a controlled musk thistle 84% at 4 WAA. Aminopyralid at 3, 5, and 7 oz/a, GF-1004 at 1.5, 2.0, and 2.5 pt/a, and 2,4-D Ester at 2 pt/a controlled musk thistle 100% at 7 WAA. Aminopyralid at 3, 5, and 7 oz/a, GF-1004 at 1.5, 2.0, and 2.5 pt/a, and 2,4-D Ester at 2 pt/a controlled buttercup (*Ranunculus sardous*) ≥ 94% at both 4 and 7 WAA. Aminopyralid at 3, 5, and 7 oz/a and GF-1004 at 1.5, 2.0, and 2.5 pt/a controlled cocklebur (*Xanthium strumarium*) and perilla mint (*Perilla frutescens*) ≥ 88% at 14 WAA. 2,4-D Ester at 2 pt/a controlled cocklebur 25% and perilla mint 43% at 14 WAA. At Knoxville, TN aminopyralid at 3, 5, and 7 oz/a and GF-1004 at 1.5, 2.0, and 2.5 pt/a controlled horsenettle (*Solanum carolinense*) ≥ 91% at 4 WAA. Escort at 0.25 oz/a controlled horsenettle 43% at 4 WAA. Aminopyralid at 3, 5, and 7 oz/a, GF-1004 at 1.5, 2.0, and 2.5 pt/a, and Escort at 0.25 oz/a controlled curly dock (*Rumex crispus*) ≥ 96% at 4 WAA. Aminopyralid has excellent safety on most grass species and will control all clovers. Aminopyralid provided good to excellent control of horsenettle, curly dock, buttercup, musk thistle, cocklebur, and perilla mint.

SURMOUNT AND PASTUREGARD EFFICACY IN US PASTURES. V.B. Langston, P.L. Burch, W.N. Kline, R.A. Masters, and M.B. Halstvedt; Dow AgroSciences, LLC, Indianapolis, IN 46268.

ABSTRACT

Dow AgroSciences, LLC. (DAS) currently provides several highly effective herbicides for use on rangeland and pastures. Recently, DAS registered two new herbicides for use in this market. These two herbicides contain fluroxypyr + triclopyr and fluroxypyr + picloram. The fluroxypyr + triclopyr formulation has the tradename of Pasturegard™. The fluroxypyr + picloram formulation has the tradename Surmount™.

Pasturegard is a mixture containing a 1:3 ratio of fluroxypyr plus triclopyr and is a non-restricted herbicide. Field research trials established throughout the US during 2000-2004 have shown Pasturegard to be an effective broadleaf weed control herbicide on a wide range of troublesome pasture weeds. Key weeds that have proven to be particularly susceptible to Pasturegard herbicide are sericea lespedeza (*Lespedeza cuneata*), ironweed (*Vernonia baldwinii*) and dogfennel (*Eupatorium capillifolium*). Pasturegard at 1.5 pts/a provided superior control of sericea lespedeza and ironweed when compared to Grazon P+D or Weedmaster at 2 pts/A.

Surmount is a 1:1 ratio of fluroxypyr plus picloram. Field research trials established throughout the US during 2000-2004, Surmount at 1.5 pts/A provided similar control, compared to Grazon P+D and Weedmaster at 2.0 pts/A of many key weed species including western ragweed (*Ambrosia psilostachya*), woolly croton (*Croton capitatus*), broomweed (*Gutierrezia dracunculoides*), and marshelder (*Iva annua*). Surmount at 1.5 pts/A provided superior control of sericea lespedeza and ironweed when compared to Grazon P+D or Weedmaster at 2.0 pts/A.

Surmount at rates of 4.0 pts/A or greater also provides suppression or control of many brush species, including black locust (*Robinia pseudoacacia*), honey locust (*Gleditsia triacanthos*), pricklypear (*Opunita sp.)* and common persimmon (*Diospyros virginiana*).

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EFFICACY OF SPIKE 80DF APPLIED AS A BANDED SOLID STREAM. V.B. Langston, A.A. Carriger, and R.F. Borgogni; Dow AgroSciences, LLC, Indianapolis, IN 46268.

ABSTRACT

Dow AgroSciences LLC (DAS) currently provides several herbicides for use on rangeland and pastures. Spike™ 80DF herbicide is a dry-flowable formulation which is mixed and applied with a water carrier. A soil-active product, Spike 80DF is applied to the soil surface by ground equipment and enters plants by root uptake. It cannot enter plants through foliage or bark. Spike 80DF has the same active ingredient (tebuthiuron) as Spike™ 20P herbicide, a pelleted formulation.

Recently, DAS registered a new use for Spike™ 80DF in the states of AL, KS, LA, MO, MS, NM, OK, and TX. Spike 80DF herbicide is mixed with water and applied directly to the soil surface in a concentrated, narrow, straight stream band. From these bands, the herbicide enters the soil profile where it intersects the lateral roots of woody plants. Absorbed by the roots, Spike 80DF translocates through the susceptible plant and interferes with photosynthesis until the plant dies. The plant may repeatedly drop its leaves, grow new foliage, and drop its leaves again until root reserves are exhausted and the plant succumbs to the herbicide.

Precise, banded applications of Spike 80DF herbicide controls blackbrush acacia (*Acacia rigidula*), Catclaw acacia (*Acacia greggii*), sand shinnery oak (*Quercus havardii*), post oak (*Quercus stellata*), running live oak (*Quercus pumila*), Texas persimmon (*Diospyros texana*), whitebrush (*Aloysia lyciodes*), colima or lime prickly ash (*Zanthoxylum fagara*), Texas colubrina or hogplum (*Colubrina texensis*) at various rates (0.63 – 5 lbs formulated product per acre) and spacings (4-10 ft spacings).

Spike 80DF works best on light, relatively coarse soils. The herbicide is less suited to high clay-content soils (more than 15-20%) and those with high organic matter content. If brush has been mowed, delay application until regrowth is at least 2 feet tall. Spike 80DF should not be used where desirable woody species are near plants targeted for control. A small amount of Spike 80DF reaching the roots of desirable trees or shrubs may cause severe injury or death. Refer to Spike 80DF label for specific use information and precautions.

PRE- AND POSTEMERGENCE USE OF ETHOFUMESATE IN PROCESSING SPINACH. J.C. Hodges, R.W. Wallace; Texas Tech University, Texas A&M Agricultural Research and Extension Center, Lubbock.

ABSTRACT

Preemergence (PRE) and early postemergence (EPOST - 21 days later) ethofumesate was compared to PRE-applied s-metolachlor (grower standard) to evaluate weed control and crop injury to processing spinach (*Spinacia oleracea var*. DMC 66-09) in the Texas Wintergarden. Major weeds present in these trials were henbit (*Lamium amplexicaule*) and London rocket (*Sisymbrium irio*). Weed control was generally good to excellent (greater than 90%) for both PRE-applied s-metolachlor (0.65 lb ai/A) and ethofumesate (1.0 and 2.0 lb ai/A). When applied EPOST, s-metolachlor (0.325 lb ai/A) failed to adequately control henbit and London rocket, while ethofumesate (0.164 lb ai/A) had good control of London rocket, but not henbit. These results indicate that these weeds were present at the time of application but that additional POST herbicides would be needed to control these weeds. PRE-applied s-metolachlor caused very little crop injury (2.5%) while injury from ethofumesate was 21.3% at the 1.0 lb ai/A rate when evaluated early in the season. When applied at the high rate, crop injury increased to 52.5%. The lower rate of ethofumesate resulted in tolerable injury and the spinach crop was able to compensate for this injury by harvest. Yields in ethofumesate-treated plots were statistically equivalent to the hand weeded and s-metolachlor plots, but were significantly less (27%) in plots treated with the high rate of ethofumesate. Although s-metolachlor continues to be an excellent choice for weed control, its widespread use (100% of growers) in processing spinach and many other vegetable crops creates a need to evaluate alternative choices. Ethofumesate is an excellent potential candidate for both PRE and POST applications in processing spinach. More evaluations of ethofumesate applied PRE and POST alone and in combination with other herbicides are needed to determine its potential for spinach production.

QUANTIFICATION OF INCIDENT LIGHT UNDER MATURE AND YOUNG CITRUS TREES FOR THEIR EFFECT ON WEED GROWTH AND HERBICIDE EFFICACY. Steve H. Futch[1] and Samunder Singh[2]. [1]University of Florida-IFAS, Citrus Research and Education Center, Lake Alfred, FL-33850, USA and [2]Agronomy Department, CCS Haryana Agricultural University, Hisar 125004, India.

ABSTRACT

Temperature and light greatly influence weed germination, their growth, and herbicide activity; particularly for photosynthetic inhibitors. These factors are important in citrus weed management as mature and young trees may require different herbicide rates for effective weed control. The present study quantifies the amount of incident light under mature and young citrus trees and the influence of shade on soil and ambient air temperature. Studies were conducted for 12 months in a 15-year-old Hamlin grove planted 12.5 by 25 ft in north-south rows with 8.5 ft canopy on both sides of the tree. A total of four light sensors (Spectrum Technologies, Inc., US) were placed under the mature tree at 2 and 4 ft from tree trunk on both sides. The light and air temperature sensors were positioned under mature tree canopy 30 cm above the ground and attached to Watch-Dog data loggers which were programmed to record data every 5 minutes. Soil temperature was measured at 2.5 cm depth. A pair of young citrus trees (replant) in the same tree row was used for comparisons. Sensors (light and temperature) were placed between two resets. Data were downloaded three times per month using Specware Software. The incident light falling under the young citrus tree was 30 times greater than under the mature tree. Under the mature tree, light intensity was higher on the eastern than western side of the tree trunk. Light intensity was further reduced in the inner perimeter (2 ft from trunk) than outer perimeter (4 ft from trunk) on either side. Air Temperature around young citrus trees was higher from 8 AM to 8 PM than mature tree; increase in air temperature correspondingly increased soil temperature which was consistently higher than under mature tree. Both air and soil temperatures were higher around young than mature citrus tree.

EFFECT OF LIGHT INTENSITY ON GROWTH OF PRICKLY SIDA AND EFFICACY OF BROMACIL + DIURON AND GLYPHOSATE UNDER CONTROLLED CONDITIONS. Samunder Singh[1] and S.H.Futch[2]
[1]Agronomy Department, CCS Haryana Agricultural University, Hisar 125004, India and [2]University of Florida-IFAS, Citrus Research and Education Center, Lake Alfred, FL 33850

ABSTRACT

Prickly sida (*Sida spinosa*) is a serious weed of many crops including citrus in Florida. Poor control of prickly sida has been reported when treated with glyphosate. Prickly sida growing under different light levels (in areas of mature and young citrus trees) may require differential rates of herbicides to maximize control. Information on interaction of light and herbicide is lacking on prickly sida as well as for other species growing in citrus orchards. Present investigation was conducted using horticultural grade shade cloth in mini greenhouses with light inhibition of 90, 70, 60, 30 and 0%. Prickly sida seeds were planted in 3.75L pots containing field soil (Candler fine sand). After watering, pots were placed in each greenhouse with different light levels. Herbicide (Krovar 1 at 1 and 2 kg/ha, Krovar plus Roundup UltraMax at 1+2 and 2+2 kg/ha and Roundup UltraMax alone at 2 kg/ha) were applied by a track sprayer with 3 replicated pots for each treatment. Control plants were maintained for each light level. Chlorophyll fluorescence was measured after 24 and 48 h of spraying. Plant height and visible mortality were recorded periodically. Plants were harvested 4 wk after treatment (WAT) and fresh weight was recorded. Chlorophyll fluorescence was greatly reduced by Krovar used alone or with glyphosate at both rates compared to glyphosate alone within 24 h of application; effect was further increased at 48 h. Tank mix of Krovar plus glyphosate had lower reduction in chlorophyll fluorescence compared to Krovar alone in some treatments, but differences were not significant. Leaves of treated plants dropped later during the study and no chlorophyll fluorescence was recorded. Plant height recorded at spraying, 2 and 4 WAT was significantly affected by different light levels. Greater plant height was recorded at 70% light level which was similar to 100% light, but significantly higher than lower light levels. The fresh weight, however, was significantly higher with plants in 100% light. Prickly sida growing under limited light (10%) was dead 3 WAT in all herbicide treatments, whereas glyphosate alone at 2 kg/ha was less effective on plants growing under higher light levels. Lower efficacy of tank mixture was recorded with plants growing in 100% incident light, but mortality increased to 100% 4 WAT.

EVALUATION OF PREEMERGENCE HERBICIDES FOR CONTROL OF YELLOW NUTSEDGE IN HERBACEOUS PERENNIAL LANDSCAPE BEDS. Y. Chen, R.E. Strahan, and R.P. Bracy, LSU AgCenter, Baton Rouge, LA 70803.

ABSTRACT

Yellow nutsedge (*Cyperus esculentus L*.) is a common weed in the residential and commercial landscape plantings that can significantly reduce the overall aesthetic quality of the properties. Five preemergence herbicides: sulfentrazone, Snapshot (trifluralin + isoxaben), BroadStar (flumioxazin), Pendulum (pendimethalin), and Pennant (S-Metolachlor) were evaluated at 0 (control), 1X, 2X, and 4X recommended rates for their yellow nutsedge control effects and phytotoxicity on seven herbaceous perennials: Mexican heather, gaura, lantana, liriope, phlox sabulata, Mexican petunia, and verbena. Two applications were applied 4 weeks apart and nutsedge control effect and plant injury were estimated weekly after the first application for 8 week. Pennant provided the best yellow nutsedge control (89~99%) at the recommended rate with little plant injury at higher rates. Sulfentrazone provided effective control (88~100%) at the recommended rate after the second application but severely injured liriope, guara, and Mexican heather. BroadStar obtained good control (95~100%) at higher-than-recommended rates but also caused severe injuries on lantana, Mexican petunia and phlox. Generally, the second application caused more significant injury than the first application possibly because of the higher temperature at that time. Pennant is the best performer in this test, and preemergence herbicides should be applied in early April to avoid injury caused by active plant uptake and high temperature.

BELL PEPPER AND NUTSEDGE RESPONSE TO DMDS ALONE AND IN COMBINATION WITH OTHER FUMIGANTS. A.W. MacRae and A.S. Culpepper, Department of Crop and Soil Sciences, University of Georgia, Tifton, GA 31794.

ABSTRACT

Methyl bromide (MB) controls weeds, diseases, and nematodes but is being phased from the market place. Currently labeled alternatives offer disease and nematode control, however, weed control is often lacking. Dimethyl disulfide (DMDS) is an alternative fumigant currently being developed. Our objective was to determine if DMDS systems could be used to replace methyl bromide for the control of purple nutsedge, one of Georgia's most troublesome weeds.

A study was conducted in TyTy, GA during the spring of 2005 on a Tifton Sandy Loam soil having 1.3% organic matter and a pH of 6.4. Plots consisted of one bed (8 in. tall by 32 in. wide) by 20 feet covered with black low density polyethylene (LDPE) plastic mulch. On each bed, two rows of 'Stiletto' bell pepper were transplanted 15 in. apart with a 12 in. in-row spacing 26 d after fumigating. Treatment arrangement was a randomized complete block design with four replications. Pepper production followed commercial standards using drip irrigation.

Fumigant options included DMDS, chloropicrin (Pic), and metam sodium (Vapam) applied alone as well as combinations of MB plus Pic at a ratio of 67:33 and DMDS plus Pic at the following ratios 50:50, 67:33, 75:25, and 87:13. Treatments consisted of DMDS at 200, 400, and 600 lb/A, Pic at 100 and 200 lb/A, Vapam at 75 gal/A, MB:Pic 67:33 at 400 lb/A, DMDS:Pic 50:50 at 400 lb/A, DMDS:Pic 67:33 at 300 and 600 lb/A, DMDS:Pic 75:25 at 800 lb/A, DMDS:Pic 87:13 at 700 lb/A, Vapam at 75 gal/A followed by (fb) DMDS:Pic 87:13 at 500 lb/A, Vapam at 75 gal/A fb DMDS at 200, 400, and 600 lb/A, and Vapam at 75 gal/A fb DMDS:Pic 50:50 at 400 lb/A. A non-treated check was included for comparison purposes.

Vapam was applied 4 inches deep to flat, tilled ground using injection blades spaced 4 inches apart. Beds were then formed while injecting the remaining fumigants 6- to 8-inches deep with three knives spaced 11 inches apart.

Emergence of purple nutsedge through the LDPE mulch was greatest with DMDS alone or Pic at 100 lbs/A. Increasing the rate of DMDS from 200 to 600 lbs/A or increasing the rate of Pic from 100 to 200 lbs/A reduced purple nutsedge emergence greater than 50% at 99 d after fumigating (DAF). Mixtures of DMDS and Pic were more effective than DMDS applied alone. DMDS plus Pic was as effective as MB plus Pic except with the one mixture containing only 200 lbs DMDS and 100 lbs of Pic. Vapam provided effective control of purple nutsedge, similar to that of MB, thus, DMDS applied after Vapam did not improve control.

Pepper was stunted 7% or less from all treatments 34 DAF which was 8 d after planting (DAP). At 30 DAP, DMDS alone caused less than 2% stunting while DMDS plus Pic stunted pepper 4 to 11%. Vapam stunted pepper 2% while Vapam fb DMDS or DMDS plus Pic stunted pepper 3 to 18%.

When no fumigant was applied, the number and weight of fruit produced was 39 and 45% less than with the standard MB plus Pic mixture. Yields from plots treated with DMDS alone were generally greater than the non-treated control but significantly less than those treated with MB plus Pic. However, DMDS in combination with Pic or applied following Vapam provided similar yields to the MB plus Pic standard.

DMDS alone did not provide adequate control of purple nutsedge. However, applying DMDS in a fumigant system with Pic and/or Vapam provided purple nutsedge control and produced pepper yields similar to the methyl bromide standard. These results are from fumigant applications made in the early spring (February) when soils are cool thereby slowing the fumigant dissipation process. The study must be repeated in varying soil conditions to better understand the consistency of DMDS systems relative to MB systems. Additionally, much research is needed to address the time interval needed between fumigating and planting with all MB alternative systems.

ORGANIC WEED CONTROL IN SQUASH. C.L. Webber III, USDA, ARS, SCARL and J.W. Shrefler, Oklahoma State University, Lane, Oklahoma.

ABSTRACT

Corn gluten meal (CGM) has been identified as an organic herbicide for weed control in turf and established vegetable plants, direct contact with vegetable seeds can decrease crop seedling development and plant survival by inhibiting root and shoot development. Therefore, the use of CGM as a preemergence or preplant-incorporated organic herbicide is not recommended for use with direct-seeded vegetable production. The development of equipment to apply CGM in banded configurations has created an opportunity to investigate whether banded CGM applications will provide significant crop safety for direct-seeded vegetables. The objective of this research was to determine the impact of banded corn gluten meal applications on squash plant survival and yields. This factorial field study was conducted during the summer of 2005 on 32-inch (81-cm) wide raised beds at Lane, OK with two application configurations (banded and solid), two CGM formulations (powdered and granulated), two incorporation treatments (incorporated and non-incorporated), and three application rates [5, 10, and 15 lb/100 ft^2 (250, 500, and 750 g/m^2)]. The two CGM formulations at three application rates were uniformly applied in both banded and solid patterns on August 19. The banded application created a 3-inch (7.6-cm) wide CGM-free planting zone in the middle of the raised bed. The CGM applications were then either incorporated into the top 1 to 2 inches (2.5 to 5.0 cm) of the soil surface with a rolling cultivator or left undisturbed on the soil surface. 'Lemondrop' summer squash (*Cucurbita pepo* L.) was then direct-seeded into the center of the raised beds. When averaged across the other factors, there was no significant difference between powdered and granulated CGM formulations or incorporating and non-incorporating the CGM for either squash plant survival or yields. CGM application rates did make a significant difference for both crop squash survival and yields when averaged across all other factors. As the CGM application rates increased the plant survival and yields decreased. When averaged across all other factors, the banded application resulted in significantly greater crop safety (90% plant survival) and yields (180 cartons/a) than the broadcast (solid) applications (45% plant survival and 127 cartons/a). The banded application of CGM increase yields beyond the level of the weed-free treatment by 11%, while the weedy-check treatment reduced squash yields by 25% compared to the weed-free treatment. The increase in squash yields may be the result of the 9 to 10% nitrogen content of CGM. The plants in the field also looked larger and greener. The research demonstrated the potential usefulness of CGM in direct-seeded squash production, if used in banded application configuration. Additional research should further investigate the interaction of CGM application rates and the width of the CGM-free zone on crop safety for various vegetables.

INVENTORY OF 200 CROPS IN TEXAS AGRICULTURE. D.T. Smith, J.L. Anciso, and M.A. Matocha. Department of Soil and Crop Sciences, Texas A&M University and Texas Cooperative Extension, College Station and Weslaco, TX 77843-2474.

ABSTRACT

Horticultural and other specialty crops present unique challenges in pest management since these crops are inherently unattractive to registrants in seeking pesticide labels - due to small market potentials, geographic diversity, and the economic risks. While major grain and other agronomic crops are relatively few in number, these crops are financially and biologically attractive for commercial pesticide development. This paper summarizes a survey and data on specialty crops, including crop acreage, economic values, economic ranking of crops, and brief narratives on 200 crops of some economic importance to the state and south. Crops and data are organized by crop groups, which are key factors in obtaining MRLs (Maximum Residue Limits) for Representative Crops and then extending MRL data for pesticide labels to other crops in the same Group. The role of Crop Groups and use of data base information from the U.S., in contrast to MRL data for EU and other countries shows that U.S. growers have far more pesticides available, compared to the limited number of MRLs for similar crops in the European Union and other countries. For example, the use of Crop Groups and Representative Crops within the Bulb crop group resulted in clearance of 6 to 8 herbicides in the U.S. But in the EU, only 1 or 2 herbicides are cleared for use on carrots, radishes, and similar bulb crops. Similar comparisons in fungicides and insecticides reveal that only a limited number of pesticides are available to growers in the EU and other countries.

PURPLE NUTSEDGE (*CYPERUS ROTUNDUS*) RESPONSE TO METHYL BROMIDE ALTERNATIVES APPLIED UNDER FOUR TYPES OF MULCH. A.S. Culpepper, T.L. Grey, and T.M. Webster; The University of Georgia and USDA-ARS, Tifton, GA 31793.

ABSTRACT

The phase out process of methyl bromide has been on going for many years due to the suspected link between methyl bromide and depletion of the ozone layer in the atmosphere. Recent research has focused on weed response to application of methyl bromide alternatives in conjunction with various types of mulch. An experiment was conducted at The University of Georgia Ponder Research Farm located near TyTy, Georgia. Soil was a sandy loam with 92% sand, 6% clay, and 2% silt with 1% organic matter. Treatments were arranged in a factorial with 5 fumigant options applied under 4 plastic mulches. Fumigant options, rates, and application procedures are reported in Table 1. Mulch options included 1) Low density polyethylene (LDPE), metalized smooth, metalized embossed, and virtually impermeable (VIF), all with a thickness of 1.25 mil. Fumigants were applied on July 7, 2005 and Prelude II squash was transplanted 30 days later. Plants were placed one foot apart on a 32 inch bed top. Moderate to heavy natural infestations (33 plants per square yard, uniformly distributed) of purple nutsedge were present.

Table 1. Five fumigant options (broadcast rates) applied under four mulches in July of 2005.

1. Methyl Bromide plus Chloropicrin (67:33, 350 lb/A) injected 8 in. with a super-bedder plastic layer.
2. Methyl Iodide plus Chloropicrin (50:50, 350 lb/A) injected 8 in. with a super-bedder plastic layer.
3. Dimethyl disulfide plus Chloropicrin (80:20, 750 lb/A) injected 8 in. by a super-bedder plastic layer.
4. Telone II/Chloropicrin/Vapam. Telone II (12 gallon/A) injected 12 in. with a Yetter rig followed by (fb) Chloropicrin (150 lb/A) injected 8 in. with a pre-bedder fb Vapam (75 gallon/A) injected 4 in. deep in the final bed top with a super-bedder plastic layer.
5. No fumigant

All fumigant options controlled purple nutsedge 69 to 79% when applied under LDPE mulch when compared to no fumigant applied under LDPE mulch. Applying any of the fumigants under metalized embossed mulch did not improve control compared to control under LDPE mulch. In contrast, control was increased to 87 to 100% when fumigants were applied under metalized smooth or VIF mulch. Obtaining excellent nutsedge control during July in Georgia has proven extremely difficult in the past as the fumigants often dissipate too quickly to control nutsedges. This trial suggests that the VIF and metalized smooth mulch do keep these fumigant in the soil longer, thereby improving weed control.

If growers are to have a smooth transition away from methyl bromide, they need to start implementing alternatives on a small acreage in the spring of 2006. Potential methyl bromide alternatives include Telone II (1,3-dichloropropene) fb Chloropicrin fb Vapam (metam) which is currently labeled and methyl iodide which is expected to be labeled in early 2006. Dimethyl disulfide mixtures also appear effective, but registration is several years away. Initially, growers should adopt methyl bromide alternatives in the spring (as opposed to summer/autumn) due to cooler soil conditions which allow the fumigants to remain in the soil longer thereby improving weed control. VIF and smooth metalized mulches will improve nutsedge control by these fumigants but will also increase the time interval needed from application until planting which has not been adequately studied. Additionally, no research has been conducted to date to evaluate the longevity of VIF or metalized mulches compared to LDPE mulch, which will be used for several cropping seasons in most instances.

INTEGTRATED STRATEGIES FOR PURPLE NUTSEDGE SUPPRESSION IN ORGANICALLY GROWN BELL PEPPER. S.K. Bangarwa, J.K. Norsworthy, P. Jha, M.S. Malik, and M.J.Oliveira, Department of Entomology, Soils, and Plant Science, Clemson University, Clemson, SC 29634.

ABSTRACT

A field experiment was conducted at Clemson, SC, in 2005 to test integrated strategies for managing purple nutsedge utilizing various combinations of cultural and mechanical control measures. The experiment was organized as a split-plot design with four replications. Main plots consisted of 1) a green film from mid-March through early August, 2) a clear film (solarization) from mid-March through early August, 3) turnip from mid-March to mid-June followed by (fb) a green film through early August, 4) turnip from mid-March to mid-June fb solarization through early August, 5) monthly tillage from mid-March through early-August, and 6) no nutsedge management (weedy control). Subplots were 1) hand hoed (weed free), 2) mulched with wheat straw, and 3) no nutsedge management. All subplots were applied from early August through early November. Measurements taken included tuber viability and size in mid-March, early August, and mid-November; shoot density in mid-June, late July, and August through late October; time of weeding the pepper crop, and marketable fruit yield. Tuber size categories were small (0.1 to 0.25 g), medium (0.26 to 0.5 g), and large (>0.5 g).

Average tuber density over the test site at initiation of the experiment in March was 499, 298, and 110 viable tubers/m^2, totaling 907 viable tubers/m^2. Green film, solarization, and turnip fb solarization from March through early August significantly reduced purple nutsedge density by 473 to 649 viable tubers/m^2 over the initial density in March. From March to early August, tuber density increased by 779 viable tubers/m^2 in the 'no management' main plots. Main plot treatments, excluding the 'no management' treatment, depleted the number of medium and large sized tubers, with no significant impact on small sized tubers. The shoot density of purple nutsedge at 2 weeks after transplanting pepper followed the same trends as viable tuber density sampled in early August. Among subplot treatments, hand hoeing was more effective in managing the viable tuber density compared to mulching, mainly by depleting the number of small sized tubers. In contrast, tuber density in 'no management' subplots increased by 1,561 tubers/m^2 from August through November, averaged over main plots. The initial depletion of tubers in main plots from March through early August was of little benefit if some form of nutsedge management was not practiced for the remainder of the season (August through November). For instance, in the 'no management' subplots, tuber density increased by 968 to 1,230 viable tubers/m^2 over the initial density in March for all main plot treatments, excluding the 'no management' treatment. Purple nutsedge shoot density at the end of the season in the 'no management' subplots did not differ among main plot treatments, averaging 456 shoots/m^2, indicating that early season nutsedge management strategies must be supplemented by hand hoeing during the fall cropping season. There was a significant reduction in weeding time in all main plot treatments (averaging 17.9 min/subplot) compared to 'no management' (27.5 min/subplot). These results indicate that green film, solarization, or solization following a turnip cover crop suppresses purple nutsedge tuber density before transplanting fall grown pepper, which lowers the shoot density of purple nutsedge at 3 weeks after transplanting pepper compared to no nutsedge management. Research will be continued at this site in the upcoming year to determine the long-term impact of each strategy on purple nutsedge tuber dynamics.

WILD RADISH AS A COVER CROP AIDS WEED MANAGEMENT IN SWEET CORN. M.S. Malik, J.K. Norsworthy, A.S. Culpepper, M.B. Riley, and P. Jha; Department of Entomology, Soils, and Plant Sciences, Clemson University, Clemson, SC 29634; Department of Crop and Soil Sciences, Tifton, GA 31793-1209.

ABSTRACT

Wild radish, a member of the Brassicaceae family, is an annual, allelopathic broadleaf common throughout the southeastern US. It has a potential to aid weed management in tolerant summer crops because of its common occurrence in production fields and allelopathic suppression of many weeds. A field experiment was conducted at Blackville, SC, and Tifton, GA, during the summers of 2004 and 2005 to evaluate the effect of wild radish and rye cover crops on weed suppression and sweet corn yield when used in conjunction with lower than recommended herbicide rates. Cover crop treatments included wild radish, rye, and no cover crop alone and in conjunction with one-half and full recommended rates of atrazine at 1.68 kg/ha plus *S*-metolachlor at 0.87 kg/ha applied prior to sweet corn emergence. Florida pusley, large crabgrass, spreading dayflower, Texas panicum, smallflower morningglory, and ivyleaf morningglory were the predominant weeds infesting test sites in SC or GA.

Glucosinolates, the precursors for isothiocyanates (allelochemicals), were quantified in aboveground wild radish biomass from the test site in SC in 2004 and included glucoiberin, progoitrin, glucoraphanin, glucoraphenin, gluconapin, glucotropaeolin, glucoerucin, glucobrassicin, and gluconasturtin. Wild radish or rye in conjunction with the one-half recommended rate of atrazine plus *S*-metolachlor provided 64 to 97% weed control across locations and years at 4 wk after planting (WAP), whereas weed control ranged from 78 to 100% following the full recommended rate of atrazine plus *S*-metolachlor. In the absence of a cover crop, weed control with atrazine plus *S*-metolachlor ranged from 54 to 98% across locations and years. The one-half rate of atrazine plus *S*-metolachlor generally failed to provide effective weed control through 8 WAP, regardless of cover crop in SC. Conversely, both rates of herbicides provided season-long weed control in GA. Wild radish in conjunction with the full rate of atrazine plus *S*-metolachlor provided superior control of Florida pusley, large crabgrass, and ivyleaf moringglory compared with rye or no cover crop treated with a full herbicide rate in 2004 in SC, whereas in 2005, weed control from the wild radish cover crop was not different from rye. Wild radish or rye cover crops in conjunction with a one-half or full rate of atrazine plus *S*-metolachlor provided excellent weed control in GA both years. Sweet corn following wild radish or rye produced 21,000 to 48,000 and 28,000 to 46,000 marketable ears/ha in herbicide treated and hand-weeded plots, respectively, in SC across both years. In 2004 in GA, sweet corn following wild radish or rye produced 34,000 to 48,000 and 41,000 to 51,000 marketable ears/ha in herbicide treated and hand-weeded plots, respectively. Only total ears were recorded in GA in 2005. Sweet corn following wild radish or rye in the absence of herbicides produced less marketable ears than herbicide treated plots, indicating that a combination of cover crops and herbicides are required to optimize yields and obtain desirable weed control.

USE OF BRASSICACEAE COVER CROPS FOR WEED SUPPRESSION IN BELL PEPPER. M.S. Malik, J.K. Norsworthy, M.B. Riley, P. Jha, and S.K. Bangarwa; Department of Entomology, Soils, and Plant Sciences, Clemson University, Clemson, SC 29634.

ABSTRACT

Field experiments were conducted at Clemson, SC, over two growing seasons to evaluate the potential of using various fall-seeded Brassicaceae cover crops for weed suppression in spring transplanted bell pepper. The cover crops used included: Indian mustard (Fumus F-E75 and F-L71), canola, meadowfoam, gardencress, brown mustard, and turnip. Recorded measurements included cover crop biomass production, glucosinolate composition of roots and shoots, weed suppression following mechanical termination of the cover crops, and crop tolerance and fruit yields of peppers. Total biomass production ranged from 102 g/m^2 to 915 g/m^2. Fumus F-E75 produced greatest biomass in 2004, whereas turnip produced the greatest biomass in 2005. Cover plots generally suppressed weed growth for 2 to 4 weeks, but not longer. Suppression of large crabgrass ranged from 48 to 73% at 2 weeks after transplanting (WATP) peppers, whereas it ranged from 45 to 79% at 4 WATP in 2004. Palmer amaranth was controlled 25 to 55% at 2 WATP in 2004. Initial large crabgrass control in 2005 ranged from 5 to 54% at 2 WATP and there was less than 10% control of large crabgrass by 4 WATP for any cover crop. In the absence of weeds (hand-weeded plots) cover crops did not negatively affect pepper growth or fruit yield.

PALMER AMARANTH AND LARGE CRABGRASS GROWTH IN PLASTICULTURE BELL PEPPER.

J.K. Norsworthy, M.J. Oliveira, P. Jha, M. Malik, J.K. Buckelew, K.M. Jennings, and D.W. Monks; Department of Entomology, Soils, and Plant Science, Clemson University, Clemson, SC 29634; Horticultural Science Department, North Carolina State University, Raleigh, NC 27695.

ABSTRACT

Experiments were conducted at Clemson, SC, in 2004 and 2005 and at Clinton, NC, in 2004 to quantify the development of Palmer amaranth and large crabgrass growing alone and in combination with bell pepper in a plasticulture system over multiple environments. Experiments at both locations were constructed as a split-plot design replicated four times with main plots consisting of 2 main plot treatments (early and late spring planting) and 5 subplot treatments (pepper alone, large crabgrass alone, Palmer amaranth alone, pepper with large crabgrass, and pepper with Palmer amaranth). Four plants were destructively harvested from each plot at 2, 4, 6, 8, and 10 weeks after transplanting (WATP) to determine plant height, biomass, canopy width, leaf number, large crabgrass tiller number, and pepper fruit number. At Clinton, data from Palmer amaranth plots were not recorded at 6, 8, or 10 WATP for the first planting date or at 8 or 10 WATP for the second planting date. Data from large crabgrass plots at Clinton were not recorded at 8 or 10 WATP for the second planting date. At both locations, 'Heritage' bell pepper was transplanted into twin rows, with 30 cm between rows on the bed and 30 cm between plants within each row. Palmer amaranth and large crabgrass were established by planting seeds of each weed adjacent to the base of the transplants and then thinning to one plant per transplant hole following emergence. The day of weed emergence was recorded at both locations. Daily maximum and minimum air temperature data were used to calculate growing degree days (base 10 C) accumulated following pepper transplanting and weed emergence. Data were plotted and a linear or logistic function was chosen to model growth of each species. Paired t-tests were used to compare data within each planting date at each location for a species alone and in combination for each destructive harvest. If differences were detected by t-tests at any of the harvests, parameter estimates of models were allowed to differ between species. Parameter estimates for models for each species alone or in combination were deemed similar when no differences were detected from t-tests at any sampling time. A coefficient of determination was calculated for each predicted response. The logistic function was used to describe biomass accumulation of all species, and height increases for Palmer amaranth and large crabgrass. A linear function adequately described pepper growth alone or with either weed. Palmer amaranth growth with pepper was similar to that in the absence of pepper; therefore, a single response for Palmer amaranth alone and in combination with pepper was used to describe height and an additional single response for biomass accumulation. The model better accounted for variation in height data than biomass accumulation data. Large crabgrass height when growing with pepper was similar to large crabgrass growing alone; however, biomass accumulation by large crabgrass was deleteriously affected by pepper. When large crabgrass was growing with pepper, an exponential increase in large crabgrass biomass was delayed by approximately 100 GDD compared to large crabgrass growing alone. Pepper height was not affected by large crabgrass, but was negatively affected by Palmer amaranth. Pepper biomass accumulation was deleteriously affected by the presence of Palmer amaranth or large crabgrass, beginning at approximately 200 and 500 GDD after transplanting, respectively. The height models for all three species were also used to predict when Palmer amaranth or large crabgrass would over top transplanted pepper if both weeds emerged on the day of pepper transplanting – a worst case scenario. Palmer amaranth was predicted to be the same height as pepper at 277 GDD, with both species being 18-cm tall at this time. For large crabgrass, plant height was predicted to be the same as pepper at 620 GDD, which occurs when plants are 36-cm tall. These models can be used to more effectively time postemergence herbicides through knowledge of weed heights, upon which application timings are dependent and which are essential to choosing herbicide rates, as well as awareness of when in the growing season Palmer amaranth or large crabgrass negatively impact pepper growth.

CANTALOUPE TOLERANCE AND WEED CONTROL WITH POSTEMERGENCE APPLICATIONS OF RIMSULFURON AND HALOSULFURON. R.L. Blanton and J.K. Norsworthy; Department of Entomology, Soils, and Plant Science, Clemson University, Clemson, SC 29634.

ABSTRACT

Field trials were conducted in the spring of 2004 and the spring and fall of 2005 at Clemson, SC to evaluate cantaloupe tolerance to rimsulfuron and halosulfuron applied to cantaloupe at the 2-leaf stage, 5- to 6-leaf stage, plants having 30 to 40 cm vines, and plants having up to 5 cm diameter melons. Additionally, control of eight weed species was evaluated in these trials in 2005. Rimsulfuron and halosulfuron were each applied at 35 g ai/ha at 187 L/ha, and each treatment contained 0.25% (v/v) nonionic surfactant. Cantaloupe plant injury from rimsulfuron differed among application timings and trials, but applications were generally injurious, more so when applied at either of the initial two crop stages. Halosulfuron was less injurious to cantaloupe, but 31 and 14% injury occurred following the 2-leaf and 5- to 6-leaf applications, respectively, in the second trial in 2005. In the first trial in 2005, marketable melons per plant were lower for all halosulfuron applications during the first week of harvest compared to the non-treated control (30 to 37% reduction). Total number of marketable melons was comparable to the non-treated control in all trials and timings for each of the halosulfuron treatments, except the 5 to 6 leaf and up to 5 cm diameter melon applications in the second trial in 2005. Visual injury estimates were not a good indicator of occurrence or absence of delays in crop earliness or number of marketable melons. Rimsulfuron was generally effective ($\geq$80% control) in controlling seedling Texas panicum, large crabgrass, tall morningglory, pitted morningglory, and Palmer amaranth, but was ineffective against yellow and purple nutsedge and goosegrass. Halosulfuron was effective in controlling yellow and purple nutsedge, but was ineffective against Texas panicum, large crabgrass, goosegrass, pitted morningglory, tall morningglory, and Palmer amaranth. This research indicates that cantaloupe does not have sufficient postemergence tolerance to rimsulfuron to warrant registering the herbicide.

WEED CONTROL IN ORCHARDS WITH RIMSULFURON. W.E. Mitchem, D.W. Monks, and K.M. Jennings. Mountain Horticultural Crops Research and Extension Center, North Carolina State University, Fletcher, NC; N.C. State University, Raleigh, NC

ABSTRACT

Rimsulfuron is a sulfonylurea herbicide that is currently registered for use in corn , tomato, and potato crops and is being evaluated for broadleaf weed control in fruit crops. Two trials were conducted in Edgefield county, SC to evaluate rimsulfuron for use in peach orchards.

The first trial was conducted in a peach orchard established 2 years in a Fuquay loamy sand soil. Treatments consisted of sequential applications of rimsulfuron + diuron at 0.035 or 0.071 kg ai ha^{-1} + 0.45 or 0.9 kg ai ha^{-1}, respectively, and flumioxazin at 0.14, 0.21, or 0.28 kg ai ha^{-1}. The initial application was applied November 30, 2004. The second application was applied May 14, 2005. In addition to the flumioxazin comparison treatments, simazine at 1.8 kg ai ha^{-1} in November followed by terbacil + diuron in May at 1.3 kg ai ha^{-1} was also evaluated. Herbicide efficacy and tree injury were estimated visually and all treatments were applied in a tank mix with paraquat and non-ionic surfactant for postemergence weed control. The fall applications for all treatments provided excellent control (99% or better) of cutleaf eveningprimrose (*Oenothera lanciniata,* Hill) through peach tree bloom in March. Rimsulfuron + diuron at 0.071 + 0.9 kg ai ha^{-1} provided 90% cutleaf eveningprimrose control through May 4th which was similar to the 86% control provided by simazine applied in the fall at 1.8 kg ai ha^{-1} and better than flumioxazin at 0.14 and 0.28 kg ai ha^{-1} which provided only 60 and 70%, respectively. The fall applications of flumioxazin and rimsulfuron + diuron provided 81 to 95% control of Parmer amaranth (*Amaranthus palmeri*) through May 4th and was better than the 46% control provided by simazine applied in the fall. The second application for all treatments was applied May 14th and observations for summer weed control were made August 1st. Rimsulfuron + diuron at 0.035 + 0.45 kg ai ha^{-1} provided only 38% control of Palmer amaranth through August1st which was less than the 87 to 95% control with flumioxazin or the 79% control provided by terbacil + diuron. However rimsulfuron + diuron at 0.071 + 0.9 kg ai ha^{-1} provided 60% control of Palmer amaranth which was similar to control provided by terbacil + diuron. Terbacil + diuron was the most effective treatment for large crabgrass (Digitaria sanguinalis) providing 93% control. Large crabgrass control with flumioxazin ranged from 79 to 86% which was similar to the control provided by terbacil + diuron. Rimsulfuron + diuron treatments provided 38 and 66% control and were less effective than terbacil + diuron.

TOLERANCE OF DIRECT-SEEDED GREEN ONION TO HERBICIDES. S.K. Bangarwa, J.K. Norsworthy, J.P. Smith, and P. Jha; Department of Entomology, Soils, and Plant Science, Clemson University, Clemson, SC 29634.

ABSTRACT

Field experiments were conducted in 2004 and 2005 on a sand soil in Lexington, SC, to determine the tolerance of direct-seeded green onion to selected preemergence and postemergence herbicides. Preemergence herbicides included *S*-metolachlor at 0.5 lb ai/A, pendimethalin at 0.5 lb ai/A, dimethenamid at 0.4 lb ai/A, quinclorac at 0.25 lb ai/A, pronamide at 1.5 lb ai/A, ethofumesate at 1.0 lb ai/A, and DCPA at 6.0 lb ai/A, a labeled standard. Postemergence herbicides were applied to 2- to 3-leaf green onion and included glyphosate at 0.25 and 0.5 lb ai/A, trifloxysulfuron at 0.014 lb ai/A, flumioxazin at 0.05 lb ai/A, phenmedipham at 0.39 lb ai/A, ethalfluralin at 1.1 lb ai/A, pendimethalin at 0.5 lb/A, *S*-metolachlor at 0.5 lb/A, and oxyfluorfen at 0.5 lb ai/A. All postemergence treatments received 0.25% (v/v) nonionic surfactant, except ethalfluralin, *S*-metolachlor, and pendimethalin. Plots were cultivated and hand-weeded to minimize negative affects of weed competition on the crop. All preemergence herbicides, excluding DCPA, caused excessive injury to green onion in at least one of two years (>25%). Postemergence treatments causing less than 10% injury to green onion were oxyfluorfen, ethalfluralin, and *S*-metolachlor in both years. Green onion yields following treatment with oxyfluorfen, ethalfluralin, and *S*-metolachlor were equivalent to the standard treatment of a preemergence application of DCPA. All other postemergence herbicides resulted in height, density, or yield reductions relative to DCPA in at least one of two years.

THREE-YEAR EVALUATION OF SULFENTRAZONE ON SWEETPOTATO. S.T. Kelly and M.W. Shankle. LSU AgCenter, Winnsboro, LA 71295 and Mississippi State University, Pontotoc, MS, 38863

ABSTRACT

Sulfentrazone was evaluated in 2003, 2004 and 2005 at the Sweet Potato Research Station at Chase, LA. Treatments in 2003 and 2004 included 0.375 and 0.5 lb ai/A sulfentrazone applied preplant incorporated (PPI) and post-transplant (POTtr), and 0.063 and 0.096 lb ai/A flumioxazin PPI. In 2004, flumioxazin was also applied pre-transplant (PREtr). Treatments in 2005 were similar to the previous experiments, except that sulfentrazone was applied PREtr rather than POTtr. Clomazone (1 lb ai/A) was included in each experiment as a standard treatment. PPI treatments were incorporated by disking 2X in opposite direction two inches deep. PREtr applications were made immediately prior to transplanting and POTtr applications made immediately after transplanting in each experiment. Treatments were applied using a CO_2-powered sprayer delivering 15 gallons per acre (gpa). Field-grown sweetpotato ('Beauregard' B-14 mericlone) cuttings, approximately 10 inches long were planted using a mechanincal transplanter on July 14, 2003, June 10, 2004, and June 23, 2005. Sweetpotato injury was evaluated using a 0 to 100% scale with 0 equaling no injury and 100 equaling complete necrosis or death. Weed control was visually estimated using a 0 to 100% scale with 0 eqaling no control and 100 equaling complete control. Weeds present included spiny amaranth (*Amaranthus spinosus*), yellow nutsedge (*Cyperus esculentus*), southern crabgrass (*Digitaria ciliaris*) and barnyardgrass (*Echinochloa crus-galli*). Sweetpotato yield was taken at 113 to 132 days after transplanting (DATr) using a one-row PTO-powered chain digger. Sweetpotato roots were graded according to USDA standards and separated into three fractions: U.S. No. one, canners and jumbo. In 2003, severe injury (63 to 83%) was observed at 10 and 18 days after transplanting (DATr) with sulfentrazone applied POTtr. Injury with flumioxazin was 8% or less at either evaluation date. Sweetpotato vine cover was 80 to 90% among all treatments except sulfentrazone POTtr at 50 DATr (45 to 48%). Yellow nutsedge control was greatest with sulfentrazone (70 to 90%) compared to all other treatments. Spiny amaranth control was greatest (85 to 90%) with sulfentrazone or flumioxazin, compared to clomazone or the untreated. Compared to the untreated, sweetpotato yield (U.S. No. ones and twos) at 155 DATr was greatest with flumioxazin and 0.5 lb/A sulfentrazone PPI. No differences in canner and jumbo yield were observed. Total yield was greatest with flumioxazin and 0.5 lb/A sulfentrazone PPI. In 2004, greatest injury was observed with sulfentrazone PPI. However, rainfall in 2004 was much greater than in 2003 in the weeks immediately after transplanting. Yellow nutsedge control was greatest with sulfentrazone or fluioxazin PREtr. However, yellow nutsedge control with sulfentrazone was at least 85%. Southern crabgrass control was equal among all treatments at 23 or 44 DATr. Spiny amaranth control with sulfentrazone or flumioxazin was 80 to 90%, and greater than clomazone or the untreated. No consistent differences in yield fractions were observed at 132 DATr. However, total yield with flumioxazin PRE and 0.5 lb/A sulfentrazone POTtr was greater than either herbicide applied PPI, indicating that in years with excessive rainfall, these two herbicides could potentially cause yield loss if applied in this manner. Sweetpotato injury in 2005 was less than the previous two experiments with no significant injury compared to the untreated at 21 or 51 DATr. No differences in spiny amaranth control were observed between sulfentrazone and flumioxazin at 21 DATr. Either herbicide controlled spiny amaranth greater than clomazone at 51 or 113 DAtr. By 113 DATr, sulfentrazone PREtr controlled spiny amaranth 88%. Barnyardgrass control was 83 to 90% with any herbicide at 21 or 51 DATr. Greatest yield of U.S. No. one at 114 DATr was observed with 0.375 lb/A sulfentrazone, compared to clomazone or the untreated. No differences were observed in canner or jumbo yield. Greatest total yield was also observed in plots treated with 0.375 lb/A sulfentrazone. With the exception of the PPI treatments in 2004 and POTtr applications in 2003, sulfentrazone caused no excessive injury or yield reduction. Sulfentrazone could have the potential to be used in Louisiana sweet potato production. However, current research would indicate that PREtr applications would be the most desirable since little injury was observed with those treatments and weed control was equal to or greater than the clomazone standard.

EVALUATION OF FLUMIOXAZIN FOR HERBACEOUS WEED CONTROL IN LOBLOLLY PINE PLANTATIONS. A.W. Ezell, Mississippi State University, Mississippi State, MS

ABSTRACT

Herbaceous weed control continues to be an important component of pine plantation establishment in the South. Valor is a herbicide used in agricultural settings, but was previously untested in forestry applications. The objective of the study was to evaluate Valor (flumioxazin) applied alone or in tank mixtures for both crop tolerance and weed control in a first-year loblolly plantation. A total of eight treatments were replicated three times in a RCB design. Treatments were applied in April, 2005 and evaluated at 30-day intervals until September. At each evaluation, control of grasses, broadleaves, and vines was recorded and pines were examined for any symptoms of phytotoxicity. Results indicated that Valor is safe to use in loblolly pine plantings. Best weed control was obtained from mixtures of Valor and Arsenal AC, and Valor alone did not provide as much control as the mixtures. Flumioxazin appears to be a viable active ingredient for use in forestry.

ADDITION OF OUST EXTRA TO SITE PREPARATION MIXTURES PROVIDES COMPETITION CONTROL DURING THE FOLLOWING GROWING SEASON. A.W. Ezell, J.L. Yeiser, and L.R. Nelson, Mississippi State University, Mississippi State, MS, Stephen F. Austin State University, Nacogdoches, Texas, and Clemson University, Clemson, South Carolina.

ABSTRACT

Adding sulfometuron to site preparation tank mixtures has been proven to provide herbaceous weed control the growing season after a fall application. Oust Extra now combines sulfometuron and metsulfuron which could expand the range of residual competition control in site prep applications. To evaluate such applications, a total of 17 treatments were replicated four times in a RCB design on recently harvested areas. Applications were conducted in September, 2004. Herbaceous weed control was evaluated in May, June, July, August, and September of 2005 and hardwood control was assessed in October, 2005. Results varied by state and the herbaceous complex found at each site. Generally, the Oust Extra provided excellent control of grass and sedges except for tolerant species such as Andropogon. Control of broadleaves was very good overall with most treatments holding well until August. A few plots did exhibit more occupancy by Erichetes and some Eupatorium species than was expected. Residual control was generally better in plots which had an imazapyr/glyphosate mixture. The results for residual Rubus control were notably better if glyphosate was a part of the tank mixture. Overall, the use of Oust Extra for residual weed control appears to be a viable management option.

EFFECTS OF HERBICIDE TIMING AND APPLICATION METHOD ON FRUITING AND SEED GERMINATION IN CHINESE PRIVET (*LIGUSTRUM SINENSE*). L.R. Nelson and S.R. Vokoun, Department of Forestry and Natural Resources, Clemson University, Clemson, SC 29634. (lnelson@clemson.edu)

ABSTRACT

Herbicide applications applied as directed foliar (glyphosate) and basal stem (triclopyr) sprays were tested at three rates and eight application times (May to December, 2004) on mature privet plants. Foliar spray rates of either 5 or 10 % v/v in water were effective from May through December. A 2.5 % rate was ineffective (<50% control) from May to September, but provided 100% control when applied in October and November. Basal sprays were effective at 20 and 30 % from May through October. Privet control with either herbicide dramatically reduced seed populations and viability when treated from May to September. Due to loss of seed, viability was not assessed for October, November, and December treatments. October and November foliar treatments were repeated in 2005. Treatments of 2.5, 5.0 and 10 % provided nearly 100 % control of privet at both dates. Percent seed viability was 0 for all rates applied in October and ranged from 68 to 87 for the November treatments.

SELECTIVE CONTROL OF COGONGRASS [*IMPERATA CYLINDRICA* (L.) BEAUV.] IN JUVENILE LONGLEAF PINE. Z.B. Chesser, J.D. Byrd, M.T. Myers, and D.N. Ivy; Mississippi State University, Mississippi State, MS.

ABSTRACT

Experiments were initiated in George and Hancock counties, Mississippi to evaluate control of cogongrass with glyphosate and imazapyr applied through a rope wick applicator. A 5 ft rope wick applicator attached to a tractor loader for height control was used to apply Roundup Pro 4SC or Arsenal AC 4AS at 33 or 50% (v/v) solutions. Cogongrass foliage was wiped one direction or two directions. Treatments were applied as a randomized complete block design with a factorial arrangement of treatments in 5 ft by 40 ft plots in juvenile longleaf pine stands. Visual ratings of cogongrass control and longleaf pine injury were taken 60 and 180 days after treatment (DAT) to evaluate effectiveness of the applications. Analysis of visual ratings 60 and 180 DAT revealed no significant differences between the number of rope wick passes (1 versus 2) nor herbicide concentration (33 versus 50% v/v). Although, imazapyr provided a higher level of cogongrass control than glyphosate when applied through the rope wick applicator. No injury to longleaf pines was observed 60 DAT.

SITE PREPARATION WITH TOTALPREP: AN EVALUATION OF 9 OPERATIONAL PINE TRIALS.
J.L. Yeiser. PO Box 6109 Stephen F. Austin State University Arthur Temple College of Forestry and Agriculture Nacogdoches, TX 75962.
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ABSTRACT

The Sustainable Forestry Initiative (SFI) seeks to minimize the visual impact of timber harvesting by blending harvested units into the terrain for a green, diverse landscape. DuPont offers the TotalPrep program to enhance survival and growth of newly planted seedlings, thereby helping managers meet the green-up guidelines of SFI. The objective of this study was to compare two approaches to site preparation: TotalPrep and a conventional approach to the preparation of loblolly pine sites. As tested in this study, TotalPre is a June ULW treatment followed at least 90 days later (SEP) by a liquid chemical treatment selected to further reduce residual plant levels (TotalPrep). The conventional approach is a single, SEP treatment of a liquid spray (Cooperator Standard) selected for the site by the cooperator. Nine sites were established across the South to compare the weed control and resultant loblolly pine seedling performance. At all sites, ULW was applied in mid-JUN-05 and liquid treatments in mid-SEP-05. Data from six sites are available for presentation. The three test treatments at all sites are: (1) TotalPrep-MSO (ULW (4lb) followed by Oust Extra+Chopper+MSO (4+10+128oz)), (2) TotalPrep-OneStep (ULW (4lb) followed by Oust Extra+OneStep+NIS (4+32+16oz)), and (3) Cooperator Standard (Oust Extra+OneStep (3.5+128oz; 4.0+128oz; 4.0+128oz); Chopper+Razor Pro NIS (32+96+16oz); Chopper+Garlon 4+NIS (24+32+64oz); Accord SP+Arsenal aC+Nu-Film IR (128+14+4oz)). Herbicides were applied by helicopter and seedlings planted by operational crews. In JUN-05 the means of TotalPrep treatments and the Cooperator Standard were 82, 81; 82, 36; 81, 97; 86, 21; 80, 73; and 81, 66 for percent control of blackgum, red oak, red maple, sweetgum, minor species, and all species, respectively. In SEP-05 the means of TotalPrep treatments and the Cooperator Standard were 78, 98; 78, 76; 62, 99; 84, 41; 63, 55; and 70, 67 for percent control of blackgum, red oak, red maple, sweetgum, minor species, and all species, respectively. TotalPrep provided better, similar, or less control than the Cooperator Standard depending on the woody species. TotalPrep-MSO provided numerically better SEP-05 hardwood control than TotalPrep-NIS. In JUN-05, the means of TotalPrep treatments and the Cooperator Standard for percent bareground and percent cover for grasses, forbs, woody species, vines, and *Rubus* were 64, 81; 36, 25; 22, 16; 14, 9; 3, 5; 5, 5; 0, 1, respectively. In SEP-05, the means of TotalPrep treatments and the Cooperator Standard for percent bareground and percent cover for grasses, forbs, woody species, vines, and Rubus were 37, 27; 63, 59; 16, 22; 45, 37, 1, 7; 4, 10; 1, 3, respectively. TotalPrep treatments provided less JUN and more SEP-05 bareground than conventional treatments. After one growing season, means of TotalPrep treatments and the Cooperator Standard for survival, total height and ground line diameter were 77%, 71%; 20.0-in, 16.8-in; and .392-in, .315-in, respectively. TotalPrep-MSO seedlings, numerically, survived and grew the best of all three treatments. TotalPrep shows promise as a program for the intensive chemical preparation of loblolly pine sites for enhanced pine survival and growth.

LOBLOLLY PINE PERFORMANCE IN TEXAS AND MISSISSIPPI FOLLOWING HERBACEOUS RELEASE WITH OUST EXTRA. J.L. Yeiser and Andrew W. Ezell. PO Box 6109 Stephen F. Austin State University Arthur Temple College of Forestry and Agriculture Nacogdoches, TX 75962; PO Box 9681 Mississippi State University Department of Forest Resources Mississippi Sate MS 39762.

ABSTRACT

Herbaceous weed control is an accepted part of the intensive management of loblolly pine. This justifies the continued refinement of rates and herbicide mixtures for efficient herbaceous weed control. One site in each of Mississippi (MS) and Texas (TX) were tested. The MS Upper Coastal Plain site supported a natural stand that was harvested in 2001. The ULW (4lb) chemical site preparation in APR-02 was followed by a burn in SEP and by hand planting of loblolly pine seedlings in JAN-03. In Texas, the Upper Coastal Plain site supported a plantation that was harvested in DEC-00. In MAY, a single-chop reduced debris before Arsenal+Accord+Rebound (16+64+32oz) were applied in late JUN-02. Seedlings were machined planted in DEC-02. Test products were applied on 13-APR-03 in MS and 8-APR-03 in TX. The objective was to compare weed control, crop tolerance and pine growth resulting from treatments of (1) Oust XP+Escort XP (Oust Extra) alone, (2) Oust XP+Escort XP (Oust Extra)+Arsenal AC, (3) Arsenal AC alone, (4) Velpar DF+Oust XP combinations and (5) an untreated check. At both sites, seedling survival and herbicide tolerance were excellent for all treatments with no visible damage. In TX and MS, three-way Arsenal AC+Oust XP+Escort XP mixtures provided numerically more and Arsenal AC alone treatments numerically less weed control and seedling growth than other treatments. In TX, Oust XP+Escort XP performed better than Velpar DF+Oust XP; in MS the reverse was true. In a factorial analysis of TX data, growth was not enhanced by the rate of Arsenal AC (4, 6oz). Age three total height and ground line diameters for 3+1 Oust XP+Escort XP+Arsenal AC, 2.25+.75 Oust XP+Escort XP+Arsenal AC and Arsenal AC alone were 8.1-ft, 7.5-ft and 7.0-ft and 2.10, 1.90,or 1.69, respectively. The addition of 2.25+.75oz Oust XP+Escort XP to the Arsenal AC tank, produced trees statistically similar and numerically intermediate to 3+1oz Oust XP+ Escort XP and Arsenal AC alone. The high rate of Oust XP+Escort XP+Arsenal AC yielded trees statistically and numerically greater than those treated with Arsenal AC alone. Growth differences at both sites may be attributed to common ragweed, wooly croton, horseweed, and Rubus control. Arsenal AC did not control Rubus and common ragweed. Velpar DF+Oust XP did not control wooly croton and Rubus. Escort XP controlled horseweed, Rubus and emerged wooly croton and common ragweed.

PREEMERGENCE AND POSTEMERGENCE CONTROL OF ROADSIDE WEEDS WITH AMINOPYRALID. D.P. Montgomery, C.C. Evans, and D.L. Martin; Horticulture and Landscape Architecture Department, Oklahoma State University, Stillwater, OK 74078.

ABSTRACT

Two roadside weed control studies were conducted during the summer of 2005 to evaluate the effectiveness of Milestone VM (aminopyralid) for control of roadside weeds and tolerance of common bermudagrass. In Study One applications were made to dormant bermudagrass on March 14. Treatments evaluated in Study One included Milestone VM at 5 & 7 fl. Oz./A, alone, or combined with either Glypro Plus at 8 fl. Oz./A + Oust XP at 0.33 oz./A, Glypro Plus at 8 fl. Oz./A + Outrider at 1.33 oz./A, or Campaign at 32 fl. Oz. + AMS at 3.4 lbs./A The standard treatment in this study was Campaign at 32 fl. Oz./A + AMS at 3.4 lbs./A. In Study Two applications were applied to actively growing bermudagrass on May 10. Treatments evaluated in Study Two included Milestone VM at 5 fl. Oz./A, alone, or combined with either Garlon 3A at 32 fl. Oz./A, Garlon 32 at 12.8 fl. Oz./A + Vista at 8.5 fl. Oz./A, 2,4-D at 22.2 fl. Oz./A, or Vanquish at 8 fl. Oz./A. The standard treatment in this study was Vanquish at 16 fl. Oz./A. All treatments, excluding those that involved Campaign, included a non-ionic surfactant at 0.25% V/V. In Study One postemergence weed control was visually collected for common chickweed (*Stellaria media)*, Carolina geranium (*Geranium carolinianum*), downy brome (*Bromus tectorum*), and preemergence weed control was collected on common ragweed (*Ambrosia artemisifolia*), and marestail (*Hippurus vulgaris*). In Study Two postemergence weed control was visually collected on kochia (*Kochia scoparia*) and field bindweed (*Convolvulus arvensis*). Treatments were applied to 10 by 20 foot plots using a CO2 powered boom sprayer calibrated to deliver 20 gallons of spray solution per acre. Treatments were replicated 3 times in a randomized complete block design.

In Study One at 56 days-after-application (DAA) all treatments including Milestone VM were producing 99% control of chickweed and Carolina geranium while the standard treatment of Campaign + AMS was producing 60% and 65% control, respectively. Treatments of Milestone VM alone did not provide acceptable control of downy brome, cheat, or annual ryegrass throughout the duration of this study. AT 28 DAA Milestone VM combination treatments including Oust, Campaign, and the Campaign + AMS standard were producing good (80%) to excellent (>90%) control of brome. By 56 DAA Milestone VM combination treatments, and the standard, were producing moderate to excellent control of both brome and cheat. At 56 DAA the Milestone VM combination treatment with Oust was the only treatment providing acceptable ryegrass control (>80%). Early evaluation (28 DAA) for preemergence control of common ragweed revealed that all treatments were producing good to excellent control as compared to the standard Campaign + AMS. At 56 DAA ragweed had produced significant growth in untreated plots while all Milestone VM alone or combination treatments were showing near complete control of ragweed. AT 85 DAA all Milestone VM treatments were maintaining 95% control of ragweed as compared to the standard Campaign + AMS. Marestail control was evaluated at 56 and 85 DAA and was very similar to ragweed control with one exception. The standard treatment of Campaign + AMS produced moderate control of marestail which would likely mean that some of the marestail had emerged at treatment time as this treatment should produce little if any preemergence control. Common bermudagrass greenup was evaluated on 28 and 56 DAA at which times only the Milestone VM combination treatment with Oust was producing unacceptable greenup delay. No other treatments were affecting bermudagrass greenup. At 85 DAA all bermudagrass had achieved 100% greenup however the Milestone VM combination treatment with Oust was producing very noticeable bermudagrass stunting which was allowing large crabgrass to infest. In Study Two postemergence kochia control for Milestone VM alone, or tank-mixed with either Garlon 3A or 2, 4-D amine did not provide satisfactory control throughout the duration of the study. The 3-way mix of Milestone VM, Garlon 3A, and Vista produced good control of kochia at 28 DAA (87%) that was maintained out to the 84 DAA evaluations (80%). The Milestone VM mixture with the lower rate of Vanquish produced good 28 DAA kochia control (83%) but control fell slightly to 72% by 84 DAA. The standard treatment of Vanquish at 1 pt/A produced excellent kochia control of 93% or greater throughout the duration of the study. Milestone VM alone produced moderate levels of field bindweed control during this study which ranged from 40-78%. All Milestone VM tank-mixes and the standard Vanquish treatment produced excellent control of field bindweed at both 26 and 56 DAA evaluations. Field bindweed control was at least 93% through 56 DAA. Field bindweed control was beginning to break somewhat by the 84 DAA evaluations as noted by the reduced control in the standard treatment. The data shows little bermudagrass phytotoxicity for all treatments throughout the duration of this study. At the 28 DAA evaluation a few treatments caused slight chlorosis and stunting that ranged from 2-13%. Little if any effects were noticed on bermudagrass after 28 DAT.

COMBINATIONS OF DIURON, FLUMIOXAZIN, GLYPHOSATE, IMAZAPIC, SULFENTRAZONE, AND SULFOMETURON METHYL FOR TOTAL VEGETATION CONTROL. M.P. Blair and D.D. Beran, University of Kentucky, Lexington, KY 40502 and BASF Corp., Des Moines, IA 50311.

ABSTRACT

Industrial vegetation managers often require that sites such as utility substations, roadsides, underneath guardrails, and pipeline yards remain vegetation-free during the growing season. Reasons for maintaining vegetation-free areas range from maintenance concerns to worker and public safety. Traditionally, these areas were treated with high rates of old herbicide pre and post chemistries and combinations thereof. Off target movement of these herbicides were often problematic and limited the options available to vegetation managers. Imazapic is an ALS inhibitor herbicide belonging to the imidazolinone family with pre and post activity that controls a wide range of broadleaf and grass species at low active ingredient rates. This herbicide also has residual soil activity with little to no activity on desirable woody species and limited off target movement. These characteristics make imazapic a desirable option for total vegetation control.

A study was initiated in the spring of 2005 to evaluate imazapic in combination with glyphosate, formulated as Journey®, with combinations of other herbicides for their ability to provide season long vegetation control. The study was located at a retired storage lot in Lexington, KY with a compacted gravel base with little soil underneath, similar to that of operational, or “real world” areas. The study was installed as a randomized complete block design with three replications. Dominant vegetation at initiation included tall fescue, white clover, and common ragweed. Percent bareground and percent cover by species were recorded preapplication, 60, 90, and 120 DAT. Data was analyzed using analysis of covariance (preapplication data as covariate) and adjusted treatment means were compared using Tukey-Kramer’s HSD at $p = 0.05$. Sulfentrazone and flumioxazin, applied alone at 0.375 lb a.i. / ac and 0.32 lb a.i. / ac respectively, provided approximately 80 % bareground at 60 DAT; however, these treatments dropped to unacceptable levels (< 60 % bareground) at 120 DAT. When imazapic was added to these treatments at 0.188 lb a.i. / ac (equivalent to 32 fl oz / ac of Journey), control increased to greater than 95 % at 60 DAT and maintained bareground levels greater than 90 % at 120 DAT. These results were statistically similar to those of sulfometuron at 0.14 lb a.i. / ac tank mixed with the same rates of flumioxazin and sulfentrazone. Diuron and sulfometuron methyl, tested alone at 6.4 lb a.i. / ac and 0.14 lb a.i. / ac respectively, provided greater than 95 % bareground at 60 DAT and maintained control levels greater than 90 % at 120 DAT. The addition of imazapic at 0.188 lb a.i. / ac to the diuron treatment maintained control levels greater than 95 % control through the entire trial; however, the control levels were not statistically different than the diuron alone treatment. There were no statistical differences between diuron alone, diuron plus imazapic, sulfometuron alone, imazapic plus flumioxazin, imazapic plus sulfentrazone, sulfometuron plus flumioxazin, and sulfometuron plus sulfentrazone (> 90 % bareground) at 120 DAT. These results indicate the potential of reducing diuron or sulfometuron rates in combination with imazapic and still provide operationally successful control levels for the entire growing season and potentially decrease off target damage potential. This also shows the ability of imazapic in combination with flumioxazin or sulfentrazone to provide excellent control similar to industry standards (diuron and sulfometuron) while reducing potential off target damage.

COMBINATIONS OF OVERDRIVE AND VISTA FOR KOCHIA CONTROL ON ROADSIDES. C.C. Evans, D.P. Montgomery and D.L. Martin; Horticulture and Landscape Architecture Department, Oklahoma State University, Stillwater, OK 74078.

ABSTRACT

Two companion roadside weed control studies were conducted in the summer of 2005 to evaluate the postemergent effectiveness of Vista (fluroxypyr), applied alone at multiple rates, and combinations of Vista and Overdrive (diflufenzopyr + dicamba), applied at multiple rates, on control of kochia (*Kochia scoparia*). Both studies were initiated on May 20 with herbicide applications to kochia plants 1-15 inches tall. Study One included four rates of Vista alone at 8, 12, 16, and 24 fl. Oz./A. In Study 2 applications included combinations of 4 and 6 Oz./A Overdrive with each of the four respective rates of Vista used in Study One. All treatments included a methylated seed-oil at 1.25% V/V. In both studies postemergence weed control was visually rated on a 0-100% control scale. Treatments were applied to 5 by 15 foot plots using a CO2 pressurized boom-type sprayer calibrated to deliver 20 gallons of spray solution per acre. Treatments were replicated 3 times in a randomized complete block design.

In study one, excellent control (90-100%) was observed at 61 DAT with the 24 fl. Oz./A rate of Vista producing a 90% control level. All other Vista treatments were below good (80-89%) control levels. This trend continued through the last rating 91 DAT with the 24 fl. Oz./A rate maintaining a 90% control level. In Study Two where Vista rates were combined with two incremental rates of Overdrive, 4 and 6 Oz./A., control was enhanced with all treatments achieving good to excellent control levels at 31 DAT. The Vista 8 fl. Oz./A + Overdrive 4 Oz./A rate achieved 93% control and the Vista 8 fl. Oz./A + Overdrive 6 Oz./A achieved 95% control. Treatments of Vista at 12 fl. Oz./A in combination with 4 and 6 Oz./A of Overdrive both achieved 87% control. The Vista 16 fl. OZ./A + Overdrive 4 Oz./a treatment achieved 88% control with the tank mix of Vista at 16 fl. Oz./A with Overdrive at 6 Oz./A achieving 92% control. Vista at 24 fl. Oz./A combined with both the Overdrive 4 and 6 Oz./A rates achieved an excellent level of control. At 61 DAT through 91 DAT all combinations of Vista and Overdrive were achieving excellent control levels ranging from 96% to 99% control.

WEED CONTROL ON SOUTH CAROLINA HIGHWAY RIGHT-OF-WAYS. J.K. Higingbottom, A.G. Estes, and L.B. McCarty; Department of Horticulture, Clemson University, Clemson, SC 29634.

ABSTRACT

Herbicide usage on highway right-of-ways plays a vital role in the management and control of vegetation along South Carolina roadsides. The removal of noxious and tall weeds like annual ryegrass and little barley are needed because they detract from the beauty of state roadsides and can ultimately pose a hazard to motorist by obstructing unforeseen hazards along the grass shoulders of highways. The removal of these weeds also helps reduce the frequency of mowing and can help release lower growing species. Clemson University, in cooperation with the South Carolina Department of Transportation, is exploring options in dealing with problematic winter weeds along state roadsides.

In 2005, Clemson University performed a postemergence trial to control various winter weeds on a right-of-way located on Interstate 95 near St. George, SC. The trial was initiated on January 19th to evaluate selected postemergence herbicides for control of annual ryegrass (*Lolium multiflorum*), little barley (*Hordeum pusillum*), cats' ear dandelion (*Hypochoeris radicata*), and Carolina geranium (*Geranium carolinianum*) in a 'Pensacola' bahiagrass (*Paspalum notatum*) right-of-way mowed at 6 in. Treatments were applied in a randomized complete block with 3 replications using a CO_2 backpack sprayer calibrated to deliver 20 GPA. Treatments (oz product/acre) included single applications of the following herbicides: Roundup Pro 4L (16.0), Oust 75 DG (1.0), Telar 75 DG (1.0), Roundup Pro (8.0) + Oust (0.25), Roundup Pro (8.0) + Oust (0.25) + Telar (0.25), Campaign 3.1L (64.0), Escort 65 DF (1.0), Revolver 0.19L (17.0), Monument 75 DF (0.3), Hoelon 3EC (42.5), QuikPRO 75.2 WG (72.0), Overdrive 70 WG (6.0), Plateau 2L (6.0), and Journey 2.25L (16.0). Weed control was rated on a 0-100% scale where 100% = complete control. Bahiagrass was rated for percent initial green-up density where 100% = full green-up and percent seedhead suppression where 0% = no seedheads present.

For annual ryegrass, at 86 days after treatment (DAT), Oust, Roundup Pro + Oust, and Journey provided 100% control. Also providing excellent control (>92%) were Roundup + Oust + Telar, Plateau, Revolver, Hoelon, and QuikPRO. Telar, Escort and Overdrive provided <45% control of annual ryegrass. For little barley, Roundup Pro, Roundup Pro + Oust, Plateau, and Journey provided ≥92% control. Oust, Roundup Pro + Oust + Telar, Campaign, and QuikPRO completely controlled little barley through 86 DAT. Telar, Escort, Revolver, Hoelon, and Overdrive were unsuccessful in controlling little barley at <10% control. Only, Oust completely controlled both grasses through 86 DAT. For cat's ear dandelion, Escort and Roundup Pro + Oust + Telar provided >98% control at 86 DAT followed by Oust, Campaign, and QuikPRO at 92%. For Carolina geranium, Campaign and QuikPRO yielded 100% control through 86 DAT. Also providing good (≥92%) control of Carolina geranium was Oust, Telar, Roundup + Oust + Telar, Escort, and Overdrive. Revolver, Monument and Hoelon failed to provide sufficient control at ≤10%. The initial spring bahiagrass green-up at 98 DAT was delayed by Oust, Escort and QuikPRO at <20% bahiagrass density compared to 50% of that of the untreated. By 135 DAT, Escort, Oust, and Overdrive continued to provide a slight delay in bahiagrass green-up at 61, 60 and 58%, respectfully compared to the untreated at 73%. At 168 DAT, Oust and Escort provided significant seedhead suppression at 30 and 27%, respectfully.

In conclusion, Roundup + Oust + Telar, Oust and QuikPRO all provided >90% control of all 4 weeds evaluated in this trial. Roundup Pro + Oust, Plateau, and Journey provided >90% control of little barley and annual ryegrass while, Escort and Campaign provided >90% control of cats' ear dandelion and Carolina geranium. Oust, Escort and QuikPRO delayed green-up for up to 6 weeks following initial green-up of the bahiagrass. Since Roundup Pro + Oust + Telar did not delay bahiagrass green-up and provided excellent control of all 4 weeds, it can be concluded that it was the best overall treatment in this trial. Despite Oust and QuikPRO performing equally as good controlling winter weeds, delaying bahiagrass green-up poses a further risk of weed invasion from summer weeds and permanent stand density reduction.

HERBICIDE RESISTANT WEEDS ALONG ROADSIDES. R.S. Wright, J.D. Byrd, and J.M. Taylor, Department of Plant and Soil Sciences, Mississippi State University, Mississippi State, MS 39762.

ABSTRACT

Two experiments were conducted during 2002 in a greenhouse near Starkville, MS and a third experiment was initiated in 2004 along a roadside in Mississippi to evaluate preemerge herbicide applications for control of resistant weeds. Greenhouse treatments were applied using compressed air with a regulated pressure of 27 psi, and a CO_2 backpack sprayer was used to apply treatments in the field experiment. Samples were taken for fresh weight evaluations 35 days after treatment (DAT) for the greenhouse experiment, and visual control ratings were taken on a 0 and 90% (0 = no control and 90 = best control) scale in March, April, and May for the field experiment.

Experiment 1 was initiated February 27, 2002, and experiment 2 was initiated July 19, 2002. Treatments consisted of Oust (sulfometuron methyl) 75DF at 0.001, 0.01, 0.1, 1.0, 10, or 100 oz prod/A for both susceptible and suspected resistant biotypes of palmer amaranth [*Amaranthus palmeri* (S.)Wats.]. Susceptible palmer amaranth control was between 88 and 90% treated with Oust at 0.01 to 100 oz/A. Oust at 0.001 oz/A provided 69% average biomass reduction of susceptible palmer amaranth, while the same rate of Oust applied to the suspected resistant biotype provided only 29% average control. The highest level of control observed in the suspected resistant biotype was 77% achieved with Oust at 100 oz/A which was 32% or greater compared to any other rate of Oust in the suspected resistant biotype 35 DAT (10 oz/A = 45%; 1 oz/A 37%; 0.1 oz/A = 27%; 0.01 oz/A = 8%; 0.001 oz/A = 29%).

Initial applications were made on September 24, 2004 and follow-by (fb) applications were made February 3, 2005 for experiment 3. Treatments were as follows: AquaCap (pendimethalin) 3.8MC at 2.0, 3.0, or 4.0 lb ai/A alone or combined with Oust 75DF at 1.0 oz prod/A, AquaCap at 1.0 lb fb 1.0 lb, 1.5 lb fb 1.5 lb, or 2.0 lb fb 2.0 lb ai/A combined with Oust at 1.0 oz prod/A, or Oust at 1.0 oz prod /A. Evaluations in March or April indicated AquaCap at 2.0 lb up to 4.0 lb alone provided 78 to 88% control of Italian ryegrass (*Lolium multiflorum* Lam.). Significantly lower Italian ryegrass control was observed with AquaCap at 2.0 lb compared to 4.0 lb when evaluations were made in May. No beneficial increase of Italian ryegrass control was observed in March, April, or May when applying AquaCap as split application. Oust alone provided no control of Italian ryegrass, and when combined with AquaCap no beneficial increase of control was observed compared to AquaCap alone in March, April, or May.

CONTROLLING BAMBOO (*PHYLLOSTACHYS SPP.*) WITH HERBICIDES. Mark A. Czarnota, Assistant Professor, University of Georgia, Department of Horticulture, 1109 Experiment Street, Griffin, GA 30223, E-mail: mac@griffin.uga.edu.

ABSTRACT

Bamboo is a species that can escape cultivation and invade lawns, landscapes, and other areas. Limited information is available on ways to control bamboo. Field studies were initiated to determine the level of bamboo control provided by a single application of selected preemergence and postemergence herbicides. In field trials, bamboo control with dichlobenil in the 2002 and 2004 experiments was less than 23%. For the study initiated in 2002, glyphosate and imazapyr provided 76% and 98%, respectively, bamboo control at 58 weeks after treatment (WAT). By 161 WAT (approximately 3 yrs after treatment), bamboo control ratings were 40% with glyphosate and 85% with imazapyr. For the study initiated in 2004, at 61 WAT glyphosate provided 46% control while imazapyr controlled bamboo 88%.

DORMANT STEM HERBICIDE APPLICATIONS FOR BUSH HONEYSUCKLE CONTROL. M.P. Blair, University of Kentucky, Lexington, KY 40502.

ABSTRACT

Bush honeysuckle is an inclusive term used to describe woody shrub honeysuckles. Species in this group include Amur honeysuckle (*Lonicera maackii* (Rupr.) Herder), Morrow's honeysuckle (*L. morrowii* Gray), and Tatarian honeysuckle (*L. tatarica* L.). These plants, native to Asia and introduced in the 17 and 1800s as ornamentals, are considered invasive due to their sprouting ability, prolific fecundity, and ability to quickly colonize and out compete native species. Somewhat intolerant to shade, bush honeysuckles establish themselves in open forests, along forest edges, abandoned fields, and roadsides. Infestations of bush honeysuckle can be problematic in roadside situations by reducing driver line of sight, reducing sign visibility, and decreasing native and desirable grass and forb vegetation. Past control techniques for bush honeysuckle include cut stump treatments and foliar applications of herbicides. Dormant stem broadcast herbicide applications may prove to be another effective treatment, allowing crews to remain productive in the winter months, and minimize damage to desirable vegetation (woody or herbaceous) in the understory. These types of herbicide treatments can be cost prohibitive so it would be beneficial to know if plant size (i.e. height or number of stems per rootstock) affected herbicide efficacy to allow for site specific applications. A study was initiated in March 2005 to investigate the ability of broadcast herbicide treatments to dormant stems to provide effective control of Amur honeysuckle. Specifically, the study evaluated 1) the ability of several herbicide treatments to control bush honeysuckle and 2) determine if any relationship existed between either height of target plant or number of stems from a rootstock of a target plant and control levels from dormant stem herbicide treatments.

Five treatments were evaluated in a completely randomized design with three replications. Treatments included BK 800 (a.i. 2,4 – D, 2,4 – DP ester and dicamba acid) at 3 % v/v plus crop oil concentrate (COC) at 2.5 % v/v, Garlon 4 (a.i. triclopyr ester) at 1.5 % v/v plus COC at 2.5 % v/v, BK 800 at 1 % v/v plus Garlon 4 at 1.5 % v/v plus COC at 2.5 % v/v, BK 800 at 3 % v/v plus Garlon 4 at 1.5 % v/v plus COC at 2.5 % v/v, and COC alone at 2.5 % v/v. Each plot included ten bush honeysuckle rootstocks, which were labeled and numbered, and estimated height and number of stems per rootstock were recorded before application. Treatments were applied in early March 2005 while plants were still dormant using a hand gun and entire stems were treated to the point of runoff. Plots were evaluated for percent control (estimated by amount of leafout) at 60 and 120 DAT. Treatment means were compared using Fishers LSD at p = 0.05. Simple linear regressions were performed in SAS® by each treatment using height and number of stems as individual regressors to predict control levels at p = 0.05 for significant models.

The BK 800 at 3 % v/v plus Garlon 4 at 1.5 % v/v treatment provided significantly higher control levels (85 %) than BK 800 alone (71 %) at 60 DAT. There was no significant difference between the BK 800 and Garlon 4 tank mixes (79 % for BK 800 at 1 % tank mix) and the Garlon 4 alone treatment (78 %) at 60 DAT. The BK800 alone treatment was significantly different (71 %) than all other treatments at 60 DAT. There was no observable effect at 60 DAT of treating stems with a COC / water mix. There were no significant differences between the BK 800 at 3 % plus Garlon 4 at 1.5 % (89 %), Garlon 4 at 1.5 % (83 %), BK 800 at 1 % plus Garlon 4 at 1.5 % (83 %), and BK 800 at 3 % (81 %) at 120 DAT. Treating bush honeysuckle with COC at 2.5 % resulted in 14 % control at 120 DAT.

Only two significant models could be produced to predict control levels of the 10 models tested (2 variables X 5 treatments). The BK 800 at 3 % plus Garlon 4 at 1.5 % treatment could be predicted using stem height at 120 DAT ($y = 107.23x – 2.52$, $p = 0.0233$, $R^2 = 0.1705$). Even though the model was significant it is of little operational use due to its low coefficient of determination (R^2). The other model produced used the number of stems to predict the effect of COC at 2.5 % 60 DAT. This is of little operational value as well since there were low control levels using COC alone at 120 DAT. There appears to be no significant relationship between size of bush honeysuckle and the amount of control provided by the herbicides and application technique screened here.

Future work will include the reevaluation of this study at 1 YAT. This data set will be reevaluated using simple and multiple linear regressions in an attempt to predict levels of control using the same variables. The study will be replicated in 2006, with the addition a several other herbicide treatments, to determine if a different physiological variable, such as diameter of stems, could be used to more accurately prescribe herbicide recommendations for bush honeysuckle control in dormant stem applications. A foliar study using the same treatments will also be installed in 2006.

BIOCHEMICAL AND PHYSIOLOGICAL STUDIES ON FLURIDONE RESISTANT HYDRILLA (*HYDRILLA VERTICILLATA*). Atul Puri[1], G.E. MacDonald[1], W.T. Haller[2], M. Singh[3] and D.G. Shilling[4]
[1]Department of Agronomy, [2]Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL
[3]UF Citrus Research and Education Center, Lake Alfred, FL.
[4]Department of Crop and Soil Sciences, University of Georgia, Athens, GA.

ABSTRACT

Hydrilla (*Hydrilla verticillata* L.f. Royle) was introduced to Florida in the 1950s and is one of the most serious aquatic weed problems in the USA. Fluridone is the only US-EPA approved herbicide that provides systemic control of hydrilla. During last the 4-5 years, there has been a decrease in fluridone efficacy for hydrilla control in many lakes. This lead to the discovery of fluridone resistant hydrilla biotypes, with varying levels of resistance. To further characterize fluridone resistance, hydrilla biotypes were collected from different Florida lakes and maintained under natural conditions for a period of one year in absence of fluridone. During this one year period, phenotypic measurements were performed to monitor differences in growth and reproductive physiology. In addition, shoot tips were collected from each biotype at 0, 3, 6, 9, and 12 months after planting and were exposed to 5, 10, 15, 20, 30 and 50 $\mu g\ L^{-1}$ fluridone to assess changes in fluridone susceptibility over time. Regression analysis was performed to calculate EC_{50} values for phytoene and β carotene. EC_{50} (β carotene) values of 9 and 63 $\mu g\ L^{-1}$ fluridone were reported in the susceptible and the most resistant biotype, respectively. There were no significant changes in fluridone resistance in hydrilla biotypes over time. Resistant biotypes were significantly superior or at par with susceptible hydrilla in growth and reproductive parameters. These data indicate the resistance mechanism in hydrilla to fluridone is not deleterious and results in no loss in fitness.

INVESTIGATIONS INTO SUSPECTED RESISTANCE OF ITALIAN RYEGRASS TO GLYPHOSATE IN MISSISSIPPI. Nandula, V.K.[1], T.W. Eubank[1], D.H. Poston[1], C.H. Koger[2], and K. N. Reddy[3]. Delta Research and Extension Center, Stoneville, MS 38776[1], USDA-ARS Crop Production and Genetics Research Unit, Stoneville, MS 38776[2], USDA-ARS Southern Weed Science Research Unit, Stoneville, MS 38776[3].

ABSTRACT

Italian ryegrass (*Lolium multiflorum* Lam.) is an erect winter annual with a biennial-like growth habit. It grows vigorously in winter and early spring and is highly competitive. Recently, unacceptable control of Italian ryegrass with glyphosate has been observed in selected populations in Mississippi. Glyphosate-resistant (GR) Italian ryegrass populations can seriously jeopardize preplant burndown options in minimum and reduced till crop production systems.

Greenhouse studies were conducted at Stoneville, MS in fall 2005 to evaluate response of two Italian ryegrass populations, Tribett and Fratesi, suspected to be resistant to glyphosate. A glyphosate-susceptible population, Elizabeth, was included for comparison. Glyphosate (isopropylamine salt), at 0, 0.11, 0.21, 0.42, 0.84, 1.68, 3.36, 6.72 kg ae/ha was applied to 4 to 6-inch tall (3 to 6 leaves, 2 to 3 tillers) Italian ryegrass plants. Visible injury, 0 indicating no injury and 100% indicating complete plant death, was recorded 4 wk after treatment (WAT). GR_{50} (glyphosate dose required to cause a 50% reduction in plant growth) values for the Tribett, Fratesi, and Elizabeth populations were 0.66, 0.66, and 0.22 kg/ha, respectively. This indicates that both Tribett and Fratesi populations were 3-fold more tolerant to glyphosate compared to the Elizabeth population.

Alternative non-glyphosate-based herbicide options were also evaluated for efficacy on these three populations. Diclofop at 0.56 and 1.12 kg ai/ha, mesosulfuron at 0.015 kg/ha, clethodim at 0.11 and 0.14 kg/ha, nicosulfuron + rimsulfuron at 0.04 kg/ha, glufosinate at 0.47 and 0.58 kg/ha, and paraquat at 0.7 and 0.98 kg/ha were applied to Italian ryegrass plants at two growth stages, small (3 to 4-inch tall, 2 to 3 leaves, 2 to 3 tillers) and large (6 to 8-inch tall, 4 to 5 leaves, 10 to 12 tillers). Glyphosate at 0.84 and 1.68 kg/ha was also included. Glyphosate provided complete control of both small sized and large sized plants of Elizabeth population. Control of Tribett and Fratesi plants with glyphosate was higher in small sized plants (80 to 98%) than in large sized plants (44 to 79%). Diclofop was ineffective on small sized Tribett plants at 0.56 kg/ha rate providing only 38% control. It was ineffective at both 0.56 and 1.12 kg/ha rates on large sized plants of all three populations, with highest control being 61% for Elizabeth. Mesosulfuron effectively controlled (≥88 %) both small sized and large sized plants of all three populations. Glufosinate at 0.47 and 0.58 kg/ha provided ≥90% control of small plants of all populations. When glufosinate rate was increased to 0.58 kg/ha, a significant increase in control of large size Elizabeth plants was observed but not with Tribett. All three populations were highly susceptible (≥96% control) to clethodim, nicosulfuron + rimsulfuron, and paraquat, regardless of herbicide rate or growth. However, it should be noted that this level of Italian ryegrass control with paraquat is uncommon in the field. This is likely due to incomplete spray coverage associated with dense canopy from other weeds.

EVALUATION OF GLYPHOSATE LOCALIZATION IN GLYPHOSATE-RESISTANT HORSEWEED.
W.E. Thomas, C.H. Koger, K.C. Vaughn, and J.W. Wilcut. Crop Science Department, North Carolina State University, Raleigh, NC 27695, Crop Genetics and Production Research, USDA-ARS, Stoneville, MC 38776, and Southern Weed Science Research, USDA-ARS, Stoneville, MS 38776.

ABSTRACT

Glyphosate-resistant horseweed and rigid ryegrass have shown altered glyphosate translocation patterns. Whole plant quantification of glyphosate translocation in glyphosate-susceptible and –resistant weeds has been conducted on these resistant biotypes. However, limited data is available examining tissue and cellular localization patterns of glyphosate. Therefore, our objective were (1) to evaluate glyphosate translocation patterns in whole plants and single leaves of multiple horseweed biotypes and (2) to examine anatomical differences in the crown region of glyphosate treated horseweed biotypes. Different studies were conducted for each objective.

All studies used glyphosate-susceptible and -resistant horseweed biotypes obtained from Arkansas and Mississippi and were grown in culture vessels containing soil-less medium composed of ½ strength Hoagland's solution plus MS vitamin plus 8 g/l agar. In the first objective, ^{14}C-glyphosate and the associated radiolabel quantification techniques were used. Two – one ml droplets containing a total of 1.25 kBq of ^{14}C-glyphosate plus 0.25% (v/v) non-ionic surfactant were applied with a microsyringe near the mid rib on a single horseweed leaf. Plants were harvested at 6, 12, 24, and 48 h after treatment. Treated leaves were rinsed with 5 ml of methanol:water (1:1 v/v) plus 0.25% (v/v) non-ionic surfactant and diluted in scintillation cocktail. Radioactivity was quantified by liquid scintillation spectrometry (LSS). Each treated leaf was divided into six regions using a cork borer: (1) spot ring, (2) secondary ring, (3) tertiary ring, (4) quaternary ring, (5) distal leaf portion, and (6) basal leaf portion. Remaining plant tissue was divided into non-treated leaves, crown, and roots. Parts were dried for 3 d at 70 C, weighed, combusted, and radioactivity quantified by LSS. The treated leaf and crown from one replication were exposed to autoradiographic film for 3 d at –80 C. Studies contained three replications and repeated in time. In the second objective, plants were treated postemergence with 1.12 kg ai/ha of glyphosate. A non-treated of each horseweed biotype was included for comparison. Crown regions of plants were harvest at 7 and 14 d after glyphosate treatment. Following harvest, tissue was processed in 3% glutaraldehyde plus 0.2 M PIPES (pH 7.2) for 2 h, two DI water washed (15 min each), ethanol dehydration (25, 50, 75 and 100%, 15 min each), LR White resin:100% ethanol (1:2 v/v) for 2 h, LR White resin:100% ethanol (2:1 v/v) for 4 h, LR white resin for 3 d, and LR White at 50 C for 3 h. Sections were cut with a microtome and viewed with a light microscope. Sections were antibody labeled with various antibodies for cell wall modifying proteins. Studies contained three replications and were repeated in time.

In the first objective, glyphosate absorption increased over time, regardless of horseweed biotype. Glyphosate was translocated throughout all horseweed biotypes. However, resistant horseweed biotypes showed numerically lower glyphosate translocation from the source leaf to other leaves, crown, and roots. For example, non-treated leaves of susceptible horseweed from Arkansas and Mississippi contained 28 and 42% more ^{14}C-glyphosate at 48 h after treatment, respectively compared to resistant biotypes from both states. The level of statistical significance in these studies may be limited due to the number of replications (2) and experimental runs (2). These data support previous results from multiple publications.

Morphological and anatomical evaluation of glyphosate treated horseweed biotypes revealed several distinct characteristics. After glyphosate application all biotypes were adversely affected, but new shoots began to arise from the crown of glyphosate-resistant plants, ensuring the survival of the plant despite severe damage. A similar phenomenon is found in so-called overcompensation biotypes of other plants that survive insect or animal herbivory. Within the crown of glyphosate treated resistant horseweed, multiple new shoot apical meristems, resembling embryos at early stages, were initiated. Glyphosate-treated susceptible horseweed revealed no new meristematic growth even though this tissue appeared viable many days after treatment. The new meristems in resistant plants were strongly labeled with antibodies to arabinoglacatan proteins and surrounding tissues were labeled with xylogalacturonan antibodies, indicating a site of new wall synthesis and separation from surrounding tissue, respectively. These data suggest that cell wall modification(s), indicated by various antibody labeling, may be allowing horseweed to survive glyphosate applications by directly excluding glyphosate from these new regions or indirectly by using over compensenation as a complimentary mechanism to altered glyphosate transport.

GERMINATION OF HORSEWEED (*CONYZA CANADENSIS L.*) UNDER FIELD CONDITIONS. Thatsaka Saphangthong and W. W. Witt; Department of Agronomy, University of Kentucky, Lexington

ABSTRACT

Conyza canadensis (L) is known as horseweed (WSSA terminology) and marestail in the Mid-South. Horseweed is unique in that it acts as a winter and summer annual with seed germination in the fall through the next summer. The intensive use of herbicides has created a situation in which certain weed species can no longer be controlled by the usual herbicide. Horseweed is one of the most common and troublesome winter annual weed in no-tillage systems. We have little knowledge about winter survival and spring emergence of horseweed under Kentucky condition. A better understanding of horseweed emergence would improve the effectiveness and consistency of weed management systems for crop production. The objective of this study was to evaluate horseweed seedling emergence from fall and spring planting in Kentucky. A field experiment was conducted from October 2004 to October 2005 on Spindletop research farm near Lexington, KY. Two biotypes of horseweed were collected in the fall of 2003. Spindletop biotype from the research farm and Trigg biotype which was collected from a farm field in Trigg County in Western Kentucky. The experimental design was a randomized complete block with two biotypes (Spindletop and Trigg), 8 planting dates (October, November, December, January, February, March, April and May) and 5 replications. Horseweed seeds were planted at the beginning of each month in the middle of each plot at a depth of about 0.5 cm deep. The emergence of horseweeds in the each plot was counted one time per week. The numbers horseweeds emerging were recorded from early October 2004 to October 2005. The height and diameter of horseweeds were recorded near the end of experiment and were determined on 3 randomly selected plants in each plot. The data were first transformed to the natural logarithm of (count + 1/6). Efforts to model the covariance structure of the repeated measures, fraught with problems of very slow convergence to a solution and/or failure to obtain a solution because of "infinite likelihood", led to adoption of the following strategy for obtaining an analysis. To resolve the "infinite likelihood" problem, observed counts that were zero were transformed to log(1/6 + 0.01z) where z is a random standard normal deviate. The model chosen for the covariance structure was the "linear log" structure, "TYPE=SP (LINL)" in the SAS Proc Mixed syntax, as a compromise between goodness of fit and rapidity of convergence to a solution. SAS Procedure IML was then used to compute tests of pair wise differences between each data. The planting month of two horseweed biotypes over all sampling dates showed great emergence for both biotypes. The Spindletop biotype had about two times greater emergence than the Trigg biotype when averaged over all planting dates. Horseweed size was an important factor regulating winter survival. The May planting had lowest number of plants, because of very dry conditions during April and May. The cyclic emergence patterns of the two biotypes were similar. The least emergence occurred between weeks 5 to 7, 16 to 25, and 39 to 48 weeks after the October planting date. Horseweed seeds planted in October and November reached maximum emergence about 5 to 7 weeks after planting and additional plants did not emerge until about 50 weeks later. December planted seeds had an initial emergence about 4 weeks after planting. Horseweed seeds planted in May had low emergence until October; this was attributed to extremely low rainfall during this time. Seed planted at all dates had germination and emergence in October and November of 2005 after rainfall was received on the site. Horseweed height and diameter were not significantly different at any planting dates. From this experiment, a conclusion was made that horseweeds can emerge any time of year and timing of emergence depended on suitable soil and environmental conditions. Horseweed is not a true winter annual, because of germination in summer. Horseweed's life cycle may be regulated by timing of seed shed and availability of resource, rather than for vernalization to bring flowering. Horseweed germinating in the spring did not form a rosette, but did mature and produce seed and our results confirmed this achievement

GERMINATION AND EMERGENCE CHARACTERISTICS OF DOVEWEED (*MURDANNIA NUDIFLORA)*. D.G. Wilson Jr., M.G. Burton, and A.C. York, North Carolina State University, Raleigh, NC.

ABSTRACT

Doveweed has historically been a problematic weed in turf, but it has become increasingly more common in North Carolina row-crop production. This is mostly due to the widespread adoption of glyphosate-resistant crops, which allowed producers to eliminate soil-applied herbicides and abandon tillage and cultivation. Doveweed, and other members of the Commelinaceae, are not adequately controlled with glyphosate programs. Studies conducted on related taxa (tropical spiderwort, *Commelina benghalensis* L.) have shown that the optimal temperature for germination and growth ranges from 30 to 35 C. Doveweed also has been observed to emerge late in the growing season, which subjects it to reduced herbicide exposure, especially in cotton production. To date, there has been little research conducted on its biological characteristics.

Studies were conducted to develop a better understanding of the requirements for doveweed germination and emergence to further develop and improve integrated weed management strategies for this weed. Germination requirements were evaluated under both constant and alternating temperatures, and emergence was evaluated under various burial depths. Separate studies were conducted for constant temperature, alternating temperature, and seed burial depth. The constant temperature studies were conducted on a temperature gradient table, and consisted of temperature treatments of 20, 25, 28, 30, 33, 36, and 38 C. The alternating temperature studies were conducted in growth chambers set a 20/10, 25/15, 30/20, 35/25, 40/30, and 40/35 C (14 hr light and 10 hr dark) with both light and continuous dark treatments. Seed burial depth studies were conducted in a greenhouse (29/23 ± 2 C) in 20-cm pots filled with a sandy loam soil. Treatments consisted of seed burial depths of 0, 0.5, 1, 2, 4, 6, and 10 cm. Pots were sub-irrigated daily to prevent soil crusting. Scarified seed was used in all of the aforementioned studies.

Doveweed germinated equally well under both alternating and constant temperatures. The minimum base temperature required for germination was 20 to 25 C, while the optima was 28 C. Light was not a requirement for germination. Peak emergence was reached at 2 weeks after planting (WAP), regardless of planting depth. Additionally, optimal emergence was between 0 and 1 cm at 4 WAP, and occurred as deep as 4 cm.

Doveweed emergence is severely inhibited by burial. It is likely that greater emergence would occur in a no-tillage or a shallow tillage system compared with a system that incorporates deep tillage. Germination is heavily influenced by temperature, and the southeastern and mid-southern U.S. provides an adequate environment for germination to occur. Additionally, light is a not a major germination factor, explaining why germination has been observed after crop canopy closure.

PITTED MORNINGGLORY GERMINATION AND EMERGENCE IS INFLUENCED BY ENVIRONMENTAL FACTORS AND BURIAL DEPTH. M.J. Oliveira and J.K. Norsworthy; Department of Entomology, Soils, and Plant Sciences, Clemson University, Clemson, SC 29634.

ABSTRACT

Experiments were conducted to determine the effect of light, temperature, solution pH, moisture stress, and oxygen on pitted morningglory germination, and the effect of seeding depth on emergence. Natural light plus incandescent light resulted in lower total germination after 14 d than in darkness. Germination was similar under treatments of red, far-red, red followed by far-red, far-red followed by red, and no pretreatment with artificial light. Germination occurred over a wide range of constant temperatures, from 10 to 52.5 C, with the greatest germination at 25 C. Germination was affected by temperature and solution pH, with optimal germination near a pH of 6 at 15 C and near a pH of 7 at 30 C. Germination decreased with increasing moisture stress, with less than 3% germination at -1.0 MPa. Germination declined with reduced oxygen concentration with 29 and 51% germination at 2 and 20% oxygen, respectively. Emergence averaged 64% for surface-lying seeds, over two soil types, and decreased with increasing burial depth to 4% at 10 cm. These findings add to our understanding of pitted morningglory emergence under field conditions and to the development of more effective management strategies for this troublesome weed.

TEMPORAL EMERGENCE OF PALMER AMARANTH FROM A NATURAL SEEDBANK. P. Jha, J.K. Norsworthy, M.S. Malik, S.K. Bangarwa, and M.J. Oliveira; Department of Entomology, Soils, and Plant Science, Clemson University, Clemson, SC 29634.

ABSTRACT

Palmer amaranth is one of the most troublesome weeds of crops in the southeastern US. Understanding temporal emergence of Palmer amaranth from a natural seedbank is critical to improving integrated weed management strategies. This includes determining the effect of tillage and crop canopy formation on seedling emergence. An experiment was conducted at Pendleton, SC, in 2004 and 2005 on sites with a natural infestation of Palmer amaranth. Tillage treatments were tilled to an approximate depth of 10 cm in early April and mid-May each year. ‘Delta Pine 6880’ soybean (glyphosate-resistant) was planted in 19-cm wide rows over the entire test area on May 21, 2004 and May 18, 2005. Soybean plants were removed from the ‘no soybean’ plots by clipping plants at the soil surface following emergence. Palmer amaranth seedlings were enumerated and removed by hand at least once weekly.

Palmer amaranth emerged from May 10 through October 23 in 2004, with three well defined emergence periods from mid-May through mid-July and one smaller emergence period in mid-August. In 2005, two major emergence periods occurred from mid-May through early June. While the emergence period in 2005 was relatively shorter than in 2004, the number of seedlings that emerged was greater in 2005, likely because of a higher population of seed in the soil seedbank. Total emergence averaged 794 and 939 plants/m^2 in no-tillage plots with soybean during 2004 and 2005, respectively. An average of 1,060 plants/m^2 emerged in no-tillage plots without soybean in 2004 compared to 1,204 plants/m^2 in 2005. Total emergence in tilled plots averaged 737 and 844 plants/m^2 in the presence and absence of soybean, respectively, during 2004. In 2005, Palmer amaranth averaged 1,027 and 812 plants/m^2 in the presence and absence of soybean, respectively. Tillage affected weekly emergence of Palmer amaranth throughout most of the growing season. Soybean presence had no effect on emergence in 2004, but in 2005, emergence was affected by canopy formation from mid-July through August.

ISOTHIOCYANATES SUPPRESS YELLOW AND PURPLE NUTSEDGE. R.L. Blanton, J.K. Norsworthy, M.S. Malik, P. Jha, and M.J. Oliveira; Department of Entomology, Soils, and Plant Science, Clemson University, Clemson, SC 29634.

ABSTRACT

Purple and yellow nutsedge are two of the most troublesome weeds of the world. In the southeastern US, both weeds are common in vegetable crops and are difficult to control. A greenhouse experiment was conducted to evaluate the herbicidal activity of five liquid isothiocyanates (ITCs) (benzoyl, o-tolyl, m-tolyl, tert-octyl, and 3-fluorophenyl) on purple and yellow nutsedge. All ITCs were applied to soil in jars at 0, 100, 1,000, 5,000, and 10,000 nmol g^{-1} of soil and sealed for 72 h to prevent gaseous losses followed by nutsedge growth evaluations after an additional 18 d. All ITCs reduced purple and yellow nutsedge shoot density and shoot biomass over the concentrations evaluated, with differences in effectiveness apparent among compounds on each species. The lethal concentration to reduce purple nutsedge shoot density by 50% (LC_{50}) ranged from 1,179 nmol g^{-1} of soil for 3-fluorophenyl ITC to 3,762 nmol g^{-1} of soil for o-tolyl ITC. For yellow nutsedge, the LC_{50} for shoot density ranged from 2,402 nmol g^{-1} of soil for benzoyl ITC to 7,535 nmol g^{-1} of soil for m-tolyl ITC. Based on LC_{50} values for shoot density, all ITCs were more effective in suppressing purple nutsedge than yellow nutsedge. At 10,000 nmol g^{-1} of soil, 3-fluorophenyl ITC reduced shoot density by 99%. Benzoyl and 3-fluorophenyl ITCs were generally the most effective of the five ITCs evaluated.

RICE (*Oryza sativa* L.) CULTIVAR RESPONSE TO GLYPHOSATE DRIFT AS INFLUENCED BY GROWTH STAGE. J.R. Meier, K.L. Smith, R.C. Doherty, and M.B. Kelley; University of Arkansas Division of Agriculture, Monticello, AR., and R.C. Scott; University of Arkansas Division of Agriculture, Little Rock, AR.

ABSTRACT

Glyphosate resistant crop acreages continue to increase in Arkansas as well as drift injury to non-glyphosate resistant crops, especially rice. A study was conducted to identify potential differences in tolerance between several rice varieties to low levels of glyphosate. Experiments were conducted at the Southeast Research and Extension Center in Rohwer, AR on a Sharkey clay soil and at the UAPB Lonoke Farm in Lonoke, AR on a Lonoke silt loam soil in 2005. Drew, Lagrue, Cocodrie, CL-161, CL-XL8, Wells, Bengal, Katy, Banks, and Francis cultivars were grown under normal rice culture and treated with 0 kg ae/ha, 0.045 kg ae/ha, and 0.09 kg ae/ha of glyphosate at the 3-4 leaf, ¼ inch internode elongation (IE), and boot stages of growth. Visual injury (0-100%), % heading by date, and flag leaf length (cm) were recorded for all treatments. Yields were obtained using a small plot combine. Yield data from these trials may be confounded due to severe lodging sustained from late season hurricane winds and rainfall. Therefore, only yield results from the Lonoke location will be discussed.

Visual injury in the form of chlorosis and stunting increased as the rate of glyphosate increased, and was more evident at the 3-4 leaf and ¼ inch IE applications. Following the 3-4 leaf application, heading of Cocodrie was delayed three days with the 0.09 kg ae/ha application at Rohwer and Lonoke, and with the 0.045 kg ae/ha application at Lonoke. CL-161 and Katy were delayed seven days and CLXL-8 was delayed five days from the 0.09 kg ae/ha application at Lonoke. There was no difference in flag leaf length from either rate within varieties with the 3-4 leaf application at Rohwer. However, at Lonoke, flag leaf length was reduced in Lagrue, Wells, Bengal, Banks and Francis with the 0.09 kg ae/ha application and Drew was reduced by both application rates. CL-161 had an increased yield over its respected untreated check from both application rates, and Bengal had a yield reduction from both application rates at this timing.

At the ¼ inch IE application stage, heading of Francis at the Rohwer location was not delayed by either rate. However, heading was delayed 3 to 14 days in all other varieties following the 0.09 kg ae/ha application and from 3 to 5 days from the 0.045 kg ae/ha application in Drew, Lagrue, CL-161, Bengal, and Banks at this location. Heading at the Lonoke location was only delayed 3 days by the 0.09 kg ae/ha application in Cocodrie, and was delayed 3 days with both application rates in CL-161 and Banks. Flag leaf length of Cocodrie, CLXL-8, Wells, and Bengal was reduced at Rohwer by both application rates and by the 0.09 kg ae/ha rate in Banks. Flag leaf length of CL-161 and Katy was reduced in Lonoke by both glyphosate rates and in Drew and CLXL-8 at the 0.09 kg ae/ha rate. Bengal and Francis were not evaluated at this timing due to a misapplication. Cocodrie was the only variety to have a yield decrease from the 0.09 kg ae/ha application, and no decrease in yield was observed from the 0.045 kg ae/ha application.

Heading was delayed past harvest with all varieties and application rates at the Rohwer location following the boot application. Bengal was the only variety to reach 100% heading at harvest at the Lonoke location. Flag leaf length was reduced in all varieties by 70% to 100% following the 0.09 kg ae/ha rate and by 55% to 75% from the 0.045 kg ae/ha rate at Rohwer. At Lonoke, flag leaf length was reduced by 60% to 90% with the 0.09 kg ae/ha rate and by 40% to 70% with the 0.045 kg ae/ha rate. Bengal was the only variety at the Lonoke location that did not sustain a reduction in flag leaf length from the 0.045 kg ae/ha application, but a reduction was sustained by this variety in response to the 0.09 kg ae/ha rate. Yield was reduced in all varieties from the 0.09 kg ae/ha application and only with Drew, Cocodrie, CL-161, Wells, Katy, Banks, and Francis from the 0.045 kg ae/ha application. Yield of Lagrue, CLXL-8 and Bengal was not affected by the 0.045 kg ae/ha application at this timing.

There is not a variety from this trial that can be selected as glyphosate resistant or as glyphosate tolerant. Until glyphosate resistant rice cultivars can be marketed we will have to rely on information from trials like this one. In further research I hope to develop correlations between flag leaf length, delayed heading and yield between varieties as influenced by glyphosate rate.

GLYPHOSATE AS A MODEL FOR PHOTOASSIMILATE TRANSLOCATION IN GLYPHOSATE-RESISTANT FLEX COTTON. W.E. Thomas, W.J. Everman, B. Sheldon, C.H. Koger, and J.W. Wilcut. Crop Science Department, North Carolina State University, Raleigh, NC 27695, and Crop Genetics and Production Research, USDA-ARS, Stoneville, MS 38776.

ABSTRACT

Studies were conducted to evaluate absorption and translocation of ^{14}C-glyphosate as influenced by a single Pix (mepiquat chloride) application using ^{14}C-glyphosate and Roundup Ready Flex cotton as a model system for photoassimilate (sucrose) movement. Multiple researchers have shown that translocation patterns of glyphosate and sucrose were similar. In addition, ^{14}C-glyphosate offers fewer experimental complications compared to sucrose since glyphosate is only marginally metabolized. Cotton was grown in a plastic greenhouse maintained at 30 $\pm$ 2 C. A factorial treatment design was used with two factors. The factors were plant growth regulator application [none and Pix at 16 oz prod/acre at first bloom] and ^{14}C-glyphosate spot treatment at timings of 0, 7, 14, and 21 days after Pix application. Treatments were replicated four times and the experiment was repeated in time. ^{14}C-glyphosate was applied in 10-one μl droplets on the youngest most fully expanded leaf (mainstem leaf number 8-11, depending on time of ^{14}C application). All plants were harvested 14 days after the respective ^{14}C-glyphosate application timing. Plants were divided by node, position within each node, and plant part within each position. Roots were also collected. All plants were mapped for boll retention prior to harvest. Plant height, leaf area, and fresh and dry weight of plant parts were recorded. Glyphosate absorption was determined by rinsing the treated leaf with 10 ml of a methanol:water (1:1, v,v) plus 0.25% (v/v) non-ionic surfactant solution. A one ml aliquot was taken to quantify absorption. Plant parts were dried, weighed, and combusted in a biological sample oxidizer. Radioactivity was quantified using liquid scintillation spectrometry.

Absorption of ^{14}C-glyphosate and cotton height was not influenced by Pix or ^{14}C application timing. Only data from five nodes of the plant [node subtending the treated leaf (designation node 1), one node below the treated leaf (designated node 2), and three nodes above the treated leaf (designated nodes 3 to 5)] are discussed. Regardless of Pix treatment, leaf area decreased with increasing nodal position vertically up the plant and laterally outwards on a reproductive branch. Glyphosate translocation followed a general source to sink relationship. For example, the greatest amounts of radioactivity were translocated to expanding tissue like leaves, stems, and bolls of reproductive branches. No significant differences between Pix treatment and ^{14}C timing for dry biomass accumulation were apparent with two of the five nodes (designation nodes 1 and 5). Dry biomass accumulation was greater in bolls subtending the first position on nodes 2 and 3 of Pix-treated plants. In addition, the mainstem leaf two nodes above the treated leaf of Pix-treated plants accumulated lower biomass compared to non-treated plants, potentially due to the reallocation of resources. For ^{14}C-glyphosate accumulation, significant differences in translocation were observed with a Pix application for the second position on all three nodes above the treated leaf. The level of significance varied between parts on the second position of each fruit branch. For example, ^{14}C-glyphosate accumulation in the stem of the second position of Pix treated plants increased 41% while the leaf and boll of the second position of Pix treated plants increased numerically by 22 and 59%. Similar increases in ^{14}C-glyphosate accumulation in Pix treated plants compared to non-treated plants were observed for the leaf and stem of the second position on node 4 and the leaf and boll on the second position of node 5. These data indicate that Pix may alter translocation patterns of glyphosate, which may be indicative of altered sucrose translocation.

SEED GERMINATION AND VIABILITY EFFECTS IN RESPONSE TO GROWTH HORMONES AND HERBICIDES. J.L. Alford and L.R. Oliver; University of Arkansas, Fayetteville, AR.

ABSTRACT

No-till production has offered the opportunity to reduce future weed problems. Because the soil in no-till production is undisturbed, only seed in the top 1 to 2 inches of soil will probably germinate. Therefore, if we could force new seed lying on the soil to germinate or make it non-viable, then seedbank reserves could be reduced. Based on this hypothesis the focus of this study was to determine the effect of treating weed seed with growth hormones or herbicides to initiate a germination response or reduce seed viability.

During the fall of 2004 and 2005, sicklepod (*Senna obtusifolia*) seed were harvested at full fruit maturity. A sample of seed was evaluated before the study was initiated to ensure proper seed viability. Thirty seed were placed on the surface of moistened soil in three-inch diameter pots. Seed were treated with growth hormones or herbicides at four application rates (1/2x, 1x, 2x, and 4x of the recommended use rate). Treatments applied and suggested use rates were gibberellic acid (9 oz/A) + UAN, ethephon (0.039 % v/v), dicamba (8 oz/A) + UAN, 2,4-D (12 oz/A) + UAN, and glyphosate (22 oz/A). Untreated seed were used for germination comparisons. Seed were allowed to dry and were transferred to a growth chamber adjusted to normal fall temperatures (75 to 85 F). Germinating seed were counted every 5 days over a 45-day period. The remaining non-germinating seed were separated from the soil using small soil screens and placed in a growth chamber at an optimum growth temperature of 30 C to test for changes in viability.

Data analysis suggested that seed treated with gibberellic acid (4x and 1x) rates had higher percentage germination than the ethephon (1x) and untreated seed. All other treatments had similar germination. However, the highest germination of seed treated with the 4x rate of gibberellic acid was only 3 % greater than the untreated seed, which is well below desired standards. Seed viability was >90% in all treatments, indicating that applications of growth hormones and herbicides do not affect seed viability at the evaluated application rates. However, visual evaluation of seed treated with 2,4-D and dicamba reflected the imbibition of herbicides by the seed. These seed had significantly swollen hypocotyls and were stunted in size.

In conclusion, applications of growth hormones or herbicides following crop harvest do not provide an effective method for reducing future seed populations. However, 2,4-D and dicamba have the potential to control the seedling after they have germinated, which should be further evaluated by future research.

INFLUENCE OF SPRAY CARRIER PH ON ABSORPTION AND TRANSLOCATION OF TRIFLOXYSULFURON IN PALMER AMARANTH (*AMARANTHUS PALMERI*) AND TEXASWEED (*CAPERONIA PALUSTRIS*).

M.A. Matocha[1], L.J. Krutz[2], S.A. Senseman[1], C.H. Koger[2], and K.N. Reddy[2]; [1]Texas A&M University, College Station, TX; [2]USDA-ARS, Stoneville, MS

ABSTRACT

Spray carrier pH affects the solubility of sulfonylurea herbicides and therefore could affect absorption and translocation of these compounds in weeds. The objective of this study was to evaluate the absorption and translocation of foliar-applied ^{14}C-trifloxysulfuron in Palmer amaranth and Texasweed at pH 5, 7, and 9 over a period of 4 to 72 h after treatment (HAT). For absorption, effects of time, species, and pH were significant. Absorption averaged over species and pH increased logarithmically from 4 to 72 HAT. Absorption was greater for Palmer amaranth (88%) than for Texasweed (29%) when averaged over time and pH. Absorption averaged over species and time increased in the order of pH 5 (52%) < pH 9 (60%) = pH 7 (61%). The main effects and interaction among harvest interval, species, and pH were significant for the translocation of ^{14}C-trifloxysulfuron. At 24 HAT, translocation was greater in Palmer amaranth compared to Texasweed at all pH levels and harvest intervals. Altering pH did not affect the translocation of trifloxysulfuron in Palmer amaranth. In contrast, translocation of ^{14}C-trifloxysulfuron in Texasweed at 72 HAT increased in the order of pH 5 (5%) < pH 7 (10%) = pH 9 (10%). These data indicate that absorption and translocation of trifloxysulfuron in some weed species may be enhanced by increasing the pH of the spray solution by two pH units above the pK_a.

ABSORPTION AND TRANSLOCATION OF BISPYRIBAC-SODIUM IN BARNYARDGRASS (*ECHINOCHLOA CRUS-GALLI*). D.M. Dodds, D.B. Reynolds, M.C. Smith, and J.H. Massey; Department of Plant and Soil Sciences, Mississippi State University, Mississippi State, MS 39762.

ABSTRACT

Experiments were conducted to determine the effect of surfactant and time on absorption and translocation of bispyribac-sodium in barnyardgrass. Barnyardgrass plants were grown under greenhouse conditions in 40 cm^3 sub-irrigated Conetainers. The following adjuvant systems (and rates) were included: Dyne-Amic (0.25 % v/v), Dyne-Amic plus 32% urea ammonium nitrate (UAN) (0.25% and 2% v/v), Dyne-A-Pak (2% v/v), Kinetic HV (0.25% v/v), Kinetic HV plus Coron 25-0-0 (0.25% v/v + 2.34 L/ha), and Kinetic HV plus 32% UAN (0.25% and 2% v/v). Bispyribac-sodium was applied to 25 cm plants with two to three tillers. The center 2.5 cm of the second true leaf of each plant was covered while remaining exposed plant tissue was treated with bispyribac-sodium at 22 grams active ingredient per hectare. Following this application, radiolabelled herbicide was applied to the second true leaf, in the non-treated area. Samples of treated leaves, other remaining leaves, and roots were collected 6 and 24 hours after application. Results of the initial experiments indicated absorption and translocation was unaffected by time. Mean absorption was greatest with Dyne-Amic plus 32% UAN and Dyne-a-Pak at 80 and 74% of applied ^{14}C bispyribac-sodium, respectively. Translocation to untreated leaves and roots was also highest with these treatments. All other adjuvant systems provided less than 47% absorption. However, the addition of 32% UAN to Dyne-Amic and Kinetic HV treatments resulted in approximately a five-fold increase in absorption compared to treatments without UAN.

Additional experiments were conducted to determine when maximum absorption and translocation occurred. Materials and methods for the follow-up study were similar to the first study; however, the only adjuvant system utilized was Dyne-Amic plus UAN (0.25% and 2% v/v). The adjuvant system was selected based on the amount of absorption in the previous study and user availability. Also, plants were divided into a greater number of fractions in order to determine translocation patterns. Plant fractions in the second study included: treated area, leaf tissue from treated area to the leaf tip, leaf tissue from the treated area to the collar region, remaining leaves from collar of treated leaf upward, remaining leaves from collar of treated leaf downward to soil line, and roots. Plants were harvested at the following time intervals to determine when maximum absorption and translocation was occurring: 0.5, 1, 2, 3, 6, 12, 24, 48, and 96 hours. Recovery of ^{14}C bispyribac-sodium generally decreased as time after application increased; however, recovery was 86% or greater for all time intervals. The decrease in recovery with time may be due to more ^{14}C bispyribac-sodium being partitioned into the roots. Not all portions of the roots were able to be excised from the soil during root washing. Data analysis indicates that 68% of applied ^{14}C bispyribac-sodium was absorbed 12 hours after treatment. ^{14}C bispyribac-sodium was portioned in the plant in the following manner: 48% in the treated area, 10% in leaf tissue from treated area to leaf tip, 2% in leaf tissue from treated area to collar region, 2% in remaining leaves from collar of treated leaf upward, 5% in remaining leaves from collar of treated leaf downward to soil line, and 1% in the roots. These data indicate that maximum absorption is achieved 12 hours after application and therefore, bispyribac-sodium should be rainfast at this time. Significant increase in translocation to plant fractions other than the treated leaf was observed as time after application progressed beyond 12 hours.

GLYPHOSATE AND IMAZAPYR ACTIVITY AND TRANSLOCATION IN TORPEDOGRASS (PANICUM REPENS L.). G.E. MacDonald, K.A. Langeland, A. Puri, and R. Querns; University of Florida, Gainesville, FL.

ABSTRACT

Torpedograss is a continuing major problem in Florida and millions of dollars are spent annually for control, often with highly variable results. Herbicidal efficacy is often influenced by environmental factors including water stress from drought or flooded conditions. Torpedograss is found under both of these water extremes, but there is limited research on herbicide efficacy as a function of soil moisture for torpedograss control. When flooded, the exposed surface area of torpedograss is reduced and may influence the amount of aerially applied herbicide that comes in contact with the plant. Additionally, if translocation is reduced under flooded conditions treatment efficacy may be reduced. Currently, there has been limited research into this phenomenon. Therefore, greenhouse studies were conducted to evaluate the influence of moisture stress on herbicide efficacy in torpedograss. Additional studies were also performed on the uptake and movement of radiolabeled imazapyr and glyphosate under non-submerged and submerge conditions, with treatments occurring at the mother or a distal shoot tip. Plants for both studies were collected from Lake Okeechobee and established in 3L pots under greenhouse conditions. Plants were allowed to grow for 6 to 8 weeks and treated when shoot regrowth after final clipping began to form rooting shoots. Treatments included glyphosate at 0.0, 0.5, 1.0, 2.0, and 4.0 lbs-ai/A or imazapyr at 0.0, 0.125, 0.25, 0.5, or 1.0 lbs-ai/A. Treatments were applied to plants under three environmentally imposed conditions; 1) flooded - roots and rhizomes submerged, water level at the top of the pot; 2) well watered plants - pots watered to field capacity; and 3) drought stressed plants - plants treated when the first visible signs of wilting begins. Plants were grown under normal conditions and placed under these imposed conditions 3 to 7 days to treatment. One week after treatment the plants were returned to optimum water status (that used during establishment phase). Visual assessment of treatment efficacy (0 = no injury to 100 complete control/plant death) was taken 2 weeks after treatment. Above ground biomass was removed 2 weeks after treatment and the plants allowed to regrow for four months. After this time, plants were harvested, separated into above and below ground biomass, dried at 60F and dry weights (g) determined. For the radiolabeled studies, uptake and translocation was conducted under simulated dry and aquatic conditions. Plants were allowed to grow until rhizomes extend from the pot into the water column (aquatic) to simulate mature plants in the natural environment. Plants were treated under simulated aquatic (as described above) or terrestrial conditions. In addition, plants were treated so that herbicide applications occurred to the mother plant (potted plant) or the extended shoot. Treatments included non-labeled glyphosate at 2.0 lbs-ai/A or imazapyr at 0.5 lbs-ai/A. Applications (5 - 5uL droplets) of radiolabeled material were made to a single mature leaf on each plant. Two levels of radioactivity was used - 300,000 and 600,000 dpm/plant. After 10 days the plants were removed, soil washed from the roots and placed on blotter paper to dry. The dried specimen was placed on X-ray film for 40 days to allow for auto-radiograph development. There were very few differences observed in the soil moisture study, either as a function of herbicide used or environmental regime. Glyphosate appeared to provide better control under dry conditions, as evidenced by higher visual ratings and lower shoot regrowth. However, control from glyphosate was less than that observed with imazapyr. Imazapyr was most effective under flooded conditions, contrary to previous research. In the radiolabeled studies, both herbicides translocated effectively when not submerged, but there was limited movement when applications were made to tissues submerged in water. As in previous studies, movement stops when the phloem reaches the water line. Phloem cells move materials through a process called mass flow, which involves active loading and unloading of carbohydrates. This process uses energy derived from respiration, which is an energy dependent mechanism that uses oxygen. More than likely, the phloem cells underwater are being deprived of oxygen and therefore shut down/inactive. This would lead to activity and accumulation in regions in the air, but no activity in the water due to anoxic conditions.

SEX RATIO VARIABILITY IN PALMER AMARANTH. M.G. Burton and A.C. York; Crop Science, NC State University, Raleigh, NC.

ABSTRACT

During late summer 2005 hundreds of soybean and cotton fields in the Piedmont and Coastal Plain of North Carolina were searched for suspected glyphosate-resistant populations of Palmer amaranth (*Amaranthus palmeri*). Among the georeferenced populations were 256 populations for which sex identification was performed and had ≥ 25 individuals. Although data on herbicide treatments was not available for these populations, all surveyed fields were assumed to have been treated at least once with glyphosate in 2005 prior to the survey because of the popularity of glyphosate-resistant cotton and soybean. In total > 20,000 plants were assessed. Male to female ratios averaged 1.5 and a histogram gave skewness and kurtosis values of 2.15 and 3.67, respectively. Thirty-five of the 256 populations had male to female ratios ≥ 2.0 and three populations had ratios > 4.0. Whether the observed variability in sex ratio is related to glyphosate-resistance in Palmer amaranth is unclear since no known control (historically untreated with glyphosate) populations were surveyed. While variability in sex ratios among dioecious populations has been observed for many species, extraordinarily male-skewed sex ratios are puzzling because of the obvious implications for reproductive output. However, the large potential fecundity of even a solitary surviving female (and the potential for hybridization with other *Amaranthus* spp.) could allow such populations to persist for many years.

MULTI-YEAR EVLAUATION OF RECIPROCAL OUTCROSSING RATES BETWEEN SELECTED RICE CULTIVARS AND RED RICE TYPES AT STUTTGART, ARKANSAS. D.R. Gealy[1], L.E. Estorninos, Jr[2], and N.R. Burgos[3]. USDA-ARS, Dale Bumpers-National Rice Research Center, Stuttgart, AR[1], University of Arkansas, Stuttgart, AR[2], and University of Arkansas, Fayetteville, AR[3]

ABSTRACT

In Arkansas various reports and observations have long indicated that hybridization between rice and red rice in farm fields can occur with either of these rice types serving as the pollen donor (male) or pollen acceptor (female). Reliable measurements of the outcrossing rates between rice and red rice have been problematic because these rates are often near the lower limits of detection, depending on the particular local environmental conditions in a given year. Experiments were conducted in isolated field plots (typically 2 or 4 m wide by 5 m long) from 2000 to 2004 to determine reciprocal outcrossing rates between pairs of diverse rice cultivars and red rice biotypes growing in adjacent drill rows. Seed from individual plots containing the rice cultivars and red rice biotypes was harvested and stored separately. In 2005, this seed was planted in long (~13 m) drill strips and the resulting seedlings were observed for the presence of phenotypic traits expected in F_1 hybrids (e.g. from preliminary observations, hybrids growing in rice plots were easily distinguished by their pubescent leaves and tall heights; hybrids derived from awned blackhull red rice and growing in red rice plots were easily distinguished by their purple colored stems and pink colored awns). Plants exhibiting an expected hybrid phenotype were sampled for subsequent DNA SSR marker analysis. Preliminary results based only on phenotypic traits indicate that outcrossing rates varied greatly across years and among the rice cultivar-red rice biotype pairs. From 2000 to 2004, outcrossing rates in plots seeded with Kaybonnet rice and #8 awned blackhull red rice ranged from 0.03% to 0.79% and averaged 0.36% when red rice served as the pollen donor. However, when rice served as the pollen donor, outcrossing rates ranged from 0.03% to 0.13% and averaged only 0.07%. By contrast, outcrossing rates in plots seeded with Cl-121 imidazolinone-resistant rice and StgS strawhull red rice were 0.06% each year when red rice served as the pollen donor, and ranged from 0.006% to 0.05% with an average of 0.03% when rice served as the pollen donor. Thus, outcrossing rates among years varied by more than an order of magnitude and generally were much greater when red rice served as the pollen donor. The highest outcrossing rate observed for any imidazolinone-resistant rice was 0.54%, with awned #8 blackhull red rice serving as the pollen donor to Cl-161 rice in 2004. DNA SSR marker analyses of all putative hybrid phenotypes are underway to confirm the presence of the expected parental alleles.

INTRASPECIFIC VARIABILITY IN THE ALS GENE OF RED RICE. V.K. Shivrain, N.R. Burgos, S.N. Rajguru, and M.A. Sales; University of Arkansas, Fayetteville, AR 72704.

ABSTRACT

Acetolactate synthase (ALS) inhibitor herbicides have been a boon to weed management in various crops, but their propensity to select resistant weed populations is a big drawback. Continuous use of imidazolinone herbicides in Clearfield® rice (*Oryza sativa*) will increase the selection pressure on red rice (*O. sativa*), which can give rise to imidazolinone-resistant red rice.

Determining the genetic variability in the ALS gene of red rice will help in predicting the propensity of different red rice populations to develop resistance to the imi-herbicides. In this study, we investigated the intraspecific variability in the ALS gene among morphologically different red rice accessions.

Five red rice accessions representing an assortment of characteristics-- black, gold, and straw hull colors; short and tall; awned and awnless-- were selected to study their ALS gene. Leaf tissues were harvested from each accession at the two- to three-leaf stage. DNA was extracted using a modified CTAB protocol. Five primer pairs were used in the polymerase chain reactions (PCRs) to amplify overlapping segments of the ALS gene. Primer design was based on the ALS gene sequence of *Oryza sativa*. PCR was done twice using the same template DNA to assure reproducibility of each amplified DNA fragment. In order to sequence the ALS gene fragments, the PCR-amplified DNA was cloned. To confirm their similarity to previously characterized ALS genes, the ALS gene sequences of the five red rice accessions were compared to the ALS gene sequences of rice cultivar “Bengal” and Stuttgart strawhull red rice .

The red rice ALS gene is composed of 1935 base pairs, similar to Bengal and Stuttgart strawhull red rice. Of the 1935 nucleotides, 42 (2.17%) were polymorphic. Polymorphism among red rice accessions ranged from 0 to 14 nucleotides with respect to Bengal ALS. Polymorphism was observed across the entire ALS gene. Most of the nucleotide substitutions led to a change of amino acids. Maximum amino acid mutations (11) were found in gold hull accession, which was phenotypically very different from all other red rice accessions in this study and was morphologically closer to cultivated rice. The amino acid mutations we found in the red rice ALS gene have not been reported as the basis for resistance to any ALS-inhibitor herbicides in other species. However, similar amino acid substitutions at other positions in the ALS gene have been found responsible for resistance in some weed species. In terms of homology in the ALS gene, brownhull has an amino acid sequence identical to Bengal. Strawhull accessions are very close to Bengal, whereas black and gold hull are relatively distinct from Bengal.

The presence of variability in the ALS gene of morphologically different kinds of red rice indicates that there is some genetic diversity in red rice ALS, which may give red rice a propensity to select tolerant individuals and develop resistant populations.

UPDATE: ARKANSAS GLYPHOSATE-RESISTANT COMMON RAGWEED. C.E. Brewer, L.R. Oliver, and R.C. Scott; Department of Crop, Soil, Environmental Sciences, University of Arkansas, Fayetteville, 72704.

ABSTRACT

In 2004 common ragweed (*Ambrosia artemisiifolia*; AMBEL) plants that survived multiple in-crop glyphosate applications were found in an 8-ha no-till soybean field, in Jackson Co., AR. Screening of transplanted seedlings indicated a high probability of increased glyphosate tolerance compared to a known susceptible from Fayetteville (S_1). Greenhouse experiments to determine the LD_{50} for two susceptible and the suspected resistant (R) populations were initiated. Seed from S_1 and seed obtained via a commercial source (S_2) were used as known susceptible populations. Trials consisted of eight glyphosate rates ranging from 0.084 to 15 kg ae ha^{-1} applied at 3- to 4-node AMBEL (7 to 12 cm), three populations, and six replications. Data were then subjected to probit analysis using SAS with a 95% confidence interval. The analysis showed that the LD_{50} for S_1 and S_2 plants was nearly identical (0.36 and 0.32 kg ae ha^{-1}); however, the LD_{50} for the R population was 3.5 times higher at 1.29 kg ae ha^{-1}.

An agronomic interference study initiated in 2005 consisted of five AMBEL densities (0, 3, 6, 12, and 24 plants m row^{-1}) and two ecotypes (S_1 and R). Soybean was planted on a 1-m row spacing and thinned to 271,000 plants ha^{-1}. Seeds of the S_1 and R ecotypes were planted within 3 cm of the row the same day as the soybean and were also thinned following emergence. Soybean yield was taken following full-season interference. R AMBEL infestation can cause yield loss at 3 plants m row^{-1} and the R ecotype was more competitive than S_1 ecotype.

Comparative growth analysis was initiated to determine the relative fitness of S_1 and R ecotypes. This study was conducted by growing one plant per ecotype in a 19-L bucket and harvesting whole plants weekly from 2 to 8 weeks after emergence (WAE) with six replications per treatment. Leaf area, fresh and dry weight, node number, and height were obtained from each plant. R plants accumulated 30% more biomass than the S_1 plants (71 and 54 g), were 26% taller (43 and 34 cm), and had a 12% higher leaf area ratio (90 and 80 cm^2 g^{-1}) when averaged over harvest dates. R plants had nearly 30% more leaf area than S_1 plants by 4 WAE and maintained that margin through 7 WAE. Peak leaf area for R and S_1 ecotypes occurred at 7 WAE with 7,100 cm^2 and 5500 cm^2, respectively.

Control studies were initiated to determine the best preplant and in-crop herbicide options for AMBEL in no-till soybean. Applications of preplant herbicides were made 30 d prior to soybean planting at full label rates for the sandy loam soil type. At 20 d after application (DAA) glufosinate, paraquat, metribuzin, and 2,4-D + sulfentrazone + chlorimuron controlled glyphosate-resistant AMBEL >95%. However, by 30 DAA dicamba provided >95% control. Soybean yield was not taken due to non-irrigated conditions and a severe season-long drought. When applied at the full labeled rate to 2- to 4-node (15 to 20 cm) greenhouse-grown, AMBEL chlorimuron, cloransulam-methyl, bentazon, fomesafen, acifluorfen, and lactofen resulted in >95% biomass reduction compared to an untreated check. However, later applications at 6 to 8 nodes (20 to 30 cm) reduced biomass only 50 to 75%, with fomesafen and lactofen providing the best control.

These trials indicate that there is glyphosate-resistant AMBEL in Arkansas. AMBEL can reduce soybean yield at three plants m row^{-1}, but it can be controlled at 2- to 4-node growth stage with a variety of herbicides. There are differences in the growth habit of AMBEL ecotypes that explain the different levels of interference between R and S_1 plants.

DYNAMIC RETRIEVAL OF WEED MANAGEMENT INFORMATION THROUGH DATABASE APPLICATIONS. W. Zhang, E. P. Webster, and S. T. Kelly. Louisiana State University AgCenter, Baton Rouge, LA 70803.

ABSTRACT

Weed management information is presented traditionally in printed formats (i.e. books) or recently in electronic formats (i.e. PDF files). These formats are static, suitable only for simple data retrieval. When information that involves multiple criteria is needed, data retrieval becomes more difficult and time-consuming. As timely weed management decisions are often based on multiple factors, a dynamic data retrieval system is needed. In 2005, a MS Access database application was designed with a unique query by form (QBF) data retrieval system for weed management information in Louisiana crops. The main source of information for the database is '2005 Louisiana Suggested Chemical Weed Control Guide'. Additional information was added to enhance the functionality of the database application.

The database application has several unique features:

1. It is very easy to use. No database knowledge is needed. The basic operation only involves clicking buttons and selecting query criteria. If there is an error in operation, a warning message will appear to instruct the user.
2. A database switchboard is used to make it easy to switch from one component to another.
3. The query results are automatically displayed in pre-designed reports.
4. The reports can be saved in the database or exported in different formats for further use or electronic delivery to clients.

The database application has seven components featured with QBF design:

1. Herbicide Options: It allows a user to find herbicide options according to the user-defined circumstances. Query criteria can be set on crop type, application timing, and up to 10 weed species within the crop. Control level requirement for each species can also be set. The query results are automatically displayed in the 'Herbicide Recommendation Report' with all herbicide options (trade names and rates) being listed for the weed species at the required control levels.
2. Herbicide Product Scanner: A user can use this component to find specific information about an herbicide product. By selecting an herbicide product (trade name) under a crop and submitting the query, the 'Herbicide Product Scanner Report' will be formed displaying information such as herbicide trade and common name, recommended rate, recommended application timings, cautions regarding its use, and weeds evaluated and the associated control ratings.
3. Herbicide Knowledge Base: By selecting an herbicide by its common name and submitting the query, a user can use this component to find information such as its chemical family, site of action, general symptoms, as well as how this herbicide is used in different crops in terms of trade name, formulation, rate, application timing, major weeds controlled, and cautions regarding its use. The query results are displayed in the 'Herbicide Knowledge Base Report'.
4. Other components: To enhance the functionality of the database application, four other components are included: Weed Management References for control options of a specific weed in different crops; Herbicide Label for current herbicide label information; Calibration Guide for calculations involving various herbicide application aspects; Drift ID Guide for identification of herbicide drift symptoms in different crops; and Weed ID Guide for identification of weeds at early growth stages in different crops.

In conclusion, this database application demonstrates much greater functionality and efficiency compared with the traditional formats; therefore, it has great potential to be used as a weed control information management and retrieval tool.

USE OF RADIO SPOTS FOR DISSEMINATING TROPICAL SODA APPLE CONTROL INFORMATION.
J.J. Mullahey and J.A. Ferrell; University of Florida, Milton and Gainesville, FL.

ABSTRACT

Tropical soda apple (*Solanum viarum* Dunal.) is an invasive weed that continues to spread throughout Florida and the southeastern U.S. This exotic weed displaces desirable pasture grasses which significantly reduces the carrying capacity and lowers ranch profitability. Tropical soda apple (TSA) is rapidly spread across the landscape by numerous seed dispersal methods. Ranchers purchasing hay, grass seed, cattle, and sod need to insure that these products are not contaminated with TSA. Currently, BMP’s developed by the University of Florida, IFAS are available for controlling TSA along with ideas on prevention and scouting. Control information has been disseminated to landowners using traditional delivery approaches (extension publications, grower meetings, trade magazine articles, posters, regional meetings, Florida Cattlemen Association meetings, etc). Unfortunately in Florida, many ranchers and landowners (state owned lands, federal property) are missed by these extension approaches and new approaches that reach all cattlemen in Florida are needed. In particular, small and medium size operations are less inclined to participate in extension activities or to be a member of the Florida Cattlemen’s Association. To reach a larger segment of the cattle industry radio programs (1-2 minute spots) were produced that deliver educational information on biology, ecology and control of TSA to help educate all of Florida’s cattlemen. Radio spots were produced by the Southeastern Ag Net Company and broadcast over the Ag Net’s radio network in Florida. TSA radio spots focused on control, biology, ecology, and regulatory issues and they were developed using interviews of university experts, cattle industry leaders, regulatory agency personnel, and chemical industry representatives. Radio stations from across the state played these educational announcements and ranchers/landowners were asked if they had listened to the radio spots and could they recall any of the information. Since 2003, twenty one radio spots have been aired on radio stations that cover 90% of the cattle population areas in Florida. These stations have reached millions of people throughout Florida. These radio spots aired from the Fall through the Spring seasons when TSA is actively growing in Florida. Initial feedback from producers about the radio spots has been very positive. Producers hear the radio spots during the morning agricultural programming and they have increased their knowledge on herbicide recommendations, fruit/seed production, cattle shipping, prevention strategies, etc. Producing and airing radio spots is costly but it has proven to be an effective venue for disseminating educational information on TSA to all of the cattlemen in Florida.

FRAMEWORK FOR A SITE-SPECIFIC HERBICIDE APPLICATION DECISION SUPPORT SYSTEM.
W.A. Givens and D.R. Shaw; Mississippi State University, Mississippi State, MS 39762.

ABSTRACT

Since the birth of large scale farming operations, weed control has been one of the most important issues that producers have faced. Several decision support systems (DSSs) for weed management have been developed to aid producers in this decision making process. A common driver for these DSSs has been to base herbicide use on some economic treatment threshold. These DSSs give herbicide recommendations for the entire field based on the competitive index for each weed, crop growth stage, herbicide cost, and application cost. These herbicide recommendations are optimized to the greatest economic net return calculated. One of the pitfalls of these DSSs is their “whole field” approach to herbicide recommendations. Past research has shown that weeds tend to grow in patches across an agricultural landscape. Other research has shown that site-specific herbicide applications often have a greater net return than whole field applications, particularly in non-glyphosate resistant soybean. Based on this information, a site-specific herbicide application DSS would appear to be a more logical weed management tool. The framework for the DSS in development is based on a site-specific management approach. This DSS uses the concepts developed by North Carolina’s HADDS (Herbicide Application Decision Support System). This DSS utilizes interpolated weed maps developed by the user to generate optimized herbicide recommendations for either single product, variable rate applicators or multiple product, variable applicators.

The VRA-DSS in development will run as an add-in for ESRI’s ArcGIS software package. It will allow for the interpolation of weed distribution maps according to the user’s preference. Once the weed maps are created, the program will guide the user through a series of windows to prepare the data for analysis. Once the arguments for the software are assigned, components of the HADSS software are used to create the site-specific recommendations.

Results of this procedure will give user ten herbicide recommendations for each map cell ranked according to net return (multiple product, variable rate). Another product generated will be a table of the top ten unique herbicide recommendations for all map cells. Information for each herbicide recommendation will include the net return if applied to the entire field (whole field recommendation) and net return if applied site-specifically (single product, variable rate).

ENHANCING CONTROL OF COGONGRASS [*IMPERATA CYLINDRICA* (L.) BEAUV] WITH IMAZAPYR. Z.B. Chesser, J.D. Byrd, M.T. Myers, and D.N. Ivy; Mississippi State University, Mississippi State, MS.

ABSTRACT

Experiments were conducted at two sites in Lucedale, Mississippi to evaluate cogongrass control with mixtures of imazapyr and Dyne-a-Pak® compared to imazapyr and traditional nonionic surfactant (NIS). Cogongrass foliage at 8, 16, 24, 32, and 48 fl oz/A with Timberland 90 NIS at 0.25 % v/v or 1% v/v Dyne-A-Pak®. An untreated check was included list for comparisons. Visual ratings were taken 60 and 90 days after treatment (DAT) to determine the effectiveness of the applications. There was no significant effect of location, so data from the two sites were combined in the final analysis. Averaged across imazapyr rates at 90DAT, Dyne-a-Pak enhanced cogongrass control 18% compared to traditional NIS. Control of cogongrass treated with 16 fl oz/A Arsenal plus Dyne-a-Pak® was similar to that obtained with 48 fl oz/A Arsenal when traditional NIS was added.

COGONGRASS MANAGEMENT USING A CLEARFIELD CROPPING SYSTEM. Burns, B.K., J.D. Byrd, Z.B. Chesser, J.M. Taylor, and B.S. Peyton. Mississippi State University, Mississippi State, MS 39762.

ABSTRACT

Three study sites were utilized for field experiments conducted the fall of 2003 to the fall of 2005 in Hancock county, Mississippi to evaluate control of cogongrass using a imidazolinone (Imi) tolerant cropping system. Two study sites were used for only one year (fall 2003 to fall 2004 or fall 2004 to fall 2005) while the third study site was used for two consecutive years (fall 2003 to fall 2005). Two treatments with an untreated check were replicated two times at each site in a randomized complete block design. Treatments were 0.84 kg ae/ha imazapyr (Arsenal AC) with no cover crop or 0.42 kg ae/ha imazapyr applied to an Imi-tolerant cropping system. Each chemical application was made with 0.25% (v/v) non-ionic surfactant (NIS). The Imi-tolerant cropping system consisted of AgriPro AP112 CL Imi-tolerant wheat broadcast planted the fall of 2003 at 112 kg/ha followed by Unity Hybrid IMT-115 Imi-tolerant corn planted the spring of 2004 and 2005 at 89,000 seeds/ha. Existing cogongrass biomass was removed by mowing to a 15-cm stubble height the day prior to planting wheat. Herbicides were applied immediately after planting Imi-tolerant corn. Cropping system plots were fertilized 5/18/04 with a granular blend of 280 kg/ha 8-24-24 (N-P-K) and again 5/24/05 with 448 kg/ha of 34-0-0. Corn was planted to a depth of 5.1 cm with a John Deere Max Emerge Seed Planter™ with 76.2 cm between rows. Herbicide applications were made with a tractor mounted sprayer calibrated to deliver 187 L/ha. Cogongrass shoot density was evaluated twice a year (spring and fall) at each location and visual control (in the form of percent cogongrass control) was evaluated 3, 6, 10, 13, and 17 months after initial treatment (MAIT). Cogongrass shoot density was determined by averaging the number of live, green shoots clipped at the ground level in twenty-five 93 cm^2 quadrats in each plot.

In fall 2004, the first significant level of control was detected. Cogongrass shoot density was reduced 57% with 0.84 kg ae/ha imazapyr or 44% in the crop system. By spring 2005, cogongrass shoot density was reduced 52% from imazapyr alone and 45% in the crop system. The highest level of cogongrass control based on shoot density was detected fall 2005, with cogongrass shoot density reduced 69% with the crop system and 68% with imazapyr alone. Visual control data collaborated results indicated by shoot density data. At 3, 6, 10, 13, and 17 MAIT, imazapyr applied at the higher rate with no crop system provided superior cogongrass control with 47, 68, 48, 68, and 83%, respectively, compared to the crop system and the lower imazapyr rate which provided 40, 51, 33, 48, and 63% control, respectively.

GROUND-TRUTHED HYPERSPECTRAL DATA FOR REMOTE SENSING OF WATERHYACINTH. W. Robles, J.D. Madsen, A. Mathur, and L.M. Bruce. GeoResources Institute, Mississippi State University, Mississippi State, MS.

ABSTRACT

Waterhyacinth [*Eichhornia crassipes* (Mart.) Solms] is a nuisance aquatic weed worldwide that causes economic losses and impacts the aquatic environment. Successful control of this aquatic weed requires accurate monitoring. Remote sensing is an alternative to monitoring waterhyacinth populations and surrounding aquatic habitats. Hyperspectral remote sensing covers more spectral bands compared to multispectral methods. Pertinent features can be extracted from this higher dimensional feature space, allowing for higher accuracies on species differentiation. Studies were conducted in Lake Columbus, Columbus, MS between April 4 2004 and February 11 2005 to differentiate waterhyacinth and common rush (*Juncus effusus* L.) in natural areas by means of hyperspectral data. Both plants have been found growing in the same habitat where species differentiation may help on image classification. Hyperspectral data was collected monthly using a spectroradiometer, Analytical Spectral Device (ASD), Field Spec Pro®, model FR. The data was collected in 2151 spectral channels between 350 and 2500 nm with a 1.4 nm band width. The best spectral band used to distinguish waterhyacinth from common rush was selected using a spectro-temporal greedy search approach. The best spectral bands selected were 1347, 1348, 1349, and 1350 nm in the month of July, where, the combination of features results in an accuracy classification of 100%. These spectral bands clearly differentiated waterhyacinth from common rush during July, when both plants were found in flowering stage. Growth stage of these plants may have to be considered in remote sensing applications.

MAPPING INVASIVE AQUATIC MACROPHYTES IN THE ROSS BARNETT RESERVOIR, MISSISSIPPI. R.M. Wersal, J.D. Madsen, and M.L. Tagert; Mississippi State University, Mississippi State, MS.

ABSTRACT

Invasive aquatic macrophytes are an increasing problem in waterways within Mississippi and throughout the United States. Invasive species directly impact navigation, drainage, commercial and sport fishing, drinking water quality, fish and wildlife habitat, and the overall aesthetics of an area. Indirectly, these species can impact aquatic ecosystems through the depletion of oxygen in the water column, alteration of water nutrient cycling, changes in water pH, and reductions in light availability to native plant species. The presence of invasive species in the Ross Barnett Reservoir is a major concern because it is the largest reservoir in Mississippi and the primary source of potable water for the city of Jackson. We have initiated a five year study of the plant community by mapping the current distribution of aquatic macrophytes in the reservoir. A point intercept survey was conducted using a 300 meter grid during June 2005. A hand held computer enabled with GPS technology and Farm Site Mate® software was used to navigate to each point and log data. A total of 1423 points were sampled for the presence of aquatic macrophytes by deploying an aquatic plant rake. Environmental factors (e.g. water depth, pH, turbidity, dissolved oxygen, and percent saturation) were recorded at six locations throughout the reservoir. Light intensity profiles were also measured in 0.5 meter intervals from the water surface to the bottom sediments at the six locations. We observed 19 species of aquatic or riparian macrophytes during the survey. Of those species, 14 were strictly aquatic species and 6 were commonly considered invasive species. The invasive species, alligatorweed (a nonnative) and American lotus (a native), were located most often during the survey (10.0 and 8.2% respectively). Plant growth was primarily located in the upper reservoir, along the eastern shoreline, and in Pelahatchie Bay where water depths were shallower and light could penetrate to the bottom. Light profiles indicated that more than 80% of light is attenuated in the upper 1 meter of the water column. Rooted plant growth is subsequently restricted to those shallow water areas where light can penetrate to the bottom. The mean maximum depth of macrophyte colonization in the Ross Barnett Reservoir is approximately 1.6 ± 0.1 m, meaning that rooted macrophytes would be able to colonize 22% or 2900 ha (7,200 acres) of the Ross Barnett Reservoir. However, floating species such as water hyacinth could potentially infest a larger area if management techniques are not implemented.

EVALUATION OF HERBICIDES FOR ACTIVITY ON COGONGRASS. D.N. Ivy, J.D. Byrd, B.S. Peyton, J.M. Taylor, and K.D. Burnell. DEPARTMENT OF PLANT AND SOIL SCIENCE, MISSISSIPPI STATE UNIVERSITY, MISSISSIPPI STATE, MS.

ABSTRACT

Field studies were conducted in 2003 and 2004 in Kemper and Goerge Counties, MS with the objective to screen newly registered herbicides for activity on cogongrass. Treatments for the test consisted of 22 herbicides applied with nonionic surfactant (NIS), crop oil concentrate (COC), or ammonium sulfate (AMS) (per manufacturers recommendations) to established and actively growing cogongrass. Data compiled from visual ratings indicated that 4.3 kg ae/ha glyphosate, 0.56 kg ae/ha imazapyr, 3.43 + 1.42 kg ae/ha glyphosate + imazapyr, and 0.21 ai/ha flumioxazin were the only treatments that provided above 50% control at any rating date. Averaged over years and locations, glyphosate + imazapyr was the most effective treatment, and provided 84% cogongrass control 365 days after treatment (DAT). At 120 DAT, most treatments that contained imazapyr and glyphosate controlled cogongrass between 55 and 91%. Treatments that did not provide acceptable control included: 0.58 kg ai/ha tralkoxydim, 0.45 kg ai/ha carfentrazone, 0.07 kg ai/ha imazamox, 0.74 kg ai/ha mesotrione, 0.62 kg ai/ha cyhalofop, 0.50 kg ai/ha flufenacet, 0.05 kg ai/ha trifloxysulfuron, 0.07 + 0.04 kg ai/ha thifensulfuron + tribenuron premix, 0.11 kg ai/ha flazasulfuron, 0.1 + 0.03 kg ae/ha imazethapyr + imazapyr premix, 1.79 kg ai/ha azafenadin, 0.04 kg ai/ha foramsulfuron, 0.14 kg ai/ha sulfosulfuron, 0.14 kg ai/ha halosulfuron, 0.12 kg ai/ha bispyribac-sodium, 0.13 kg ai/ha pyrithiobac-sodium, 0.07 + 0.04 kg ai/ha nicosulfuron + rimsulfuron premix, and 0.21 kg ai/ha flumioxazin.

SHOULD ABOVEGROUND BIOMASS BE REMOVED BEFORE HERBICIDE APPLICATIONS FOR CONTROL OF COGONGRASS. M.T. Myers, J.D. Byrd Jr., B.S. Peyton, B.K. Burns, R.S. Wright and K.D. Burnell; Mississippi State University, Mississippi State, MS.

ABSTRACT

The experiment was conducted in 2004 and 2005 to evaluate control of cogongrass using combinations of no foliage removal, or foliage removal by mowing or burning followed by applications of no herbicide, 72 fl oz/A of glyphosate 4L (Roundup Pro®), 48 fl oz/A of imazapyr 2AS (Arsenal®) or a mix of glyphosate and imazapyr. The experimental design was completely random with a 4 herbicide by 3 foliage removal practices factorial with 4 replications of each treatment. Each experimental unit had an average plot size of 40 ft. by 60 ft. All treatments that contained imazapyr were applied with non-ionic surfactant (NIS) at 0.5% volume per volume (V/V). Either burning foliar biomass with a drip-torch or mowing to a 3-4 inch stubble height, with a tractor-mounted mower, achieved removal of aboveground biomass. After biomass removal, chemical treatments were applied to 6 to 8 in. tall cogongrass re-growth. All herbicide applications were made using a CO_2 pressurized backpack with a 4 nozzle hand-held boom delivering 25 gal/A. Mechanical and chemical treatments were reapplied to the same experimental units in 2005. Visual evaluations of control were taken using a scale of 0 to 100% with 0 indicating no cogongrass control and 100 indicating complete cogongrass control. Stem counts and aboveground biomass weights were also taken. Analysis of cogongrass foliage biomass dry weight data indicated that the removal of aboveground biomass before chemical treatments increased herbicide efficacy by 60 to 80%. Mowing with no herbicide application reduced aboveground biomass 40% while burning with no herbicide treatment reduced cogongrass biomass 60%. All treatments that included biomass removal before herbicide application reduced cogongrass biomass 55 to 96% compared to chemical treatment alone. Chemical treatments alone provided only 9 to 40% biomass reduction. Visual control data indicated almost all treatments provided satisfactory control (above 70%), however glyphosate with no foliage removal, mowing or burning with no herbicide treatments provided 40 to 50% control.

PRESENCE OF THE INVASIVE SPECIES, BUSHKILLER (*CAYRATIA JAPONICA*) IN NORTH CAROLINA. R.J. Richardson, M.G. Burton, A. Krings, C.A. Judge, R. Westbrooks and J.C. Neal; Crop Science Department, North Carolina State Univ., Raleigh, NC 27695.

ABSTRACT

A plant sample was submitted to a local North Carolina Cooperative Extension Center in August 2005, by a Winston-Salem area landscaper. The plant was unknown to local extension personnel and forwarded to NCSU campus specialists. A preliminary identification was performed and then confirmed by Alexander Krings, NCSU herbarium curator, as *Cayratia japonica* (Thunb.). Plant specimens originated from a landscape in Winston-Salem, Forsythe County, North Carolina. A follow-up visit to the site confirmed the presence of this invasive plant on at least four residential properties within the city limits.

This North Carolina population consisted of vines climbing as high as 12 m into surrounding bushes and trees, often overtopping them. A fence was covered with the vines and an English ivy groundcover in deep shade was also overtopped. According to the landscaper, plants are fairly aggressive and re-sprout prolifically when handweeded. A stump > 2.5 cm in diameter was also reported to have been removed with remaining exposed roots of 0.6 cm diameter. The mechanism of dispersal to this site is unknown, although intentional planting as a curiosity or contamination or ornamental stock could be possible. Bird dispersal may be less probable, as no additional populations between North Carolina and other confirmed sites have been reported. No viable seed production was observed at the North Carolina site, but the presence of a viable, over-wintering population in a suburban area near Winston-Salem (Forsyth Co., NC) verifies that this species is spreading in the United States.

INVASION OF LIMPOGRASS IN THE KISSIMEE RIVER. W. Beattie, B.A. Sellers, and J.A. Ferrell. University of Florida-IFAS Range Cattle Research and Education Center and Agronomy Department, Ona, FL 33865; University of Florida-IFAS Agronomy Department, Gainesville, FL 32611.

ABSTRACT

Limpograss (*Hemarthria altissima*) is a stoloniferous tropical grass of the family Poaceae, which is found in its native habitat along stream banks and in other wet or seasonably wet soils in southern Africa. It was introduced into Florida as a promising forage and four cultivars have since been released. Approximately 100,000 ha of limpograss have been planted for grazing and/or hay production in central and south Florida.

Historically, the Kissimmee River was a meandering 166 km stretch of waterway consisting of a 1.6 to 3.2 km wide floodplain. As a result of catastrophic flooding in the 1940's and early 1950's, the state of Florida along with the U.S. government funded a plan to channelize the river to prevent such wide-spread flooding events. Once the 9.1 m deep by 91 m wide channel was complete in 1972, much of the flood plain was drained and diversity of desirable plant and animal species began to decline.

The loss of species diversity and increasing environmental concerns resulted in an effort to restore the river back to its native state. This prompted nearly 20 years of research on restoration in the Kissimmee River and its floodplain, which led to back-filling 35 km of the man-made canal and restoring approximately 104 km^2 of the floodplain. Within this non-residential area, the floodplain was acquired from ranchers and it is as many as 3.2 km wide, with much of this area subject to seasonal flooding.

Prior to dechannelization of the Kissimmee River, ranchers improved pastures near the channel by establishing limpograss. It is estimated that over 15,000 ha was planted near the Kissimmee River. However, limpograss was not recorded in biological surveys prior to restoration. After restoration efforts were concluded in the pool C section of the river, limpograss invasion began to occur. It is estimated that limpograss has infested approximately 1,200 ha where a broadleaf marsh existed prior to channelization of the river. Additionally, limpograss can be found in isolated patches in a portion of the floodplain that was a bahiagrass (*Paspalum notatum*) sod farm prior to dechannelization.

Although limpograss is an important forage species for Florida cattlemen, it is also important that best management practices for eradication in natural areas, such as the Kissimmee River, be developed. Experiments were established at the Range Cattle Research and Education Center to determine the most effective treatment options for limpograss control. Glyphosate ($\geq$1.1 kg ae/ha) appears to be the best option as greater than 95% visual control was observed 3 months after treatment. Other herbicides such as clethodim, fluazifop, nicosulfuron and diquat provided some reduction in limpograss growth, but limpograss quickly recovered. These results will be used to develop treatments for limpograss in the Kissimmee River floodplain in an attempt to restore the native broadleaf marsh that was present prior to channelization.

NURSERY CROPS VECTORING NOXIOUS WEEDS. J.C. Neal, M.G. Burton, R.J. Richardson, and J.K. Norsworthy; NC State University, Raleigh, NC; and Clemson University, Clemson, SC.

ABSTRACT

Both field-grown and container-grown nursery crops vector weeds. Common groundsel (*Senecio vulgaris*) was spread from the Pacific northwest throughout the US in nursery crops. Most infestations of mugwort (*Artemisia vulgaris*) can be traced back to a balled-and-burlaped tree or shrub. The spread of common weeds in nursery crops is generally accepted and nurseries are inspected to ensure no noxious pests are shipped with the crop. However many "new" unregulated weeds (such as these below) are common in the nursery trade and are being moved with the crops. However, the nature of the nursery crop industry has changed significantly in recent years. As with many other industries, it is cheaper to produce some products overseas. Since plant propagation is a labor intensive process, many ornamental plants are propagated overseas and shipped to the US. Although exporting nurseries are inspected, many weeds are routinely introduced. Once introduced to one region of the US, nursery crops can rapidly disseminate the plants throughout the country. Recent introductions via the nursery industry include:

Rorippa sylvestris – NC Class C Noxious Weed
Yellow fieldcress (or Creeping yellowcress) has been introduced in the rootballs of herbaceous perennials from northern Europe.

Inula britannica – Potential Federal Noxious Weed
British elecampane has also been introduced in rootballs of herbaceous perennials from northern Europe. Not as widespread as yellow fieldcress.

Commelina benghalensis – Tropical spiderwort or Benghal dayflower, Federal Noxious Weed
Discovered in two garden centers in NC in container grown liriope in August 2005. Traced back to a wholesale grower in SC (and to LA or FL?). Potentially contaminated plants shipped to retail garden centers in 13 states.

What can be done?

1. Federal and state agencies lack sufficient funding to react to noxious and invasive weed outbreaks, which limits the effectiveness of responses.
2. Increase awareness with the nursery industry. Nursery producers really don't want the weeds!
3. Educate regulatory community about the risks.
4. Support risk-analysis based solutions.

EFFICACY OF THREE AQUATIC HERBICIDES FOR THE CONTROL OF SWAMP SMARTWEED. J.C. Cheshier, R.M. Wersal, and J.D. Madsen; Department of Plant and Soil Sciences, Mississippi State University, Mississippi State, MS 39762.

ABSTRACT

Native aquatic and riparian plants are essential to a healthy ecosystem, however when left unchecked can cause significant damage. They outcompete other beneficial natives, decrease the dissolved oxygen in the water, and lower the overall biodiversity of an ecosystem. Swamp smartweed (*Polygonum hydropiperoides* Michx.) is a native perennial dicot found throughout North America. Swamp smartweed reproduces by seed and by vegetative growth; and it is the vegetative growth that allows it to be a nuisance species around North America. An evaluation of three common aquatic herbicides is necessary to identify an effective control of swamp smartweed. This study was conducted at a small lake near Starkville, MS. A randomized complete block design with three replications was used. The herbicides used were Rodeo, Habitat, and Garlon 3A. Two rates for each herbicide were used; maximum label rate (MLR) and one-half-maximum label rate (0.5 MLR). A non-ionic surfactant (Dyne-amic) was added to each treatment at a 1% v/v ratio. The herbicide was delivered from a two-gallon backpack sprayer at 26 GPA. Rodeo was applied at 10.3 oz/gal (MLR) and 5.13 oz/gal (0.5 MLR). Habitat was applied at 6.5 oz/gal (MLR) and 3.25 oz/gal (0.5 MLR). Garlon 3A was applied at 64 oz/gal (MLR) and 32 oz/gal (0.5 MLR). A total of twenty-one 1m-quadrats were laid out with 1 m spacing around each quadrat to minimize drift. Each plot was rated for percent control on a scale of 0 to 100%, 0 being no control and 100% being all plants dead. Greater than or equal to 90% control was considered acceptable control. Percent control measurements were taken every week after treatment up to 5 weeks starting on August 26, 2005 and ending on September 22, 2005. The data was analyzed using an ANOVA within SAS, with the means tested by a Fisher's protected LSD (p-value = 0.05). Swamp smartweed is best controlled with the Habitat and Rodeo. The 0.5 MLR of Habitat and the MLR of Rodeo were similar in efficacy (≥ 90% control) throughout the five-week study. Garlon 3A was the least effective herbicide for controlling swamp smartweed.

REGULATION OF GIANT SALVINIA (*SALVINIA MOLESTA* MITCHELL) GROWTH BY PH AND AVAILABLE NUTRIENTS. J.D. Madsen and R.M. Wersal. GeoResources Institute and Department of Plant and Soil Science, Mississippi State University, Mississippi State, MS

ABSTRACT

Giant salvinia (*Salvinia molesta* Mitchell), a native of South America, is an invasive floating aquatic fern. Giant salvinia has been a detrimental noxious pest in Australasia, Africa, South America, and the Caribbean. Giant salvinia was first reported to have escaped cultivation in South Carolina in 1995, and has since been reported in Texas, Louisiana, Mississippi, Alabama, Florida, North Carolina, Arizona, California, and Hawaii. Previous studies have reported that giant salvinia is dependent on dissolved nutrients in the water for growth and has optimal growth at circumneutral to slightly acid (pH of 6) water. We examined giant salvinia growth in a three-by-three factorial experiment, with pH levels of 5, 6.5, and 8 and low, medium, and high concentrations of nutrients. Plants were grown in 378 L tanks, with each treatment replicated three times. At two-week intervals, two samples per tank were collected using a 0.01 m^2 quadrat and dried at 55 °C. End-point analysis was performed using a two-way analysis of variance, with pH and nutrient level. Initial results after 35 days indicate that pH was not a significant factor in plant biomass ($p=0.65$), while nutrient level significantly affected growth ($p<0.001$). Although pH may not be a factor controlling giant salvinia growth, giant salvinia modifies water pH through decomposition of plant material and disruption of the water-air interface. Giant salvinia will likely succeed best in waters with high nutrient loading rates, and may not survive or compete in waters of low nutrient loading rates.

TROPICAL SPIDERWORT (*COMMELINA BENGHALENSIS*) GROWTH AND FECUNDITY IN GEORGIA. T.M. Webster[1], T.L. Grey[2], J.T. Flanders[2], and A.S. Culpepper[2]; [1]USDA-ARS and [2]University of Georgia, Tifton, GA 31793.

ABSTRACT

Tropical spiderwort (aka Benghal dayflower) poses a serious threat to agroecosystems of the Southern US due to recent changes in cultural practices and herbicide use patterns in our cropping systems. The objective of this study was to evaluate tropical spiderwort growth in the primary agronomic cropping systems in the Southern US.

In Study 1, corn, cotton, peanut, and soybean were planted 29 April 2004 and 17 May 2005 in fields near Cairo, GA with naturalized populations of tropical spiderwort. Plots were 25' long and 4 rows wide for each crop with four replications. Four tropical spiderwort plants that emerged with the crops were followed throughout the season. Plant width and number of aerial spathes were measured every two weeks for 16 weeks. Plant biomass was measured at the conclusion of the study.

In Study 2, corn was planted 14 April 2005, while cotton, peanut, and soybean were planted 16 May 2005 in an exclusion shelter in Tifton, GA. Plots were 25' long and 2 rows wide for each crop with 4 replications. Nine tropical spiderwort plants at the 1-leaf stage (<1 week old) were transplanted on 16 June 2005 into each plot. A third of the transplants were destructively sampled after 4, 8, and 12 weeks of growth. At each harvest, plant width, plant biomass, leaf area, specific leaf area, and number of aerial and subterranean spathes were quantified.

Rate of tropical spiderwort lateral growth was suppressed by corn (39%), cotton (38%), and soybean (63%) relative to peanut in Study 1, where spiderwort emerged with each of the crops. Lateral growth rate of tropical spiderwort in peanut was not different from the non-cropped control in Study 1. When tropical spiderwort was transplanted following crop emergence and establishment (Study 2), corn (71 and 82%) and soybean (85 and 90%) suppressed rate of lateral tropical spiderwort growth relative to cotton and peanut, respectively. Study 2 provided more realistic crop planting dates and tropical spiderwort transplant dates that approximated peak tropical spiderwort emergence. Tropical spiderwort plant biomass was suppressed (70 to 96%) by all crops, relative to the non-cropped control in Study 1. Among the four crops, peanut allowed the most tropical spiderwort growth (69 g/plant) and soybean the least (10 g/plant). In Study 2, the rate of tropical spiderwort biomass accumulation, relative to cotton, was 41, 94, and 99% lower in peanut, corn, and soybean, respectively. Potential biomass accumulation was less in Study 2 compared with Study 1 due to the temporal advantage of the crops to establish prior to tropical spiderwort. Spathes (leafy bract) contain 1-3 flowers, each producing 2-5 seed. The rate of spathe production was reduced in 30, 93, and 98% in peanut, corn, and soybean relative to cotton. Tropical spiderwort plants in all four cropping systems produced subterranean spathes at each harvest date.

In conclusion, tropical spiderwort growth is greatest in peanut and cotton and least in corn and soybean during the cropping season. A temporal separation of crop planting and tropical spiderwort emergence may be an effective component of management systems designed to minimize the impact of tropical spiderwort and potentially reduce its presence in future crops. While research indicates that corn will suppress tropical spiderwort growth during the season relative to other crops, tropical spiderwort can thrive in grower fields as corn begins to dry (eliminating the shaded canopy) as well as following crop harvest. Future research will need to address ways to curtail this uncontrolled growth in the autumn of the year prior to frost.

COGONGRASS CONTROL WITH CHOPPER AND GLYPRO PLUS WHEN COMBINED WITH SILWET L-77 AND MSO CONCENTRATE C.L. Ramsey, S. Jose, D. Zamora and P. Daneshgar; USDA-APHIS-PPQ-CPHST, Fort Collins, CO. 80526 and UFL/IFAS, University of Florida, Gainesville, FL. 32611.

ABSTRACT

A cogongrass (*Imperata cylindrica*) field study was installed in November 4-5, 2004 on International Paper property in Santa Rosa county, FL. The loblolly plantation was harvested in July 2000, site prep treated with Velpar ULW (5.26 kg ai ha^{-1}) in June 2001, and replanted in January 2002. Fertilizer (DAP) was applied at 224 kg ha^{-1} in July 2002. An objective of the study was to determine the effects of two herbicides and three adjuvants on foliar cover and live rhizome/root biomass for cogongrass. GlyPro Plus (4.48 and 8.96 kg ai ha^{-1}) and Chopper (0.56 and 1.12 kg ai ha^{-1}) were mixed with MSO Concentrate (0, 25, 50% v/v), Silwet L-77 (0, 0.12% v/v) in a 24 treatment, factorial design study. Other treatments involved Chopper mixed with MSO Concentrate and Stimupro (0, 0.7, 1.4, 2.1% v/v), which is a seaweed extract with plant growth hormones. Percent cogongrass cover and oven dry, live rhizome/root biomass (g m^{-2}) data was collected in July and November 2005 (7 and 12 MAT). Mechanical planting with a tractor/planter resulted in logging debris strips running through each of the plots. Cogongrass heights varied (± ~1 m) depending on organic matter decaying from pine stumps and logging debris rows. The site had higher than normal rainfall which contributed to rapid infestation for many of the treatments.

Both live rhizome biomass and percent foliage cover were not affected by the adjuvants, 7 MAT, for either herbicide. Both Chopper treatments and the highest GlyPro Plus application had better foliar control than GlyPro Plus at 4.48 kg ha^{-1}, 7 MAT. Results after the first year of control (12 MAT) show that all the GlyPro Plus treatments ranged from 64 to 98% reinfested with cogongrass. GlyPro Plus formulation contains surfactants that may have had an antagonistic effect on the two adjuvants used in this study, which in turn reduced efficacy duration. Neither Silwet L-77 nor MSO Concentrate had an effect on percent foliar cover for Chopper applied at 0.56 kg ha^{-1} (12 MAT). However, there was an inverse, linear relationship between percent foliar cover and increasing rates for Silwet L-77 or MSO Concentrate with Chopper applied at 1.12 kg ha^{-1} (12 MAT). There was also an inverse, linear relationship between oven dry, live rhizome/root biomass and Silwet L-77 or MSO Concentrate as the adjuvant rates increased. There was a positive interaction between MSO Concentrate and Silwet L-77 for foliar control, but not for rhizome control. Cogongrass photosynthesis had a quadratic relationship with Stimupro when applied with Chopper at 1.12 kg ha^{-1}. Stimupro added to Chopper (1.12 kg ha^{-1}), with or without MSO Concentrate, resulted in no effect on above or belowground control. This study will be remeasured in mid-2006 to determine the long term effects of the adjuvants on above and belowground cogongrass control.

Cogongrass in three untreated plots was sampled for foliar and rhizome/root biomass. The three plots were visually evaluated for soil organic matter levels (high, medium, and low OM). The oven-dry, live rhizome/root biomass was 1,833, 1,427, and 1,130 g m^{-2} (5.0, 6.4, and 8.2 tons ac^{-1}) for the high, medium, and low OM plots. The oven-dry, live total biomass was 2,358, 1,842, and 1,495 g m^{-2} for the high, medium, and low OM plots. The root/shoot ratios ranged from 3.3 – 3.6 for cogongrass, while cotton and clover root/shoot ratios typically average about 0.5 - 0.6.

STUDIES TO ENHANCE HERBICIDE ACTIVITY IN COGONGRASS (*IMPERATA CYLINDRICA* L. BEAUV). E.A. Ketterer, G.E. MacDonald, J.A. Ferrell, M.C. Barron and B.A. Sellers; Agronomy Dept., University of Florida, Gainesville, FL and Range Cattle Research and Education Center, Ona, FL.

ABSTRACT

Cogongrass has been shown to withstand conditions of foliar removal through remobilization of storage nutrients in its dense rhizome system. Rhizomes of cogongrass utilize apical dominance to maintain a high rhizome:shoot ratio, whereby only apical shoots arise after disturbance. By overcoming apical dominance the stimulation of axillary bud growth is initiated forcing the plant to divert more resources to these new shoots. These new shoots can then be treated with herbicide to further weaken the rhizome system and provide better control of cogongrass. To study this phenomenon, a study was initiated to utilize the growth regulator herbicide diflufenzopyr to chemically break apical dominance and potentially enhance control of cogongrass with glyphosate and imazapyr. Cogongrass plants were grown under greenhouse conditions in 3L pots. After 8 weeks, plants were treated at four application timings of diflufenzopyr at 0.2 lbs-ai/A (no diflufenzopyr, 3 days prior to imazapyr or glyphosate, tank-mixed with glyphosate or imazapyr, or 3 days after imazapyr or glyphosate). Three different rates were applied for imazapyr (0.125, 0.25, and 0.5 lbs-ai/A) or glyphosate (0.38, 0.75, and 1.5 lbs-ai/A). Four weeks after treatment, shoots were removed and the plants allowed to regrow for an additional 4 weeks. At this time, visual ratings of regrowth and above and below ground biomass were taken. All imazapyr treatments, regardless of diflufenzopyr, provided >80% control, with <0.01 gm shoot biomass. There was greater control at the lower rates of imazapyr in combination with diflufenzopyr applied 3 days prior and as a tank mix. Similar results were observed glyphosate, but at a much lower level of control. Diflufenzopyr applied as a tank mix with glyphosate provided 48 and 38% greater control at 0.38 and 0.75 lbs-ai/A, respectively, compared to glyphosate alone. However, glyphosate alone at 0.38 and 0.75 lbs-ai/A caused significantly greater shoot regrowth, even compared to diflufenzopyr alone. Glyphosate has been reported to cause growth regulator type effects and this warrants further research with cogongrass. Another aspect in cogongrass management is revegetation following initial control. However, planting after imazapyr is precarious due to the unknown residual impact of this herbicide. Due to this residual activity of imazapyr, it is important to establish a plant back interval to determine when it is appropriate to plant certain species without having an adverse effect. To determine this impact, 8 rates of imazapyr (0.0, 0.016, 0.032, 0.063, 0.125, 0.25, 0.5, and 1.0 lbs-ai/A) were applied under field conditions to bare soil in Citra, FL. Immediately after application, the herbicide was lightly incorporated and 13 desirable plant species transplanted into each plot. The experiment was initiated in June 2004 and repeated one month later. One year after planting, heights were recorded and regression analysis was used to determine the rate of imazapyr that would cause a 35% decrease in height. Transplant survival and growth was reduced in the first experiment compared to the second due to higher annual weed pressure, and this resulted in a higher sensitivity to imazapyr for several species. Based on these studies and previous soil persistence research, most species can be planted within 1-2 months of spraying imazapyr, even the 1.0 lb-ai/A rate. However, successful revegetation relies on controlling weed pressure, which appeared to worsen the impact of imazapyr.

EFFECTS OF NATIVE SPECIES PLANTED IN HERBICIDE-TREATED COGONGRASS (*IMPERATA CYLINDRICA*). L.Y. Yager, J. Byrd, J. Jones, D.L. Miller; The Nature Conservancy, Camp Shelby, MS. Mississippi State University, Mississippi State, MS, Mississippi State University, Mississippi State, MS, University of Florida, Milton, FL.

ABSTRACT

Introduced from southeast Asia, cogongrass, *Imperata cylindrica*, has become a serious problem in natural and managed forests in the southeastern United States as it forms dense patches which suppress growth of native species and causes undesirable changes to ecosystem processes. However, native plant communities and ecosystem processes will be preserved if native plant species can be used to increase plant community resistance to invasion. Additionally, restoration of infested plant communities requires re-establishment of desirable plant species after eradication of the invasive within the habitat. On Camp Shelby Training Site, MS, 3 native species *(Myrica cerifera*, *Panicum virgatum* and *Chamaecrista fasciculata*) were evaluated for their ability to 1) establish within cogongrass post-herbicide treatment and 2) suppress re-growth of cogongrass.

In October 2001, 5 cogongrass patches within longleaf/bluestem habitat were treated with a 2% (v/v) Roundup (glyphosate) solution. In December 2001, 1/2 of a 10 m section of cogongrass edge in each patch was densely planted with *M.cerifera* seedlings spaced approximately 20 cm apart in a 10 x 10 grid pattern that extended about 1.2 m into the patch and 1.2 m past the patch edge. The additional 5 m section of cogongrass edge was not planted. By May 2003, cogongrass shoots extended 390, 70, 150, and 30 cm past the original edges of the cogongrass patches in 4 of the *M.cerifera* portions of the cogongrass patches. Cogongrass shoot density ranged between 0 to 84 shoots/m^2 in the unplanted portions and 0 to 24 shoots/m^2 in the *M.cerifera* plantings; however, means (26 and 12 shoots/m^2 for control and planted portions, respectively) were not significantly different at the $P < 0.05$ level. Although *M.cerifera* did not act as a barrier to cogongrass extension or suppress re-growth of cogongrass, *M.cerifera* does appear to be able to co-occur with cogongrass. *M.cerifera* survival ranged from 93-100 % in May 2003 and shrubs appeared healthy based on visual observation in January 2006. Thus, *M.cerifera* may be useful to restore some diversity and ecosystem services (e.g. wildlife habitat) in areas where cogongrass eradication is not feasible.

In another experiment, an area with 100 % cogongrass cover was demarcated and divided into 5 blocks. Herbicide treatments (2% (v/v) Accord (glyphosate) solution or 2% (v/v) Accord + 0.5% (v/v) Arsenal (imazapyr) solution) were randomly assigned to 3.7 m x 20 m strip for each block in July 2002. In April 2003, ¼ of each strip was left unplanted (control) or planted with *C. fasciculata*, *P. virgatum, C. fasciculata* + *P. virgatum*. Cogongrass control was best in plots treated with the Accord + Arsenal mixture. By August 2004, cogongrass shoot density in Accord plots was slightly lower in planted plots compared to controls; but in Accord + Arsenal plots, density was 219 shoots/m^2 or less in planted plots compared to 440 shoots/m^2 in controls. Both native species established within the treated cogongrass strips in the first year, but *P. virgatum* declined in the second year while *C. fasciculata* increased slightly. Sequential herbicide treatments for multiple years followed by planting with *C. fasciculata* and/or *P. virgatum* species may result in better control of cogongrass. *P. virgatum* and *C. fasciculata* are important food and cover plants for many wildlife species thus habitat will be enhanced with these plantings as well.

INTEGRATED VEGETATION MANAGEMENT OF COGONGRASS (*IMPERATA CYLINDRICA*). W.H. Faircloth, M.G. Patterson, and J.H. Miller. USDA/ARS, Dawson, GA; Auburn University, Auburn, AL; and USDA Forest Service, Auburn, AL.

ABSTRACT

Cogongrass [*Imperata cylindrica* (L.) Beauv.] is invading forest lands, especially those growing loblolly pine (*Pinus teada* L.) plantations. The primary research objective of this project was to investigate IVM options for the establishment or reforestation of loblolly pine into cogongrass-infested areas. The study site was located in Mobile County, AL. The experiment was a factorial arrangement that tested two herbicide site preparation (SP) treatments, two mechanical SP treatments, and two pine release herbicide treatments. Herbicide SP levels were none and a broadcast-applied tank mixture of glyphosate at 3.3 kg ae/ha, imazapyr at 0.34 kg ae/ha, and nonionic surfactant at 0.5 % v/v. Application was on October 3-4, 2001. Mechanical SP levels were a scalping treatment and none. Scalping consisted of using a bulldozer and fire plow to remove the upper 10 to 15 cm of cogongrass rhizomes and roots, folding these back upon intervening grass to create a furrow in which seedlings were planted. Scalping was performed on December 19, 2001. Release treatment levels were band-applied herbicide and none and were applied after seedling planting. In addition to the eight plots in the factorial core, a ninth treatment, termed "complete control", was added. The nine treatments were replicated four times in a randomized complete block design. Bare-root, improved loblolly pine seedlings were hand-planted on January 15, 2002.

Biomass response. In the year immediately following planting of trees, mechanical SP reduced biomass in each category. However, in the following year, regrowth occurred to an extent that mechanical SP made no treatment differences. The combination treatment of mechanical and herbicide SP reduced live grass by 98.5% compared to the non-treated check in the first year, which suggests greater than an additive effect when combined compared to a single use. Live cogongrass regrew by 8 to 18-fold by the second year on all SP treatments, and all treatments contained live grass at the 2003 harvest (780-7400 kg/ha). Other woody and herbaceous plant biomass was least in the non-treated (830 kg/ha) and greatest in the complete control (8310 kg/ha). Herbicide SP and complete control yielded the greatest recruitment of other woody and herbaceous species in both years to assist with the rehabilitation process (8310 kg/ha in year two). Herbicide SP was significantly greater than both the mechanical SP and the non-treated, while mechanical SP yielded woody and herbaceous biomass equivalent to the non-treated. Data analysis revealed few significant differences between treatments or establishment methods for live grass and other species at year two. Despite intensive control efforts, cogongrass remained a significant component of the plant community as live cogongrass comprised at least 15% of the total plant biomass through year two. Herbicide SP resulted in at least 30% other species, increasing the overall plant community diversity in those treatments.

Tree response. Loblolly pine survival was equal to or exceeded 90% on all treatments including the non-treated check in years one and two after planting. Treatments with herbicide SP had greater survival, either with or without mechanical SP or release. Site preparation, whether herbicide or mechanical, yielded a significant increase in ground-line diameter (GLD) compared with no SP, while the addition of release made no difference in GLD in the first year. On average, herbicide SP and release showed an additive effect for GLD response. Tree height in year one ranged from 46.1 to 66 cm. Herbicide SP yielded 6 cm taller trees than mechanical SP unless combined with mechanical SP, in which case an antagonistic effect was found. The negative interaction of mechanical SP and herbicide SP was significant for both loblolly pine GLD and HT. One possible explanation for this response is that soil, previously treated with SP herbicides, sloughed into the mechanically-created furrows, thus concentrating herbicide around the seedlings. Stunting of the trees resulted along with a visual yellowing of needles during the first growing season. This effect was evident in both treatments that received herbicide SP followed by mechanical SP. Effects were transient, however, and not observed during the second growing season. Site preparation significantly increased tree growth in the second year by all measures compared to no SP. Aside from the non-treated, the release only treatment consistently yielded the smallest trees. For HT only, herbicide SP yielded taller trees than did mechanical SP. These data suggest that two years after application, herbicide SP is positively influencing loblolly pine growth more than the other establishment techniques. Release alone was not as effective as other establishment techniques as trees were generally smaller than SP.

Summary. Herbicide SP consistently increased loblolly pine growth, decreased live cogongrass, and increased overall plant community diversity. Release alone was not an effective reforestation technique, however, was generally additive when combined with a SP treatment. The use of herbicides was critical to the recruitment of woody and herbaceous species other than cogongrass. No reforestation technique reduced cogongrass to acceptable levels, however, the establishment of loblolly pine was successful, thus, some productivity restored to the land.

EVALUATION OF UF 99 AS AN AQUATIC HERBICIDE. C.R. Mudge, W.T. Haler, and T.J. Koschnick; University of Florida. Agronomy Department, Center for Aquatic and Invasive Plants. P.O. Box 110610, Gainesville, FL 32611.

ABSTRACT

Currently there are a limited number of herbicides that can be used in aquatic ecosystems. In particular, there are even less available for hydrilla *(Hydrilla verticillata* (Lf) Royle) control in Florida. Over the last two years, The University of Florida has evaluated many row crop, turf, ornamental, and right-of-way herbicides for hydrilla efficacy with few providing hydrilla control. Flumioxazin was one herbicide that effectively controled hydrilla and has relatively low toxicity and a short half-life in water. Therefore, flumioxazin is being evaluated for hydrilla efficacy and selectivity on native and other non-target plants, and herbicide residue and dissipation are being conducted to determine the suitability of this herbicide for aquatic use. An Experimental Use Permit (EUP) has been submitted to the EPA to further evaluate flumioxazin for hydrilla control and selectivity in larger test sites. Flumioxazin is broken down in water by hydrolysis and under laboratory conditions has an average half-life of 17 minutes at pH 9, whereas at pH 7, half-life is about 22 hours. Initial results indicate flumioxazin efficacy on hydrilla at water pH 8.0 was at < 400 µg/L (ppb).

BIOLOGY AND CURRENT HERBICIDE CONTROL OF SERICEA LESPEDEZA. R.L. Farris, D.S. Murray, R.N. Rupp, and L. Tapia; Oklahoma State University, Stillwater, OK and DuPont Crop Protection Chemicals, Wilmington, DE.

ABSTRACT

Sericea lespedeza, an invasive weed species found in Oklahoma and many other states, was collected monthly from the OSU Range Research Station in 2004 and 2005 and from a privately-leased pasture, near Stillwater, OK, in 2004. Laboratory analysis measured sericea lespedeza root total non-structural carbohydrates (TNC), crude protein, fat, ash, and neutral detergent fiber (NDF) to provide foundational and biological information on sericea lespedeza plant maturity, regrowth, persistence, as well as herbicide translocation/efficacy potential. Laboratory analysis was also conducted monthly on the condensed tannin concentration present in the stem plus leaf structures; providing foundational information for the biological control and management of sericea lespedeza. Results showed that root TNC and protein concentration from April to July are approximately 5% lower as compared to other months. Therefore, from April to July there was lower carbohydrate reserves in the root tissues and possible decreased ability of plant regrowth and persistence if managed during this time period. Results also showed that TNC increases by 7% from July to October with increased mobilization of carbohydrates down into root structures. NDF was approximately 9% higher from April to August, as compared to other months, which is the period of maximum leaf and stem structure growth and presence. Condensed tannins increased 2.4% with active growth (April to September) and is related to increased plant maturity, higher leaf:stem ratio, and growth months with lower precipitation/higher temperature. Condensed tannins also decreased 2.3% from flower initiation through plant dormancy.

A second field experiment was conducted at the OSU Range Research Station near Stillwater, OK to evaluate the efficacy of Ally XP with various tank-mix herbicides and application timings for the control of sericea lespedeza. The experiment was designed as a randomized complete block with four replications and 10 by 30 ft plots. Two application timings (spring vs late summer/early fall) as well as increasing herbicide rates were used for the various herbicide tank-mix combinations. For the June application, the results showed that herbicide efficacy increases as days after treatment application (DAT) increases; tank-mixes containing mid-range to lower rates of Ally XP (0.021 or 0.0105 kg ai/ha) + Glean XP (0.0263 or 0.0132 kg ai/ha) or Ally XP (0.0158 or 0.0105 kg ai/ha) + Range Star (0.814 or 0.543 kg ai/ha) provide better control (83-100% control; 87 DAT), when compared to higher rates within the tank-mix groups; and the tank-mixes containing Remedy (1.12 kg ai/ha) provide the best season-long control (98-100%; 87 DAT). For the September application, the results showed that addition of Glean XP (0.00322 kg ai/ha) or Range Star (1.63 kg ai/ha) to Ally XP (0.0105 and 0.042 kg ai/ha, respectively) did increase control approximately 27% (best control only 35% at 28 DAT); herbicide efficacy increased as DAT increased; Remedy (1.12 kg ai/ha) alone provided the best control (100% versus 0-35%; 28 DAT); and it is more difficult to control seasonally mature sericea lespedeza.

BENGHAL DAYFLOWER: BENGHAL DAYFLOWER: AN INVASIVE ISSUE FOR THE SOUTH. (INVASIVE, REGULATED, AND ROUNDUP RESISTANT). A.V. Tasker, USDA APHIS. Riverdale, MD.

ABSTRACT

Benghal Dayflower (BD) aka Tropical Spiderwort (Commelina benghalensis) is an invasive species with expanding infestations in the southern U.S. Apparently first introduced in 1928, it was common in Florida by the 1930s. It was regulated as a Federal Noxious Weed in 1983. BD is additionally regulated by 9 of the states. It is a perennial creeping herb which produces both aboveground and underground flowers, fruits, seeds, and rhizomes. It is highly competitive, with the stems able to root at the nodes. The plant can take root in water-saturated soil and can also withstand drought conditions. Because of its resistance to glyphosate, and the nature of its growth habit, it is becoming a problem in Roundup Ready cotton, and in various other southern crops. Recent finds as a contaminant in a retail nursery in North Carolina traced to a wholesale nursery in South Carolina have led to new concerns. The Southern Plant Board is establishing a work-group to work with APHIS in developing regional program options. A recent meeting of researchers and others interested in BD was held in Tifton, GA to explore research and program needs.

LOCAL AND REGIONAL DISPERSAL OF TROPICAL SPIDERWORT (*COMMELINA BENGHALENSIS*). M.G. Burton[1], E.P. Prostko[2], T.M. Webster[3], A.S. Culpepper[2], and J.K. Norsworthy[4]; Crop Science, NCSU[1]; Crop and Soil Sciences, University of Georgia, Tifton[2]; USDA-ARS, Tifton, GA[3]; Entomology, Soils, and Plant Sciences, Clemson University[4].

ABSTRACT

Tropical spiderwort accomplishes temporal and spatial dispersal with both vegetative and seed propagules. Stem cuttings buried or stored in unfavorable conditions resumed growth or produced spathes and seeds when moist conditions were restored days or weeks later. Temporal dispersal of tropical spiderwort through seeds has also been observed through continued germination of seeds from the seedbank in fields where reproduction had been prevented for the previous two years. Emergence in the field during the second year was 25% observed during the first year. Viable seeds have been recovered from controlled seed longevity experiments (buried mesh bags) for two years, although survival of small aerial seeds declined to 65% after 12 months. Spatial dispersal is occurring by contaminated equipment, nursery stock, seed cotton, and possibly by wildlife. Observations of tropical spiderwort seedlings germinating in piles of gin trash raise concerns about land application of these residues. Equipment used to harvest and move cotton, peanut and other crops are likely dispersal agents, both for seed and vegetative plant parts. In August 2005 nursery stock contaminated with tropical spiderwort (and a *Phyllanthus* sp.) were identified at two major retail locations in NC. The contaminated stock was traced to a SC nursery, which in turn indicated they had received stock from LA and FL. Additional discoveries of tropical spiderwort at research stations and near a slaughterhouse in NC have increased awareness that movement of this federal noxious weed species is being moved by nursery markets and potentially in livestock or contaminated crop seed from infested fields. The largest known infestation in NC is under quarantine and all production fields have been fumigated. Other long term research areas are being intensively scouted and emerging seedlings killed to deplete the tropical spiderwort seedbank. NC has now identified infestations or taken regulatory action in five counties. The number of counties identified as affected in GA has increased from five counties in 1999 to 33 counties in 2005. Because of its germination and growth characteristics, tropical spiderwort is considered pre-adapted and a threat to cotton, peanut, rice, and southern corn production areas. Additional information is needed to determine the potential range of expansion of this taxa. A free brochure for distinguishing between tropical spiderwort and two other closely related species is available at http://www.nctropicalspiderwort.com.

IMPACT OF TILLAGE AND TILLAGE FREQUENCY ON COGONGRASS [*Imperata cylindrica* (L.) Beauv.] CONTROL. M.T. Myers, J.D. Byrd Jr, D.N. Ivy, Z.B. Chesser; Mississippi State University, Mississippi State, MS.

ABSTRACT

A study was initiated in 2005 to measure the effectiveness of tillage type and frequency on established cogongrass populations. Three tillage methods, disk harrow, rotary tiller and moldboard were used. Prior to tillage operations cogongrass aboveground biomass was removed by burning. Each tillage tool was used to thoroughly pulverize cogongrass biomass above ground along with the soil surface. The plots were roto-tilled to a depth of five inches, moldboard plowed to an eight-inch depth, and disked to a three in depth. Tillage operations were performed 0, 1, 2, 3 times a year. The experimental design was a complete randomized block with a 4 tillage methods by 4 frequencies complete factorial arrangement with 4 replications. Plots size was 20 by 50ft. Plots were tilled May, October, and December 2005. Cogongrass stand counts were made at the initiation of the experiment, and will be taken the following spring, mid-summer and prior to frost. Cogongrass leaf heights will also be measured. Visual evaluations of control were taken using a scale of 0 to 100% with 0 indicating no cogongrass control and 100 indicating complete cogongrass control. Preliminarily results indicate rotary tillage provided the best control (above 90%) 30, 60 and 90 days after first tillage (DA1T). Moldboard plowing provided 80% control 30 DA1T, but control decreased to 57% 60 DA1T and 28% 90 DA1T. Disking provided 77% control 30DA1T and decreased to 51% 60 DA1T and 25% 90 DA1T. The study will be continued spring 2006.

ROUNDUP READY FLEX COTTON – TOMORROW'S TECHNOLOGY TODAY. S.W. Murdock; Monsanto Company, St. Louis, MO 63167.

ABSTRACT

Roundup Ready® Flex cotton will be launched in the United States for sale and distribution in 2006. Roundup Ready Flex cotton has been widely tested across the U.S. Cotton Belt since 2001 and its launch has been highly anticipated. This technology enables a more flexible window of over-the-top applications of Roundup® agricultural herbicides and will offer cotton producers additional benefits above and beyond Roundup Ready® cotton.

Roundup Ready Flex cotton enables growers to spray Roundup WeatherMAX® and Roundup Original MAX™ over-the-top from emergence through seven days prior to harvest. The label allows a maximum rate of up to 32 oz/A per application by ground application equipment and up to 22 oz/A per application by air, from cotton emergence through 60% open bolls. Additionally, there are no growth or timing restrictions for sequential applications. Four (4) quarts/A is the total in-crop volume allowed from cotton emergence through 60% open bolls. A preharvest application of up to 44 oz/A may be applied after cotton reaches 60 percent open bolls through seven days prior to harvest, if needed.

Monsanto has broadly tested Roundup Ready Flex cotton with university and third party researchers since 2001. This testing has included agronomic and tolerance testing, regulatory studies, variety trials and development of weed management recommendations by local University scientists. In 2005, in addition to the extensive small plot research, Monsanto initiated over 160 on-farm grower and consultant Roundup Ready Flex cotton trials, each were 20 to 40 acres in size. These trials allowed growers and consultants to experience the new trait a growing season prior to launch. The research, as well as, grower and consultant experiences have shown that the Roundup Ready Flex cotton system will provide growers with:
-Expanded window for over-the-top herbicide applications
-Enhanced flexibility and convenience
-Increased production efficiencies
-Less dependence upon selective spray equipment
-Ability to tailor herbicide applications to weed heights instead of cotton stage of growth

In testing Roundup Ready Flex cotton Monsanto determined that a combination of components in glyphosate formulations have the potential to cause leaf injury when applied to Roundup Ready Flex cotton during later stages of crop growth. Therefore, Roundup WeatherMAX and Roundup Original MAX are now formulated for use with Roundup Ready Flex cotton to reduce the potential for leaf injury and are the only Roundup agricultural herbicides labeled and approved for new labeled uses over the top of Roundup Ready Flex cotton.

Monsanto has and will continue to broadly license the Roundup Ready Flex cotton trait through seed company licensees. In 2006, there will be 10 seed companies offering Roundup Ready Flex cotton varieties. Monsanto strongly encourages growers to utilize seed company and local university resources in making variety decisions. As the growing season and environments vary across the Cotton Belt, variety performance may also vary; therefore, Monsanto is recommending that growers plant no more than 30% of their cotton acres to the new Roundup Ready Flex cotton varieties in 2006. This will allow growers to determine what varieties best fit their farm, management practices and gain experience with the Roundup Ready Flex cotton system.

EFFECTS OF PESTICIDE PROGRAMS FOR COTTON ON SOIL MICROBIAL ACTIVITY. S.R. Lancaster[1], S.A. Senseman[1], R.L. Haney[2], F.M. Hons[1], and J.M. Chandler[1]; [1]Texas A&M University-Texas Agricultural Experiment Station and [2]USDA-ARS.

ABSTRACT

Adoption of glyphosate-based weed control systems has lead to increased use of the herbicide glyphosate; however, other pesticides are still utilized in these systems. Soil microbial activity may be influenced by various mixtures of these pesticides. Research was conducted to evaluate the influence of glyphosate-based cotton pest management systems on soil microbial activity. Two soils (pasture and cultivated field) were treated with fluometuron (Cotoran 4L), trifluralin (Treflan 4L), aldicarb (Temik 15G), and mefenoxam plus PCNB (Ridomil Gold PC GR) with or without glyphosate (Roundup WeatherMAX). Soil microbial activity was measured by quantifying carbon (C) and nitrogen (N) mineralization 1, 2, 3, 4, 10, and 30 days after treatment (DAT). Soil microbial biomass C and N (SMBC and SMBN) were evaluated using the chloroform incubation method. In cultivated soils, glyphosate increased microbial activity as measured by C mineralization 30 DAT, relative to untreated soils or aldicarb applied alone. Nitrogen mineralization in cultivated soils was increased 10 and 30 DAT, regardless of the presence of other pesticides. Soil microbial biomass C was also increased by all treatments that included glyphosate. None of the characteristics measured were influenced by any treatments in pasture soils.

ATRAZINE LOSSES IN TWO TILLAGE SYSTEMS. M. Dozier, P. Baumann, S. Senseman, T. Gerik, W. Harman and J. Matocha, Texas Cooperative Extension1; Texas Agricultural Experiment Station, College Station, TX; Texas Agricultural Experiment Station, Temple, TX; Texas Agricultural Experiment Station, Corpus Christi, TX.

ABSTRACT

Potential pesticide contamination of surface and groundwater from agricultural land has generated considerable concern from both the general public and agricultural producers of food, fiber and forage products. These concerns have brought the use of agricultural chemicals to the forefront of the environmental debate. Presently, less than 2% of the U.S. population is working to meet the demand for food and fiber. As this demand increases, reliance on crop protection chemicals may also continue to rise.

In 1990, more than 90% of the acreage in the United States planted in corn (*Zea Mays* L.), soybeans (*Glycine max* L.), cotton (*Gossypium hirsutum* L.), and rice (*Oryza sativa* L.) received pesticide applications (USDA 1991). Although invaluable and economical, crop protection chemicals can pose a potential risk to the environment because of intense use. This potential risk is demonstrated when herbicides are applied to soil prior to emergence of crops and weeds creating vulnerability to loss of the compound through surface runoff in both aqueous and sediment phases (Shaw and Webster 1994).

Pesticides have impacted an estimated 76% of lake acreage, 65% of stream mileage, and 45% of the estuarine square mileage in the United States through agricultural nonpoint source pollution (USEPA 1986). Herbicides were detected in 90% of the samples collected from 149 sites along Midwest rivers and streams in 1989 after the first major spring runoff event following herbicide applications (Thurman 1991).

Atrazine is one of the compounds commonly detected in surface water following runoff events (Senseman 1997 and Tierney 1993). Best management practices are being studied to reduce off-target losses of atrazine in surface runoff. One such practice is the use of conservation tillage. In this study, off-target surface runoff losses of atrazine and corn yields from a no till production system were compared to a conventional system.

The objectives of this study were:

1) Determine Off-target losses of atrazine in surface runoff from a no-till and a conventional tillage system tillage systems and
2) Compare corn yields under these two tillage systems.

This project was conducted at the Texas Agricultural Experiment Station (TAES) near Corpus Christi in 2003 and 2004. Corn production plots (3.05 m x 12.29 m) were established in a field managed under a conventional tillage system and in a no-till field. Plots were replicated four times. Corn was planted on April 12, 2003 and March 23, 2004 and atrazine applied broadcast using a CO2 backpack spray and boom system. Soil berms were placed around each individual plot and a passive runoff sampler was placed at the lower end of each plot. Samplers were designed to catch runoff from each individual plot. Runoff collected from the first flush event was analyzed for atrazine concentration using High Performance Liquid Chromatography (HP-LC) by the TAES Pesticide Fate Laboratory in College Station, TX. Results in µg L-1 are reported in Table 1. Crop was taken to yield and hand harvested. Yield data in bushels acre-1 is reported in Table 2.

All means were separated using Duncan's MRT at a 0.05 level of significance and treatments not compared across years.

Off-target losses of atrazine in surface runoff were greater in 2003 from the no till plots verses the conventional tillage plots. This trend was reversed in 2004. This may be explained by the fact the first flush event in 2003 did not occur until almost 60 days after application compared to only 17 days in 2004. Atrazine applied to the conventional tilled system in 2003 may have been subjected to more microbial degradation at the soil surface interface than the atrazine applied in the no till system. It should be noted that no significant differences in off-target losses of atrazine in surface runoff were reported for either year.

Yields in 2003 were significantly greater for the conventional treatments verses the no till treatments. For 2004, yields were not significantly different between the treatments. Though spring rain fell in 2004, lack of mid and late season moisture coupled with high grassy weed pressure negatively impact '04 yields in both systems.

IMPACT OF LAND USE CHANGES ON NONPOINT SOURCE RUNOFF. M.L. Tagert, R.L. Bingner, J.H. Massey, D.R. Shaw, and J.M. Prince; Mississippi State University, Mississippi State, MS; and USDA-ARS National Sedimentation Laboratory, Oxford, MS.

ABSTRACT

Watershed models are an efficient and effective means of estimating water runoff and pollutant loadings entering surface waters. Watershed models are also useful in analyzing the effects of land use on nearby surface waters, as well as the effects of land use changes. The primary objective of this study was to compare runoff and pollutant loading predictions of the Annualized Agricultural Non-Point Source Pollutant (AnnAGNPS) loading model with a 1987 land use dataset and with a 2002 land use dataset. In particular, average annual water runoff and selected pollutant loadings simulated by AnnAGNPS were compared to determine the effects of land use changes from 1987 to 2002. The simulation with 2002 land cover resulted in 15% more average annual water runoff than did the simulation with 1987 land cover, although both simulations had similar average annual precipitation. The AnnAGNPS simulation with 2002 land cover data also had higher values for average annual watershed or landscape erosion, sediment loading, organic carbon loading, and phosphorus loading. This can be explained by the decrease in forested acreage in the watershed from 1987 to 2002. Average annual nitrogen loading was less for the 2002 land cover simulation than for the 1987 land cover simulation, likely because the percentage of cotton grown in the watershed decreased from approximately 2% in 1987 to 0.07% in 2002. Additionally, the urban land cover class was a more dominant contributor to water runoff and pollutant loadings from 1987 to 2002, while traditional row crop agriculture had less of an impact on runoff and pollutant loadings.

FOLIAR WASHOFF POTENTIAL AND SURFACE RUNOFF LOSSES OF TRIFLOXYSULFURON IN COTTON (*Gossypium hirsutum*).
M.A. Matocha[1], L.J. Krutz[2], S.A. Senseman[3], K.N. Reddy[2], M.A. Locke, R.W[4]. Steinriede, Jr[4]; [1]Texas Cooperative Extension Ag. & Environmental Safety, College Station, TX 77843; [2]Southern Weed Science Research Unit, USDA-ARS, Stoneville, MS 38776; [3]Department of Soil and Crop Sciences, Texas Agricultural Experiment Station, Texas A&M University, College Station, TX 77843; [4]National Sedimentation Laboratory, USDA-ARS, Oxford, MS 38655.

ABSTRACT

The surface runoff potential of trifloxysulfuron in Mississippi Delta cotton production systems has not been evaluated. The objectives of this study were to 1) determine sorption/desorption coefficients for trifloxysulfuron; 2) quantify foliar washoff of trifloxysulfuron applied to cotton at the 5-leaf stage; 3) and determine average edge-of-field concentrations and total mass losses of trifloxysulfuron when applied to cotton at the 5-leaf stage and to bare soil. Sorption and desorption of trifloxysulfuron to Dundee silt loam was described by the Freundlich equation. The Freundlich sorption and desorption coefficients were 1.2 and 1.2, respectively. Sorption data indicated that trifloxysulfuron is moderately sorbed to soil and will likely be transported primarily in the dissolved phase of surface runoff. Foliar washoff studies indicated that the amount of ^{14}C-trifloxysulfuron available for washoff decreased logarithmically with time. Ninety-one percent of the applied trifloxysulfuron was available for washoff after 72 h. Average edge-of-field concentrations of trifloxysulfuron were 0.8 µg L^{-1} and 1.3 µg L^{-1} for bare plots and cotton plots, respectively. Cumulative trifloxysulfuron losses in runoff from cotton plots were 0.21 g ha^{-1} while losses from bare plots were 0.13 g ha^{-1}. These values correspond to fractional losses of 2.7% for cotton plots and 1.7% for bare plots. Greater runoff loss of trifloxysulfuron from cotton plots relative to bare plots is likely due to foliar washoff. Losses of trifloxysulfuron in runoff may be reduced if applied when canopy closure is minimal.

MEASURING THE PERSISTANCE HALOSULFURON METOLACHLOR, AND SULFENTRAZONE USING ANALYTICAL AND BIOASSY TECHNIQUES FOR BARE-SOIL VERSES SOIL UNDER POLYETHYLENE MULCH. T.L. Grey*, A.S. Culpepper*, and T.W. Webster**. *University of Georgia Crop and Soil Science Dept. and **USDA/ARS, 115 Coastal Way, Tifton GA 31794.

ABSTRACT

The use of polyethylene mulch has become more common for Georgia spring and fall vegetable production. Following the spring crop, fall plantings are made directly into the existing polyethylene-covered beds in order to grow two crops in one year. Fumigation as a means of weed control is being limited by the restricted use and eventual elimination of methyl-bromide (MBr). Alternative fumigants have been investigated as MBr replacements have had varying levels of success for weed control. Yellow nutsedge (*Cyperus esculentus*) and purple nutsedge (*C. rotundus*) are the most common and troublesome vegetable weeds throughout the southern US. Herbicides that could be incorporated into polyethylene mulch-fumigant systems must control *Cyperus* species to be effective. Halosulfuron, sulfentrazone, and metolachlor all have *Cyperus* species activity. Establishing the dissipation of these herbicides will be critical for determining season long nutsedge control, if facultative fall plantings are possible, or if potential carryover could jeopardize the crop. The objectives of this research were to compare directly the dissipation of several herbicides on bare-soil to soil under polyethylene mulch. The second objective was to conduct bioassays with these same soil samples to see if data correlation could be conducted between analytical and plant growth measurement.

Field studies were conducted to compare herbicide dissipation in bare-soil verses polyethylene mulch environments. Tifton loamy sand soil was treated by injection with MBr followed by application of polyethylene mulch. After removal of the mulch, the entire length of each plot was then treated with herbicide. Half of each plot was then recovered with the same mulch. Soil cores were collected at 1 h, 1, 2, 3, 7, 14, 21, 28, 44, and 66 days after treatment (DAT). A representative 25-g sample (dry soil basis) was extracted with 25 ml of extraction solvent in a 50 ml Nalgene Centrifuge tube. After purification, samples were injected into an YMC ODSA reversed phase 3 um, 2 X 100 mm silica column. A Waters Alliance 2690 system coupled to a Micromass Quattro was used to analyze the samples using Electrospray Ionization and the data was processed using Masslynx. Data was combined for analysis then subjected to ANOVA. Regression analysis was performed for data presentation using the exponential decay equation $ug = Boe^{-B1(DAT)}$. Half-life was determined using the equation $DT50 = \ln 0.50/k$. Bioassays were performed for all soil samples using a species deemed sensitive to each herbicide: oat for metolachlor, cotton for sulfentrazone, and canola for halosulfuron. Correlation analysis was performed matching soil dissipation data for respective bioassay data for root- and shoot- weight and length data.

Sulfentrazone dissipation was slower than halosulfuron or metolachlor. This indicates that sulfentrazone could provide nutsedge control when PRE applied to vegetables, but could also have the propensity for carryover concerns (i.e. 2nd crop injury). For polyethylene mulch, halosulfuron concentration remained consistent to the initial 20 ug/kg soil for 7 DAT. However, halosulfuron concentration for bare-soil was half this amount at 10 ug/kg soil. Regression data indicated that the half lives for bare-soil and soil under polyethylene mulch were 7 and 10 d, respectively. First order rate constants indicated that bare-soil dissipation of halosulfuron was greater than soil covered with polyethylene mulch, but they were not significantly different from each other. At 14 DAT bare-soil and soil covered with polyethylene mulch halosulfuron concentration dropped to <1 ug/kg soil. Bioassay data for halosulfuron indicated poor correlation between shoot- and root- dry weights and lengths to the analytical measurement. Metolachlor concentrations were similar for soil under the polyethylene mulch system and bare-soil for the first 7 DAT, dissipating to 396 and 337 ug/kg, respectively. From this point forward, dissipation of metolachlor was linear with soil dissipation rates of 0.404 and 0.131 and half-life of 2 and 5 d for bare-soil and soil under polyethylene mulch, respectively. These data indicate that polyethylene mulch decreased the rate of dissipation of metolachlor verses bare-soil. Under polyethylene mulch, the herbicidal activity for halosulfuron should be extended. For the oat bioassay, correlation data indicated that there was an inverse relationship for metolachlor for root- and shoot- dry weight and length for the bare-soil dissipation. As the concentration of metolachlor decreased, all plant bioassay measurements increased. Initial sulfentrazone concentration was 328 and 562 ug/kg for the bare-soil and soil under polyethylene mulch systems, respectively. Dissipation was significantly different with a first order rate constant of 0.036 for soil under polyethylene mulch and 0.054 for bare-soil. Half lives were 20 days for bare-soil and 13 days for soil under polyethylene mulch. While counter intuitive, this could be due to increased temperature regimes under the polyethylene mulch that actually accelerated dissipation. For the bioassay, correlation data indicated that there was an inverse relationship for sulfentrazone similar to metolachlor.

USE OF GPS AND CONTROLLED ENVIRONMENT EXPERIMENTS TO EXAMINE FACTORS AFFECTING PASPALUM SPECIES DISTRIBUTION. G.M. Henry, M.G. Burton, and F.H. Yelverton; North Carolina State University, Raleigh, NC.

ABSTRACT

Dallisgrass (*Paspalum dilatatum* Poir.) and bahiagrass (*Paspalum notatum* Fluegge) are two of the most troublesome weed species in managed turfgrass. These rhizomatous, perennial grass species are known to affect appearance, texture, and playability of turf in home lawns, golf courses, and athletic fields. The severity and prevalence of these problem species, as well as the difficulty of achieving control with herbicide management alone, invite examination of their population ecology for clues to improved management tactics. The distribution of these species was evaluated in both fairways and roughs of three holes on two golf courses. Golf courses were selected based on the presence of both weed species. Individual plants were mapped using a high precision (RTK) GPS unit. The RTK unit was used to delineate between the rough and fairway height of cut as well as the elevation characteristics of each hole. Volumetric soil water content and soil penetration resistance readings were also obtained. Characteristics used for initial correlation analysis consisted of mowing height, elevation, volumetric soil water content (soil moisture), and soil penetration resistance (soil compaction). Categorical ranges were created for each landscape characteristic using Jenk's natural breaks method. Data was subjected to chi-square analysis in order to determine if the existing distribution of *Paspalum* spp. differed from a homogeneous distribution across all environmental factors. Bahiagrass growth and distribution was more affected by mowing height than dallisgrass. Bahiagrass was predominantly distributed in the rough, while dallisgrass occurred at both mowing heights. Although highly significant, data suggest that elevation was not a factor affecting *Paspalum* spp. distribution. Similar responses were observed for both species in regards to soil compaction. Higher plant density for both species was observed in moderately compacted soil (40-60 N). Bahiagrass distribution was not affected by soil moisture. Dallisgrass density was lower in areas with low volumetric soil moisture levels (< 27%). Controlled environment experiments were conducted to help clarify the effect of several of these factors and to negate the possibility of spatial autocorrelation. Research was conducted at the Sandhills Research Station in Jackson Springs, NC focusing on the effects of mowing height on the lateral spread and rhizome production of *Paspalum* spp. Dallisgrass spread and rhizome production was reduced when compared to the non-mowed check. However, the amount of reduction did not differ between mowing treatments. Bahiagrass plants that were mowed at the 1.3 cm (fairway) height had both spread and rhizome productions that were less than plants mowed at 7.6 cm (rough) height. This data supports our spatial distribution research concerned with mowing height. Therefore, areas that are maintained at a rough height may be more conducive to bahiagrass infestation than areas maintained at a fairway height. Greenhouse experiments were conducted to quantify the growth response of dallisgrass and bahiagrass to soil moisture using water table depth gradient tanks in a controlled environment. Lowest order curves giving high R^2 values were fit to the preliminary data for comparison of plants at different soil moisture levels. Bahiagrass growth and survival was less affected by soil moisture than dallisgrass. Bahiagrass survival was 100% regardless of simulated environmental conditions. Bahiagrass rhizome production increased as depth to water table increased when grown in sandy loam soil, but decreased or remained relatively constant when grown in sand. Dallisgrass survival decreased as depth to water table increased. This trend was more severe when grown in competition with bermudagrass. Dallisgrass rhizome production decreased as depth to water table increased in all simulated environments except when grown as a monoculture in sandy loam soil. This data supports our spatial distribution research concerned with volumetric soil water content. Therefore, areas that have high volumetric soil water contents may be more conducive to dallisgrass infestation, while areas with low volumetric soil water contents may be more conducive to bahiagrass infestation.

SYMPOSIA

HERBICIDES: NOT WHAT YOUR FATHER USED, OR ARE THEY?

NEW HERBCICIDES AND HERBICIDE-RESISTRANT CROPS – HOW DRY IS THE PIPELINE? S.O. Duke, Natural Products Utilization Research, Agricultural Research Service, United States Department of Agriculture, University, MS 38677

ABSTRACT

In the United States, improvements in weed management have largely depended on a steady stream of new herbicides, often with new modes of action. In the past decade, the introduction of herbicide-resistant crops (both transgenic and via mutations) has extended the use of some herbicides, further improving weed management. Glyphosate-resistant crops in particular have reduced the cost of excellent weed management, reducing the market value of most other herbicides that are used in crops for which glyphosate-resistant varieties are available. Furthermore, the performance and regulatory requirements for competitive herbicides have become more stringent. Many more compounds must be evaluated now than in previous years to generate one new product. From these developments and the dramatic consolidation over the last two decades of companies that discover and develop new herbicides, one might predict that introduction of new herbicides would be dramatically reduced. In fact, the rate of introduction of new herbicides over the past five years has been lower than in previous five-year periods. However, new, streamlined discovery approaches and the large value of the global herbicide market probably ensure that new products will be continually introduced for years to come. Herbicide-resistant crops have been on the market for ten years. The vast majority of the acreage of these crops is in glyphosate-resistant soybean, corn, cotton, and canola. Glyphosate-resistant alfalfa was introduced and glyphosate-resistant sugarbeet was reintroduced in 2005. Glyphosate-resistant turf grasses are being tested. Glufosinate-resistant corn, canola and cotton are available and a relatively large number of glufosinate-resistant crops are being field tested. Crops with new genes for resistance to glyphosate are being tested in greenhouses, and crops made resistant to imidazolinones, isoxazoles, and dicamba are at the field testing stage. In summary, the pipeline for both herbicides and herbicide-resistant crops appears to be in no immediate danger of drying up.

SYMPOSIA

HERBICIDES: NOT WHAT YOUR FATHER USED, OR ARE THEY?

HOW TO MAKE THE OLD HERBICIDES WORK IN THE NEW SEED TRAIT TECHNOLOGY ARENA.

L.E. Steckel, C.C. Craig and M.A. Thompson. University of Tennessee, Jackson, TN

ABSTRACT

Glyphosate-tolerant transgenic cotton (*Gossypium hirsutum*) and soybean (*Glycine max*) varieties now make up the vast majority of acres in the United States. The acres of glyphosate-tolerant corn (*Zea mays*)hybrids are also on the rise. The result of this transition to glyphosate-tolerant transgenic varieties and hybrids has caused a drastic decrease in all “traditional” herbicides, while the use of glyphosate has increased dramatically. A good example of this is in cotton where from 1997 to 2003 glyphosate use has increased 752%. In contrast, notable herbicides prior to the introduction of Roundup Ready cotton such as trifluralin, fluometuron and pendimethalin have decreased 22, 84 and 26%, respectively. The reasoning behind this is the many positives glyphosate brings to the weed management table including broad spectrum weed control, convenience and excellent environmental aspects. Recently however, this almost complete reliance on one herbicide has led to selection pressure which has magnified a few glyphosate-resistant individuals in several weed species to become the dominate biotype of that species. In Tennessee, traditional herbicides are being put back to use in both glyphosate-tolerant cotton and soybean varieties. Glyphosate-resistant horseweed (*Conyza canadensis*) has been the biggest driver of this return. Herbicides such as dicamba, diuron, pendimethalin, prometryn and fluometuron are now being incorporated into the Roundup Ready cotton or soybean system to manage this weed. Another reason for the increase in traditional herbicides particularly in cotton has been the residual weed control aspect many of them provide which can reduce a post glyphosate application later in the spring. This often is an advantage to cotton growers who manage many acres by reducing the number of trips across the field.

SYMPOSIA

HERBICIDES: NOT WHAT YOUR FATHER USED, OR ARE THEY?

IMPORTANCE OF RESIDUAL HERBICIDES IN ROUNDUP READY AND LIBERTYLINK SYSTEMS.

J.W. Keeling, P.A. Dotray, and J.D. Everitt, Texas Agricultural Experiment Station, Lubbock.

ABSTRACT

Roundup Ready technology has improved weed control in cotton, and has reduced the need for preplant incorporated (PPI) and preemergence (PRE) herbicides, mechanical cultivation, and hand labor inputs. With the development of LibertyLink and Roundup Ready Flex cotton varieties, an increasing reliance on postemergence (POST) herbicides has resulted in some weed shifts and concerns about development of weed resistance.

Trials conducted on the Texas Southern High Plains have demonstrated the value of soil residual herbicides in both Roundup Ready and LibertyLink cotton weed management systems. Dinitroaniline herbicides applied PPI provide economical and effective control of weeds such as Russian thistle (*Salsola iberica*), kochia (*Kochia scorparia*), and Palmer amaranth (*Amaranthus palmeri*) prior to planting, as well as providing a foundation for Palmer amaranth control in-season. Palmer amaranth control has been improved in both Roundup Ready and LibertyLink programs when a dinitroaniline PPI was used compared to Roundup WeatherMax or Ignite alone. PRE herbicides can broaden the spectrum of weeds controlled and improve annual morningglory and Palmer amaranth control, especially in LibertyLink systems. POST tank mixes of Staple or Dual in combination with Roundup WeatherMax or Ignite have improved POST weed control and provides residual control of Palmer amaranth, morningglory, and yellow nutsedge (*Cyperus esculentus*). In LibertyLink systems, Staple used either PRE or POST with Ignite improved Palmer amaranth, ivyleaf morningglory (*Ipomoea hederacea*), and devil's-claw (*Proboscidea louisianica*) control compared to Ignite POST alone. Postemergence directed (PDIR)/layby treatments (Direx, Caparol, or LaybyPro) alone or tank mixed with Roundup WeatherMax or Ignite can improve late-season weed control.

The development of Roundup Ready Flex cotton technology may improve control of tougher weeds using higher Roundup WeatherMax rates and reduce late-season Palmer amaranth competition with POST treatments. Trials have demonstrated the use of residual herbicides in Roundup Ready Flex cotton can reduce number of glyphosate applications required. Soil–applied residual herbicides are important in Roundup Ready, Roundup Ready Flex, and LibertyLink systems as an economical means to maintain effective weed control while minimizing the potential for weed resistance development.

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HERBICIDES: NOT WHAT YOUR FATHER USED, OR ARE THEY?

IGNITE® HERBICIDE AND FIBERMAX® COTTONSEED WITH LIBERTYLINK® TECHNOLOGY – CURRENT AND FUTURE COMPETITIVE EDGE. M.D. Parrish, Bayer CropScience, Research Triangle Park, NC.

ABSTRACT

The LibertyLink cotton system, combining Ignite 280 herbicide and FiberMax seed is a viable alternative to the Roundup Ready system. Ignite 280 (glufosinate-ammonium) is a non-selective, broad-spectrum herbicide that controls glyphosate-resistant or tolerant weeds and volunteers. It has a unique mode of action enabling management of weed resistance/shifts. The Liberty Link trait is contained in FiberMax cotton genetics, which are highly regarded for yield potential and quality characteristics. These varieties are regionally adapted, further maximizing quality and yield potential. The LibertyLink system, allows for an unrestricted broadcast application timing window and rate range. In total, the system offers growers a non-selective broad spectrum weed control with all the same benefits of Roundup Ready or Flex systems, including less tillage and equipment, less labor, greater ease, and convenience vs. conventional systems.

The development pipeline for LibertyLink and LibertyLink varieties with Bollgard II represents next generation genetics with more specific adaptation for US geographic regions. There are more than 19 new genetic variants currently in introgression with this technology for 2007 and beyond. New lines with LibertyLink and Bollgard II technologies were developed through forward crossing for specific, underserved geographies to ensure that yield and quality is not taking a back seat to technology selection. The excellent tolerance of the current LibertyLink event to over-the-top applications of glufosinate have allowed the breeders to concentrate specifically on genetic improvements in yield and quality. Five to ten new candidate varieties will be evaluated this year and each year after for potential commercial release. Beyond 2007, improvements not only in the technology, but also in new genetic developments will become available. The goal is to have LibertyLink available in a full complement of varieties to serve growers in the major regions where Ignite is an excellent herbicide choice.

SYMPOSIA

HERBICIDES: NOT WHAT YOUR FATHER USED, OR ARE THEY?

ROUNDUP READY FLEX COTTON – TOMORROW'S TECHNOLOGY TODAY.
S.W. Murdock; Monsanto Company, St. Louis, MO 63167.

ABSTRACT

Roundup Ready® Flex cotton will be launched in the United States for sale and distribution in 2006. Roundup Ready Flex cotton has been widely tested across the U.S. Cotton Belt since 2001 and its launch has been highly anticipated. This technology enables a more flexible window of over-the-top applications of Roundup® agricultural herbicides and will offer cotton producers additional benefits above and beyond Roundup Ready® cotton.

Roundup Ready Flex cotton enables growers to spray Roundup WeatherMAX® and Roundup Original MAX™ over-the-top from emergence through seven days prior to harvest. The label allows a maximum rate of up to 32 oz/A per application by ground application equipment and up to 22 oz/A per application by air, from cotton emergence through 60% open bolls. Additionally, there are no growth or timing restrictions for sequential applications. Four (4) quarts/A is the total in-crop volume allowed from cotton emergence through 60% open bolls. A preharvest application of up to 44 oz/A may be applied after cotton reaches 60 percent open bolls through seven days prior to harvest, if needed.

Monsanto has broadly tested Roundup Ready Flex cotton with university and third party researchers since 2001. This testing has included agronomic and tolerance testing, regulatory studies, variety trials and development of weed management recommendations by local University scientists. In 2005, in addition to the extensive small plot research, Monsanto initiated over 160 on-farm grower and consultant Roundup Ready Flex cotton trials, each were 20 to 40 acres in size. These trials allowed growers and consultants to experience the new trait a growing season prior to launch. The research, as well as, grower and consultant experiences have shown that the Roundup Ready Flex cotton system will provide growers with:
-Expanded window for over-the-top herbicide applications
-Enhanced flexibility and convenience
-Increased production efficiencies
-Less dependence upon selective spray equipment
-Ability to tailor herbicide applications to weed heights instead of cotton stage of growth

In testing Roundup Ready Flex cotton Monsanto determined that a combination of components in glyphosate formulations have the potential to cause leaf injury when applied to Roundup Ready Flex cotton during later stages of crop growth. Therefore, Roundup WeatherMAX and Roundup Original MAX are now formulated for use with Roundup Ready Flex cotton to reduce the potential for leaf injury and are the only Roundup agricultural herbicides labeled and approved for new labeled uses over the top of Roundup Ready Flex cotton.

Monsanto has and will continue to broadly license the Roundup Ready Flex cotton trait through seed company licensees. In 2006, there will be 10 seed companies offering Roundup Ready Flex cotton varieties. Monsanto strongly encourages growers to utilize seed company and local university resources in making variety decisions. As the growing season and environments vary across the Cotton Belt, variety performance may also vary; therefore, Monsanto is recommending that growers plant no more than 30% of their cotton acres to the new Roundup Ready Flex cotton varieties in 2006. This will allow growers to determine what varieties best fit their farm, management practices and gain experience with the Roundup Ready Flex cotton system.

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HERBICIDES: NOT WHAT YOUR FATHER USED, OR ARE THEY?

OVER-THE-TOP AND LAY-BY HERBICIDE TREATMENTS TO CONTROL SILVERLEAF NIGHTSHADE, DESERT HORSE PURSLANE AND TEXAS SMELLMELON IN RR, RR-FLEX AND LIBERTY LINK TRANSGENIC COTTON. S. D. Livingston, Texas Cooperative Extension Service, Corpus Christi, TX.

ABSTRACT

Silverleaf nightshade (S*olanum eligeanium*), has increased as an escape weed on the lower Texas Gulf Coast during the past 10 years. This perennial weed, when established, has a root biomass in excess of 3X that of the above ground plant. During the fallow time of year, fields containing silverleaf nightshade (SLNS) continue to extend root systems and produce some additional berries. A conventional, a Roundup Ready Flex and an Ignite system were arranged in a randomized complete block with four replications. Conventional products, Mon 3539 and Ignite were applied to respective plots according to label, and Texas panicum, Silverleaf nightshade, and Texas smellmelon were evaluated for control at 14 DAT and at harvest. The Ignite system provided 80% control of Texas Panicum and the Roundup Ready® system provided 99% control. Roundup Ready® Flex and Ignite cotton, were shown to provide silverleaf nightshade suppression of plants larger than 8 inches in height, and control of smaller SLNS plants derived from seed. Roundup WeatherMax provided excellent control of Texas smellmelon at 3 true leaves or less. Larger plants were suppressed. The Ignite system provided dessication and full suppression of Texas smellmelon vines during the 70-day treatment window, but later emerging plants continued to provide competition. Larger silverleaf nightshade fruit contain as many as 155 seed and single plants may have as many as 30-40 berries. Because of the 300-day growing season in South Texas, SLNS survives post-harvest tillage and requires additional tillage or an aggressive winter weed control program to prevent seed production.

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HERBICIDES: NOT WHAT YOUR FATHER USED, OR ARE THEY?

THE INTANGIBLE BENEFITS OF A GLYPHOSATE PRODUCTION SYSTEM. C. C. Craig L. E. Steckel and T. C. Mueller, Department of Plant Sciences, The University of Tennessee, Jackson, TN

ABSTRACT

In 1996 Roundup Ready (RR) soybeans were introduced to farmers and Roundup Ready cotton followed a year later. In the United States Roundup Ready soybeans now make up over 90% of the soybean acres while well in excess of 80% of cotton acres are now in Roundup Ready technology. Soybean and cotton producers quickly embraced this new technology for many reasons. Some reasons are very tangible and have already become well documented including reduced herbicide inputs, wide spectrum of weed control and no crop injury from glyphosate. Other reasons for the relatively quick adoption of Roundup Ready technology can not be so easily measured. A number of intangible benefits of the glyphosate production system include the confidence that almost complete weed control occurs compared to traditional herbicide systems that were not as reliable. Producers also mention having peace of mind that they no longer fear using the wrong herbicide on the wrong field, such as spraying glyphosate on a non-RR field. When all fields are sprayed with the same herbicide there is little chance such a mistake could occur. Another intangible is that the herbicide glyphosate is very user and environmentally friendly. These and other reasons are often mentioned by growers as to why they have moved to Roundup Ready technology so quickly. These reasons are hard to assess but must somehow be added into the equation when any biotech company is determining the value of a herbicide tolerant trait.

Producers also mention having peace of mind that they no longer fear using the wrong herbicide on the wrong field, such as spraying glyphosate on a non-RR field. When all fields are sprayed with the same herbicide there is little chance such a mistake could occur.

No longer fear applying glyphosate to a non-RR crop.

SYMPOSIA

WEED MANAGEMENT IN TURF WITH SULFONYLUREA HERBICIDES

OVERVIEW OF SULFONYLUREA HERBICIDES IN TURFGRASS. J.W. Boyd. University of Arkansas Cooperative Extension, Little Rock, AR.

ABSTRACT

In the beginning there were two sulfonylurea (SU) herbicides in turfgrass, chlorsulfuron and metsulfuron. Chlorsulfuron, introduced in the 1990's under the trade name Lesco TFC, was the first SU approved for use in fine turf. Lesco TFC was marketed for tall fescue control in Kentucky bluegrass and other tolerant turfgrass species. This herbicide also controlled many other weeds. However, use of this product was never widely adopted. Shortly thereafter, The O.M. Scotts Company brought metsulfuron to the market under the trade name Scott's DMC Weed Control. Scott's dropped the product after a short time and metsulfuron disappeared from the turfgrass for several years. However, metsulfuron had proven to be an effective, broad spectrum herbicide for which bermudagrass and St. Augustinegrass have excellent tolerance. Metsulfuron controls several problem weeds including prostrate spurge, wild garlic and bahiagrass. In addition, metsulfuron proved to be a useful tool for the transition of ryegrass in overseeded bermudagrass. As a result, metsulfuron developed a following which led to use widespread use of Escort, a metsulfuron product labeled for industrial applications, on highly maintained bermudagrass turf throughout the south. Sulfometuron was developed around the same time as metsulfuron and sold under the trade name Oust. Due to injury on fine turf, use of Oust has been confined to roadside and industrial sites, primarily for bermudagrass release on right-of-ways. Around 2000, metsulfuron and chlorsulfuron were returned to the turfgrass market by Riverdale as Manor and Corsair.

Halosulfuron (Manage, SedgeHammer) was the next SU to appear in turfgrass weed control. Monsanto began trials in 1988 and the herbicide was approved for use in turfgrass in the mid 1990's. Halosulfuron, now being marketed by Gowan, is a sedge control herbicide that is unique in that it is safe to use on almost all turfgrasses.

Rimsulfuron, trade name TranXit, was the next SU to be introduced into turfgrass use around 2000. The primary target weed was annual bluegrass. However, rimsulfuron has also been shown to be effective on other cool season grasses. TranXit brought the problem of movement of SU herbicides onto sensitive sites such as bentgrass greens to the attention of the turfgrass industry. Griffin introduced TranXit but it is now part of the DuPont portfolio.

The period from about 2000 to the present has seen the most rapid increase in the number of SU herbicides being used in turfgrass and consequently the amount of research being conducted. Trifloxysulfuron (Monument), foramsulfuron (Revolver), and sulfosulfuron (Certainty) were all labeled for use in rapid succession.
Certainty, Monument and Revovler have demonstrated usefulness for control of several cool season grasses. Monument, developed by Syngenta, is also effective for control of sedges and several broadleaf weeds. Revolver, a Bayer product, is active on goosegrass and shows promise for dallisgrass control. Certainty, from Monsanto, controls johnsongrass and sedges.

Flazasulfuron, an ISK Biotech SU, was in university trials in the mid 1990's and then dropped out of sight. It reappeared in 2001 and is now on track for approval as a turfgrass herbicide under the trade name (Katana). Katana will be used for control of cool season grasses, especially tall fescue, and certain sedges and broadleaf weeds.

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WEED MANAGEMENT IN TURF WITH SULFONYLUREA HERBICIDES

ROOT AND FOLIAR UPTAKE OF SULFONYLUREA HERBICIDES. R.H. Walker, Alabama Agric. Exp. Stn., Auburn University, Auburn University, AL 36849-5412

ABSTRACT

Herbicides classified as sulfonylureas (SU) are used to control a broad spectrum of grass, broadleaf and sedge species in turf. All are applied postemergence (POST) but can provide some preemergence (PRE) activity. It is commonly known that weeds have a propensity to develop resistance to SU- and other ALS-inhibiting compounds. Therefore, understanding root and/or foliage absorption by weed species should help in developing usages that will allow for maximum efficacy and thus potential to prevent weed resistance. After reviewing the literature, it can be concluded that SU herbicides are absorbed by both root and foliage of plants. Ambi-mobile translocation patterns in plants are usually observed. However, absorption varies among SU herbicides and weed species. In earlier research Leys and Slife (1988) reported chlorsulfuron and metsulfuron reduced wild garlic (ALLVI) shoot dry weight, height, and number of leaves more when applied to the foliage or to both the foliage and the soil, than when they were applied to the soil alone. Baird et al. (1989) reported sulfometuron was absorbed by the roots and foliage of centipedegrass (ERLOP) and bahiagrass (PASNO); extent of which was not characterized. More recently in selective placement studies with rimsulfuron, Wehtje and Walker conclude that *Poa annua* var. *annua* (POAAN) was equally controlled with foliar+soil and soil-only applications. However, with var. *reptans*, foliar+soil was the most effective exposure but soil only was still significantly better than foliar only. In subsequent studies with POAAN control with rimsulfuron, trifloxysulfuron, and foramsulfuron they showed identical results with rimsulfuron. Best control with trifloxysulfuron and foramsulfuron was foliar+soil applications. However, trifloxysulfuron was equally absorbed by root and foliage whereas foramsulfuron showed only minor root absorption from soil-only applications. The same experiment was conducted with goosegrass (ELEIN). Control was best with all three herbicides with foliar+soil application. Again, foliar absorption with foramsulfuron was far more important than root absorption. Importance of root and shoot absorption with rimsulfuron and trifloxysulfuron could not be determined since efficacy against ELEIN with these herbicides was low. Williams et al. at examined the importance of selective placement of trifloxysulfuron for control of torpedograss (PANRE). Foliar+soil and soil only were more effective than foliar only in suppressing regrowth at 10 wk after treatment. They concluded that soil-only application followed by root entry was more effective in delivering phytotoxic concentrations to the regenerative tissues of PANRE than foliar only. Wehtje et al. conducted selective placement studies with halosulfuron for control of eclipta (ECLPZ) in container-grown ornamentals. They concluded that control was a product of foliar and root entry, with foliar being of greater importance. McElroy et al. conducted selective placement studies with trifloxysulfuron and halosulfuron for control of green kyllinga (KYLBR). Shoot number reduction with soil+foliar, foliar-only and soil-only application of trifloxysulfuron was 99, 2 and 40%, respectively. With halosulfuron, reductions were 67, 7 and 22%, respectively. McElroy et al. also evaluated selective exposure of yellow (CYPES) and purple (CYPRO) nutsedges to trifloxysulfuron, imazaquin, MSMA and imazaquin + MSMA. Soil-applied trifloxysulfuron reduced shoot number, shoot weight and root weight greater than foliar applied. Averaged over herbicide treatments, soil-applied treatments were more effective in reducing CYPRO shoot number, whereas foliar applied were more effective in reducing CYPES shoot number.

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WEED MANAGEMENT IN TURF WITH SULFONYLUREA HERBICIDES

LATERAL MOVEMENT AND TRACKING OF SULFONYLUREA HERBICIDES. S.D. Askew, Virginia Tech, Blacksburg, VA.

ABSTRACT

With registration of several ALS-inhibiting herbicides in turfgrass within the last few years, concerns have been raised about injury to sensitive turfgrass species surrounding treated areas. Data has suggested that these herbicides can be dislodged from the treated area and deposited elsewhere by equipment tires, pedestrians, and runoff water. Several field trials and one laboratory trial have been conducted at Virginia Tech in the last four years to better understand relative differences in mobility between ALS-inhibiting herbicides and to determine methods to decrease injury to sensitive turfgrass in conjunction with treatment on adjacent sites.

For tracking studies, herbicides were applied to perennial ryegrass maintained at between 0.75 and 1.5 inch mowing height. At various times after treatment, a greens mower was driven across the treated area and over an adjacent plot of creeping bentgrass ‘L93’ maintained at 3/8 inch. Irrigation techniques such as applying 0.1 inch water to the treated perennial ryegrass 2 hours after treatment or to “tracked” creeping bentgrass immediately after the mower traverses the area were employed in an effort to prevent visual injury symptoms. In addition, stimulatory treatments such as gibberellic acid and foliar iron were applied to areas with visual “track” injury in an effort to remedy the problem. In some cases, tracking was done at time intervals of 6 hours, 1 day, and 3 days after treatment. Herbicides included rimsulfuron, metsulfuron, foramsulfuron, and flazasulfuron.

For runoff studies, herbicides included trifloxysulfuron, rimsulfuron, metsulfuron, flazasulfuron, and pronamide and were applied to overseeded Vamont bermudagrass fairways at Farmington Country Club near Charlottesville or the Turfgrass Research Center in Blacksburg. Two hours after treatment, irrigation was applied (and in conjunction with natural rainfall at FCC) to provide a total of 2 inches water over an eight hour period. Data were collected as visually estimated injury to perennial ryegrass down slope of plots. Plots were 3 ft by 12 ft and were oriented using surveyor’s equipment to minimize side-to-side slope (less than 1%) and adjust down slope to within 7 to 11 % in all cases. Cups were employed to capture irrigation/rainfall to insure uniformity.

The following herbicides are prone to “track” in the order of most to least injurious to creeping bentgrass: foramsulfuron> rimsulfuron> trifloxysulfuron= flazasulfuron> metsulfuron = pronamide. Radioactive rimsulfuron was water extractable from perennial ryegrass and annual bluegrass leaf surfaces at 60% after 10 minutes, 50% after 1 d, 40% after 3 d, and 35% after 4 d. Irrigating “tracked” creeping bentgrass did not reduce injury symptoms appreciably. Irrigating the treated perennial ryegrass border area nearly eliminated track symptoms and seems to be the most effective way to avoid track injury on areas adjacent to the treated area. Tracks were evident when the mower traversed foramsulfuron plots at 6 hours after treatment on dry turf or at 1 and 3 d after treatment on dew-moistened turf in the morning. Other herbicides did not cause injury tracks when turf was dry. The following herbicides are prone to cause “runoff” injury to perennial ryegrass after significant rainfall following treatment in order from most to least injury: pronamide > flazasulfuron > trifloxysulfuron > rimsulfuron = metsulfuron. Runoff severity increases as turfgrass density decreases or as rainfall or herbicide rate increases.

SYMPOSIA

WEED MANAGEMENT IN TURF WITH SULFONYLUREA HERBICIDES

MANAGEMENT OF VIRGINIA BUTTONWEED, DALLISGRASS, AND OTHR DIFFICULT TO CONTROL WEEDS WITH SU HERBICIDES – A SYNTHESIS OF RESULTS. B. J. Brecke, University of Florida, Milton, FL 32583 and J. S. McElroy, University of Tennessee, Knoxville, TN 37996.

ABSTRACT

A survey was conducted during 2005 to determine the utility of sulfonylurea (SU) herbicides for control of selected weeds in turfgrass. Eleven weed scientists/turfgrass specialists located in the southeast were surveyed and reported on dallisgrass (*Paspalum dilitatum* Poir.), Virginia buttonweed (*Diodia virginiana* L.) and sedges. Survey questions included: 1) How common is this weed?, 2) What level of control can be achieved with SU herbicides?, 3) What level of control is observed with treatments that do not include a SU?, 4) List the three best SU herbicides for control of this weed, and 4) List the three best treatments overall for control of this species. Dallisgrass, Virginia buttonweed and sedge species were listed as widespread in the southeast U.S. Foramsulfuron provides the highest level dallisgrass control among SU's, however, overall control is best with MSMA. Survey responses were evenly divided over whether SU herbicides provide any advantage for control of dallisgrass. Those surveyed indicated that Virginia buttonweed control is comparable between SU and non-SU treatments. Among SU herbicides, metsulfuron and chlorsulfuron provide the best Virginia buttonweed control while triclopyr + clopyralid is the best non-SU treatment. Purple nutsedge (*Cyperus rotundus* L.) is the most common of the sedge species reported in the survey. SU herbicides control sedge species better than non-SU treatments. Trifloxysulfuron and sulfosulfuron are rated the best among SU herbicides for sedge control while MSMA is the best non-SU treatment.

SYMPOSIA

WEED MANAGEMENT IN TURF WITH SULFONYLUREA HERBICIDES

DESIGNING FUTURE SULFONYLUREA HERBICIDES IN FINE TURF – A TOP 10 WISH-LIST. L.B. McCarty: Department of Horticulture, Clemson University, Clemson, SC 29634-0319.

ABSTRACT

Sulfonylurea (SU) herbicides were first reported to possess herbicidal properties in 1966 and originally were derivatives of triazine herbicides. In 1975, they were reformulated, thus, “rediscovered” for their current herbicide properties. SUs were first patented in 1983 and have become one of the largest herbicide research endeavors in the history of the crop protection chemical industry. Currently, over 30 commercial formulations are available. All are moderate to weak acids with ionization constant (pKa) values of 3 to 5. Water solubility increases as pH increases. One of their most desirable characteristic is low mammalian toxicity with acute oral LD50 values >5000 mg/kg. SUs also typically have very low use rates (e.g., 0.25 to 2 oz product/acre), thus, dramatically reduce active ingredient loads in the environment. All, therefore, are general use products. SUs are quickly (~2 hr) foliar (mostly) and root absorbed and rapidly translocated (mobile, systemic) via xylem and phloem in plants to points of new growth (e.g., meristematic regions). SUs inhibit the enzyme acetolactate synthase (ALS) which is needed for biosynthesis of the branched chain amino acids - leucine, isoleucine, and valine. This is the same mode of action as members of the Imidazolinones (e.g., Image, Plateau).

Problems with SU herbicides in fine turf are generally limited and local in nature. However, when they arise, these are often near catastrophic since SU low rates and potential mobility can cause considerable concern. Based on concerns and desires of end-users, the following is a “wish list” of agronomic characteristics of future SU herbicides developed for in fine turf.

1. Expanded selective weed control spectrum, especially perennial grassy weeds such as *Panicum* and *Paspalum* species. Selective control options of these weeds are largely unavailable and they have quickly become almost epidemic in fine turf.
2. Ability to selectively control one turfgrass species in another, especially cool-season turf species in other ones. A major “weed” problem are mixed stands of cool-season grasses. Having the ability to selectively control one grass in another would be highly beneficial and currently difficult to obtain.
3. Reduced lateral movement, especially under high pH soils near high value turf areas such as golf greens.
4. Less tracking, which relates to SU’s extended solubilities and powerful low use rates.
5. Increased turfgrass safety, especially to the warm-season turfgrasses centipedegrass and St. Augustinegrass, as well as all cool-season grasses.
6. Preventing or extending the time to plant resistance occurrence. With such a specific mode of action, resistance to SUs typically arises 3 to 7 years after continued use.
7. Provide quicker control. Under cool (<60 F) climatic conditions, extended times are needed for herbicide expression, causing end-user confusion and impatience.
8. Reduced leaching potential, especially in landscape settings where undesirable damage or discoloration may occur to shallow-rooted trees and ornamentals.
9. Less pH sensitive. High pH environments tend to dramatically increase solubility of SUs, thus, they become more mobile.
10. Extended soil residual/persistence time. Most SUs have relatively short (<30 day) half-lives, thus, seeds can quickly germinate after an application and become problematic again.

As always, end-users also desire more cost-effective products and possibly increase the spectrum of tank-mix capabilities of SUs with other herbicides and pesticides. In recent years, SUs have become very popular in the fine turf market and offer control levels of certain weeds (e.g., sedges, bahiagrass) that were previously unattainable. Due to recent success, the next step in evolution of SU chemistry is to broaden the application and use of these on other troublesome weeds and in other turf species and situations.

SYMPOSIA

GRASSY WEED CONTROL IN PASTURES

REMOVAL OF TALL FESCUE FROM KENTUCKY BLUEGRASS HORSE PASTURES. W.W. Witt, Plant and Soil Sciences Department, University of Kentucky, Lexington, KY.

ABSTRACT

The preferred forage for grazing mares in Kentucky horse farms is Kentucky bluegrass or orchardgrass. However, nearly all equine pastures in Kentucky have a tall fescue component and essentially all of this tall fescue is the cultivar ‘KY 31’. Further, one can assume that all of the tall fescue is infected with the natural race of *Neotyphodium coenophialum*, an endophytic fungus. Equine breeding farms are particularly sensitive to the endophyte infected tall fescue because pregnant mares which graze endophyte-infected tall fescue towards the latter stages of pregnancy frequently exhibit increased gestational length, dystocia, agalactia, decreased foal survival, and less frequently, death of the mare due to complications of dystocia. Consumption of endophyte-infected tall fescue has also been implicated in fetal loss in early- and mid-gestational mares Because of these deleterious effects on reproductive performance, horse farm managers seek ways of renovating pastures to reduce the amount of tall fescue. Currently, tall fescue can be removed from Kentucky bluegrass pastures by killing all forages with glyphosate and reseeding the desired grass. This is effective but removes the paddock from grazing for several months and is not an alternative for many small farms that have limited acreage for grazing. Tall fescue can also be removed selectively from Kentucky bluegrass by imazapic and the paddock can be grazed after the tall fescue dies. Several experiments were conducted to evaluate the effectiveness of imazapic, imazamox, metsulfuron-methyl, and sulfosulfuron. Imazapic was evaluated as the ammonium salt (Plateau) or the parent acid (Cadre). Tall fescue control with Plateau at 10 oz/A ranges from 80 to 90% control when applied at any time from May through October. Slightly greater control of tall fescue was obtained at 12 oz/A of Plateau. Metsulfuron-methyl, applied as Cimarron at 0.5 to 1.0 oz/A results in 50 to 70% tall fescue control with the 1.0 oz rate needed for maximum control. Sulfosulfuron, applied as Outrider controlled less than 50% tall fescue at rates of 2 or 3 oz/A. Imazapic, applied as Cadre (with ai rates the same as Plateau) provided less than 10% tall fescue control in 2004 and about 50% control in 2005. Imazamox, applied as Raptor at 4, 6, or 8 oz/A, resulted in less than 50% control in 2005. All herbicide treatments were applied with adjuvants as suggested on the product labels. The height of tall fescue did not impact control with these herbicides. Similar tall fescue control was obtained with these herbicides at fescue heights of 2, 6 to 8, or 12 to 18 inches. Tall fescue can be removed selectively from Kentucky bluegrass pastures with Plateau, and to a lesser extent with the other herbicides evaluated. However, tall fescue composition in pastures increases in years following treatment. Multiple treatments over years are required for successful removal of tall fescue.

SYMPOSIA

GRASSY WEED CONTROL IN PASTURES

SMUTGRASS [*SPOROBOLUS INDICUS* (L.) R. BR.] CONTROL IN MISSISSIPPI WITH VELPAR. J. D. Byrd, Jr., B. K. Burns, and M. T. Myers, Mississippi State University.

ABSTRACT

Smutgrass is a perennial bunch type grass that invades pastures in many southern states. Because of its low palatability, combined with high rates of reproduction and spread, cattle producers consider it a problematic weed. The Natural Resource Conservation Service branch of USDA provides private landowners in most Mississippi counties a cost share program to help offset costs of smutgrass control.

Velpar has been the recommended herbicide treatment for smutgrass control since the late 1980's when Dowpon was taken off the market. Registration in Mississippi was maintained through a special local needs label [24(C)]. When DuPont renewed the 24(C) label, EPA forced a change in the grazing restriction from 37 to 60 days after application. This increase in the grazing restriction has caused concern both by company personnel as well as cattle producers. It has been postulated that the grazing interval can be reduced if Velpar treatments were made in a nonliquid form.

In an attempt to evaluate control of application methods that could lead toward a shortened grazing restriction interval, experiments were conducted at two sites in Mississippi to evaluate smutgrass control with Velpar impregnated onto dry fertilizer. Treatments included Velpar 2L at 0.75 or 1.1 lb ai/A, Velpar 75DF at 0.56, 0.75 or 1.1 lb ai/A, and 34-0-0 impregnated with Velpar 2L and applied at 330 lbs/A to deliver either 0.75 or 1.1 lb ai/A hexazinone. All sprayed treatments were applied with 0.25% v/v nonionic surfactant at 20 gpa with two Boominator® nozzles covering 30 feet per pass. Plots were 60 by 100 feet with two replicates at each location. All treatments were applied in June when smutgrass was 15 inches tall.

At 3 weeks after treatment (WAT), the 2L Velpar formulation applied at 1.1 lb/A provided 80% smutgrass control compared to 73% control with the 75DF formulation. Control with the 0.75 lb/A rate was approximately 20% less than that provided by the higher rate. Visible smutgrass control could not be measured in the plot treated with 34-0-0 impregnated with Velpar at 3 WAT. Control increased for all treatments by 6 WAT and ranged from a high of 85% with 1.1 lb/A Velpar 2L to slightly below 10% with 0.75 lb/A impregnated onto 34-0-0. By 12 WAT, smutgrass control was above 80% for all sprayed Velpar treatments above 0.75 lb/A. Velpar at 1.1 lb/A provided 90 and 88% smutgrass control with 2L and 75DF formulations, respectively. Smutgrass control with 0.75 lb/A applied as 2L was 85% or 83% with the 75DF. Fertilizer impregnated with hexazinone provided only 10% or less control even by 12 WAT.

Attempts were also made to apply Velpar 75ULW granular product with various devices at rates labeled for smutgrass control in pastures. However, consistent, uniform delivery of pasture rates was not successful.

SYMPOSIA

GRASSY WEED CONTROL IN PASTURES

FIELD SANDBUR (CENCHRUS INCERTUS) CONTROL AND BERMUDAGRASS (CYNODON DACTYLON) TOLERANCE TO PRE AND POST HERBICIDE APPLICATIONS. P.A. Baumann, C.R. Medlin, D.S. Murray, E.P. Castner, and R.N. Rupp, Texas Cooperative Extension, College Station, Oklahoma State University, Stillwater, and DuPont Crop Protection, Weatherford, TX, and Ardmore, OK

ABSTRACT

Field studies were conducted in Texas and Oklahoma during 2005 to examine field sandbur control and bermudagrass tolerance to several PRE and POST herbicides and combinations. Experiments were conducted near College Station, TX, and Medford and Ft. Cobb, OK. Standard small plot field experimentation techniques were employed at all three locations. Plots were sprayed with CO2 backpack sprayers calibrated to deliver 15 GPA in the Oklahoma trials and 20 GPA in the Texas trials. In the Oklahoma trials, four replications of each treatment were sprayed on 10 ft. X 25 ft. plots which were arranged in an RCB design. In the Texas studies, two separate locations were utilized, one for the field sandbur efficacy studies where no bermudagrass was present and another for a herbicide tolerance study that contained a weed free stand of Coastal bermudagrass. In the Texas field sandbur efficacy studies, three replications of 10 ft. X 15 ft. plots were employed and arranged in an RCB design. In the bermudagrass tolerance study, four replications were employed using a plot size of 10 ft. X 20 ft.

One experiment was established at all three locations to evaluate Accent (nicosulfuron) applied at O.83, 1.043, and 1.25 oz../A in combination with Ally (metsulfuron) applied at 0.167, 0.208 and 0.25 oz./ A , respectively. In addition, the low and high rates of these combinations were applied with 16 oz. per acre of Karmex (diuron) in two treatments, along with a separate treatment of Plateau applied at 4 oz./A. When evaluated 23 to 35 DAT, all treatments provided greater than 80% field sandbur control, except the highest combination of Accent and Ally applied at the Medford site. At the Ft. Cobb site, all treatments exceeded 90% control. Common bermudagrass injury was slight to moderate (30-45%) from the Accent/Ally combination rates at both the Medford and Ft. Cobb sites but dissipated during the growing season. When Karmex was added to the Accent/Ally combinations, bermudagrass injury was significantly and substantially reduced, ranging from 8-17% when rated from 22 to 29 DAT. In contrast to these studies, no Coastal bermudagrass injury was shown at the College Station site from the Accent/Ally combinations. However, when Karmex was added, severe (>70%) chlorosis was observed 7 DAT but disappeared by the 55 DAT evaluation. Coastal bermudagrass yields were not affected by any of the treatments. Plateau was highly injurious (>65% stunting) at the Oklahoma sites but only slightly injurious at the College Station site.

At all three locations in Oklahoma and Texas, a similar protocol was employed to examine control from PRE and POST herbicide applications. PRE applications included Prowl (pendimethalin) applied at 3 and 6 pts./A, Sinbar (terbacil) at 1.5 lb./A, Dual II Magnum (s-metolachlor) at 1.5 pts./A, and Karmex at 2.0 lb./A. POST treatments included Accent 0.75 to 1.33 oz./A, Journey (imazapic plus glyphosate) at 6 to 10 oz./A, Everest (flucarbazone) at 0.61 to 1.23 oz./A, and a combination of Accent plus Karmex (1.0 oz. plus 1.0 lb./A). At both Oklahoma sites, Prowl was ineffective largely due to lack of timely rainfall needed for activation. However, at the College Station site, timely rainfall was received and field sandbur control was equal to or above 90%. Results from the Karmex, Sinbar and Dual II Magnum treatments were also inconsistent between sites, however, precipitation was not a common factor for this disparity. Accent provided a high degree of control at the Ft. Cobb and College Station sites, ranging from 80 to 98% control from the rates examined. However, results from the Medford site showed only 48-75% control. Journey was highly effective at all locations, providing greater than 88% control. Everest provided a high degree (>83%) of field sandbur control at the College Station and Ft. Cobb sites, but similar to those results shown from Accent, control at the Medford site was reduced to 46 to 60%. In a separate study conducted at Medford, POST applications of Accent applied at 0.75, 1.0, and 1.33 oz./A and Journey at 6, 8, and 10 oz./A were studied. Field sandbur control from Accent ranged from 42 to 75% while Journey provided from 85 to 90% control. Common bermudagrass injury from Accent ranged from 20 to 50% and from 60 to 70% for Journey.

SYMPOSIA

GRASSY WEED CONTROL IN PASTURES

BERMUDAGRASS TOLERANCE TO HERBICIDES FOR CONTROLLING GRASSY WEEDS IN PASTURES. C.R. Medlin, R.L. Woods, and M.R. Jones; Oklahoma State University and Oklahoma State University Cooperative Extension Service, Stillwater, OK

ABSTRACT

Bermudagrass (*Cynodon dactylon*) is a common forage crop used across the Southeast United States. This crop is a warm-season, sod-forming grass which spreads mainly by rhizomes and stolons, and does not grow much taller than 70 cm. Summer grass weeds, such as johnsongrass (*Sorghum halepense*), foxtail (*Setaria spp.*), and field sandbur (*Cenchrus incertus*) are common problems in bermudagrass pastures. Imazapic was once registered for control of many grassy weeds in bermudagrass, however, after only a few years on the market the label was changed making it illegal to use the product on bermudagrass. Experimental herbicide treatments currently being investigated for this part niche also exhibit significant visual (qualitative) crop response, however, documented quantitative yield response from these experimental treatments have not been documented. Therefore, the objective of this research was to evaluate bermudagrass growth response to various combinations of terbacil (1.2 lb ai/A) or diuron (0.8 lb ai/A) applied alone as a preemergence (PRE) treatment, or applied postemergence (POST) in combination with nicosulfuron (0.04, 0.05, or 0.06 lb ai/A), and glyphosate+imazapic (0.04+0.07 or 0.05+0.09). Traditional small-plot, RCB design, weed-free field experiments with four replications were utilized. On common bermudagrass (i.e. variety unknown) glyphosate+imazapic applied POST resulted in the most bermudagrass stunting (80 to 83%) by 4 WAT, followed by nicosulfuron (50 to 60%). Tankmixing diruon (0.8 lb/A) with nicosulfuron (0.05 lb/A) decreased bermudagrass stunting from 55% to 16%. Dry matter yield from these treatments averaged from 2530 to 2642 lbs/A in the glyphosate+imazapic treated plots, from 4264 to 5580 lb/A in the nicosulfuron treated plots, 7588 lb/A in the nicosulfuron+diuron treated plots, and 6106 in the untreated check. When applied to Midland 99 bermudagrass visual injury was not as apparent. Similarly, yield from Midland 99 was not reduced as much as common bermudagrass. Midland 99 yields averaged from 6505 to 7594 lb/A in the glyphosate+imazapic treated plots, from 6376 to 8124 lb/A in the nicosulfuron treated plots, 9035 lb/A in the nicosulfuron+diuron treated plots, and 7831 lb/A in the untreated check. Further investigations should be conducted to determine if the yield increase from nicosulfuron+diuron is consistent across years, environments, and bermudagrass cultivars.

SYMPOSIA

GRASSY WEED CONTROL IN PASTURES

ESTABLISHMENT OF COOL-SEASON PERENNIAL GRASSES WHEN ANNUAL GRASSES ARE PREVALENT. T.J. Butler, The Noble Foundation, 2510 Sam Noble Parkway, Ardmore, OK 73401.

ABSTRACT

Cool-season perennial grasses (C3PG) are currently being evaluated for the southern Great Plains, since these grasses can provide high quality forage when the dominant warm-season grasses are dormant and these grasses could have an advantage over the current annual cool-season forages like rye (*Secale cereale*), and ryegrass (*Lolium multiflorum*) (RG) since the annual grasses have to replanted each year and are exposed to environmental (rainfall) risks associated during the establishment period. However, establishment of these perennial grasses has been unsuccessful, especially where cool-season annual grasses are prevalent. The objective of this paper is to summarize research trials (PRE herbicide screening, POE herbicide screening, Seed treatments, Banding herbicides, and Vegetation management (glyphosate timing applications and planting dates) to determine the best method for establishing summer dormant tall fescue (*Festuca arundinacea*) (SDF), summer active tall fescue (SAF), tall wheatgrass (*Thinopyrum ponticum*) (TWG), and hardinggrass (*Phalaris aquatica*) (HG) in traditional graze-out systems containing RG.

PRE Herbicides: SDF, SAF, TWG, and HG were drilled with Hege planter in fall of 2005 at the recommended seeding rates and diclofop, diuron, metolachlor, trifluralin, metribuzin, and atrazine were applied immediately after planting at the recommended rates. All herbicide treatments severely injured or killed SDF, SAF, and HG. Diclofop, diuron, metribuzin, and atrazine caused little injury to TWG, however only diclofop and diuron provided control of RG, therefore these PRE herbicides should be further evaluated for establishing TWG.

POE Herbicide Screening: Fifteen herbicides were applied in 2004 and 2005 when a majority of the perennial grasses reached the 5-leaf stage. Herbicides were not selective between SDF, HG, and RG; herbicides that controlled RG also killed these grasses. In 2004, Nicosulfuron and clodinafop provided acceptable control (>85%) while injuring SAF by ~70%, however, SAF recovered by the end of the growing season and had 70% stand for both herbicides. Diclofop, clodinofop, and mesosulfuron controlled RG (>85%) and caused no injury to TWG, and had 80% stand at the end of the growing season, therefore these POE should be considered when establishing TWG.

Seed Treatments: SDF seeds were treated with Concep seed safener, Dynasty fungicide, or activated charcoal at 250%, 500%, and 750% buildup and drilled with Hege planter in the fall of 2004. Recommended use rates of diuron, trifluralin, imazapic, diclofop, and metolachlor were applied immediately after planting before emergence. Although the 750% activated charcoal reduced injury with all herbicides, all herbicide-seed treatment combinations caused excessive injury to tall fescue. Thus it appears that these seed treatments do not appear useful.

Banding Herbicides: In 2004, SDF was seeded to moisture using a Hege No-till drill. Diuron and imazapic were banded on 40, 60, and 80% of the area between the rows. Both 40 and 60% caused no injury and resulted in excellent stands (>95% cover). In 2005, diuron, imazapic, metolachlor, metribuzin, and atrazine were banded on 60% of the area when SDF, SAF, TWG, and HG were planted with a clean-till drill. Results in 2005 were extremely variable due to limited moisture conditions at the time of planting. Seeds planted to moisture, germinated and there was no visible injury, however a majority of the seeds did not germinate prior to the next rainfall, which resulted in movement of the herbicide into the row and prevented emergence. Banding may have potential, however due to dependence on drilling to moisture and seeds germinating before it rains, it is unlikely to be widely used. Applying these PRE herbicides POE to the crop may be a better option.

PRE Herbicides applied POE: In 2005, diuron, metolachlor, atrazine, metribuzin, and trifluralin were applied to SDF, SAF, TWG, and HG at the 3-leaf and 5-leaf stage. Diuron controlled SDF and HG and were safe on SAF and TWG. Atrazine and metribuzin controlled HG, but were safe on SDF, SAF, and TWG. Metribuzin and trifluralin did not cause visual injury to any of the grasses evaluated.

Vegetation Management (glyphosate timing): In both 2004 and 2005, the best method for establishing these cool-season perennial grasses in fields known to have annual grassy weeds was a combination of spring-applied

glyphosate in May to prevent seed production followed by another glyphosate application after weeds emerge following rainfall in autumn (which occurred in Oct both years), and no-till drilling seed to moisture. In 2004, this treatment averaged 4673 kg/ha for C3PG and 1297 kg/ha for RG, at the end of the growing season. In 2004, grazing did not change species composition or improve establishment of the perennial cool-season grasses evaluated.

SYMPOSIA

HERBICIDES IN INTENSIVE FOREST MANAGEMENT SYSTEMS: EFFICACY, COST-EFFECTIVENESS, AND ECOLOGICAL IMPACTS

LONG TERM RESPONSES TO VEGETATION CONTROL AND FERTILIZATION IN PINE PLANTATIONS IN THE SOUTHEAST US. T.J. Albaugh, H.L. Allen, T.R. Fox, and H.E. Quicke. North Carolina State University, Virginia Polytechnic Institute and State University, and BASF. Raleigh, NC

ABSTRACT

Vegetation control (VC) and fertilization (F) applications may improve mid-rotation resource limitations in pine plantations. Both VC and F influence the same resources but in different ways so they may substitute for one another or create a synergistic result when applied together. However, the timing of crop tree response may be different. Response to VC is likely to develop slowly as site resources are reallocated to the crop species while F response should occur soon after application. We quantified growth responses to VC and F for crop (*Pinus taeda* L. (loblolly pine) (ten sites) and *Pinus elliottii* Engelm. (slash pine) (three sites)) and competing vegetation (hardwood or shrub dominated competing vegetation plant communities) species in plantations across the southeastern United States. At each site treatments were applied in three or four replicates of a two by two factorial of VC (none and one time application of herbicide) and F (none and one time application of 224 and 56 kg ha^{-1} elemental N and P, respectively) installed in a randomized complete block design.

Two years after treatment VC resulted in significantly lower levels of the dominant competing vegetation at all sites reducing it on average 82% relative to that found on the check plots. The dominant competing vegetation showed little recovery through four years on most sites, however, at sites with eight and ten year data, the dominant competing vegetation had regrown to a level that was 46 and 38% of the amount prior to treatment application, respectively. Hardwood dominated sites with significant positive responses to VC had at least 1.4 m^2 ha^{-1} of initial hardwood basal area while at shrub dominated sites no lower limit of shrub cover was associated with a positive response to VC. Vegetation control improved loblolly (4 sites) and slash (2 sites) volume growth an average of 4.8 and 1.8 m^3 ha^{-1} yr^{-1}, respectively, six years after treatment. Fertilization had no effect on the dominant competing vegetation at ten sites, while significantly increasing it at one site and decreasing it at two sites two years after treatment. Nine of the thirteen sites had significant positive pine volume growth fertilizer responses at two and four years. Fertilization increased loblolly (4 sites) and slash (2 sites) pine volume growth by an average of 5.7 and 2.2 ft^3 ac^{-1} yr^{-1}, respectively, six years after treatment. The combined treatment (VC+F) exhibited a greater volume growth response than either of the single treatments for all but a few sites and measurement increments, however the combined treatment volume growth response was typically less than the sum of the two individual treatment responses. There is overlap in the resources affected by F and VC and, consequently, less than additive effects might be expected. Two sites with eight year data, one loblolly and one slash, showed a slowing of incremental volume growth response for the VC and F treatments starting at year 5 indicating that these sites may be nearing their maximum cumulative response.

Previous studies have demonstrated that fertilization provides resources that are readily available and in large quantities to allow rapid crop tree uptake, foliage development and large early volume growth responses. Resources from VC would also be readily available but are likely small relative to that from fertilization, would be limited by the site's inherent ability to supply resources and may take more time than F treatments to build leaf area and yield more volume growth. Over time, the available resources from fertilization diminish as they are used up while the available resources from VC may diminish as competing vegetation recovers or reinvades the treated area. Clearly these sites were limited by N and P which was provided by fertilization. Through year six the average annual volume growth F response was typically greater than the VC response at the sites examined here; however some sites at year 6 had cumulative volume growth response for the VC treatments equal to the comparable F response. Site conditions that appeared conducive to more robust VC responses were those that had been thinned and had greater than 2.3 m^2 ha^{-1} of hardwood basal area. Biologically significant responses are possible from VC and F treatments in midrotation pine plantations, which given the time frame over which they occur, are likely financially attractive as well. Even though the growth effects of VC and fertilization were less than additive, it may still be financially advantageous to do both.

SYMPOSIA

HERBICIDES IN INTENSIVE FOREST MANAGEMENT SYSTEMS: EFFICACY, COST-EFFECTIVENESS, AND ECOLOGICAL IMPACTS

EFFECTS OF INTER- AND INTRASPECIFIC COMPETITION ON GROWTH AND ECOPHYSIOLOGY OF LOBLOLLY PINE. M.S. Rahman and M.G. Messina; Department of Forest Science, Texas A&M University, College Station, TX 77843-2135

ABSTRACT

The Western Gulf Culture – Density Study (WGCDS) is a regionwide research trial by Texas A&M University in collaboration with five major forest products companies (http://wgcds.tamu.edu). The unique WGCDS design provides an opportunity to test the relative effect of inter- and intraspecific competition on the growth and ecophysiology of loblolly pine (*Pinus taeda* L.). The study is a 2x5 factorial in a split-plot with planting density (200, 450, 700, 950, and 1200 trees per acre) as the main plot and silvicultural intensity (Intensive and Maximum) as the sub-plot. The planting densities represent intraspecific competition while the two silvicultural intensities represent interspecific competition. The study is replicated across locations on four soil types defined by drainage class and depth to a restrictive layer. There is only one replication in any location. Eighteen study sites were established in Texas, Louisiana, Arkansas, and Mississippi between 2001 and 2003. This presentation is an introduction to the WGCDS and discusses a seasonal ecophysiology study in Bradley County, Arkansas. The study site is underlain by a somewhat poorly to poorly drained soil and has a restrictive layer (fragipan) deeper than 20 inches. The site experiences winter and spring waterlogging which may persist to early summer. However, trees may experience late summer water stress in a prolonged drought. We collected data on volumetric soil moisture content, needle xylem water potential, stomatal conductance, transpiration and net photosynthesis on at least three occasions in each of four consecutive growing seasons between 2002 and 2005, inclusive. The sampling sessions were distributed within the growing season to represent early, mid and late summer. Preliminary analysis shows that available volumetric soil moisture content becomes limited as growing season progresses. As a consequence, needle xylem water potential was lowest in late summer in all four growing seasons monitored. Likewise, net photosynthesis was greatest in the early summer and lowest in the late summer. Intensive silvicultural treatment with continuous competition control resulted in greater availability of soil water and needle xylem water potential in the first two years; however, this effect was absent in years three and four. Beginning in year three and throughout year four, xylem water potential was significantly lower for trees planted in the high density. We conclude that interspecific competition affects tree ecophysiology and consequently growth during the early years, but after crop trees occupy the site with canopy closure, intraspecific competition becomes the dominant factor, with competition occurring sooner in high densities than in low densities.

SYMPOSIA

HERBICIDES IN INTENSIVE FOREST MANAGEMENT SYSTEMS: EFFICACY, COST-EFFECTIVENESS, AND ECOLOGICAL IMPACTS

NITROGEN DYNAMICS IN RESPONSE TO MID-ROTATION VEGETATION SUPPRESSION ACROSS A GRADIENT OF SOIL CONDITIONS IN LOUISIANA. M.A. Blazier, Hill Farm Research Station, Louisiana State University Agricultural Center, Homer, LA 71040; D.A. Scott, Southern Research Station, USDA Forest Service, Pineville, LA 71360; R. Coleman, School of Renewable Natural Resources, Louisiana State University Agricultural Center, Baton Rouge, LA 70803

ABSTRACT

An asynchrony between the supply and demand of nitrogen has been well demonstrated for loblolly pine plantations. Nitrogen deficiencies are common in mid-rotation loblolly pine stands, so the practice of fertilizing mid-rotation stands with urea has become a common practice. However, understory vegetation may reduce the efficacy of mid-rotation fertilization on some sites by taking up fertilizer-derived nitrogen. As such, the suppression of understory vegetation may improve loblolly pine responses to fertilization. The objective of this study was to assess the nitrogen accumulation of crop trees, understory vegetation, and soil microorganisms and the soil nitrogen supply in response to fertilization and understory vegetation suppression in four loblolly pine plantations in Louisiana. The study plantations were similar in age and management history, and the soil textural classes of the sites ranged from well-drained to poorly-drained. The following treatment combinations were conducted: (1) no fertilization, no vegetation control, (2) fertilization, no vegetation control, and (3) fertilization, vegetation control. Fertilizer was applied at 120 lb N and 12 lb P per acre as a urea-diammonium phosphate mixture. Understory suppression was conducted via a basal bark application of a 20% solution of triclopyr and a broadcast application of a 5% solution of glyphosate. Understory biomass and biomass N was significantly reduced by understory control. Exchangeable soil N was significantly increased by fertilization, but the combination of fertilization and understory control did not enhance soil N greater than that of fertilization alone. At all sites, exchangeable soil N returned to background levels within 4 months of fertilization. Microbial biomass N was significantly reduced in summer when understory vegetation was controlled, suggesting some dependence of microbial populations on hardwood roots for labile C sources. However, the reduction in microbial biomass N from the combination of fertilization and understory control led to significantly enhanced soil N mineralization at only one site. Furthermore, the combination of fertilization and understory control did not increase foliage N to levels greater than that of fertilization alone at any site. Thus, understory control did not increase soil N supply and did not increase the efficacy of fertilization in promoting pine N accumulation because understory vegetation was a relatively weak sink for N at these sites.

SYMPOSIA

HERBICIDES IN INTENSIVE FOREST MANAGEMENT SYSTEMS: EFFICACY, COST-EFFECTIVENESS, AND ECOLOGICAL IMPACTS

INTEGRATION OF SITE PREPARATION AND HERBACEOUS WEED CONTROL ON UPPER COASTAL PLAIN SITES: THIRD YEAR RESULTS. D.K. Lauer, Silvics Analytic, Richmond, VA, and H.E. Quicke, BASF Corporation, Raleigh, NC.

ABSTRACT

Herbaceous weed control (HWC) strategies following two timings (July vs. October) and three rates (32, 48, and 64 oz ac^{-1}) of Chopper herbicide site preparation were examined. Pines were planted the winter following the Chopper site prep treatments. Post-plant HWC treatments were Arsenal + Oust (4 + 2 oz ac^{-1}) applied as follows: 1) first year March only; 2) first year June only; 3) first year March and second year March; 4) first year June and second year March. Treatments were replicated three times at each location in a split-plot design with Chopper site prep as main plot treatments and HWC as sub-plot treatments.

Three study sites were selected to cover a range of conditions: 1) a moderately well to well drained clay soil with a one pass rip and bed at Barnett Crossroads, AL, 2) a moderately well to well drained clay soil with no tillage at Zwolle, LA and 3) a somewhat poorly drained silt loam (saturated to within 6 inches over half the year) with a bed at Crossett, AR. The AL and LA sites were machine planted and the AR site was hand planted. Chopper site prep treatments were tank mixed with 2 qt glyphosate on two sites or 1 qt Garlon on a site with waxy leafed shrub competition. Non-ionic surfactant was used at a rate of 0.5% v:v and a total spray volume of 10 gal ac^{-1}.

Pine groundline diameter and total height were measured in December of the third year after planting and treatments compared in terms of average tree stem volume index. First-year HWC increased volume at all three locations with increases ranging from 70% to 90% compared to no HWC. An additional second year of HWC increased volume by 6% to 52% compared to first year HWC only. Although not statistically significant, increasing the Chopper rate from 32 to 48 oz increased volume by 5% to 15% on these sites with relatively low levels of hardwood competition.

Year 3 volume response was greatest when HWC treatments were combined with July site prep. At Crossett, AR all HWC treatments performed better when combined with July (vs. October) site prep. At Barnett Crossroads, AL there was a significant interaction between site prep date and HWC in that first-March HWC treatments combined with July site preparation outperformed all other HWC treatments. Although not significant, the first-March HWC treatments at Zwolle, LA performed better when combined with July site prep.

The operational message from these studies is that Chopper site prep provides a good base treatment for HWC. Response to first-year HWC was greatest when combined with July vs. October site prep. Average year 3 pine height for the best combination of July Chopper and first year HWC was 7.8, 9.0, and 9.8 ft at the Zwolle, Crossett, and Barnett Crossroads locations, respectively.

SYMPOSIA

HERBICIDES IN INTENSIVE FOREST MANAGEMENT SYSTEMS: EFFICACY, COST-EFFECTIVENESS, AND ECOLOGICAL IMPACTS

RESPONSE OF WOODY COMPETITION TO MID-ROTATION FERTILIZATION AND IMAZAPYR IN UPPER GULF COASTAL PLAIN LOBLOLLY PINE STANDS. H.O. Liechty, P. Dahal; School of Forest Resources, University of Arkansas at Monticello, Monticello, AR. 71656 and C. Fristoe; Plum Creek Timber Co., Crossett, AR 71635

ABSTRACT

Application of fertilizer in mid-rotation loblolly pine stands has consistently been shown to increase pine production and yields in a variety of sites. Added growth responses from the application of herbicide with or without fertilizer application have been inconsistent at least during the first few years following application. We initiated a study to evaluate the effects of fertilizer (365 lb/ac urea and 175 lb/acre DAP) and herbicide application (Arsenal 16 oz/acre) on five mid-rotation loblolly pine stands in the Upper Gulf Coastal Plain of Louisiana and Arkansas. Initial two year responses related to hardwood competition and pine growth on four of these stands were summarized. Between 26 and 50% of the hardwood competition died in the herbicide treated plots during the first growing season following herbicide application. In many instances woody competition defoliated by the herbicide showed some level of recovery during the second growing season. However, these trees appear to have little chance for continued survival. Ingrowth ($\geq$1"dbh) of hardwood competition which was measured two years following herbicide application and one year following fertilization was reduced by the herbicide application but not impacted by fertilization. Growth of pine was not significantly impacted by herbicide application; however net basal area growth during the first growing season following fertilizer application was 29% greater than in unfertilized plots.

SYMPOSIA

ISSUES ASSOCIATED WITH FORMAL INSTRUCTION OF WEED SCIENCE

COURSES AND SUBJECT MATTER TAUGHT IN THE SOUTHERN REGION RELATED TO WEED MANAGEMENT. D.L. Jordan, North Carolina State University, Raleigh, N.R. Burgos, University of Arkansas, Fayetteville, J.M. Chandler, Texas A&M University, College Station, P.A. Dotray, Texas Tech University, Lubbock, J.L. Griffin, Louisiana State University, Baton Rouge, G.E. MacDonald, University of Florida, Gainesville, C.R. Medlin, Oklahoma State University, Stillwater, T.C. Mueller, University of Tennessee, Knoxville, D.S. Murray, Oklahoma State University, Stillwater, J.R. Norsworthy, Clemson University, Clemson, SC, A. Rankins, Jr., Mississippi State University, Starkville, R. Smeda, University of Missouri, Columbia, D. H. Teem, Auburn University, Auburn, AL, W.K. Vencill, University of Georgia, Athens, J.W. Wilcut, North Carolina State University, Raleigh, and W.W. Witt, University of Kentucky, Lexington.

ABSTRACT

An informal survey of instructors of the principle undergraduate weed science course taught at land grant universities in the southern region was conducted during the fall of 2005 to compare percentages of time devoted to subject matter topics. While some overlap in topics was noted, averages and ranges of times were assigned to 16 categories. The average percentage of time and range were as follows: introduction and history (5%, 0-20%), weed ecology (6%, 0-20%), weed thresholds and scouting (2%, 0-10%), organic weed management (1%, 0-1%), herbicide families (15%, 5-45%), herbicide behavior in plants (10%, 5-35%), herbicide behavior in soils (3%, 1-5%), herbicide resistance (5%, 1-10%), problem solving (3%, 0-10%), weed management in specific crops (10%, 1-28%), herbicide compatibility (1%, 0-5%), adjuvants (3%, 1-5%), weed identification (12%, 5-20%), spray nozzles and equipment (8%, 3-25%), herbicide labels (5%, 2-12%), and herbicide calibration (11%, 5-30%). Several instructors indicated that herbicide resistance was discussed simultaneously with herbicide families and mode action. Likewise, herbicide behavior in plants and herbicide families often overlapped in terms of discussion. Some topics such as organic weed management, adjuvants, and compatibility were relatively consistent across universities. Addressing weed management for specific crops and commodities varied across universities and reflected the instructor's philosophy about spending more time on principles and techniques rather than specifics for each crop. Considerable variation in the amount of time spent discussing herbicide families and herbicide behavior in plants was noted. A small percentage of time was spent discussing herbicide behavior in soil.

SYMPOSIA

ISSUES ASSOCIATED WITH FORMAL INSTRUCTION OF WEED SCIENCE

CHANGES IN EMPHASIS OF UNDERGRADUATE AND GRADUATE WEED SCIENCE COURSES.
C.B. Rogers and J.L. Griffin; Morehead State University, Morehead, KY 40351; and Louisiana State University AgCenter, Baton Rouge, LA 70803

ABSTRACT

Over the past 20 or more years there have been noticeable changes in the education of undergraduate students of agriculture in general and of weed science as well. This has been noted in both land grant and non-land grant institutions. In an attempt to characterize some of these changes I, as a faculty member at a non-land grant institution with an undergraduate program in agriculture, have looked at four major areas: 1) the student, 2) the resources, 3) the technology, and 4) the subject matter and approach.

Some undergraduate programs have seen student interest shift from agronomic production to a horticultural and turf focus. Additionally, it often appears that many students are not well-focused and only "want a degree so they can get a job". Some are disruptive and do not appear to care about grades and many do not come with the practical experiences of previous years. The teacher's response in many cases is more time for basic explanation and foundation building and "more weeds and less science". For many undergraduates a weed science course is an end-user product. Teaching resources have always been limited. Land grant instructors often have the advantage of "borrowing" from their research programs to help in teaching but non-land grant instructors are missing that resource. The general conclusion in that not much has changed in this area.

One of our greatest changes has come in the technology of presentation. The digital technology world has enhanced the ability to present materials, especially for undergraduate programs, through the use of software such as PowerPoint and through available weed ID software. Opinions on the subject matter taught are varied. One commentator said that the principles are the same and there is not a major shift, although he uses a special lab section to focus student interest. Another individual commented that there is so much material that it is difficult to sort and reduce for an undergraduate class. There is also the necessity to approach new areas as in the discipline such as herbicide resistance, invasive species and the ecosystem, and renewing non-chemical approaches. Undergraduate students can also be introduced to research and to interaction with the public and political process.

In viewing weed science education from the graduate teaching perspective, undergraduate programs are the life blood of graduate programs in weed science. At most land grant institutions the number of undergraduates in traditional agricultural plant and soils degree programs has decreased. Mandated decreases in the number of credit hours per curriculum have caused many departments to concentrate the bulk of the curriculum requirement on courses offered in that department. Consequently the number of hours devoted to elective courses (those chosen by the student) has been reduced. Students in many cases are not challenged to branch out in selecting "non-required" elective courses. Enrollment in both undergraduate and graduate courses that I am responsible for teaching at LSU has decreased in recent years with peak enrollment between 1995 and 2000. In recent years many courses have not "made", i.e. they have not had the required number of students registered to justify teaching based on university rules. This has forced instructors to find innovative ways to offer course material through "Special Topics" or "Special Problems" courses, which do not have enrollment restrictions. There is concern at many universities that a time will come when reduced student numbers may prevent needed courses from being offered, which may affect the level of training needed for weed scientists

Graduate education can continue to be the same as it always has been with emphasis on research methodology, weed biology and ecology, plant-herbicide physiology, and soil-pesticide interactions, but how that material is delivered to students may change. There may be the need for on-line web based courses that can be shared by universities and there will definitely be the need for more concentrated interaction between students and their major professor. With fewer students out there the time should be available to focus individually with graduate students. The high cost of tuition and the uncertainty in return on investment has forced students to contemplate the value of post graduate programs. The downsizing of universities and companies has only caused more concern when students consider employment opportunities after graduation with advanced degrees. Can we as graduate advisors in good conscience recruit graduate students when these concerns exist? It is imperative that we as graduate advisors be honest with students as to employment opportunities and that we realize that one on one contact will be essential to the education

and training of graduate students. The future of graduate education will depend directly on the future of undergraduate programs. Recruitment of undergraduate students should be of paramount importance if graduate programs are to survive. All means should be used to ensure that traditional undergraduate plant and soils agricultural programs survive as changes occur in the Colleges of Agriculture.

SYMPOSIA

ISSUES ASSOCIATED WITH FORMAL INSTRUCTION OF WEED SCIENCE

DESIGN AND IMPLEMENTATION OF WEB-BASED AGRICULTURE CURRICULUM. G.G. Light, P.A. Dotray, and D.L. Auld; Plant and Soil Science Department, Texas Tech University, Lubbock, TX 79409-2122.

ABSTRACT

The internet has become a new means for delivering college curriculum, even in agricultural courses which are traditionally not technologically advanced. It can serve not only to enhance existing on-campus courses, but also allows for increased course enrollment from distance and non-traditional students.

The delivery format for web-based courses falls into three main categories. The first of these is a text-based format with lecture information presented much like a textbook and enhanced with figures, tables, and graphs. This format is easy to create and revise using simple word processing and web page editing software. Unfortunately, this format is least like the actual classroom and requires the most student input. A narrated slide show is another delivery format in which the audio portion of a lecture is added to a Microsoft® PowerPoint presentation. It is more similar to an in-class presentation and best suited for visual learners and laboratory courses. This format, however, is time-consuming to produce and difficult to edit. The third format is actual video of the lecture presentation. While identical to in-class presentation of the course, it is difficult to edit for future instruction, limits the teaching style, and delays implementation of course.

Motivation of students to maintain interest in a course is essential in web-based curriculum, even at the graduate level. There are various tools within course management systems such as WebCT that allow professors to monitor and encourage course participation. Self-tests allow students to test their knowledge of the content without affecting their course grade. Graded weekly quizzes are a means of ensuring that students are reading weekly content modules. Activities such as crossword puzzles can enhance learning by providing an entertaining way to test vocabulary. Finally, links to other web sites, online discussion and inclusion of practice problems will improve student retention of presented material.

As exam times approach, it is important to relieve student tension by posting study guides so that students will know the professor's expectations. In an e-learning environment this is essential because vocal cues from the professor are not passed to the students. Like the course itself, exams may be given and graded entirely online. Within WebCT, question formats may include any combination of essay, short answer, multiple choice, and true/false. Proctoring of exams by impartial individuals is necessary to prevent academic dishonesty.

While an excellent means of course delivery, there are challenges when implementing a course that is entirely web-based. Good communication with students is a necessity, often requiring telephone conversations and, more importantly, prompt responses to emails. Professors must be flexible and accommodate the special requests of students as they arise. Finally, creativity in every aspect of the course is essential. Professors must think outside of the box when it comes to presentation of course material as well as means of assessing student learning.

Special consideration must be made when including images obtained from the internet in any course curriculum. Care must be taken not to include copyrighted images without express permission from the author. Creation of your own images is easily accomplished with software packages such as WordPerfect®. Inclusion of your own digital images is highly encouraged.

Like any the traditional classroom, academic dishonesty exists. Professors must be electronically savvy to prevent, or at least reduce, the occurrence of this phenomenon in the e-classroom. But like the traditional classroom, web-based course delivery can be a highly rewarding experience.

SYMPOSIA

ISSUES ASSOCIATED WITH FORMAL INSTRUCTION OF WEED SCIENCE

I WISH SOMEHOW I DID KNOW THEN WHAT I DIDN'T KNOW…WHAT I REALLY NEEDED FROM MY FORMAL CLASSROOM INSTRUCTION. S.D. Askew and A.J. Price, Virginia Polytechnic Institute and State University, Blacksburg, VA. and USDA-ARS National Soil Dynamics Laboratory, Auburn, AL.

ABSTRACT

Both a public-state institutional and a federal government employee's viewpoints on formal classroom instruction received at N.C. State University were discussed. Class instruction received by both authors included biological weed control, herbicide behavior in plants, weed biology, weed management, weed science, and weed team. Non-weed specific classes included biochemistry, crop physiology, chromatographic techniques, electron microscopy, physiological ecology, and statistics in plant science. Both authors filled new positions and built their respective programs from scratch. Dr. Askew's title is Assistant Professor of Turfgrass Weed Science and Extension Turfgrass Weed Specialist. Dr. Askew's research program includes development of a comprehensive research and extension program relating to the identification and control of weeds in Virginia turfgrass. Dr. Price's title is Plant Physiologist and Affiliate Assistant Professor of Weed Science. Dr. Price's research program includes projects addressing the impact of integrated weed management strategies on weed populations/competitiveness in conservation systems as well as the development of cost-effective and environmentally friendly weed management systems integrating conservation tillage, crop rotations, cover crops and associated allelopathy, and transgenic crops for the region. Both Dr. Askew and Dr. Price agree that their formal classroom instruction provided them each with the background to be successful in their respective positions. They both also agree that their abilities to effectively communicate, write manuscripts, and manage multiple projects are essential to success; as much as or more so than formal classroom instruction. Dr. Askew, if offered when in graduate school, could have benefited from formal instruction in research methods in ecology of plant/plant interactions. Dr. Price, if offered when in graduate school, could have benefited from formal instruction in cover crop/weed interactions and allelopathy/natural product chemistry. Dr. Askew ranks Statistics in Plant Sciences as his most influential college course due to practical, applied instruction of statistical methods and analysis techniques conveyed in the course that have allowed him to better design and summarize data of numerous experiments. Both authors feel that those classes that demonstrated, discussed, and debated actual research methods and experiments were extremely helpful for their research oriented careers. Dr. Askew feels that his communication skills, which began in high school Agriculture and FFA, have helped him more than any other skill and have had the broadest impact on his success at work. Dr. Price concurs that communication skills are among the most important to master. Both authors agree that predicting their eventual career stations would have been unlikely and that classroom instruction, above all else, offered a breadth of knowledge that allows the authors to react to a diversity of situations and correspond with many people.

SYMPOSIA

INVASIVE GRASSES AND SEDGES: DEEP-ROOTED ISSUES

INVASIVENESS OF AMENITY GRASSES IN THE CONTINENTAL UNITED STATES. J.C. Stier; Department of Horticulture, University of Wisconsin-Madison, Madison, WI 53706.

ABSTRACT

Executive order 13112, signed in 1999, was intended to prevent the introduction of invasive species into the U.S. and provide for their control if extant. Approximately 350 of the 2000 or so non-native species are considered serious pests. Virtually all of the turfgrasses, and many of the forage grasses, used in the U.S. are not native. Most cool-season (C_3) grasses originated in Europe or western Asia, while most warm-season (C_4) grasses originated in Africa or Asia. Many species have naturalized and can grow without routine cultivation but disagreement exists as to their invasiveness in part due to lack of agreement on the definition of invasive. Most often invasive species are defined as those that have the ability to naturalize and spread in places where they are not native, and cause economic and/or environmental harm (Baskins, 2002). In some cases species may be identified as invasive even though no economic or environmental harm is apparent; occasionally the tem is applied to native species. Difficulties involved with proper identification of grasses present a hurdle in identification of invasive species: many species appear morphologically similar and require in-depth taxonomic analysis for accurate identification, particularly for those non-native species that have native counterparts. Molecular analysis has been used to correctly identify species that were misidentified based on morphological traits alone. A complicating factor in the identification of invasive species is the fact that most of the native vegetation in the U.S. has been removed for cultivation, logging, or other purposes. Continued anthropogenic forces such as application of road salt, air and water pollution, and disruption of surface flow and groundwater withdrawals may affect the ability of native species to re-establish compared to some non-native grasses. A number of characteristics such as leaf life, ploidy, and reproductive traits have been proposed as characteristics of invasive species, but all too often invasive species fail to have many of these traits while many species with the traits do not appear to be invasive. A number of organizations have developed lists of invasive species in order to better inform the public about their risks, provide for their identification, and distribute information for their control. Most turfgrass species and some forage species are listed as invasive species by several semi- or non-governmental organization lists. In some cases the listings depend on observations of their presence such as tall fescue in the Great Smoky Mountains National Park or Kentucky bluegrass in the Western U.S. Analysis is needed to determine forces contributing to their presence, e.g., previous cultivation, ecosystem degradation, or unassisted spread. The focus of the presentation is on tall fescue and bermudagrass. Tall fescue is a C_3 grass while bermudagrass is a C_4 grass. Of the 16 species of bermudagrass in the world, *Cynodon dactylon* var. *dactylon* (Cdd) is the only one found in the U.S. apart from synthetic hybrids developed from crossing *C. dactylon* x *Cynodon transvaalensis* (Ct). Cdd spreads by rhizomes and stolons and is capable of surviving up to 53 degrees N latitude. It's optimum growing temperature is 27-35 C. Bermudagrass has fair to good salt and drought tolerance but relatively poor shade tolerance. Cdd plants are tetraploid and capable of sexual reproduction via seed; Cdd x Ct hybrids are sterile. Bermudagrass is considered a serious weed in many agronomic or managed landscape settings, including soybean, alfalfa, cotton, peanut, turf, pine production, and rights-of-way. Its lack of shade tolerance seems to prevent it from being a problematic weed in areas of higher vegetation. There is a lack of evidence and reports on bermudagrass as being invasive in natural areas, in fact Harlan and DeWet (1969) reported it only grows in large, pure stands under "artificial" conditions. One difficulty with singling out bermudagrass for eradication or control is its extensive use as a turf and pasture crop; occasionally it is used to reclaim damaged sites to mitigate runoff and erosion. Introduced into the U.S. in the 1800s, tall fescue is used extensively for forage, rights-of-way/roadsides, and turf. Tall fescue is a polyploid capable of growing throughout most of the central and northern U.S. It's deep root system allows it to survive droughts and it has good shade tolerance; some varieties are capable of hosting endophytic fungi which reduce its palatability for livestock and insect pests. A few studies have been published regarding its potential as a mid-successional invasive species. In an Oklahoma old-field grassland, tall fescue was able to spread at the expense of C_4 plant cover where the vegetation was dominated by forbs. Tall fescue was unable to spread in areas containing significant C_4 grass cover. Species biodiversity was not affected by tall fescue. Several herbicides are effective for controlling bermudagrass (BG) and tall fescue (TF) in a variety of agronomic and non-agronomic settings, including glyphosate, imazapic (TF), clethodim (TF), imazapyr (BG), and fluazifop (BG). Research is needed to document the spread of invasive grasses, ensuring their proper identification, and assess whether their existence is due to former or continued anthropogenic forces. Development of methodology to re-establish native species in desirable areas continues to be an area needing attention.

SYMPOSIA

INVASIVE GRASSES AND SEDGES: DEEP-ROOTED ISSUES

BUFFEL (*Pennisetum ciliare*) RESOURCE USE IN PULSE-DRIVEN ECOSYSTEMS.
A.E. Castellanos[1], J.C. Rodríguez[2], R. Méndez[1], and C. Watts[3]. [1]DICTUS, Universidad de Sonora, Hermosillo, Sonora, [2]IMADES, Hermosillo Sonora, [3]Depto. Física, Universidad de Sonora, Hermosillo, Sonora.

ABSTRACT

Buffel grass (*Pennisetum ciliare, Cenchrus ciliaris)* is an introduced African grass seeded after scraping the land in Sonoran Desert ecosystems. Until recently when it became an invasive, particularly roads and hills, it has been managed and seeded extensively in Sonora. We wanted to know what some of the possible ecological strategies could be that has made this species to become an invasive and what the ecological impacts could be in water use and availability. We followed evapotranspiration at a site using a eddy covariance approach and water use on individual species. Seasonal pulses of rainfall and total water use was found and compared to known estimates of native vegetation nearby and for similar habitats in other arid and semiarid regions. We address some of the ecological impacts that this invasive grass could have to Sonoran Desert ecosystems.

SYMPOSIA

INVASIVE GRASSES AND SEDGES: DEEP-ROOTED ISSUES

COGONGRASS AIN'T A PROBLEM IN TEXAS, SO WHY SHOULD I CARE?

John D. Byrd, Jr., Mississippi State University, Mississippi State, MS.

ABSTRACT

Cogongrass (*Imperata cylindrica* Beauv.) first arrived in the United States at the Port of Mobile, Alabama in the early teens as a soil contaminate. It was later established at Experiment Stations in several southern states to be evaluated as a potential forage crop. Cogongrass is a warm season perennial grass that reproduces both sexually through wind dispersed seed and asexually through rhizomes. Perhaps the most unique feature of cogongrass is the emergence of white fluffy wind dispersed seeds immediately following transition in the spring. The first reported cogongrass survey in Mississippi conducted in the late 1970's identified cogongrass populations in 19 counties. Twenty five years later, cogongrass has been identified in 54 counties. Populations have been found in every southern county extending from the Alabama to the Louisiana state lines along the I-20 corridor and northward to Greenwood, Coffeeville, Pontotoc, and Tupelo. Cogongrass invades a wide variety of habitats, but rarely establishes in cultivated sites. Consequently, populations occur in forested areas, highway and utility rights of way, parks and recreational areas, sod, pastures, lawns, abandoned fields, conservation reserve programs (CRP), and other low management environments. Because of the biomass of rhizomes produced, established cogongrass populations are difficult to eradicate with herbicides. Research at Mississippi State University has focused on both biology and management. Seed production, growth models of seedhead emergence, colony expansion rates, carbohydrate allocation to rhizomes, herbicide efficacy, mowing tolerance, tillage tolerance, cover cropping, herbicide treatment methods and additives, remote sensing populations are some of the ongoing research topics to help landowners and land managers minimize the impact of this exotic invasive weed.

SYMPOSIA

INVASIVE GRASSES AND SEDGES: DEEP-ROOTED ISSUES

MANAGING INTRODUCED GRASSES USING GRAZING. Michael McMurry, Texas Department of Agriculture, Austin Texas.

ABSTRACT

Many if not most, exotic grasses found in rangelands today were introduced for use as livestock forage. Although palatability differs among species many can be managed to become less invasive in the presence of a holistic approach that treats them as an integral part of of a planned grazing program. Total absence of grazing a unit of land generally favors the invasive tendencies of these introductions.

SYMPOSIA

INVASIVE GRASSES AND SEDGES: DEEP-ROOTED ISSUES

THE POTENTIAL FOR SPREAD OF *CYPERUS ENTRERIANUS* (CYPERACEAE) INTO NATIVE HABITATS IN THE SOUTHEASTERN UNITED STATES.

D.J. Rosen, R. Carter, and. C.T. Bryson, U. S. Fish and Wildlife Service, Houston, TX 77058; Valdosta State University, Valdosta, GA 31698; and USDA-ARS, SWSRU, Stoneville, MS 38776.

ABSTRACT

Cyperus entrerianus, a native of temperate South America, has become a tenacious weed in the southeastern United States. Herbarium and field studies revealed records of *C. entrerianus* from an additional 39 counties in the southeastern United States, increasing the number of counties where it was previously recorded by 118%. Vegetation sampling in southeast Texas showed that *C. entrerianus* occurs in bottomland forest stands with mature canopy structure. This study also showed that native herbaceous species richness and aerial cover are negatively correlated with increasing aerial cover of *C. entrerianus*. Life history characteristics of *C. entrerianus* suggest it will continue to spread and could alter both herbaceous and woody plant dynamics in bottomland forests and other native habitats of the southeastern United States.

SYMPOSIA

INVASIVE GRASSES AND SEDGES: DEEP-ROOTED ISSUES

DISPERSAL, BIOLOGY, AND CONTROL OF DEEPROOTED SEDGE. C.T. Bryson, R. Carter, and D.J. Rosen, USDA-ARS, SWSRU, Stoneville, MS; Valdosta State University, Valdosta, GA; and U. S. Fish and Wildlife Service, Houston, TX.

ABSTRACT

Deeprooted sedge (*Cyperus entrerianus* Boeck.) is a non-native invasive weed that has spread at an alarming rate across the coastal plain of the southern United States. It was first reported in the United States in 1990. Apparently, deeprooted sedge was introduced from temperate regions of South America. Currently, deeprooted sedge is established in a total of 71 counties in the states of Alabama, Florida, Georgia, Louisiana, Mississippi, and Texas. Deeprooted sedge can be distinguished from related species by its robust growth habit, deeply set thick rhizomes, dark purplish black leaf bases, and glossy leaves. Flooding, construction equipment, mowing, heavy traffic, and soil moving activities, especially along highways, spread the tiny achenes of deeprooted sedge, resulting in infestations in new areas, particularly in disturbed habitats. Birds and wild hogs are also likely vectors for seed dispersal in deeprooted sedge. Deeprooted sedge is displacing native vegetation even in undisturbed habitats. Without widespread control, deeprooted sedge will likely continue to spread rapidly, infesting agricultural, forest, riparian, urban, and natural areas. In the southern United States, this perennial species reproduces primarily by copious seed production, but can reproduce from short, woody rhizomes. Established deeprooted sedge plants survive (>95%) winters as far north as Stoneville, Mississippi. Plants survived winter conditions during 2004 and 2005 at a recently detected population in Tunica County, Mississipi. Unlike purple nutsedge (*Cyperus rotundus* L.) and yellow nutsedge (*Cyperus esculentus* L.), deeprooted sedge remains green longer during the fall and winter months and some green leaves were observed near the soil surface in January and February in northern Mississippi during 2001 through 2005. Plants established from seeds weighed 1 to 1.8 kg/plant at the end of the first growing season during a three-year study. In field studies, biweekly mowing at 15 cm above soil surface prevented seed production but did not control vegetative re-growth. The number of seed per inflorescence ranged from 1,000 to > 20,000 depending on the size and maturity of deeprooted sedge plants, and mature plants ($\geq$ 1 year old) produced from 10 to 100 inflorescences per year. In a heavily infested area, seed production from deeprooted sedge may exceed 1 to 2 billion seed/ha annually. Deeprooted sedge re-growth was rapid and seed production was only temporarily suppressed (< one month) following a single tillage operation (disking). Repeated tillage controlled established plants, but without herbicide treatments or additional tillage seedlings rapidly replaced them following rainfall. Over a three year period in field trials, the most effective herbicides for deeprooted sedge control were glyphosate at 2.2 kg/ha (98%) or 1.1 kg/ha followed by 1.1 kg/ha (10 days apart) (95%), hexazinone at 0.28 kg/ha (92%), MSMA at 2.2 kg/ha (85%), glyphosate at 1.1 kg/ha (84%), halosulfuron-methyl at 0.07 kg/ha (80%), 2,4-D at 0.8 kg/ha + dicamba at 0.27 kg/ha (78 %), and 2,4-D at 2.2 kg/ha + picloram at 0.07 kg/ha (70%). Additional spread of deeprooted sedge can be prevented by (1) cleaning machinery, vehicles, equipment, clothing and other personal items after use in infested areas to avoid spread; (2) suppressing seed production by repeated mowing at 2 to 4 weeks intervals; and (3) herbicide application and/or repeated tillage operations where and when possible. Because deeprooted sedge continues to spread at an alarming rate threatening agricultural and natural areas with potential to spread northward into Arkansas, North Carolina, South Carolina, Tennessee, and Virginia, additional research is needed to determine more effective methods of prevention and control.

SYMPOSIA

INVASIVE GRASSES AND SEDGES: DEEP-ROOTED ISSUES

INVASIVE SEDGES: IMPENDING PROBLEMS. R. Carter, C.T. Bryson and D.J. Rosen, Valdosta State University, Valdosta, GA 31698; USDA-ARS, SWSRU, Stoneville, MS 38776; and U. S. Fish and Wildlife Service, Houston, TX 77058.

ABSTRACT

Some of the world's worst agricultural pests are sedges, e.g., *Cyperus rotundus* L., *C. esculentus* L., *C. difformis* L., *C. iria* L., *Fimbristylis miliacea* (L.) Vahl, and *F. dichotoma* (L.) Vahl. Many sedges are highly competitive, have the ability to survive in a wide range of environments, and exhibit mechanisms facilitating short- and long-distance dispersal. Worldwide, 449 species of Cyperaceae have been cited as weeds, yet Cyperaceae have generally been neglected as weeds of natural ecosystems. In descending order of importance, sedge genera with weeds are: *Cyperus*, 148 spp, 33%; *Carex*, 83 spp., 18%; *Eleocharis*, 52 spp., 12%; *Fimbristylis*, 46 spp., 10%; *Scleria*, 24 spp., 5%; *Schoenoplectus*, 20 spp., 4%; *Rhynchospora*, 19 spp., 4%; *Kyllinga*, 13 spp., 3%; *Bulbostylis*, 9 spp., 2%; *Fuirena*, 8 spp., 2%; *Scirpus*, 8 spp., 2 %; *Bolboschoenus*, 5 spp., 1%; *Lipocarpha*, 4 spp., <1%; *Cladium*, 2 spp., <1%; *Abildgaardia*, 1 sp., <1%; 1%; *Courtoisina*, 1 sp., <1%; *Isolepis*, 1 sp., <1%; *Lepidosperma*, 1 sp., <1%; *Lepironia*, 1 sp., <1%; *Mapania*, 1 sp., <1%; *Oxycaryum*, 1 sp., <1%; and *Scirpodendron*, 1 sp., <1%. Recently, a number of sedges have been reported to be invasive in natural areas of the southeastern United States, e.g., *Cyperus entrerianus* Boeck., *C. prolifer* Lam., *Eleocharis acutangula* (Roxb.) Schult., *E. mutata* (L.) Roem. & Schult., *Oxycaryum cubense* (Poepp. & Kunth) Palla, and *Scleria lacustris* C. Wright. Many Cyperaceae are colonizers adapted to natural and artificial disturbance and are anthropogenically dispersed, including intentional transport in the ornamental horticultural trade. The intrinsic competitive and adaptive characteristics of sedges along with trends toward increased dispersal by human activities and the escalating frequency of long-distance travel by humans and cargo, indicate that additional Cyperaceae will be dispersed by humans and that sedges will become increasingly detrimental to natural ecosystems. International and interdisciplinary collaboration among botanists, weed scientists, natural resource managers, and representatives of governmental agencies are essential for early detection and control of emerging problems with cyperaceous weeds.

SYMPOSIA

INVASIVE GRASSES AND SEDGES: DEEP-ROOTED ISSUES

ROADSIDE NOXIOUS WEEDS, NEW GUIDANCE. Bonnie L. Harper-Lore, Federal Highway Administration (FHWA), Office of Natural Environment, Washington D.C. 20590.

ABSTRACT

Along with the 2005 passage of the Transportation Bill (SAFETEA-LU) came an expectation of new funding for the prevention and control of invasive plants along highway corridors. Why so much interest? Interstate, State, and County highways (Federal-aid highways) crisscross the nation and cross your lands. Because of the very nature of highways, (wind gusts, maintenance disturbances, errant vehicles, movement from one place to another), highways have become vectors of invasive species. This paper will discuss the intent of the Transporation Bill's paragraph on invasives as well as the reality of Congress' decisions and the FHWA interpretation of that paragraph, to be based on each State's Noxious Weed Law. SAFETEA-LU makes history in making maintenance units in each State Department of Transportation ELIGIBLE to use federal-aid dollars for the control of noxious weeds and the establishment of native plants. Eligibility to spend dollars on noxious weeds and native plants will be extended to predesign, construction, landscaping, and vegetation management. This applies to every State DOT.

SYMPOSIA

REGULATORY ASPECTS WORKSHOP

THE PESTICIDE REGISTRATION IMPROVEMENT ACT (PRIA) - AN INDUSTRY PERSPECTIVE Dr. Greg Watson, State Regulatory Affairs & Federal Label Support Team Lead, Syngenta Crop Protection

ABSTRACT

This presentation will provide an overview of PRIA including some background on the particulars of the legislation including established timelines, the progress being made by the Environmental Protection Agency on the implementation of PRIA, the progress in the part of PRIA that calls for the development & implementation of process improvements, and assesses the question whether PRIA has been a success in its first two years of implementation.

PRIA was initially implemented by EPA on March 23, 2004 and covers registration actions submitted by registrants after that date. PRIA does not affect the processing of Section 24(c) or Section 18 registrations, nor the timing or cost of notifications or fast track or administrative amendments. The primary benefits of PRIA are reduced timeframes for registration decisions, greater predictability/accountability for registration decisions, enhanced resources to assure that Food Quality Protection Act (FQPA) and reregistration deadlines are achieved, and more stable, predictable and augmented funding for EPA's pesticide program. Fee waiver provisions for small businesses, minor uses, IR-4 and state & federal agencies are allowed under PRIA.

There are 90 fee categories overall for the three registering divisions within the Office of Pesticide Programs (OPP); 37 fee and timeline categories have been established for conventional chemicals that are regulated by the Registration Division of OPP. OPP has established a website that contains fee categories (fees & timeframes), interpretations of categories, details on who qualifies for a waiver & instructions on requesting a waiver (www.epa.gov/pesticides/fees).

The success rate of decisions under the PRIA time has varied by registering divisions; within Registration Division only 3% of all PRIA applications have had to have their PRIA timeline renegotiated. There has been a Federal Advisory Committee Act group formed to look at the process improvement aspects required under PRIA. This has led to the establishment of a group within OPP looking at making the Label Review Manual a living document and a Labeling Consistency Team formed with the goal to work on labeling question that are not product specific. Questions to the Labeling Consistency Team and other information regarding this group can be found at http://www.epa.gov/pesticides/regulating/labels/label_review.htm .

In the presenter's opinion, PRIA has made significant progress in achieving the major goals of the legislation and has been a success in large measure to the key commitment of OPP leadership to the program.

SYMPOSIA

REGULATORY ASPECTS WORKSHOP

HERBICIDE TOLERANCES FOR MAJOR AND MINOR CROPS. L.L. Whatley; BASF Corporation, Research Triangle Park, NC.

ABSTRACT

A tolerance, the maximum amount of pesticide residue permitted, is required for each food use of a crop that may be treated with the pesticide; any commodity consumed in human or animal food, drink, or chewing gum is classified as being used for food. Established on parent and metabolites of active ingredients, tolerances are expressed as parts of a.i. per million parts of the raw agricultural commodity. A tolerance is required regardless of the amount of the crop typically eaten. For example, herbicide-treated corn, soybeans, avocados, and peppermint all must have tolerances set before a product can be legally used for weed control in those crops.

The process for establishing a tolerance is the same for all crops, but the financial incentive to do so is greatest for major use or large acreage crops. Plant metabolism and field residue studies needed are expensive, and it takes less time to recover the investment made in the studies when the use covers many acres. Consequently, chemical weed control options for specialty or minor use crops, those grown on less than 300,000 acres, are usually limited.

The use of crop groupings allows tolerances to be set on groups of related crops without requiring that residue data be generated for each member of the group; residue data generated for specified representative crops may be used to project the residue profile for other crops in the group. Currently, there are 19 recognized groups: root and tuber vegetables; leaves of root and tuber vegetables; bulb vegetables; leafy vegetables (except *Brassica* vegetables); *Brassica* (cole) leafy vegetables; legume vegetables (succulent or dried); foliage of legume vegetables; fruiting vegetables (except cucurbits); cucurbit vegetables; citrus fruits; pome fruits; stone fruits; berries; tree nuts; cereal grains; forage, fodder, and straw of cereal grains; grass forage, fodder and hay; nongrass animal feeds (forage, fodder, straw, and hay); and herbs and spices.

Using crop groups has greatly expanded the number of herbicides available for minor use crops. For example, head and leaf lettuce, celery, and spinach are the representative crops for Crop Group 4, leafy vegetables except *Brassica*. If the residue profiles for those four vegetables are similar, the manufacturer has the option of including fennel, parsley, rhubarb, Swiss chard or any of 23 other leafy vegetables to the product label.

Additional crops may be grouped in the future. Possible new groups include oilseed; tropical/subtropical fruits with edible peel; tropical/subtropical fruits with inedible peel; grasses for sugar or syrup, and teas.

SYMPOSIA

REGULATORY ASPECTS WORKSHOP

YOUR TECHNIAN HAS OP POISONING. J.A. Kendig, B.A. Hinklin and P.M. Ezell, University of Missouri Delta Center, Portageville, MO 63873

ABSTRACT

After brief exposures to carbofuran, a technician complained of mild to moderate symptoms partially consistent with insecticide poisoning. The medical treatment given was likely correct; however, the diagnosis and response of medical personnel was moderately disappointing: tests for cholinesterase activity and carbofuran metabolites were not run until we insisted on them and results were never received. In early April, 2005, a technician had brief dermal contact with some year-old liquid from an in-furrow spray system used to apply carbofuran the year before. He washed immediately, went home, took showered and clothes. He thought he may have felt some slight insecticide effects from this exposure. On April 18, the technician was involved in handling and mixing of carbofuran in association with corn planting. On April 20 the technical had brief dermal contact with general rinsate from our research mixing facility. He immediately washed but complained of significant dizziness and confusion approximately 20 minutes later. The technician was taken to a local emergency room, showered, and his heart rate and blood pressure were monitored for two hours. His blood pressure was elevated (this symptom is not consistent with insecticide poisoning), but slowly returned to normal and his dizziness subsided. No further evaluations were conducted and he was released. Two days later (April 22), his symptoms returned and he went to an emergency room at a larger hospital. Non-lethal poisonings with cholinesterase-insecticides typically have rapid and complete recovery with no reoccurrence. The larger hospital expressed concern at the level of testing at the previous hospital, and proceeded to run an electrocardiogram and routine blood and urine analyses. We later determined that no tests for cholinesterase activity or carbofuran metabolites were initiated. As with the first visit, the technician's symptoms moderated and he was discharged. On May 4, the technician planted corn for about two hours. Carbofuran was being sprayed in furrow. Due to concerns over previous events, he specifically avoided handling and mixing activities and was driving a cab tractor and the spray system was controlled with an electric switch. The technician continued to periodically have symptoms and after an extensive phone visit with a poison control center on May 6, made a third visit to an emergency room. This time we insisted that the doctors contact the poison control center and send samples for cholinesterase activity and carbofuran metabolite testing. At least one follow-up visit was made to a doctor. However, the test results were not available for over two weeks and we never received written results. A local primary care physician was of limited help with diagnosis and referrals. The technician was a licensed R&D applicator and was subjected to annual safety training. Full PPE was available and required in accordance with WPS and pesticide labeling; however in some cases, the technician used reduced PPE. The technician eventually took another job. In a recent conversation he said his problems had persisted, but that his issues had been diagnosed an allergic response to a new house. The first occurrences coincided with him moving, and the technician was taking allergy medications at that time. While the hospitals appeared to have poisoning references and treatment protocols, we were disappointed in their efforts to diagnose and confirm the problem. We were specific with symptoms and that exposures were extremely brief and involved proper decontamination. We also highlighted symptoms that we knew were not inconsistent with cholinesterase insecticides: The technician complained of a dry mouth; while uncontrolled drooling is consistent with insecticides. From our own research, we found an excellent reference: Reigart, J.R. and J.R. Roberts. 1999. Recognition and management of pesticide poisonings. US EPA. 236 pp. This book is available from the EPA as well as being available as a free Adobe PDF at: http://www.epa.gov/pesticides/safety/healthcare/handbook/handbook.htm. The book is well organized, easy to use and written in layman language. It contains much, easy-to-access, and specific information about poisoning. Most emergency room doctors told the technician that his problem probably was due to carbofuran exposure, and felt that recovery should have proceeded. Some wondered if there had been carbofuran storage in his fatty tissues. It should be noted that we willingly supplied the information that the technician had been handling carbofuran and we wonder if we lead medical personnel to easy, but incorrect diagnoses. Emergency-room doctors probably place more effort on immediate treatment of critical symptoms than "detective work" and in-depth diagnoses. This is probably similar to weed scientists servicing a herbicide injury complaint where a grower states that before spraying the injured field, he had just previously sprayed another herbicide on a different crop. However the EPA booklet listed cholinesterase activity and metabolite testing as part of the treatment protocols. It would be worthwhile to have a copy of this handbook printed and available at pesticide handling areas. In a case of a suspected poisoning, especially in a slight case like this one, contact a poison control center yourself. At the hospital, insist that appropriate blood and urine samples be taken and analyzed. This may take some research on your part as well as

medical personnel. You may need to engage doctors, poison control centers and yourself in a 3-way conversation, and insist on diagnostic tests. Based on our incidents, hospitals may not be likely to test blood and urine for cholinesterase activity or pesticide metabolites.

WEED SURVEY – SOUTHERN STATES

2006

Vegetable, Fruit and Nut Crops Subsection

(Cucurbits, Fruiting Vegetables, Cole Crops and Greens, Other Vegetables, Peaches, Apples, Fruits and Nuts, Citrus Crops)

Theodore M. Webster
Chairperson

Information in this report is provided by the following individuals:

Alabama	Mike Patterson	Bobby Boozer
Arkansas	Nilda Burgos	
Georgia	A. Stanley Culpepper	Wayne Mitchem
Kentucky	J. D. Green John Strang	J. R. Martin
Louisiana	James E. Boudreaux	
North Carolina	David Monks	Wayne Mitchem
Oklahoma	Lynn Brandenberger	Eric Stafne
Puerto Rico	Nelson Semidey	Maria de L. Lugo
South Carolina	Jason Norsworthy	Wayne Mitchem

Table 1. The Southern States 10 Most Common and Troublesome Weeds in Apples.

	States		
Ranking	Alabama	Georgia	North Carolina and South Carolina
Ten Most Common Weeds			
1	Crabgrass spp.	Large crabgrass	Large crabgrass
2	Pigweed spp.	Common lambsquarters	Common lambsquarters
3	Cutleaf eveningprimrose	Smooth pigweed	Smooth pigweed
4	Bermudagrass spp.	White clover	White clover
5	Prickly sida	Buckhorn plantain	Buckhorn plantain
6	Ragweed spp.	Morningglory spp.	Morningglory spp.
7	Common lambsquarters	Carolina geranium	Carolina geranium
8	Yellow nutsedge	Dandelion	Dandelion
9	Purple nutsedge	Common chickweed	Common chickweed
10	Morningglory (*Ipomoea*) spp.	Fall panicum	Fall panicum
Ten Most Troublesome Weeds			
1	Blackberry spp.	Mugwort	Mugwort
2	Southern dewberry	Poison ivy	Poison ivy
3	Yellow nutsedge	Yellow nutsedge	Yellow nutsedge
4	Purple nutsedge	Bramble spp.	Bramble spp.
5	Prickly sida	Bermudagrass	Bermudagrass
6	Ragweed spp.	Dallisgrass	Dallisgrass
7	Common lambsquarters	Morningglory spp.	Morningglory spp.
8	Cutleaf eveningprimrose	Johnsongrass	Johnsongrass
9	Bermudagrass spp.	Horsenettle	Horsenettle
10	Bahiagrass	Virginia creeper	Virginia creeper

Table 2. The Southern States 10 Most Common and Troublesome Weeds in Citrus.

	States	
Ranking	Puerto Rico	Louisiana
Ten Most Common Weeds		
1	Guineagrass	Bristly mallow
2	Spreading dayflower	Bermudagrass
3	Dumbcane	Johnsongrass
4	Alexandergrass spp.	Pigweed spp.
5	Morningglory spp.	Crabgrass spp.
6	Balsamapple	Morningglory spp.
7	Bermudagrass spp.	Peppervine
8	Hairy grass	Trumpetcreeper
9	Dearly vines	Cutleaf eveningprimrose
10	Mikania (falso guaco)	Purslane spp.
Ten Most Troublesome Weeds		
1	Dumbcane	Bristly mallow
2	Bermudagrass spp.	Bermudagrass
3	Mikania (falso guaco)	Johnsongrass
4	Gully root	Peppervine
5	Spreading dayflower	Pigweed spp.
6	Sour paspalum	Crabgrass spp.
7	Alexandergrass spp.	Morningglory spp.
8	Red sprangletop	Trumpetcreeper
9	Morningglory spp.	Cutleaf eveningprimrose
10	Guineagrass	Purslane spp.

Table 3. The Southern States 10 Most Common and Troublesome Weeds in Cole Crops and Greens.

	States		
Ranking	Alabama	Arkansas	Georgia
Ten Most Common Weeds			
1	Annual ryegrass	Pigweed spp.	Henbit
2	Virginia pepperweed	Velvetleaf	Cutleaf eveningprimrose
3	Cutleaf eveningprimrose	Common cocklebur	Chickweed spp.
4	Carolina geranium		Wild radish
5	Henbit		Pink purslane
6	Common lambsquarters		Pigweed spp.
7	Vetch spp.		Florida pusley
8	Chickweed spp.		Texas panicum
9	Wild radish		Swinecress
10	Purslane spp.		Nutsedge spp.
Ten Most Troublesome Weeds			
1	Wild radish	Pigweed spp.	Wild radish
2	Cutleaf eveningprimrose	Velvetleaf	Yellow nutsedge
3	Carolina geranium	Common cocklebur	Purple nutsedge
4	Henbit		Cutleaf eveningprimrose
5	Vetch spp.		Morningglory (*Ipomoea*) spp.
6	Chickweed spp.		Pink purslane
7	Common lambsquarters		Pigweed spp.
8	Virginia pepperweed		Swinecress
9	Annual ryegrass		Henbit
10	Purslane spp.		Chickweed spp.

Table 3. The Southern States 10 Most Common and Troublesome Weeds in Cole Crops and Greens (continued).

	States		
Ranking	Kentucky	Louisiana	Oklahoma
Ten Most Common Weeds			
1	Large crabgrass	Pigweeds spp.	Henbit
2	Foxtail spp.	Crabgrass spp.	Shepherdspurse
3	Eastern black nightshade	Purslane	Common lambsquarters
4	Common lambsquarters	Chickweed spp.	Mustard spp.
5	Horseweed	Bermudagrass	Cutleaf eveningprimrose
6	Johnsongrass	Johnsongrass	Volunteer wheat
7	Yellow nutsedge	Annual bluegrass	Pigweed spp.
8	Ivyleaf morningglory	Cutleaf eveningprimrose	Volunteer potato
9	Horsenettle	Henbit	Common cocklebur
10	Common purslane		Johnsongrass
Ten Most Troublesome Weeds			
1	Redroot pigweed	Purslane	Henbit
2	Johnsongrass	Annual bluegrass	Shepherdspurse
3	Horsenettle	Johnsongrass	Common lambsquarters
4	Eastern black nightshade	Bermudagrass	Mustard spp.
5	Large crabgrass	Chickweed spp	Cutleaf eveningprimrose
6	Common lambsquarters	Cutleaf eveningprimrose	Volunteer wheat
7	Yellow nutsedge	Henbit	Pigweed spp.
8	Field bindweed	Pigweeds spp	Volunteer potato
9	Ivyleaf morningglory	Crabgrass spp	Common cocklebur
10	Horseweed		Johnsongrass

Table 3. The Southern States 10 Most Common and Troublesome Weeds in Cole Crops and Greens (continued).

	States	
Ranking	Puerto Rico	South Carolina
Ten Most Common Weeds		
1	Nutsedge spp.	Carpetweed
2	Morningglory spp.	Common purslane
3	Spider flower	Goosegrass
4	Jimsonweed	Common lambsquarters
5	Pigweed spp.	Hairy nightshade
6	Ragweed parthenium	Wild radish
7	Junglerice	Shepherdspurse
8	Goosegrass	Henbit
9	Hogweed	Yellow nutsedge
10	Wild poinsettia	Cutleaf eveningprimrose
Ten Most Troublesome Weeds		
1	Nutsedge spp.	Cutleaf eveningprimrose
2	Morningglory spp.	Yellow nutsedge
3	Goosegrass	Palmer amaranth
4	Ragweed parthenium	Goosegrass
5	Hogweed	Carpetweed
6	Pigweed spp.	Henbit
7	Spiny amaranth	Hairy nightshade
8	Purslane spp.	Common lambsquarters
9	Eclipta	Common purslane
10	Itchgrass	Wild radish

Table 4. The Southern States 10 Most Common and Troublesome Weeds in Cucurbit Crops.

	States		
Ranking	Alabama	Arkansas[a]	Georgia
Ten Most Common Weeds			
1	Sicklepod	Pigweed spp.	Florida pusley
2	Crabgrass spp.	Velvetleaf	Texas panicum
3	Pigweed spp.	Common cocklebur	Pigweed spp.
4	Florida pusley		Yellow nutsedge
5	Yellow nutsedge		Purple nutsedge
6	Morningglory (*Ipomoea*) spp.		Smallflower Morningglory
7	Purple nutsedge		Morningglory (*Ipomoea*) spp.
8	Florida beggarweed		Pink purslane
9	Smallflower morningglory		Crabgrass spp.
10	Arrowleaf sida		Florida beggarweed
Ten Most Troublesome Weeds			
1	Yellow nutsedge	Pigweed spp.	Purple nutsedge
2	Sicklepod	Velvetleaf	Yellow nutsedge
3	Purple nutsedge	Common cocklebur	Pink purslane
4	Morningglory (*Ipomoea*) spp.		Morningglory (*Ipomoea*) spp.
5	Tropic croton		Smallflower morningglory
6	Smallflower morningglory		Sicklepod
7	Wild radish		Pigweed spp.
8	Arrowleaf sida		Florida pusley
9	Florida pusley		Texas panicum
10	Pigweed spp.		Florida beggarweed

[a] Surveyed region includes Arkansas River Valley, Arkansas-Oklahoma border, and Northwest Arkansas-Missouri border.

Table 4. The Southern States 10 Most Common and Troublesome Weeds in Cucurbit Crops (continued).

	States		
Ranking	Kentucky	Louisiana	North Carolina[b]
Ten Most Common Weeds			
1	Large crabgrass	Pigweed spp.	Palmer amaranth
2	Foxtail spp.	Crabgrass spp.	Carpetweed
3	Common ragweed	Morningglory spp.	Large crabgrass
4	Common lambsquarters	Purslane	Smooth pigweed
5	Horseweed	Purple nutsedge	Yellow nutsedge
6	Johnsongrass	Bermudagrass	Common purslane
7	Yellow nutsedge		Entireleaf morningglory
8	Ivyleaf morningglory		Purple nutsedge
9	Horsenettle		Pitted morningglory
10	Prickly sida/Teaweed		Prickly sida
Ten Most Troublesome Weeds			
1	Yellow nutsedge	Purslane	Palmer amaranth
2	Horsenettle	Purple nutsedge	Yellow nutsedge
3	Field bindweed	Bermudagrass	Purple nutsedge
4	Johnsongrass	Morningglory spp.	Florida pusley
5	Bigroot morningglory	Pigweed spp.	Smooth pigweed
6	Large crabgrass	Crabgrass spp.	Wild radish
7	Ivyleaf morningglory		Entireleaf morningglory
8	Horsweed		Goosegrass
9	Redroot pigweed		Sicklepod
10	Trumpetcreeper		Common cocklebur

[b] This survey refers to watermelon and squash for North Carolina.

Table 4. The Southern States 10 Most Common and Troublesome Weeds in Cucurbit Crops (continued).

	States		
Ranking	North Carolina[c]	Oklahoma	Puerto Rico
Ten Most Common Weeds			
1	Palmer amaranth	Pigweed spp.	Nutsedge spp.
2	Carpetweed	Large crabgrass	Wild poinsettia
3	Large crabgrass	Carpetweed	Pigweed spp.
4	Goosegrass	Horsenettle	Junglerice
5	Smooth pigweed	Yellow nutsedge	Ragweed parthenium
6	Yellow nutsedge	Morningglory spp.	Crabgrass spp.
7	Common purslane	Bermudagrass	Itchgrass
8	Entireleaf morningglory	Tropic croton	Jimsonweed
9	Purple nutsedge	Johnsongrass	Morningglory spp.
10	Common cocklebur	Eclipta	Johnsongrass
Ten Most Troublesome Weeds			
1	Palmer amaranth	Horsenettle	Nutsedge spp.
2	Florida pusley	Yellow nutsedge	Morningglory spp.
3	Smooth pigweed	Pigweed spp.	Wild poinsettia
4	Common purslane	Buffalobur	Ragweed parthenium
5	Pink purslane	Tropic croton	Hogweed
6	Entireleaf morningglory	Woolly croton	Pigweed spp.
7	Sicklepod	Morningglory spp.	Spiny amaranth
8	Wild radish	Crownbeard	Purslane spp.
9	Common cocklebur	Large crabgrass	Itchgrass
10	Goosegrass	Eclipta	Johnsongrass

[d] This survey refers to cucumber and cantaloupe for North Carolina.

Table 5. The Southern States 10 Most Common and Troublesome Weeds in Fruit and Nut Crops.

	States		
Ranking	Alabama[a]	Louisiana	Georgia[b]
Ten Most Common Weeds			
1	Bahiagrass	Bermudagrass	Large crabgrass
2	Bermudagrass spp.	Johnsongrass	Common lambsquarters
3	Crabgrass spp.	Bahiagrass	Smooth pigweed
4	Pigweed spp.	Bristly mallow	Dandelion
5	Morningglory (*Ipomoea*) spp.	Brambles spp.	Buckhorn plantain
6	Florida pusley	Purple nutsedge	Carolina geranium
7	Nutsedge spp.	Peppervine	Common chickweed
8	Plantain spp.	Morningglory spp.	White clover
9	Ragweed spp.	Cutleaf eveningprimrose	Fall panicum
10	Curly dock	Henbit	Horsenettle
Ten Most Troublesome Weeds			
1	Blackberry spp.	Bermudagrass	Yellow nutsedge
2	Southern dewberry	Johnsongrass	Virginia creeper
3	Nutsedge spp.	Bahiagrass	Horsenettle
4	Arrowleaf sida	Brambles spp.	Bermudagrass spp.
5	Trumpetcreeper	Bristly mallow	Dallisgrass
6	Vetch spp.	Purple nutsedge	Morningglory (*Ipomoea*) spp.
7	Spotted spurge	Peppervine	Smallflower morningglory
8	Morningglory (*Ipomoea*) spp.	Moringglory spp.	Dandelion
9	Bahiagrass	Cutleaf eveningprimrose	Johnsongrass
10	Bermudagrass spp.	Henbit	Bramble spp.

[a] This survey refers primarily to Pecan for Alabama.
[b] This survey refers to Grape for Georgia.

Table 5. The Southern States 10 Most Common and Troublesome Weeds in Fruit and Nut Crops (continued).

	States		
Ranking	Oklahoma[c]	North Carolina[d]	South Carolina[d]
<u>Ten Most Common Weeds</u>			
1	Pigweed spp.	Large crabgrass	Large crabgrass
2	Common ragweed	Common lambsquarters	Common lambsquarters
3	Giant ragweed	Smooth pigweed	Smooth pigweed
4	Cutleaf eveningprimrose	Dandelion	Dandelion
5	Johnsongrass	Buckhorn plantain	Buckhorn plantain
6	Bermudagrass spp.	Carolina geranium	Carolina geranium
7	Crabgrass spp.	Common chickweed	Common chickweed
8	Nutsedge spp.	White clover	White clover
9	Trumpetcreeper	Fall panicum	Fall panicum
10	Nightshade spp.	Horsenettle	Horsenettle
<u>Ten Most Troublesome Weeds</u>			
1	Bermudagrass spp.	Yellow nutsedge	Yellow nutsedge
2	Nutsedge spp.	Virginia creeper	Virginia creeper
3	Poison ivy	Horsenettle	Horsenettle
4	Nightshade spp.	Bermudagrass spp.	Bermudagrass spp.
5	Dock spp.	Dallisgrass	Dallisgrass
6	Smartweed spp.	Morningglory (*Ipomoea*) spp.	Morningglory (*Ipomoea*) spp.
7	Morningglory spp.	Smallflower morningglory	Smallflower morningglory
8	Trumpetcreeper	Dandelion	Dandelion
9	Nettle spp.	Johnsongrass	Johnsongrass
10	Giant ragweed	Bramble spp.	Bramble spp.

[C] This survey refers to Pecan for Oklahoma.
[D] This survey refers to Grape for North Carolina and South Carolina.

Table 6. The Southern States 10 Most Common and Troublesome Weeds in Fruiting Vegetables.

	States		
Ranking	Alabama	Georgia	Kentucky
Ten Most Common Weeds			
1	Crabgrass spp.	Texas panicum	Large crabgrass
2	Sicklepod	Pigweed spp.	Foxtail spp.
3	Morningglory (*Ipomoea*) spp.	Florida pusley	Common ragweed
4	Yellow nutsedge	Yellow nutsedge	Common lambsquarters
5	Purple nutsedge	Purple nutsedge	Horseweed
6	Pigweed spp.	Crabgrass spp.	Johnsongrass
7	Florida pusley	Smallflower morningglory	Yellow nutsedge
8	Florida beggarweed	Morningglory (*Ipomoea*) spp.	Ivyleaf morningglory
9	Bristly starbur	Pink purslane	Horsenettle
10	Arrowleaf sida	Goosegrass	Common purslane
Ten Most Troublesome Weeds			
1	Yellow nutsedge	Purple nutsedge	Johnsongrass
2	Purple nutsedge	Yellow nutsedge	Horseweed
3	Morningglory (*Ipomoea*) spp.	Morningglory (*Ipomoea*) spp.	Yellow nutsedge
4	Horsenettle	Smallflower morningglory	Eastern black nightshade
5	Tropic croton	Sicklepod	Large crabgrass
6	Spotted spurge	Nightshade spp.	Field bindweed
7	Smartweed spp.	Pigweed spp.	Common lambsquarters
8	Bristly starbur	Florida pusley	Ivyleaf morningglory
9	Florida beggarweed	Bristly starbur	Horsenettle
10	Arrowleaf sida	Florida beggarweed	Common purslane

Table 6. The Southern States 10 Most Common and Troublesome Weeds in Fruiting Vegetables (continued).

	States		
Ranking	Louisiana	North Carolina[a]	North Carolina[b]
Ten Most Common Weeds			
1	Purple nutsedge	Carpetweed	Carpetweed
2	Purslane spp.	Common purslane	Common purslane
3	Crabgrass spp.	Large crabgrass	Large crabgrass
4	Pigweed spp.	Goosegrass	Goosegrass
5	Morningglory spp.	Common lambsquarters	Common lambsquarters
6	Bermudagrass	Smooth pigweed	Smooth pigweed
7	Johnsongrass	Yellow nutsedge	Yellow nutsedge
8		Purple nutsedge	Purple nutsedge
9		Eastern black nightshade	Eastern black nightshade
10		Cutleaf groundcherry	Cutleaf groundcherry
Ten Most Troublesome Weeds			
1	Purple nutsedge	Yellow nutsedge	Palmer amaranth
2	Purslane spp.	Purple nutsedge	Common lambsquarters
3	Morningglory spp.	Palmer amaranth	Smooth pigweed
4	Pigweed spp.	Common lambsquarters	Common purslane
5	Crabgrass spp.	Smooth pigweed	Entireleaf morningglory
6	Bermudagrass	Common purslane	Yellow nutsedge
7	Johnsongrass	Pink purslane	Purple nutsedge
8		Entireleaf morningglory	Hairy galinsoga
9		Sicklepod	Wild radish
10		Wild radish	Sicklepod

[a] This survey refers to pepper for North Carolina.
[b] This survey refers to tomato for North Carolina.

Table 6. The Southern States 10 Most Common and Troublesome Weeds in Fruiting Vegetables (continued).

	State	
Ranking	Puerto Rico	South Carolina
Ten Most Common Weeds		
1	Nutsedge spp.	Palmer amaranth
2	Morningglory spp.	Goosegrass
3	Spiderflower	Florida pusley
4	Jimsonweed	Large crabgrass
5	Pigweed spp.	Yellow nutsedge
6	Ragweed parthenium	Morningglory spp.
7	Crabgrass spp.	Hairy galinsoga
8	Itchgrass	Purple nutsedge
9	Hogweed	Texas panicum
10	Wild poinsettia	Nightshade spp.
Ten Most Troublesome Weeds		
1	Nutsedge spp.	Yellow nutsedge
2	Morningglory spp.	Purple nutsedge
3	Wild poinsettia	Palmer amaranth
4	Ragweed parthenium	Hairy galinsoga
5	Hogweed	Arrowleaf sida
6	Pigweed spp.	Nightshade spp.
7	Spiny amaranth	Morningglory spp.
8	Purslane spp.	Goosegrass
9	Spiderflower	Texas panicum
10	Johnsongrass	Large crabgrass

Table 7. The Southern States 10 Most Common and Troublesome Weeds in Other Vegetable Crops.

	States		
Ranking	Arkansas[a]	Arkansas[b]	Georgia
Ten Most Common Weeds			
1	Morningglory (*Ipomoea*) spp.	Pigweed spp.	Pigweed spp.
2	Pigweed spp.	Velvetleaf	Florida pusley
3	Johnsongrass	Eastern black nightshade	Texas panicum
4	Prickly sida	Hophornbeam copperleaf	Yellow nutsedge
5	Crabgrass spp.	Punturevine	Smallflower morningglory
6	Common ragweed	Buffalobur	Sicklepod
7	Yellow nutsedge	Common lambsquarters	Morningglory (*Ipomoea*) spp.
8	Bermudagrass		Crabgrass spp.
9	Sicklepod		Florida beggarweed
10	Pennsylvania smartweed		Pink purslane
Ten Most Troublesome Weeds			
1	Morningglory (*Ipomoea*) spp.	Pigweed spp.	Yellow nutsedge
2	Pigweed spp.	Velvetleaf	Purple nutsedge
3	Johnsongrass	Eastern black nightshade	Pigweed spp.
4	Prickly sida	Hophornbeam copperleaf	Morningglory (*Ipomoea*) spp.
5	Crabgrass spp.	Punturevine	Sicklepod
6	Common ragweed	Buffalobur	Smallflower morningglory
7	Yellow nutsedge	Common lambsquarters	Florida pusley
8	Bermudagrass		Texas panicum
9	Sicklepod		Pink purslane
10	Pennsylvania smartweed		Wild radish

[a] Survey of vegetable growers close to the Mississippi River Delta.
[b] Surveyed crops include snapbean and southernpea.

Table 7. The Southern States 10 Most Common and Troublesome Weeds in Other Vegetable Crops (continued).

	States		
Ranking	Louisiana	North Carolina[a]	Puerto Rico
Ten Most Common Weeds			
1	Pigweed spp.	Palmer amaranth	Nutsedge spp.
2	Crabgrass spp.	Carpetweed	Wild poinsettia
3	Purslane spp.	Yellow nutsedge	Spiderflower
4	Morningglory spp.	Large crabgrass	Johnsongrass
5	Purple nutsedge	Goosegrass	Pigweed spp.
6	Johnsongrass	Smooth pigweed	Junglerice
7	Bermudagrass	Common lambsquarters	Crabgrass spp.
8	Annual bluegrass	Common purslane	Goosegrass
9		Pennsylvania smartweed	Hogweed
10		Smooth groundcherry	Morningglory spp.
Ten Most Troublesome Weeds			
1	Purslane spp.	Palmer amaranth	Nutsedge spp.
2	Purple nutsedge	Yellow nutsedge	Morningglory spp.
3	Bermudagrass	Smooth pigweed	Goosegrass
4	Morningglory spp.	Common lambsquarters	Ragweed parthenium
5	Johnsongrass	Common purslane	Johnsongrass
6	Pigweed spp.	Florida pusley	Pigweed spp.
7	Crabgrass spp.	Pennsylvania smartweed	Itchgrass
8	Annual bluegrass	Wild radish	Purslane spp.
9		Entireleaf morningglory	Eclipta
10		Smooth groundcherry	Junglerice

[a] This survey refers to sweet potato in North Carolina.

Table 8. The Southern States 10 Most Common and Troublesome Weeds in Peaches.

	States		
Ranking	Alabama	Georgia	Louisiana
Ten Most Common Weeds			
1	Crabgrass spp.	Large crabgrass	Bristly mallow
2	Pigweed spp.	Goosegrass	Bermudagrass
3	Morningglory (*Ipomoea*) spp.	Palmer amaranth	Johnsongrass
4	Horseweed	Common lambsquarters	Crabgrass spp.
5	Prickly sida	Cutleaf eveningprimrose	Pigweed spp.
6	Nutsedge spp.	Common chickweed	Bramble spp.
7	Plantain spp.	Florida pusley	Bahiagrass
8	Florida pusley	Bermudagrass spp.	Henbit
9	Arrowleaf sida	Henbit	Cutleaf eveningprimrose
10	Curly dock	Horseweed	
Ten Most Troublesome Weeds			
1	Blackberry spp.	Yellow nutsedge	Bristly mallow
2	Bermudagrass spp.	Purple nutsedge	Bermudagrass
3	Yellow nutsedge	Bahiagrass	Johnsongrass
4	Purple nutsedge	Bermudagrass spp.	Bramble spp.
5	Ragweed spp.	Bramble spp.	Crabgrass spp.
6	Curly dock	Virginia creeper	Pigweed spp.
7	Morningglory (*Ipomoea*) spp.	Palmer amaranth	Bahiagrass
8	Florida pusley	Johnsongrass	Henbit
9	Arrowleaf sida	Horsenettle	Cutleaf eveningprimrose
10	Bahiagrass	Morningglory spp.	

Table 8. The Southern States 10 Most Common and Troublesome Weeds in Peaches (continued).

	States		
Ranking	North Carolina	Oklahoma	South Carolina
Ten Most Common Weeds			
1	Large crabgrass	Bermudagrass spp.	Large crabgrass
2	Goosegrass	Johnsongrass	Goosegrass
3	Palmer amaranth	Foxtail spp.	Palmer amaranth
4	Common lambsquarters	Nightshade spp.	Common lambsquarters
5	Cutleaf eveningprimrose	Sandbur spp.	Cutleaf eveningprimrose
6	Common chickweed	Honeyvine milkweed	Common chickweed
7	Florida pusley	Horseweed	Florida pusley
8	Bermudagrass spp.	Crabgrass spp.	Bermudagrass spp.
9	Henbit	Cutleaf eveningprimrose	Henbit
10	Horseweed	Morningglory spp.	Horseweed
Ten Most Troublesome Weeds			
1	Yellow nutsedge	Bermudagrass	Yellow nutsedge
2	Purple nutsedge	Johnsongrass	Purple nutsedge
3	Bahiagrass	Nightshade spp.	Bahiagrass
4	Bermudagrass spp.	Sandbur spp.	Bermudagrass spp.
5	Bramble spp.	Honeyvine milkweed	Bramble spp.
6	Virginia creeper	Cutleaf eveningprimrose	Virginia creeper
7	Palmer amaranth	Morningglory spp.	Palmer amaranth
8	Johnsongrass	Goosegrass	Johnsongrass
9	Horsenettle	Nutsedge spp.	Horsenettle
10	Morningglory spp.	Horseweed	Morningglory spp.

STATE EXTENSION WEED CONTROL PUBLICATIONS

J. D. Byrd, Jr., Section Chairman

Extension weed identification and control publications for all commodities are listed by state. Publication numbers, titles and ordering sources are provided. Publications that must be purchased are designated with price in parentheses following the title. URL addresses are listed for states that have Extension weed control information on the Internet. This report will be updated each year, and published in the Proceedings.

State: ALABAMA

Prepared by: Mike Patterson

Internet URL: http://www.aces.edu/pubs/

Source: Bulletin Room, Alabama Cooperative Extension System, #6 Duncan Hall, Auburn University, Auburn, AL 36849

Number	Title
CIRCULARS	
ANR-48	Weed Control in Lake and Ponds
ANR-65	Kudzu: History, Uses, & Control
ANR-104	Controlling Smutgrass in Alabama Pastures
ANR-322	Weed Control in Home Gardens
ANR-453	Christmas Tree IPM
ANR-465	Weed Control for Commercial Nurseries
ANR-616	Weeds of Southern Turfgrasses ($15.00)
ANR-715	Cotton Defoliation
ANR-811	Conservation Tillage for Corn in Alabama
ANR-854	Weed Control in Residential Landscape Plantings
ANR-908	Moss and Algae Control in Lawns
ANR-909	Tropical Soda Apple in Alabama
ANR-951	Weed Control Around Poultry Houses and Other Farm Building
ANR-975	Poisonous Plants of the Southeastern United States ($4.00)
ANR-1058	Brush Control
ANR-1128	Weed Identification for Horticultural Crops
ANR-1241	Wanted Dead Not Alive: Cogongrass
INFORMATION SHEETS	
2004IPM-2	Commercial Vegetable IPM
2004IPM-8	Peach IPM
2004IPM-11	Apple IPM
2004IPM-22	Weed Control in Commercial Turfgrass
2004IPM-27	Pecan IPM
2004IPM-28	Forage Crops IPM
2004IPM-223	Noncropland IPM
2004IPM-360	Peanut IPM
2004IPM-413	Soybean IPM
2004IPM-415	Cotton IPM
2004IPM-428	Corn IPM
2004IPM-429	Grain Sorghum IPM
2004IPM-453	Christmas Tree IPM
2004IPM-458	Small Grain IPM
2004IPM-478	Small Fruit IPM
2004IPM-590	Chemical Weed Control for Home Lawns
2004IPM-978	Alfalfa IPM

State: ARKANSAS

Prepared by: Bob Scott, John Boyd, and Ken Smith

Internet URL: http://pubs4sale.uaex.edu/

Order from: Dr. Bob Scott, Box 391, 2301 South University, University of Arkansas Cooperative Extension, Little Rock, AR 72204
[1]Bernadette Hinkle, Box 391, Little Rock, AR 72203

Number	Title
PUBLICATIONS	
MP-44	Recommended Chemicals for Weed and Brush Control in Arkansas
MP-169[1]	Weeds of Arkansas Lawns, Turf, Roadsides, and Recreation Areas: A Guide to Identification ($5.00)
MP-370	Turfgrass Weed Control for Professionals
MP-415	Weed Control in Landscape Plantings
FSA-2080	Pasture Weed and Brush Control
FSA-2109	Home Lawn Weed Control
FSA-2145	Spot Spraying Pasture Brush

A weed control chapter is included in each of the following publications:

MP-192	Rice Production Handbook
MP-197	Soybean Production Handbook
MP-214	Corn Production Handbook
-----	Grain Sorghum Production Handbook
-----	Technology for Optimum Production of Soybeans

Information fact sheets for weed problems in commodity groups such as rice, soybean, forage, cotton, etc. are published as necessary. Color posters of weeds in Wheat, Pastures, and Lawns I and II are also available.

State: FLORIDA

Prepared by: Ken Langeland, William Stall, and Brian Unruh

Internet URL: http://edis.ifas.ufl.edu/publications.html

Order from: Extension Weed Specialist, Agronomy Department, 303 Newell Hall, P. O. Box 110500, University of Florida, Gainesville, FL 32611-0500

1 Dr. W. M. Stall, Extension Vegetable Weed Specialist, 1255 Fifield Hall, Univ. of Florida, Gainesville, FL 32611-0690

2 Dr. D. P. H. Tucker, Extension Citrus Management Specialist, IFAS-AREC, 700 Experiment Station Road, Lake Alfred, FL 33850

3 Dr. K. A. Langeland, Extension Aquatic Weed Specialist, Center for Aquatic Plant Research, 7922 NW 71st Street, Gainesville, FL 32606

4 Dr. B. R. Unruh, 1523 Fifield Hall, Gainesville, FL 32611

5 University of Florida Publications, P. O. Box 110011, Gainesville, FL 32611-0011

Number	Title
PUBLICATIONS	
SS-AGR-001	Weed Control in Tobacco
SS-AGR-002	Weed Control in Corn
SS-AGR-003	Weed Control in Peanuts
SS-AGR-004	Weed Control in Cotton
SS-AGR-005	Weed Control in Soybeans
SS-AGR-006	Weed Control in Sorghum
SS-AGR-007	Weed Control in Small Grains Harvested for Grain
SS-AGR-008	Weed Control in Pastures and Rangeland
SS-AGR-009	Weed Control in Sugarcane
SS-AGR-010	Weed Control in Rice
SS-AGR-012	Florida Organo-Auxin Herbicide Rule
SS-AGR-014	Herbicide Prepackage Mixtures
SS-AGR-015	Diagnosing Herbicide Injury
SS-AGR-016	Approximate Herbicide Pricing
SS-AGR-11	Weed Management in Transgenic, Herbicide-Resistant Soybeans
SS-AGR-13	Weed Management in Transgenic, Herbicide-Resistant Cotton
SS-AGR-17	Brazilian Pepper-Tree Control
SS-AGR-22	Identification and Control of Bahiagrass Varieties in Florida
SS-AGR-50	Tropical Soda Apple in Florida
SS-AGR-52	Cogongrass (*Imperata cylindrica*) Biology, Ecology and Control in Florida
SS-AGR-58	Tropical Soda Apple Control - Best Management Practices in 2003
SS-AGR-80	NATURAL AREA WEEDS: Skunkvine (*Paederia foetida*)
SS-AGR-100	Principles of Weed Management
SS-AGR-101	Application Equipment and Techniques
SS-AGR-102	Calibration of Herbicide Applicators
SS-AGR-103	Trade Name, Active Ingredient and Manufacturer
SS-AGR-104	Trade Names of Herbicides Containing a Given Active Ingredient
SS-AGR-105	Common Name, Chemical Name, and Toxicity Rating of Some Herbicides
SS-AGR-106	Names and Addresses of Some Herbicide Manufacturers and Formulators
SS-AGR-108	Using Herbicides Safely and Herbicide Toxicity
SS-AGR-109	Adjuvants
SS-AGR-111	Weed Management in Fence Rows and Non-Cropped Areas
SS-AGR-112	Poison Control Centers
SS-AGR-164	Natural Area Weeds: Air Potato (*Dioscorea bulbifera*)
SS-AGR-165	Natural Area Weeds: Carrotwood (*Cupaniopsis anacardioides*)

SS-Agr-21	Natural Area Weeds: Old World Climbing Fern (*Lygodium microphyllum*)
SS-ORH-004[4]	2003 University of Florida's Pest Control Recommendations for Turfgrass Managers
AGR-72	Labelled Aquatic Sites for Specific Herbicides
AGR-74	Listing of Herbicide, Registrant, and Amount of Active Ingredient
AGR-79	Florida Department of Environmental Protection Aquatic Plant Management Permits
A-87-6[3]	Application Procedure for Use of Grass Carp for Control of Aquatic Weeds
A-87-7[3]	Biology and Chemical Control of Algae
A-87-10[3]	Biology and Chemical Control of Duckweed
A-87-11[3]	Chemical Control of Hydrilla
A-87-12[3]	Florida DNA Aquatic Plant Control Permit Program
ENH-84	Weed Control Guide for Florida Lawns
ENH-88	Activated Charcoal for Pesticide Deactivation
ENH-90	Pesticide Calibration Formulas and Information
ENH-94	Metric System Conversion Factors
ENH-100	Response of Turfgrass and Turfgrass Weeds to Herbicides
ENH-124	Pest Control Guide for Turfgrass Managers
FS WRS-7	Tropical Soda Apple: A New Noxious Weed in Florida
HS-88	Weed Management in Apples
HS-89	Weed Management in Blackberries
HS-90	Weed Managment in Blueberries
HS-91	Weed Management in Grapes
HS-92	Weed Management in Nectarines
HS-93	Weed Management in Peaches
HS-94	Weed Management in Pears
HS-95	Weed Management in Pecans
HS-96	Weed Management in Plums
HS-97	Susceptibility of Weeds to Herbicides
HS-107	2001 Florida Citrus Pest Management Guide
HS-188[1]	Weed Management in Commercial Citrus
HS-189[1]	Weed Control in Cole or Brassica Leafy Vegetables
HS-190[1]	Weed Control in Cucurbit Crops
HS-191[1]	Weed Control in Eggplant
HS-192[1]	Weed Control in Okra
HS-193[1]	Weed Control in Bulb Crops
HS-194[1]	Weed Control in Potato
HS-195[1]	Potato Vine Dessicants
HS-196[1]	Weed Control in Strawberry
HS-197[1]	Weed Control in Sweet Corn
HS-198[1]	Weed Control in Sweet Potato
HS-199[1]	Weed Control in Pepper
HS-200[1]	Weed Control in Tomato
HS-201[1]	Weed Control in Carrots and Parsley
HS-202[1]	Weed Control in Celery
HS-203[1]	Weed Control in Lettuce, Endive, and Spinach
HS-706[1]	Estimated Effectiveness of Recommended Herbicides on Selected Common Weeds in Florida Vegetables

CIRCULAR, BOOKS, AND GUIDES

SS-AGR-20	2003 Weed Management Guide in Agronomic Crops and Non-Crop Areas
280[5]	Families, Mode of Action and Characteristics of Agronomic, Non-Crop and Turf Herbicides
459[2]	Weed Control Guide for Florida Citrus
676	Weed Control in Centipede and St. Augustinegrass
678	Container Nursery Weed Control
707	Weed Control in Florida Ponds
852[4]	Weed Control in Sod Production
1114	Weed Management for Florida Golf Courses
-----[5]	Florida Weed Control Guide ($8.00)

DH-88-05[4]	Turfgrass Weed Control Guide for Lawn Care Professionals
DH-88-07[4]	Commercial Bermudagrass Weed Control Guide
SM-44[5]	Aquatic and Wetland Plants of Florida ($11.00)
SP-35[5]	Identification Manual for Wetland Plant Species of Florida ($18.00)
SP-37[5]	Weeds in Florida ($7.00)
	Florida Weeds Part II ($1.00)
SP-79[5]	Weeds of Southern Turfgrasses ($8.00)
SP-242	Control of Non-native Plants in Natural Areas of Florida

State: GEORGIA

Prepared by: Stanley Culpepper, Tim R. Murphy, and Eric Prostko

Internet URL: http://pubs.caes.uga.edu/caespubs/pubs.html (use for print-on-demand publications)
http://www.gaweed.com/ (contains weed science slide presentations, some publications, etc.)
http://www.georgiaturf.com (contains weed science popular articles related to turfgrasses, weed identification, etc.)

Order from: [1]Ag. Business Office, Room 203, Conner Hall, The University of Georgia, Athens, GA 30602
Make check payable to: Georgia Cooperative Extension Service
[2]HADSS, c/o AgRenaissance Software LLC, P. O. Box 68007, Raleigh, NC 27613

The University of Georgia Cooperative Extension Service is currently in the process of switching to a print -on-demand system for Extension publications. Unless noted by an asterisk (*) the publications shown below are not available at this time through the print-on-demand system. Hard copies of these publications may be obtained by contacting one of Georgia weed scientists listed above.

Number	Title
LEAFLETS	
263	Renovation of Home Lawns
400	Musk Thistle and It's Control
418	Use of Sterile Grass Carp to Control Aquatic Weeds
425	Florida Betony Control in Turfgrass and Ornamentals
CIRCULARS	
713	Commercial Blueberry Culture
796	Roadside Vegetation Management
823	Controlling Moss and Algae in Turf
855	Wild Poinsettia Identification and Control*
865	Tropic Croton Identification and Control in Cotton and Peanut*
869	Eclipta Identification and Control in Peanut*
884	Tropical Spiderwort Identification and Control in Georgia Field Crops*
EXTENSION BULLETINS	
654	Weed Control in Noncropland
829	Principles and Practices of Weed Control in Cotton
978	Weed Control in Home Lawns
984	Turfgrass Pest Control Recommendations for Professionals
986	Forest Site Preparation Alternatives
996	Commercial Watermelon Production
998	Conservation Tillage Crop Production in Georgia
1004	Herbicide Use in Forestry
1005	Georgia Handbook of Cotton Herbicides
1006	Weed Control in Ponds and Small Lakes
1008	Weed Facts: Texas Panicum
1009	Weed Facts: Morningglory Complex
1010	Weed Facts: Sicklepod and Coffee Senna
1019	Cotton Defoliation and Crop Maturity
1023	Herbicide Incorporation
1032	Forestry on a Budget
1043	Weed Facts: Yellow and Purple Nutsedge
1049	Perennial Weed Identification and Control in Georgia
1069	How to Set Up a Post-Emergence Directed Herbicide Sprayer for Cotton
1070	Forage Weed Management

1072	Weed Facts: Florida Beggarweed
1093	Guide to Field Crop Troubleshooting
1098	How to Control Poison Ivy
1100	Peanut Herbicides for Georgia
1118	Non-Chemical Weed Control Methods
1125	Weed Management in Conservation Tillage Cotton
1135	Intensive Wheat Management in Georgia
1138	Conservation Tillage for Peanut Production
1144	Commercial Production of Vegetable Transplants

SPECIAL BULLETINS

28[1]	Georgia Pest Control Handbook ($15.00)*

MISCELLANEOUS

Pub. 46	2005 Georgia Peach Spray and Production Guide
Pub. 377	2005 Georgia Tobacco Growers Guide
Pub. 380	2005 Cotton Production Package
Hdbk. No. 1[1]	Peach Growers Handbook ($25.00)
[1]	Pecan Pest Management Handbook ($20.00)
[1]	Weeds of Southern Turfgrasses ($8.00)
[1]	Poisonous Plants of the Southeastern United States ($4.00)
761[1]	Weeds of the Southern United States ($3.00)
839[1]	Identification and Control of Weeds in Southern Ponds ($3.00)*
----[2]	Georgia HADSS ($95)

State: KENTUCKY

Prepared by: J. D. Green

Internet URL: http://www.ca.uky.edu/agc/pubs/pubs.htm

Order from: Dr. J. D. Green, Extension Weed Control Specialist, Plant and Soil Sciences Department, 413 Plant Science Building, University of Kentucky, Lexington, KY 40546-0312
Dr. James R. Martin, Extension Weed Control Specialist, University of Kentucky Research and Education Center, P. O. Box 469, Princeton, KY 42445

Number	Title
AGR-6	Chemical Control of Weeds in Kentucky Farm Crops
AGR-12	Weeds of Kentucky Turf
AGR-78	Weed Control Recommendations for Kentucky Bluegrass and Tall Fescue Lawns and Recreational Turf
AGR-139	Herbicide Persistence and Carryover in Kentucky
AGR-140	Herbicides with Potential to Carryover and Injure Rotational Crops in Kentucky
AGR-148	Weed Control Strategies for Alfalfa and Other Forage Legume Crops
AGR-172	Weed Management in Grass Pastures, Hayfields, and Fencerows
ID-2	Some Plants of Kentucky Poisonous to Livestock
ID-36	Commercial Vegetable Crop Recommendations
ID-125	A Comprehensive Guide to Wheat Management in Kentucky ($10.00)
ID-139	A Comprehensive Guide to Corn Management in Kentucky ($10.00)

State: LOUISIANA

Prepared by: Steve Kelly

Internet URL: http://www.lsuagcenter.com/en/communications/publications/

Order from: LSU AgCenter communications, Publications Office, PO Box 25100, Baton Rouge, LA 70894-5100

Number	Title
PUBLICATIONS	
1565	Louisiana's Suggested Chemical Weed Control Guide for 2006 (only available online)
1618	Prescribed Burning in Louisiana Pinelands ($1)
2314	Controlling Weeds in Sugarcane ($0.50)
2398	Aquatic Weed Management Herbicides ($0.50)
2410	Aquatic Weed Management Control Methods ($0.50)
2472	Aquafacts: Algal Blooms in Fish Production Ponds ($0.50)
2476	Aquafacts: Grass Carp for Aquatic Vegetation Control ($0.50)
2500	Herbicide Application for the Small Landowner ($0.50)
2740	Control Weeds in Soybeans with Pre and Postemergence Chemicals in 2004 ($1)
2746	2004 Controlling Weeds in Cotton ($1)
2778	Nonchemical Weed Control for Home Landscapes ($0.50)
2820	Louisiana Sugarcane Burning ($1)
2838	Managing Glyphosate Tolerant Cotton ($2)
8909	Conservation Tillage Systems for Energy Reduction -- Preplant Weed Control in Cotton ($0.50)
RIS 105	Guidelines for Managing Winter Vegetation in Northeast Louisiana
Production Guides	
2321	Rice Production Handbook
2624	Louisiana Soybean Handbook
2859	Sugarcane Production Handbook

State: MISSISSIPPI

Prepared by: John D. Byrd, Jr.

Internet URL: http://www.ces.msstate.edu/anr/plantsoil/weeds
http://www.msucares.com/pubs/index.html

Order from: Department of Plant & Soil Sciences, Box 9555, Mississippi State, MS 39762-9555
[1] Dr. Marty Brunson, Wildlife & Fisheries, Box 9690, Mississippi State, MS 39762-9690
[2] Dr. John Byrd, Plant & Soil Sciences, Box 9555, Mississippi State, MS 39762-9555
[3] Dr. Andy Londo, Forestry Department, Box 9681, Mississippi State, MS 39762-9681
[4] Mr. Herb Willcutt, Agric. & Bio. Engineering, Box 9632, Mississippi State, MS 39762-9632
[5] Dr. Joe Street, Delta Research & Extension Center, P. O. Box 68, Stoneville, MS 38776
[6] HADSS, c/o AgRenaissance Software LLC, P.O. Box 68007, Raleigh, NC 27613

Number	Title
INFORMATION SHEETS	
673[1]	Control of Fish Diseases and Aquatic Weeds
803	Grain and Forage Sorghum Weed Control
875	Cotton Postemergence and Layby Herbicides
945	Forages Weed Control in Pastures
962	Soybean Preplant Foliar and Preplant Incorporated
963	Soybean Preemergence Weed Control
1024	Soybean - Management Strategies for Sicklepod
1025[1]	Aquatic Weed Identification and Control--Bushy Pondweed and Coontail
1026[1]	Aquatic Weed Identification and Control--Willows and Arrowhead
1027[1]	Aquatic Weed Identification and Control--Cattail and Spikerush
1028[1]	Aquatic Weed Identification and Control--Pondweed and Bladderwort
1029[1]	Aquatic Weed Identification and Control--Fanwort and Parrotfeather
1030[1]	Aquatic Weed Identification and Control--Frogbit and Watershield
1031[1]	Aquatic Weed Identification and Control--Burreed and Bulrush
1032[1]	Aquatic Weed Identification and Control--White Waterlily and American Lotus
1033[1]	Aquatic Weed Identification and Control--Duckweed and Water Hyacinth
1034[1]	Aquatic Weed Identification and Control--Hydrilla and Alligatorweed
1035[1]	Aquatic Weed Identification and Control--Algae
1036[1]	Aquatic Weed Identification and Control--Methods of Aquatic Weed Control
1037[1]	Aquatic Weed Identification and Control--Smartweed and Primrose
1500	Flame Cultivation in Cotton
1527	Peanut Weed Control Recommendations
1528	Kenaf Weed Control Recommendations
1580	Nonchemical Weed Control for Home Owners
1619	Cotton Preplant and Preemergence Weed Control
-----[2]	Tropical Soda Apple in Mississippi
-----[2]	Tropical Soda Apple in the United States
-----[2]	Management Strategies for Tropical Soda Apple in Mississippi
PUBLICATIONS	
475	Corn Weed Control Recommendations
461	Commercial Pecan Pest Control-Insects, Diseases and Weeds
553	Weed Science for 4-H'ers
1005[3]	Christmas Tree Production in Mississippi
1006[4]	Calibration of Ground Spray Equipment
1091	Garden Tabloid
1100	Soybeans Postemergence Weed Control

1217[5]	Rice Weed Control
1277[3]	Forest Management Alternatives for Private Landowners
1322	Establish and Manage Your Home Lawn
1344	Weed Control in Small Grain Crops
1532	2005 Weed Control Guidelines for Mississippi ($7.00)
1664	Disease, Insect and Weed Control Guide for Commercial Peach Orchards
1744	Weed Control in Home Lawns
1907	Herbicide Resistance Prevention and Detection
1934	Weed Response to Selected Herbicides
1962	Pesticides - Benefits and Risks
2036	Organic Vegetable IPM Guide
2166[2]	Poisonous Plants of the Southeastern United States

TECHNICAL NOTES

MTN-SG[3]	Weed Control in Christmas Tree Plantations
MTN-7F[3]	An Overview of Herbicide Alternatives for the Private Forest Landowner
MTN-8F[3]	Tree Injection: Equipment, Methods, Effective Herbicides, Productivity, and Costs
MTN-11F[3]	Effective Kudzu Control

COMPUTER SOFTWARE

-----[6]	Mississippi HADSS ($95.00)

State: MISSOURI

Prepared by: Andy Kendig

Internet URL: http://outreach.missouri.edu/main/publications.shtml

Order from: Extension Publications, 2800 Maguire, University of Missouri, Columbia, MO 65211
Add $1.00 for shipping and handling with each order.

Number	Title
MP171	Missouri Pest Management Guide: Corn, Soybean, Wheat
MP581	Weed and Brush Control Guide for Forages, Pastures, and Non-Cropland in Missouri ($5.00)
MP686	Using Reduced Herbicide Rates for Weed Control in Soybeans ($1.00)
G4251	Cotton Weed Control ($0.75)
G4851	Atrazine: Best Management Practices and Alternatives in Missouri ($0.75)
G4871	Waterhemp Management in Missouri ($0.50)
G4872	Johnsongrass Control
G4875	Control of Perennial Broadleaf Weeds in Missouri Field Crops ($0.75)
NCR614	Early Spring Weeds of No-Till Production

State: NORTH CAROLINA

Prepared by: David Monks, Joe Neal, Fred Yelverton, and Alan York

Internet URL: http://cipm.ncsu.edu/ent/ncpmip/
http://www.turffiles.ncsu.edu/AllPublications.aspx

Order from: Dr. Fred Yelverton or Dr. A. C. York, Crop Science Department, Box 7620, North Carolina State University, Raleigh, NC 27695-7620

[1] Dr. J. C. Neal or Dr. D. W. Monks, Department of Horticulture, Box 7609, North Carolina State University, Raleigh, NC 27695-7609

[2] Communication Services, N. C. State University, 3210 Faucette Dr., Box 7603, Raleigh, NC 27695-7603

[3] Dr. David Ritchie, Department of Horticulture, Box 7609, North Carolina State University, Raleigh, NC 27695-7609

[4] HADSS, c/o AgRenaissance Software LLC, P. O. Box 68007, Raleigh, NC 27613

Number	Title
PUBLICATIONS	
AG-37[1]	Agricultural Chemicals for North Carolina Apples
AG-146[1]	Peach and Nectarine Spray Schedule
AG-187	Tobacco Information - 2005
AG-208	Identifying Seedling and Mature Weeds in Southeastern United States ($7.00)
AG-331	2005 Peanut Information
AG-348	Turfgrass Pest Management Manual ($7.00)
AG-408	Pest Control for Professional Turfgrass Managers 2005
AG-417	2005 Cotton Information
AG-437	Weed Management in Small Ponds
AG-438	Weed Control in Irrigation Water Supplies
AG-442	Using Activated Charcoal to Inactivate Agricultural Chemicals Spills
AG-449	Hydrilla, A Rapidly Spreading Aquatic Weed in North Carolina
AG-456	Using Grass Carp for Aquatic Weed Management
AG-572[2]	Integrated Orchard Management Guide for Commercial Apples in the Southeast
AG-580	Small Grain Production Guide
AG-594	North Carolina Corn Production Guide
B-414	Stock-Poisoning Plants of North Carolina ($5.00)
-----	North Carolina Agricultural Chemicals Manual ($22.00-Revised yearly)
-----[3]	Southern Peach, Nectarine, and Plum Pest Management and Cultural Guide
INFORMATION LEAFLETS	
HIL205B[1]	Weed Control Options for Strawberries on Plastic
HIL325[1]	Peach Orchard Weed Management
HIL380	Orchard Floor Management in Pecans
HIL449	Weed Management in Conifer Seedbeds
HIL570	Greenhouse Weed Management
HIL643[1]	Weed Control for Bulbs in the Landscape
HIL644	Weed Management in Annual Color Beds
HIL647	Controlling Yellow Nutsedge in Landscape Plantings
HIL648	Postemergence, Nonselective Herbicides for Landscapes and Nurseries
HIL649	Weed Management in Conifer Seedbeds and Transplant Beds
HIL8101[1]	Weed Control in Vegetable Gardens
HIL900	Musk Thistle
HIL901	Canada Thistle
HIL902	Mugwort
HIL903	Mulberry Weed
HIL904	Florida Betony

HIL905	Japanese Stiltgrass
—[4]	North Carolina HADSS ($95)

State: OKLAHOMA

Prepared By: Case Medlin

Internet URL: http://agweb.okstate.edu/pearl/

Videotapes: Agricultural Communications, Room 111, Public Information Building, Oklahoma State University, Stillwater, OK 74078

Publications: Central Mailing Services, Publishing and Printing, Oklahoma State University, Stillwater, OK 74078

Number	Title
CIRCULAR	
E-832	OSU Extension Agent's Handbook of Insect, Plant Disease, and Weed Control
E-943	Alfalfa Harvest Management Discussions with Cost-Benefit Analysis
E-948	Aerial Pesticide Drift Management
E-949	Alfalfa Stand Establishment Questions and Answers
B-812	Hogpotato: Its Biology, Competition, and Control
F-2089	Alfalfa Stand Establishment
F-2586	Wheat for Pasture
F-2587	Bermudagrass for Grazing or Hay
F-2850	Eastern Redcedar and Its Control
F-2868	Eastern Redcedar Ecology and Management
F-2873	Ecology and Management of Western Ragweed on Rangeland
F-2874	Ecology and Management of Sericea Lespedeza
F-2776	Thistles in Oklahoma and Their Identification
F-2869	Management Strategies for Rangeland and Introduced Pastures
F-2875	Intensive Early Stocking
F-7318	Integrated Control of Musk Thistle in Oklahoma
FS-2774	Cheat Control in Winter Wheat
FS-9998	Clearfield Wheat Production Systems in Oklahoma

State:	SOUTH CAROLINA
Prepared By:	Bert McCarty and Jason Norsworthy
Internet URL:	http://www.clemson.edu/psapublishing/
Order From:	Bulletin Room, Room 82, Poole Agricultural Center, Clemson University, Clemson, SC 29634-0311

Number	Title
CIRCULAR	
463	Small Grain Production Guidelines for South Carolina
569	South Carolina Tobacco Grower's Guide
588	Peanut Production Guide for South Carolina
669	Canola Production in South Carolina
697	Turf Herbicide Families and Their Characteristics
698	Designing and Maintaining Bermudagrass Sports Fields in the United States, 2nd ed. ($15)
699	2006 Pest Control Recommendations for Professional Turfgrass Managers
702	Sod Production in the Southern United States
707	Southern Lawns ($45)
-----[1]	2003 Pest Management Handbook ($25)
BULLETINS	
150	Weeds of Southern Turfgrasses
LEAFLETS	
Forage No. 6	Weed Control in Bermudagrass
Forage No. 9	Weed Control in Tall Fescue
Forage No. 17	Weed Management in Perennial Pastures and Hay Fields

State: TENNESSEE

Prepared By: Darren K. Robinson and Larry Steckel

Internet URL: http://www.utextension.utk.edu/weedcontrol/weedcontrol.html

Order From: Extension Mailing Room, P.0. Box 1071, University of Tennessee, Knoxville, TN 37901

Number	Title
PUBLICATIONS	
956	Managing Lawn Weeds: A Guide for Tennessee Homeowners
1197	Commercial Fruit Spray Schedules
1226	Weed Management in Ornamental Nursery Crops
1282	Commercial Vegetable Disease, Insect and Weed Control
1521	Hay Crop and Pasture Weed Management
1538	Chemical Vegetation Management on Noncropland
1539	Weed Management Recommendations for Professional Turfgrass Managers
1580	2006 Weed Control Manual for Tennessee Field Crops
1659	Weeds in Ornamental Plantings: A Management Plan for Tennessee Homeowners
1758	Weed Management in Annuals, Perennials and Herbaceous Ground Covers: Nursery Production and Professional Grounds Maintenance
SP642	Dallisgrass Control Options in Bermudagrass Turf
Web Based Fact Sheets	
WO68	Pigweeds in Tennessee
WO69	Early Season Pigweed Identification
WO71	Cleaning Plant Growth Regulators PGRs out of Field Sprayers
W072	Mature Pigweed Identification
W105	Pokeweed
W106	Horseweed
W116	Goosegrass
W120	Johnsongrass

State: TEXAS

Prepared By: Dr. Paul A. Baumann

Internet URL: http://tcebookstore.org/

Order From: Dr. Paul A. Baumann, Extension Weed Specialist, 349 Soil & Crop Sciences, Texas A&M University, College Station, TX 77843-2474

Number	Title
B-1466	Chemical Weed and Brush Control - Suggestions for Rangeland
B-5038	Suggestions for Weed Control in Pastures and Forage Crops
B-5039	Suggestions for Weed Control in Cotton
B-5042	Suggestions for Weed Control in Corn
B-5045	Suggestions for Weed Control in Sorghum
B-6010	Suggestions for Weed Control in Peanuts
B-6139	Weed Control Recommendations in Wheat
L-1708	Wild Oat Control in Texas
L-2254	Common Weeds in Corn and Grain Sorghum
L-2301	Common Weeds in Cotton
L-2302	Common Weeds in West Texas Cotton
L-2339	Field Bindweed Control in the Texas High Plains
L-2436	Silverleaf Nightshade Control in Cotton in West Texas
L-5102	Perennial Weed Control During Fallow Periods in the Texas High Plains
B-6081	Herbicides: How They Work and The Symptoms They Cause
B-6079S	Como identificar malezas: Las estructuras de la planta son la clave
B-6079	Weed Identification: Using Plant Structures as a Key
L-5205	Reducing Herbicides in Surface Waters-Best Management Practices
L-5204	Some Facts About Atrazine
L-5324	Protecting the Environment-Using Integrated Weed Management in Lawns

State: VIRGINIA

Prepared By: Scott Hagood

Internet URL: gopher://ext.vt.edu:70/11/vce-data

Order From: Virginia Polytechnic Institute and State University, Extension Distribution Center, Landsdowne St., Blacksburg, VA 24061

Number	Title
PUBLICATIONS	
456-016	Pest Management Guide for Field Crops
456-017	Pest Management Guide for Horticultural and Forest Crops
456-018	Pest Management Guide for Home Grounds and Animals

Common or Code Name	Trade Name	Manufacturer
A		
acetochlor	Harness	Monsanto
	Surpass	Dow AgroSciences
	Micro-Tech	Monsanto
acifluorfen	Ultra Blazer	BASF
acifluorfen + bentazon	Storm	BASF
alachlor	Lasso, Partner	Monsanto
ametryn	Evik	Syngenta
aminopyralid		Dow AgroSciences
asulam	Asulox	Bayer Crop Science
atrazine	AAtrex / others	Syngenta / others
atrazine + s-metolachlor + glyphosate	Expert	Syngenta
azafenidin	Milestone	DuPont Ag Products
AEF 130060		Dow AgroSciences
B		
BAS 625H	Aura	BASF
BAS 654		BASF
BAY FOE5043	Axiom	Bayer
BAY MKH 6561		Bayer Crop Science
benefin	Balan	Dow AgroSciences
bensulfuron	Londax	DuPont Ag Products
bentazon	Basagran	BASF, Micro Flo
bispyribac-sodium	Regiment, Velocity	Valent USA
bromacil	Hyvar X	DuPont Ag Products
bromoxynil	Buctril, Bronate	Bayer Crop Science
butroxydim	Falcon	
C		
carfentrazone	Aim, Shark	FMC
CGA-362622	Envoke, Monument	Syngenta
chlorimuron	Classic	DuPont Ag Products
chlorimuron + sulfentrazone	Canopy Extra	DuPont Ag Products
chlorimuron + metribuzin	Canopy XL	DuPont Ag Products
chlorimuron + thifensulfuron	Synchrony	DuPont Ag Products
chlorsulfuron	Glean	DuPont Ag Products
chlorsulfuron + metsulfuron	Finesse	DuPont Ag Products
clethodium	Select, Envoy	Valent USA
clomazone	Command	FMC

clopyralid	Lontrel	Dow AgroSciences
	Stinger	
cloransulam	FirstRate	Dow AgroSciences
	Amplify	Monsanto
chloransulam + flumetsulam	Frontrow	Dow AgroSciences
cyanazine	Bladex	DuPont Ag Products
	CyPro	Griffin
cyhalofop		Dow AgroSciences

D

2,4-D	Several	Several
2,4-D + MCPP + dicamba	Trimec Classic	PBI Gordon
2,4-DB	Butoxone, Butyrac	Bayer Crop Science
DCPA	Dacthal	Amvac
dicamba	Banvel	Micro Flo
	Clarity	BASF
	Vanquish	Syngenta
dicamba + diflufenzopyr	Distinct	BASF
dicamba + diflufenzopyr + nicosulfuron	Celebrity Plus	BASF
dicamba + 2,4-D	Weedmaster	BASF
dichlobenil	Casoron	Uniroyal
dichlorprop (2,4-DP)	Several	Bayer Crop Science
diclofop	Hoelon	Bayer Crop Science
diclosulam	Strongarm	Dow AgroSciences
dimethenamid	Frontier	BASF
dimethenamid-P	Outlook	BASF
diquat	Reglone, Reward	Syngenta
dithiopyr	Dimension	Rohm & Haas
diuron	Karmex	Griffin
	Direx	Griffin

E

endothall	Endothal	Pennwalt
ethalfluralin	Sonalan, Curbit	Dow AgroSciences
ethofumesate	Prograss	Bayer Crop Science

F

fenoxaprop	Option, Bugle	Bayer Crop Science
flazasulfuron		ISK Bioscience
fluazifop-P	Fusilade DX	Syngenta
fluazifop + fenoxaprop	Fusion	Syngenta
flufenacet + metribuzin +		

azine		Bayer Crop Science
flumetsulam	Broadstrike	Dow AgroSciences
flumetsulam + clorpyralid	Hornet	Dow AgroSciences
flumetsulam + clopyralid +2,4-D	Scorpion III	Dow AgroSciences
flumetsulam + metolachlor	Broadstrike SF + Dual	Dow AgroSciences
flumiclorac	Resource	Valent USA
flumioxazin	Valor, V-53482	Valent USA
fluometuron	Cotoran,	Griffin
	Meturon	Griffin
fluoroxypyr	Vista	Dow AgroSciences
fluridone	Sonar	Sepro
fluthiacet methyl	Action	Syngenta
	Appeal	KI USA
formasulfuron	Revolver	Bayer
fomesafen	Reflex	Syngenta
fosamine	Krenite	DuPont Ag Products

G

glufosinate	Liberty, Rely Ignite, Ignite 280	Bayer CropScience
glyphosate	Roundup Ultra Max	Monsanto
	Accord, Rodeo	DowAgroSciences
	D-Pak	Monsanto
	Roundup Original	Monsanto
	Roundup Ultra Dry	Monsanto
	Touchdown	Syngenta
glyphosate + s-metolachlor	Sequence	Syngenta

H

halosulfuron	Permit, Sempra	Monsanto
hexazinone	Velpar	DuPont Ag Products

I

imazamethabenz	Assert	BASF
imazamox	Raptor	BASF
imazapic	Cadre, Plateau	BASF
imazapyr	Arsenal,	BASF
	Chopper,	BASF
	Stalker, Habitat	BASF
imazaquin	Scepter	BASF
	Image	BASF
imazaquin + glyphosate	Backdraft	BASF
imazethapyr	Pursuit	BASF
	NewPath	BASF

imazethapyr + glyphosate	Extreme	BASF
imazethapyr +	Lightning	
imazapyr	Event	BASF
isoxaben	Gallery	Dow AgroSciences
isoxaben +		
oryzalin	Snapshot DF	Dow AgroSciences
isoxoben +		
trifluralin	Snapshot TG	Dow AgroSciences
isoxaflutole	Balance	Bayer Crop Science

J-L

KIH 485		Kumiai
lactofen	Cobra	Valent USA

M

MON 3539		Monsanto
MCPA	Several	Several
mecoprop	Several	Several
mesosulfuron	Osprey	Bayer Crop Science
mesotrione	Callisto	Syngenta
mesotrione + metolachlor	Camix	Syngenta
mesotrione + metolachlor + atrazine	Lumax, Lexar	Syngenta
metham	Vapam	Amvac
methyl bromide	Bromo-gas	Great Lakes
metolachlor	Dual Magnum	Syngenta
	Pennant	Syngenta
metolachlor +		
atrazine	Bicep	Syngenta
metribuzin	Sencor	Bayer Crop Science
metribuzin +		
metolachlor	Turbo	Bayer Crop Science
metribuzin +		
trifluralin	Salute	Bayer Crop Science
metsulfuron	Ally, Escort	DuPont Ag Products
molinate	Ordram	Syngenta
MSMA	Several	Several

N

napropamide	Devrinol	Syngenta
nicosulfuron	Accent	DuPont Ag Products
nicosulfuron + rimsulfuron + atrazine	Basis Gold	DuPont Ag Products
nicosulfuron + rimsulfuron	Steadfast	DuPont Ag Products
norflurazon	Zorial, Solicam,	Syngenta
	Evital	Syngenta

O

oryzalin	Surflan	Dow AgroSciences
oxadiazon	Ronstar	Bayer Crop Science
oxadiazon + prodiamine	Regalstar	Regal Chemical Company
oxasulfuron		S;yngenta
oxyfluorfen	Goal	Rohm & Haas
oxyfluorfen + oryzalin	Rout	The Scotts Company
oxyfluorfen + oxadiazon	Regal	Regal Chemical Company
oxyfluorfen + pendimethalin	Ornamental Herbicide II	The Scotts Company

P

paraquat	Gramoxone Max Gramoxone Extra, Gramoxone Inteon, Starfire, Cyclone	Syngenta
pelargonic acid	Scythe	Mycogen
pendimethalin	Prowl,Pendulum	BASF
	Pentagon	BASF
	Lesco PRE-M	Lesco
	Corral	The Scotts Company
pendimethalin + imazaquin	Squadron	BASF
pendimethalin + imazaquin + imazethapyr	Steel	BASF
pendimethalin + trifluralin	Tri-Scept	BASF
penoxsulam	Grasp, Granite	Dow AgroSciences
picloram	Tordon	Dow AgroSciences
picloram + 2,4-D	Grazon P+D	DowAgrosciences
picloram + fluroxypyr	Surmount	Dow Agrosciences
pinoxaden		Syngenta
primisulfuron	Beacon	Syngenta
primisulforon + dicamba	NorthStar	Syngenta
prodiamine	Barricade, Factor	Syngenta
prohexadione	Apogee	BASF
prometryn	Caparol	Syngenta
	Cotton Pro	Griffin
propanil	Stam, Stampede	Rohm & Haas
prosulfuron	Peak	Syngenta
prosulfuron + primisulfuron	Exceed	Syngenta
	Spirit	Syngenta
pyraflufen-ethyl	ET	Nichino America
pyrithiobac	Staple	DuPont Ag Products
pyrithiobac + glyphosate	Staple Plus	DuPont Ag Products

Q		
quinclorac	Facet, Drive	BASF
	Paramount	BASF
quizalofop	Assure II	DuPont Ag Products
R		
rimsulfuron	Titus, Matrix , TranXit	DuPont Ag Products
rimsulfuron + thifensulfuron	Basis	DuPont Ag Products
S		
sethoxydim	Poast, Poast Plus, Vantage	BASF
simazine	Princep	Syngentas
sulfentrazone	Authority, Spartan	FMC
sulfentrazone +	Authority	
clomazone	One-Pass	FMC
sulfometuron	Oust	DuPont Ag Products
sulfosulfuron	Monitor, Maverick, Outrider	Monsanto
T-Z		
tebuthiuron	Spike	Dow AgroSciences
terbacil	Sinbar	DuPont Ag Products
thiafluamide + metribuzin	Axiom	Bayer Crop Science
thiazopyr	Dimension	Rohm & Haas
	Spindle, Visor	Rohm & Haas
thifensulfuron	Harmony GT	DuPont Ag Products
thifensulfuron + tribenuron	Harmony Extra	DuPont Ag Products
topramezone		AmVac
triasulfuron	Amber	Syngenta
triasulfuron + dicamba	Rave	Syngenta
tribenuron	Express	DuPont
triclopyr	Garlon	Dow AgroSciences
	Grandstand	Dow AgroSciences
triclopyr +clopyralid	Redeem R&P	Dow AgroSciences
triclopyr + fluroxypyr	PastureGard	Dow AgroSciences
trifloxysulfuron	Envoke, Monument	Syngenta
trifluralin	Treflan	Dow AgroSciences
	Trifluralin	Dow / Others
trinexapac-ethyl	Primo	Syngenta
	Palisade	

Abbott, John
Syngenta Crop Protection
PO Box 18300
Greensboro NC 27419
Tel. 336/632-7074
Fax. 336/292-6374
john.abbott@syngenta.com

Adcock, Tim
Diligence Technologies
219 Red Field Dr
Jackson TN 38305
Tel. 731/661-0396
timadcock@charter.net

Adkinson, Chris D
University of Florida
4254 Experiment Dr
Jay FL 32665
Tel. 850/995-3720
cadkison@ufle.edy

Alexander, Anita
Dow AgroSciences
25 Rivershyre Circle
Lawrenceville GA 30243
Tel. 770/846-4624
allalexander@dow.com

Alford, Bobby
Helena Chemical
7664 Moore Rd
Memphis TN 38120
Tel. 901/752-4402
Fax. 901/758-2817
alfordb@helenachemical.com

Alford, Jason
Univ of Arkansas
1366 W Altheimer Dr
Fayetteville AR 72704
Tel. 479/575-3955
jlalfor@uark.edu

Appleby, Jayma
Gibbs & Soell Pub Rel
2800 W Higgins Rd
Hoffman Estates IL 60195
Tel. 847/519-9150
Fax. 847/519-1877
jappleby@gibbs-soell.com

Askew, Shawn
Virginia Tech
435 Old Glade Rd
Blacksburg VA 24061
Tel. 540/231-5807
Fax. 540/231-5755
saskew@vt.edu

Atom, John V
Valent USA Corporation
3700 NW 91st Bldg C-300
Gainesville FL 32606

Atwell, Sam
BASF Corporation
5303 Hay 158
Harviell MO 63945
Tel. 662/551-8228
atwells@basf.com

Bailey, Andy
University of Kentucky
Res & Education Ctr
Princeton KY 42445
Tel. 270/365-7541
Fax. 270/365-2667
abailey@uky.edu

Baker, Robert D
The Scotts Company
14111 Scottslawn Rd
Marysville OH 43081
Tel. 937/645-2628
Fax. 937/644-7153
robert.baker@scotts.com

Bangarwa, Sanjeev K
Clemson University
277 Poole Ag Center
Clemson SC 29634
Tel. 864/656-3536
sbangar@clemson.edu

Banks, Philip A
Marathon Ag/Environmental
205 W Boutz, Bldg 4 Ste5
Las Cruces NM 88005
Tel. 505/527-8853
Fax. 505/527-8853

Bararpour, Mohammad T
Univ of Arkansas
1366 W Altheimer Dr
Fayetteville AR 72704

Barrentine, J L
Cheminova
1519 Storr Drive
Fayetteville AR 72701
Tel. 479/236-5109
jb.u$@cheminova.com

Batla, Max
Texas Agric Expt Sta
Rt 3 Box 219
Lubbock TX 79403
Tel. 816/746-6101
masbatla@yahoo.com

Batts, Roger B
North Carolina State Univ
Box 7609
Raleigh NC 27695
Tel. 919/515-1668
Fax. 919/513-7226
roger_batts@ncsu.edu

Baughman, Todd A
Texas A&M Res & Extn Ctr
PO Box 2159
Vernon TX 76385
Tel. 940/552-9941
Fax. 940/553-4657
ta-baughman@tamu.edu

Baumann, Paul A
Texas A&M University
2474 TAMU
College Station TX 77843
Tel. 979/845-0884
Fax. 979/845-0604
pbaumann@ag.tamu.edu

Bean, Brent
Texas Agric Expt Sta
6500 Amarillo Blvd W
Amarillo TX 79106
Tel. 806/677-5600
Fax. 806/677-5644
bbean@ag.tamu.edu

Beattie, Walt
University of Florida
3401 Experiment Sta Rd
Ona FL 33865
Tel. 863/735-1314
Fax. 863/735-1930
6225@ifas.ufl.edu

Biediger, Darrin
Coastal Crop Advising
2322 Memorial Pkwy
Portland TX 78374
Tel. 361/816-7944
darrinbiediger@yahoo.com

Black, David
Syngenta Crop Protection
110 Fieldcrest Dr
Searcy AR 72143
Tel. 501/305-4365
Fax. 501/305-4354

Blair, Mitchell
Univ of Kentucky
417 Plant Sci Bldg
Lexington KY 40546
Tel. 859/257-5020
Fax. 859/257-7874
mitch@uky.edu

Blanton, Rex
Clemson University
277 Poole Ag Center
Clemson SC 29634
Tel. 864/656-3501
Fax. 864/656-3443
rexb@clemson.edu

Bond, Jason A
LSU AgCenter
1373 Caffey Rd
Rayne LA 70578
Tel. 337/788-7531
Fax. 337/788-7553
jbond@agcenter.lsu.edu

Bone, Jim
DuPont Ag Products
PO Box 274
Valdosta GA 31603
Tel. 229/293-4064
Fax. 229/249-5980
jim.bone@us.dupont.com

Bottoms, Sunny
Louisiana State Univ
104 M B Sturgis Hall
Baton Rouge LA 70803
Tel. 225/578-1189
Fax. 225/578-4673
sbottoms@agcenter.lsu.edu

Boudreaux, Joey
LSU AgCenter
PO Box 16
Lebeau LA 71345
Tel. 225/578-1767
Fax. 225/578-4673
jboud32@lsu.edu

Boyd, John
University of Arkansas
PO Box 391
Little Rock AR 72203
Tel. 501/671-2224
Fax. 501/671-2297

Braun, John
FMC Corporation
920 Springwood Ln
Wylie TX 75098
Tel. 972/429-7291
john braun@fmc.com

Brecke, Barry
University of Florida
5988 Hwy 90 Bldg 4900
Milton FL 32583
Tel. 850/983-5216
Fax. 850/983-5774
bjbe@ifas.ufl.edu

Breeden, Greg
Univ of TN 252 Ellington
2431 Joe Johnson Dr
Knoxville TN 37996
Tel. 865/974-7208
gbreeden@utk.edu

Brewer, Chad
Univ of Arkansas
1366 W Altheimer Dr
Fayetteville AR 72704
Tel. 479/575-3955
Fax. 479/575-3975
cbrewer@uark.edu

Bryson, Charles T
Southern Weed Sci Lab
PO Box 350
Stoneville MS 38776
Tel. 662/686-5259
Fax. 662/686-5422
cbryson@ars.usda.gov

Buehring, Normie
Miss State Univ
PO Box 1690
Verona MS 38879
Tel. 662/566-2201
Fax. 662/566-2757
buehring@ra.msstate.edu

Bullington, Jeremy A
Univ of Arkansas
2030 Juneway Terrace
Fayetteville AR 72703
Tel. 479/696-9706
Fax. 479/575-3975
jabulli@uark.edu

Bullock, Fritzroy
Tennessee State Univ
1417 Woodfile Dr
Nashville TN 37211
Tel. 615/963-5449
Fax. 615/963-5833
fbullock@tnstate.edu

Burch, Pat
Dow AgroSciences
3425 El Creek Dr
Christiansburg VA 24073
Tel. 540/382-3062
Fax. 540/382-1549
plburch@dow.com

Burgos, Nilda R
Univ of Arkansas
1366 W Altheimer Dr
Fayetteville AR 72704
Tel. 479/575-3955
Fax. 479/575-3975
nburgos@uark.edu

Burke, Ian C
USDA ARS SWSRU
141 Experiment Sta Rd
Stoneville MS 38776
Tel. 662/686-3128
iburke@ars.udsa.gov

Burnell, Keith
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-2614
Fax. 662/325-0374

Burns, Brian
1000 Hwy 25 S Lot #217
Starkville MS 39759

Burton, Michael
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/513-2860
Fax. 919/515-5315
mike_burton@ncsu.edu

Butler, Twain
Noble Foundation
2510 San Noble Pkwy
Ardmore OK 73401
Tel. 580/224-6850
Fax. 580/224-6802
tjbutler@noble.org

Byrd, John
Miss State Univ
Box 9555
Miss state MS 39762
Tel. 662/325-4537
Fax. 662/325-0374
jbyrd@pss.msstate.edu

Campbell, Dan
Syngenta Crop Protection
107 Wedgedale Ave
Greensboro NC 27403
Tel. 336/632-7627
dan.compbell@syngenta.com

Cardner, Andrew
North Carolina State Univ
5904 Yates Mill Pond Rd
Raleigh NC 27606
Tel. 704/974-2360
andrew_gardner@ncsu.edu

Carey, Frank
Valent USA Corporation
8577 Cordes Circle
Germantown TN 38139
Tel. 901/827-3866
Fax. 901/753-0239
frank.carey@valent.com

Carter, Richard
Biology Dept
Valdosta State Univ
Valdosta GA 31698
Tel. 229/333-5759
rcarter@valdosta.edu

Chandler, James M
Texas A&M University
2474 TAMU
College Station TX 77843
Tel. 979/845-8736
Fax. 979/845-0456
jm-chandler@tamu.edu

Cheshier, Joshua
Miss State Univ
Box 9652
Miss State MS 37962
Tel. 662/325-2221
Fax. 662/325-7692
cheshier@gri.msstate.edu

Chesser, Zack
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-2311
Fax. 662/325-0374
zchesser@pss.msstate.edu

Clason, Terry
USDA NRCS
3737 Government Street
Alexandria LA 71302

Clewis, Scott B
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/515-5655
Fax. 919/515-5315
scott_clewis@ncsu.edu

Coburn, Grady
Pest Management Enterprises
1258 Bayou Rd Box 302
Cheneyville LA 71325
Tel. 318/279-2165
Fax. 318/279-2165
coburnme1@aol.com

Compton, Brent
435 Old Glade Rd
Blacksburg VA 24061
Tel. 540/231-5835
Fax. 540/231-5755
brentc@vt.edu

Corbett, Jerry
Bayer Environmental Sci
981 NC 42 East
Clayton NC 27527
Tel. 919/553-4651
Fax. 919/553-8434
jerry.corbettt@bayercropscience.com

Craig, Chism
Univ of Tennessee
605 Airways Blvd
Jackson TN 38301
Tel. 731/425-4707
Fax. 731/425-4720
chism@utk.edu

Crooks, H Lane
1295 Willow Roads Dr
Aiken SC 29803
Tel. 803/493-6114
Fax. 803/266-7925
lanecrooks@yahoo.com

Culpepper, A Stanley
University of Georgia
PO Box 1209
Tifton GA 31793
Tel. 229/386-3328
stanley@uga.edu

Custis, Gary
PBI Gordon
1217 W 12t St
Kansas City MO 64101
Tel. 816/460-6215
Fax. 816/460-3715
gcustis@pbigordon.com

Czarnota, Mark
University of Georgia
1109 Experiment St
Griffin GA 30223
Tel. 770/228-7398
Fax. 770/412-4764
mac@griffin.uga.edu

Dalley, Caleb D
USDA-ARS
5883 USDA Rd
Houma LA 70360
Tel. 985/872-5042
Fax. 985/868-8369
cdalley@srrc.usda.gov

DeFelice, Michael
Pioneer Hi-Bred Int'l
PO Box 1150
Johnston IA 50131
Tel. 515/334-6705
Fax. 515/334-6565
michael.defelice@pioneer.com

Dillon, Troy
Lonoke Co Extn Office
PO Box 357
Lonoke AR 72086
Tel. 501/676-3124
Fax. 501/676-7847
twdillon@uaex.edu

Dixson, Gregg A
Monsanto Agron Ctr
25920 Experiment Farm Rd
Loxley AL 36551

Dobbs, Robert
Miss State Univ
PO Box 1690
Verona MS 38879
Tel. 662/566-2201
Fax. 662/566-2257
rdobbs@ra.msstate.edu

Dodds, Darrin
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/375-0871
Fax. 662/325-8742
dmd76@pss.msstate.edu

Doherty, Ryan
Univ of Arkansas
PO Box 3508
Monticello AR 71656
Tel. 870/460-1091
Fax. 870/460-1415
doherty@uamont.edu

Dotray, Peter A
Texas Tech Univ
Box 42122 Agron & Hort
Lubbock TX 79409
Tel. 806/742-1634
Fax. 806/742-0775
[eter.dotray@ttu.edu

Dozier, Monty
Texas A&M University
2474 TAMU
College Station TX 77843
Tel. 979/845-2761
Fax. 979/845-0456
m-dozier@tamu.edu

Dozier, Monty C
Texas A&M University
2474 TAMU
College Station TX 77843
Tel. 979/845-2761
Fax. 979/845-0604
m-dozier@tamu.edu

Driver, Jacquelyn
Syngenta Crop Protection
110 Twisted Oak Ln
Crawford TX 76638

Driver, Tony L
Syngenta Crop Protection
110 Twisted Oak Ln
Crawford TX 76638
Tel. 254/848-5553
Fax. 254/848-7333
tony.driver@syngenta.com

Duke, Stephen O
Univ of Miss
School of Pharmacy
University MS 38677
Tel. 662/915-1036
Fax. 662/915-1035
sduke@olemiss.edu

Dunand, Richard T
Rice Research Station
1373 Caffey Rd
Rayne LA 70578
Tel. 337/788-7531
Fax. 337/788-7553
rdunand@agcenter.lsu.edu

Ellis, Andrew
Univ of Arkansas
1366 W Altheimer Dr
Fayetteville AR 72704
Tel. 865/974-2883
Fax. 865/974-5365
drewellis80@yahoo.com

Ellis, Jeff
Bayer CropScience
1490 memorial Dr
Boyle MS 38730
Tel. 662/843-8019
Fax. 662/686-9888
jeffrey.ellis@bayercorpscience.com

Elmore, Greg
Monsanto Company
800 N Lindbergh Blvd
St Louis MO 63167
Tel. 314/694-4379
greg.a.elmore@monsanto.com

Estes, Alan G
Clemson University
E-142 P&A Bldg
Clemson SC 29634
Tel. 864/656-4959
aestes@clemson.edu

Etheredge, Luke M
LSU AgCenter
307 Meadow
Baton Rouge LA 70802
Tel. 225/485-1517
letheredge@agcenter.lsu.edu

Eubank, Tom
Miss State Univ
253 Avondale Rd
Greenville MS 38703
Tel. 662/822-1964
twe8@pss.msstate.edu

Evans, Craig C
Oklahoma State Univ
360 Ag Hall
Stillwater OK 74078
Tel. 405/624-7538
craig.evans@okstate.edu

Everitt, John
Texas Agric Expt Sta
Rt 3 Box 219
Lubbock TX 79401

Everman, Wesley
North Carolina State Univ
Box 7620
Raleigh NC 27695
wjeverma@ncsu.edu

Ezell, Andrew
Miss State Univ
Box 9681
Miss State MS 39762
Tel. 662/325-1688
aezell@cfr.msstate.edu

Faircloth, Wilson
USDA-ARS
PO Box 509
Dawson GA 31742
Tel. 229/995-7459
Fax. 229/995-7416
wfaircloth@nprl.usda.gov

Falkenberg, Nyland
Texas A&M University
117 Holleman W Apt 5102
College Station TX 77840
Tel. 979/845-8696
Fax. 979/845-0456
n-falkenberg@tamu.edu

Farno, Luke A
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-5755
Fax. 662/325-8742
laf29@pss.msstate.edu

Farris, Rodney
Oklahoma State Univ
368 Ag Hall
Stillwater OK 74078
Tel. 405/744-9628
Fax. 405/744-5269
frodney@mail.pss.okstate.edu

Ferguson, Gregory P
Monsanto Company
108 Bayberry Ln
Madison MS 39110
Tel. 607/898-8408
Fax. 607/898-1793
gregory.p.ferguson@monsanto.com

Fitzgerald, Debra
ISK BioSciences
1470 Auburn Rd
Concord OH 44077
Tel. 440/357-4655
Fax. 440/357-4662
ftizgeraldd@iskbc.com

Fletcher, April
U S Fish & Wildlife
PO Box 1306
Albuquerque NM 87103
Tel. 505/248-6632
Fax. 505/248-6874
april_fletcher@fws.gov

Ford, Adam
Texas Agric Expt Sta
Rt 3 Box 219
Lubbock TX 79403
Tel. 806/746-6101
Fax. 806/746-6528
adam
ford21@yahoo.com

Futch, Stephen H
Citrus Res & Edu Ctr
700 Experiment Sta Rd
Lake Alfred FL 33850
Tel. 863/956-1151
Fax. 863/956-4631
shf@rec.ifas.ufl.edu

Gannon, Travis
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/513-4655
Fax. 919/515-7075
travis_gannon@ncsu.edu

Garbett, William S
International Paper
PO Box 579
Tybee Island GA 31328

Garris, Sam
Bayer CropScience
99 Little Big Mound Rd
Bentonia MS 39040
Tel. 662/755-9952
Fax. 662/755-8566
samual.garris@bayercropscience.com

Gealy, David
USDA-ARS, DB NRRC
PO Box 1090
Stuttgart AR 72160
Tel. 870/672-9300
Fax. 870/673-7581
dgealy@spa.ars.usda.gov

Gilbert, Lyndell
Texas Agric Expt Sta
1102 East FM 1294
Lubbock TX 79403
Tel. 806/746-6101
lvgilbert@ag.tamu.edu

Givens, Wade
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-2311
Fax. 662/325-0374
wgg1@dafvm.msstate.edu

Godley, John Lee
R&D Research Farm Inc
7033 Hwy 103
Washington LA 70589
Tel. 337/585-4455
Fax. 337/585-1006

Goldschmidt, Nathan
Univ of Arkansas
1366 W Altheimer Dr
Fayetteville AR 72704
Tel. 479/575-3955
Fax. 479/575-3475
ngoldsc@uark.edu

Gordan, David L
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/515-4068
Fax. 919/515-3338
david_jordan@ncsu.edu

Graham, James C
Monsanto Company
12381 Country Glen Ln
St Louis MO 63141
Tel. 314/694-2209
Fax. 314/469-5951
james.c.graham@monsanto.com

Gray, Cody J
Fort Lauderdale REC
3205 College Ave
Ft Lauderdale FL 33314
Tel. 954/577-6317
Fax. 954/475-4125
cjg41@ufl.edu

Grey, Timothy L
Univ of Georgia
115 Coastal Way
Tifton GA 31783
tgrey@uga.edu

Grichar, W James
Texas A&M University
PO Box 755
Yoakum TX 77995
Tel. 361/293-8815
Fax. 361/358-6390
w-grichar@tamu.edu

Griffin, James L
Louisiana State Univ
104 Sturgis Hall
Baton Rouge LA 70803
Tel. 225/578-1768
Fax. 225/578-4673
jgriffin@agcenter.lsu.edu

Griffin, Matt
Louisiana State Univ
104 M B Sturgis Hall
Baton Rouge LA 70803
Tel. 225/578-1189
Fax. 225/578-4673
rgriffin@agcenter.lsu.edu

Griffith, Griff
Univ of Arkansas
1366 W Altheimer Dr
Fayetteville AR 72704
Tel. 479/575-3935
Fax. 479/575-3975
gmgriff@uark.edu

Grove, Melvin
ISK BioScience
2237 Haden Rd
Houston TX 77015
Tel. 281/682-6241
Fax. 713/393-3751
grovem@iskbc.com

Grymes, Charles
DuPont Crop Protection
552 Ocelot Rd
Inez TX 77968
Tel. 361/781-0314
Fax. 361/781-0941
charles.f.grymes@usa.dupont.com

Gustafson, David
Monsanto Company R1C
800 N Lindbergh Blvd
St Louis MO 63167
Tel. 314/694-2698
Fax. 314/694-3688
david.i.gustafson@monsanto.com

Haas, Kade
Auburn University
Agronomy & Soils
Auburn AL 36849

Hackman, George
Sipcam Agro USA
250 Green Forest
Tumbling Shoals AR 72581
Tel. 501/250-0153
sipcam@msn.com

Hageman, Neal R
Monsanto Company
17754 Westhampton Woods
Wildwood MO 63005
Tel. 314/694-2465

Hancock, H Gary
FMC Corporation
832 Barnes Mill Rd
Hamilton GA 31811

Harden, John S
BASF Corporation
5909 Rock Canyon Rd
Raleigh NC 27613
Tel. 919/547-2019
hardenj@basf.com

Harrison, Mark
Miss State Univ
PO Box 1690
Verona MS 38879
Tel. 662/566-2201
Fax. 662/566-2257
mph31@ra.msstate.edu

Havlak, Roger D
Texas Coop Extn
3355 Cherry Ridge Dr 212
San Antonio TX 78230
Tel. 210/467-6575
r-havlak@tamu.edu

Hayes, Robert M
University of Tennessee
605 Airways Blvd
Jackson TN 38301
Tel. 731/425-4769
Fax. 731/425-4773
rhayes1@utk.edu

Heier, John
Wilbur-Ellis
4880 E Butte Rd
Live Oak CA 95953
Tel. 916/837-9845
Fax. 916/991-1837
heierjl@jtfco.com

Heiser, James W
Univ of Missouri
205 Waters Hall
Columbia MO 65211
Tel. 573/999-3748
jwhyt7@mizzou.edu

Helpert, Charles W
Triple D Diversified Ser
285 Oakmont Ct
Grapevine TX 76051
Tel. 817/233-0974
helpert@msn.com

Henry, Gerald M
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/515-5654
gmhenry@ncsu.edu

Hensley, Justin
Louisiana State Univ
104 M B Sturgis Hall
Baton Rouge LA 70803
Tel. 225/578-1189
Fax. 225/578-4673
jhensley@agcenter.lsu.edu

Herrick, Robert M
11 Wolfpack Ct
Hamilton NJ 08619
Tel. 215/299-6967
Fax. 215/299-6810
bob_herrick@fmc.com

Hickey, Joseph
Micro Flo Company
3110 C R 2849
Taft TX 78390
Tel. 361/244-3931
joe.hickey@microflocompany.com

Higingbottom, Jason K
Clemson University
E-142 P&A Bldg
Clemson SC 29634
Tel. 864/656-6365
Fax. 864/656-4960
jhiging@clemson.edu

Hixson, Adam
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/515-5654
Fax. 919/513-5315
achixson@ncsu.edu

Hodges, John C
Texas Ag Res & Extn Ctr
Rt 3 Box 213 AA
Lubbock TX 79403
jchodges@ag.tamu.edu

Holloway, Jr, James C
Syngenta Crop Protection
1840 Lance Dr
Greenville MS 38701
Tel. 731/423-0804
Fax. 731/424-9703
james.holloway@syngenta.com

Holt, Tom
BASF Corporation
26 Davis Dr
Res Tria Park NC 27709
Tel. 919/608-7870
holtt@basf.com

Hottman, Thomas
PBI Gordon
1217 W 12th St
Kansas City MO 64101
Tel. 800/821-7925
thottman@pbigordon.com

Hubbard, Ray
Clemson University
E-142 Poole & Ag Bldg
Clemson SC 29634
Tel. 869/656-6364
Fax. 869/656-4960
chbbrd@clemson.edu

Huff, Jonathan
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-2311
Fax. 662/325-0374
jah129@pss.msstate.edu

Hutto, Ken
University of Florida
4253 Experiment Dr
Jay FL 32565
Tel. 850/995-3720
Fax. 850/995-3723
khutto@ifas.ufl.edu

Irby, Trent
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-2311
Fax. 662/325-0374
jti2@pss.msstate.edu

Irons, Steve M
Bayer CropScience
2972 Greystone Dr
Pace FL 32571
Tel. 850/587-3505
Fax. 850/587-5472
steve.irons@bayercropscience.com

Ivy, Nick
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-2311
Fax. 662/325-0374

Jain, Rakesh
Syngenta Crop Protection
7145 - 58th Ave
Vero Beach FL 32967

James, J R
Syngenta Crop Protection
13417 Darby Chase Dr
Charlotte NC 28277
Tel. 800/334-9481
j_f.james@syngenta.com

Jennings, Katherine
North Carolina State Univ
Box 7609
Raleigh NC 27695

Jha, Prashant
Clemson University
277 Poole Ag Center
Clemson SC 29634
Tel. 864/656-3536
Fax. 864/656-3443
pjha@clemson.edu

Jones, Curtis
LSU AgCenter
104 M D Sturgis Hall
Baton Rouge LA 70803
Tel. 225/578-1767
Fax. 225/578-4673
cjones@agcenter.lsu.edu

Jones, Elizabeth
Delta Res & Exnt Ctr
PO Box 197
Stoneville MS 38776
Tel. 662/686-3882
Fax. 662/686-7336
ejones@drec.msstate.edu

Jones, Ronald E
Valent USA Corporation
1025 NW 101st Dr
Gainesville FL 32606
Tel. 352/332-1410
Fax. 925/817-5156
rjone@valent.com

Keeling, Wayne
Texas Agric Expt Sta
Rt 3 Box 219
Lubbock TX 79401

Keese, Renee J
Syngenta Crop Protection
985 Arrowwood Dr
Camel IN 46033
Tel. 317/846-8812
Fax. 317/846-8832
renee.keese@syngenta.com

Kelly, Steve
LSU AgCenter
21213 Macon Ridge Rd
Winnsboro LA 71295
Tel. 318/435-2908
Fax. 318/435-2902
skelly@agcenter.lsu.edu

Kendig, Andy
University of Missouri
PO Box 160
Portageville MO 63873
Tel. 573/379-0499
Fax. 573/379-5875
kendigj@missouri.edu

Ketterer, Eileen
University of Florida
704 SW 16th Ave #212
Gainesville FL 32601
Tel. 352/392-1811
ekettere@ufl.edu

Kirkpatrick, Matthew
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-2311
Fax. 662/325-0374
mkirkpatrick@pss.msstate.edu

Klosterboer, Arlen
AVI Agric Consulting
6202 Kingston Circle
Bryan TX 77802
Tel. 979/776-3546
ajklost@tca.net

Koger, Trey
USDA-ARS
141 Experiment Sta Rd
Stoneville MS 38776
Tel. 662/686-5290
Fax. 662/686-3218
ckoger@ars.usda.gov

Krutz, L Jason
USDA ARS SWSRU
PO Box 350
Stoneville MS 38732
Tel. 662/686-5260
jkrutz@ars.usda.gove

Kurtz, Mark E
KI Chemical
2830 Wilcox Rd
Leland MS 38756

Lancaster, Sarah
Texas A&M University
2474 TAMU
College Station TX 77843
Tel. 979/845-5384

Langstopn, Vernon
Dow AgroSciences
314 N Maple Glade
The Woodlands TX 77382
Tel. 281/419-7550
vblangston@dow.com

Lassiter, Ralph
Dow AgroSciences
10 Cherry Creek Cove
Little Rock AR 72212
Tel. 501/223-0381
Fax. 501/223-2088
rblassiter@dow.com

Lauer, Dwight K
Silvics Analytic
12314 Lullington Dr
Richmond VA 23233

Leon, Chris
Isagro-USA
122 Beaufort Circle
Madison MS 39110
Tel. 601/856-0714
Fax. 601/856-0717
cleon@isagro-usa.com

Light, Ginger G
Texas Tech University
RR 1 Box 109
Petersburg TX 79250
Tel. 806/742-2832
Fax. 806/742-0775
ginger.light@ttu.edu

Livingston, Steve
Texas A&M Research
10345 Agnes
Corpus Christi TX 78406
Tel. 361/265-9203
Fax. 361/265-9434
sd-livingston@tamu.edu

Luper, Charles
Oklahoma State Univ
127 NRC
Stillwater OK 74078
Tel. 405/744-5808
Fax. 405/744-6039
charles.luper@okstate.edu

MacDonald, Greg
Univ of Florida
3104 Newell Hall
Gainesville FL 32611
Tel. 352/392-1811
Fax. 352/392-1840
gemac@ifas.ufl.edu

MacRae, Andrew
Univ of Georgia
PO Box 1209
Tifton GA 31793
Tel. 229/386-3693
Fax. 229/386-7308
awmacrae@uga.edu

Mack, Danielle R
Louisiana State Univ
104 M B Sturgis Hall
Baton Rouge LA 70803
Tel. 225/578-1189
Fax. 225/578-4673
dmack@agcntr.lsu.edu

Maddox, Victor
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-2313
Fax. 662/325-0374
vmaddox@pss.msstate.edu

Madsen, John
Miss State Univ
Box 9555
Miss State MS 39762

Main, Chris
Clemson University
2200 Pocket Rd
Florance SC 29506
Tel. 843/662-3526
Fax. 843/661-5151
cmain@clemson.edu

Majure, Keith
Gowan Co
241 Windlake Ln
West Monroe LA 71291
Tel. 318/395-4790

Malik, Mayank
Clemson University
277 Poole Ag Center
Clemson SC 29634
Tel. 864/656-3536
Fax. 864/656-3443
mmalik@clemson.edu

Man-Son-Hing, Anthony
USDA
920 Main Campus Dr #200
Raleigh NC 27606
Tel. 919/855-7331
Fax. 919/855-7391
anthony.man-son-hing@aphis.usda.gov

Martin, Scott H
Syngenta Crop Protection
778 Mitcham Orchard Rd
Ruston LA 71270
Tel. 318/251-9412
Fax. 315/255-0064
scott.martin@syngenta.com

Matocha, Mark
Texas A&M Univ
115 Agronomy Field Lab
College Station TX 77843
Tel. 979/845-3789
Fax. 979/845-6251
ma-matucha@tamu.edu

Matocha, Matthew E
Texas A&M University
2474 TAMU
College Station TX 77843
Tel. 979/845-0817
Fax. 979/845-0604
mematoch@ag.tamu.edu

Matthews, Susan G
Univ of Arkansas
PO Box 717
Blytheville AR 72316
Tel. 870/762-2075
Fax. 870/762-4511
smatthews@uaex.edu

McAfee, Jim
Texas Coop Extn
17360 Cuit Rd
Dallas TX 75252
Tel. 972/952-9220
Fax. 972/952-9632
j-mcafee@tamu.edu

McCarty, Lambert B
Clemson University
D-136 Poole Ag Center
Clemson SC 29634
Tel. 864/656-0120
Fax. 864/656-4960
bmccrty@clemson.edu

McClelland, Marilyn
Univ of Arkansas
1366 W Altheimer Dr
Fayetteville AR 72704
Tel. 479/575-8779
Fax. 479/575-3975
mmcclell@uark.edu

McKemie, Tom
BASF Corporation
5104 Indigo Moon Way
Raleigh NC 27613

McMullen, Patrick
Agro TECHNOLOGY Research
7777 Walnut Grove Rd 57
Memphis TN 38120

Medlin, Case R
Oklahoma State Univ
279 Ag Hall
Stillwater OK 74075
case.medlin@okstate.edu

Meier, Jason
Univ of Arkansas
PO Box 3508
Monticello AR 71656
Tel. 870/460-1091
Fax. 870/460-1415
meier@uamont.edu

Meins, Kirk
Lonoke Co Extn Office
PO Box 357
Lonoke AR 72086
Tel. 501/676-3124
Fax. 501/676-7847
kmeins@uaex.edu

Miller, Donnie
LSU AgCenter
PO Box 438
St Joseph LA 71366
Tel. 318/766-4607
Fax. 318/766-4278
dmiller@agctr.lsu.edu

Minton, Bradford W
Syngenta Crop Protection
20130 Lake Spring Ct
Cypress TX 77433

Mitchell, Henry R
FMC Corporation
PO Box 678
Louisville MS 39339
Tel. 662/773-6697
Fax. 662/773-6674
rusty_mitchell@fmc.com

Mitchell, Mike
PBI Gordon Corp
9750 Pleasant Hollow Dr
Tyler TX 75709
Tel. 903/597-1479
mike45@cox-internet.com

Mitchem, Wayne
North Carolina State Univ
400 Davids Chapel Ch Rd
Vale NC 28168
Tel. 704/472-0770
Fax. 704/276-7584
wayne_mitchem@ncsu.edu

Monks, David
North Carolina State Univ
Box 7609
Raleigh NC 27695

Montgomery, Bob
Monsanto Company
2211 North Old Troy Rd
Union City TN 38261
Tel. 731/225-1217
Fax. 731/884-0175
robert.f.montgomery@monsanto.com

Montgomery, Doug
Oklahoma State Univ
360 Ag Hall
Stillwater OK 74078
Tel. 405/624-7538
Fax. 405/624-1918
doug.montgomery@okstate.edu

Morgan, Gaylon
Texas A&M University
Rm 349B Heep Center
College Station TX 77843
Tel. 979/845-2425
Fax. 979/845-0604
gmorgan@ag.tamu.edu

Mosdell, Dean
Syngenta Crop Protection
501-I S Reino Rd #183
Newbury Park CA 91320
Tel. 805/480-0514
dean.mosdell@syngenta.com

Mudge, Chris
University of Florida
7922 NW 71st St
Gainesville FL 32653
Tel. 352/392-9981
cmudge@ufl.edu

Mudge, Laurence
Bayer Environmental Sci
104 Santee Trl
Clemson SC 29631
Tel. 803/427-5530
laurence.mudge@bayercropscience.com

Mueller, Tom
U of T 252 Ellington
231 Joe Johnson Dr
Knoxville TN 37996
Tel. 865/974-8805
Fax. 865/974-5365
tmueller@utk.edu

Mullahey, Jeffrey
Univ of Florida
5988 Hwy 90 Bldg 4900
Milton FL 32583
Tel. 850/983-5216
Fax. 850/983-5774
wfgator@ufl.edu

Murdock, Shae
Monsanto Company C3NE
800 N Lindbergh Blvd
St Louis MO 63167
Tel. 314/694-7255
shae.w.murdock@monsanto.com

Murphree, Trent
Seeds West Inc
37860 Smith-Enke Rd
Maricopa AZ 85239
Tel. 520/568-2273
Fax. 520/568-2556
tmurph@ag.arizona.edu

Murphy, Tim
UGA-Griffin Campus
1109 Experiment St
Griffin GA 30223
Tel. 770/228-7300
Fax. 770/229-3215
tmurphy@uga.edu

Murray, Don S
Oklahoma State Univ
Agronomy Dept
Stillwater OK 74078
Tel. 405/744-6420
Fax. 405/744-5269
dmurray@okstate.edu

Muzyk, Kenneth R
Gowan
408 Larrie Ellen Way
Brandon FL 33511
Tel. 813/657-5271
kmuzyk@gowanco.com

Myers, Matt
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-2311
Fax. 662/325-0374
mtm104@pss.msstate.edu

Nandula, Vijay
Miss State DREC
82 Stoneville Rd
Stoneville MS 38776
Tel. 662/686-9311
Fax. 662/686-7336
vien8@msstate.edu

Nanson, Weldon D
Texas A&M University
Soil & Crop Sci Dept
College Station TX 77843
Tel. 979/845-5384
ricenanson@ev1.net

Nelson, Larry W
Clemson University
168 Will Owens Dr
Central SC 29630
Tel. 864/656-4866
lnelson@clemson.edu

Nester, Paul R
Texas Coop Extn
3033 Bear creek Dr
Houston TX 77084
Tel. 281/855-5639
p-nester@tamu.edu

Newsom, Larry
BASF Corporation
2511 Old Ocilla Rd
Tifton GA 31794
Tel. 229/391-9305
newsomle@basf.com

Nichols, Robert L
Cotton Incorporated
PO Box 8006
Cary NC 27512
Tel. 919/678-2371
Fax. 919/678-2233
bnichols@cottoninc.com

Norsworthy, Jason K
Clemson University
277 Poole Ag Center
Clemson SC 29634
Tel. 864/656-2607
Fax. 864/656-3443
jnorswo@clemson.edu

Oliveira, Marcos
Clemson University
277 Poole Ag Center
Clemson SC 29634
Tel. 864/656-3536
Fax. 864/656-3443
molivei@clemson.edu

Oliver, Glenn W
BASF Corp
1001 Oakgate Ct
Apex NC 27502
Tel. 919/547-2372
olivergw@bsf.com

Oliver, Lawrence
18964 Melanie Rd
Springdale AR 72764
Tel. 479/575-3976
Fax. 479/575-3975
oliver@uark.edu

Osborn, Jason
Univ of Arkansas
PO Box 189
Clarkdale AR 72325
Tel. 870/739-3239
josborn@uaex.edu

Palmer, Eric
Syngenta Crop Protection
118 Kennedy Flat Rd
Leland MS 38746
Tel. 662/686-5765
Fax. 662/686-9859
eric.palmer@syngenta.com

Parrish, Mark
Bayer CropScience
PO Box 12014
Res Tria Park NC 27709
Tel. 919/549-2939
mark.parrish@bayercropscience.com

Pearrow, Nathan
Lonoke Co Extn Office
PO Box 357
Lonoke AR 72086
Tel. 501/676-3124
Fax. 501/676-7847
npearrow@uaex.edu

Pearson, Bree A
Univ of Arkansas
1366 W Altheimer Dr
Fayetteville AR 72704
Tel. 479/575-3955
Fax. 479/575-3975
bpearso@uark.edu

Peeper, Thomas F
Oklahoma State Univ
Plant & Soil Sci Dept
Stillwater OK 74078
Tel. 405/744-9589
Fax. 405/744-5269
peepert@okstate.edu

Perkins, Russ
Bayer CropScience
Box 146
Idalou TX 79379
Tel. 806/897-2002
Fax. 806/892-3611
russ.perkins@bayercropscience.com

Petta, Jim
Syngenta Crop Protection
19 Mission Trace
New Braunfels TX 78130

Place, George
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/515-5654
Fax. 919/545-5315
gtplace@cropsci.ncsu.edu

Porpiglia, Peter J
Kumiai America
11 Martine Ave Ste 970
White Plains NY 10606
Tel. 915/682-8934
Fax. 914/682-9050
peter@kichem-usa.com

Porterfield, Dunk
Syngenta Crop Protection
101 Glen Alpine Circle
Cary NC 27513

Poston, Daniel
Delta Res & Extn Ctr
PO Box 197
Stoneville MS 38776
Tel. 663/686-9311
Fax. 662/686-7336
dposton@drec.msstate.edu

Price, Andrew
USDA ARS
411 S Donahue Dr
Auburn AL 36832
Tel. 334/502-5696
aprice@ars.usda.gov

Prince, Joby
Miss State Univ
1233 Park Circle
Starkville MS 39759
Tel. 662/325-0912
Fax. 662/325-7692
joby@gri.msstate.edu

Prostko, Eric
Rural development Center
PO Box 1209
Tifton GA 31793
Tel. 229/386-3328
Fax. 229/386-7305
eprostko@uga.edu

Puri, Atul
University of Florida
PO Box 110300
Gainesville FL 32611
Tel. 352/219-7360
Fax. 352/392-1840
atul779@ufl.edu

Quick, Mark
Isagro-USA
430 Davis Dr, Ste 240
Morrisville NC 27560
Tel. 919/321-5204
Fax. 919/321-5220
mquick@isagro-usa.com

Rainbolt, Curtis
Univ of Florida
3200 E Palm Beach Rd
Belle Glade FL 33430
Tel. 561/993-1531
Fax. 561/993-1582
crrainbolt@ifas.ufl.edu

Ralston, Jennifer
Monsanto Company C3ND
800 N Lindbergh Blvd
St Louis MO 63167
Tel. 314/694-8214
Fax. 314/694-4940
jennifer.l.ralston@monsanto.com

Ramsey, Craig
USDA-APHIS
2301 Research Blvd #108
Ft Collins CO 80526
Tel. 970/494-7536
cramsey.l.ramsey@aphis.usda.gov

Rankins, Alfred
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-3341
Fax. 662/325-8742
arankins@pss.msstate.edu

Ratliff, Randall L
Syngenta Crop Protection
PO Box 18300
Greensboro NC 27419
Tel. 336/632-3922
Fax. 336/547-0632
randy.ratliff@syngenta.com

Rawls, Eric K
Syngenta Crop Protection
7145 58th Ave`
Vero Beach FL 32967
Tel. 772/567-5218
Fax. 772/567-5229

Reynolds, Daniel B
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-0519
Fax. 662/325-0374
dreynolds@pss.msstate.edu

Rich, Gregory J
Valent USA Corporation
8577 Cordes Circle
Germantown TN 38139
Tel. 901/753-0208
Fax. 925/817-3179
grich@valent.com

Rick, Susan
E I DuPont
218 Mockingbird Ln
Waterloo IL 62298

Ricker, Dan
Virginia Tech
435 Old Glade Rd
Blacksburg VA 24061
Tel. 540/231-5835
Fax. 540/231-5755
dricker@vt.edu

Robinson, Bridget
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/513-4197
Fax. 919/515-5855
bridget_robinson@ncsu.edu

Robles, Wilfredo
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 787/298-4667
wr40@pss.msstate.edu

Rodgers, Charlie
Seeds West
37860 W Smith-Enke Rd
Mariopa AZ 85239
Tel. 520/521-2349
Fax. 520/568-2556
crodgers@ag.arizona.edu

Rodinson, Heather
MSU-DREC
PO Box 197
Stoneville MS 38776
Tel. 662/686-3235
Fax. 662/686-9311
hreno@drec.msstate.edu

Rogers, C Brent
Morehead State Univ
150 University Blvd UOP
Morehead KY 40351
Tel. 606/783-2660
Fax. 606/783-5067
b.rogers@moreheadstate.edu

Rosemond, Malone
Bayer CropScience
2100 Woodbury Dr
Hillsborough NC 27278
Tel. 919/219-9333
Fax. 919/732-5963
malone.rosemond@bayercropscience.com

Rosen, David J
US Fish & Wildlife
17629 El Camino Real 211
Houston TX 77058
Tel. 281/286-8282
Fax. 281/488-5882
david_rosen@fws.gov

Saini, Monika
Auburn University
411 S Donahue Dr
Auburn AL 36832
Tel. 334/844-4741
sainimo@auburn.edu

Sanders, Dearl
LSU AgCenter
4419 Idlewild Rd
Clinton LA 70727
Tel. 225/680-5848
dsanders@agcenter.lsu.edu

Sanders, Jason C
Syngenta Crop Protection
488 Morningside Dr
Winston-Salem NC 27107
Tel. 336/632-6280
jason.sanders@syngenta.com

Schmidt, Bob
SWSS
1508 W University
Champaign IL 61821
Tel. 217/352-4212
Fax. 217/352-4241
raschwssa@aol.com

Schroeder, Jill
New Mexico State Univ
Box 30003, MSC 3BE
Las Cruces NM 88003
Tel. 505/646-2328
Fax. 505/646-8087
jischroe@nmsu.edu

Schwarzlose, Gary L
Bayer CropScience
1331 Rolling Creek
Spring Branch TX 78070
Tel. 830/885-4287
Fax. 830/885-7382
gary.schwarzlose@bayercropscience.com

Schwertner, Matt
Texas Agric Expt Sta
Rt 3 Box 219
Lubbock TX 79403
Tel. 806/746-6101
Fax. 806/746-6528
schwert-ws@hotmail.com

Scott, Robert C
Univ of AR Coop Extn
Box 357
Lonoke AR 72086
Tel. 501/676-3124
Fax. 501/676-7847
bscott@uaex.edu

Scroggs, Derel
LSU AgCenter
8105 Tom Bowman Dr
Alexandria LA 71302
Tel. 318/473-6520
Fax. 318/476-6535
dscroggs@agcenter.lsu.edu

Sellers, Brent
UF-IFAS Range Cattle
3401 Experiment Sta Rd
Ona FL 33865
Tel. 863/735-1314
Fax. 863/735-1930
sellersb@ifas.ufl.edu

Sharma, Shiv D
Univ of Florida
700 Experiment Sta Rd
Lake Alfred FL 33850

Shaw, David R
Miss State Univ
Box 9555
Miss State MS 39762

Sherrick, Stewart
Monsanto Company
4774 River Farms
Rocky Mount NC 27803
Tel. 252/442-8374
Fax. 252/442-8374
stewart.l.sherrick@monsanto.com

Shirvain, Vinod
Univ of Arkansas
1366 W Altheimer Dr
Fayetteville AR 72704
Tel. 479/575-3955
Fax. 479/575-3975
vks4@uark.edu

Shoffner, Wendy
Shoffner Farm Research
191 Jackson 136
Newport AR 72112
Tel. 870/744-8237
Fax. 870/744-3314
shoffner@cei.net

Sims, Barry D
Univ of Tennessee
3181 Experiment Station
Springfield TN 37172
Tel. 615/382-3130
bsims@utk.edu

Singh, Megh
Univ of Florida-IFAS
700 Experiment Sta Rd
Lake Alfred FL 33850

Smith, Chad
University of Missouri
PO Box 160
Portageville MO 63873
Tel. 573/379-2361
smithchad@missouri.edu

Smith, Dudley T
Texas A&M University
Dept Soil & Crop Science
College Station TX 77843
Tel. 979/845-4702
dt-smith@tamu.edu

Smith, Kenneth L
Univ of Arkansas
PO Box 3508
Monticello AR 71656
Tel. 870/460-1091
Fax. 870/460-1415
smithken@uamont.edu

Smith, Michael A
Div of Maintenance
200 Mero St Sta E3-05-01
Frankfort KY 40622
Tel. 502/564-4556
Fax. 502/564-3532
mikea.smith@ky.gov

Soufi, Rami
The Scotts Company
14111 Scottslawn Rd
Marysville OH 43041
Tel. 937/644-7041
Fax. 937/644-7153
rami.soufi@scotts.com

Spikes, Don
Drexel Chemical
1700 Channel Ave
Memphis TN 38113
Tel. 901/774-4370
Fax. 901/744-4666
dspikes@drexchem.com

Starke, Michelle
Monsanto Company A2NA
800 N Lindbergh Blvd
St Louis MO 63167
Tel. 314/694-6913
Fax. 314/694-4928
michelle.starke@monsanto.com

Steckel, Larry
West TN Expt Sta
605 Airways Blvd
Jackson TN 38301
Tel. 731/425-4705
Fax. 731/425-4720
lsteckel@utk.edu

Steele, Greg
Monsanto Company
6274 State Hwy 22
Hillsboro TX 76645
Tel. 254/582-5610
Fax. 254/580-2598
gregory.l.steele@monsanto.com

Stephenson, Daniel
Univ of Arkansas
PO Box 42
Keiser AR 72351
Tel. 870/526-2199
Fax. 870/526-2582
dstephenson@uaex.edu

Stevens, David F
DuPont Crop Protection
PO Box 1256
Natchitoches LA 71458
Tel. 318/354-0580
Fax. 318/354-0480
david-forrest.stevens.iv-1@usa.udpont.com

Stewart, Sandy
LSU AgCenter
8105 Tom Bowman Dr
Alexandria LA 71302
Tel. 318/473-6522
Fax. 318/473-6503
sstewart@agcenter.lsu.edu

Strachan, W Fred
Bayer CropScience
1301 South 5th Ave
Cleveland MS 38732

Strahan, Ronald E
Louisiana State Univ
104 Sturgis Hall
Baton Rouge LA 70803
Tel. 225/578-4070
Fax. 225/578-1403
rstrahan@agctr.lsu.edu

Tagert, Mary Love
Miss State Univ
Box 9762
Miss State MS 39762
Tel. 662/325-8081
Fax. 662/325-7692
mltagert@agri.msstate.edu

Tasker, Alan V
USDA APHIS
4700 River Rd 6D08
Riverdale MD 20737
Tel. 301/734-5708
Fax. 301/734-8584
alan.v.tasker@aphis.usda.gov

Taylor, James M
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-7555
Fax. 662/325-0374
jtaylor@pss.msstate.edu

Test, Gary
Univ of Florida
700 Experiment Sta Rd
Lake Alfred FL 33850

Teuton, Travis
Univ of Tennessee
8136 Florence Garden Rd
Knoxville TN 37938
Tel. 865/974-2883
tteuton@utk.edu

Thatsaka, S V S
Univ of Kentucky
1608 University CT C208
Lexington KY 40503
Tel. 859/323-9628
tsaph2@uky.edu

Thomas, Walter E
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/513-7512
Fax. 919/515-5315
wethomas@unity.ncsu.edu

Throop, Stewart
FMC Corp
1735 Market St
Philadelphia PA 19103
Tel. 215/299-6847
Fax. 215/299-6810
stu_throop@fmc.com

Thurston, Ann
Bayer ES
5017 Andover
Plano TX 75023

Tingle, Chris
Univ of Ark Coop Extn
2301 S University Ave
Little Rock AR 72204
Tel. 501/671-2278
Fax. 501/671-2297
ctingle@uaex.edu

Totten, Wesley
Clemson University
E-142 P&A Bldg
Clemson SC 29634
Tel. 864/656-6365
Fax. 864/656-4960
ftotten@clemson.edu

Turner, Jay
Micro Flo Company
8050 Meadow Creek Cove
Olive Branch MS 38654
Tel. 901/233-7530
jay.turner@microflocompany.com

Turner, Ronnie G
DuPont Crop Protection
8295 Tournament Dr #300
Memphis TN 38125
Tel. 901/746-6006
Fax. 901/766-6001
ronnie.g.turner@usa.dupont.com

Urwiler, Michael
Syngenta Crop Protection
495 County Road 1300 N
Champaign IL 61822
Tel. 217/863-5324
Fax. 217/863-2763
michael.urwiler@syngenta.com

Vaculin, Paul D
AMVAC Chemical Corp
747 Steeple Ridge Cove
Collierville TN 38017
Tel. 901/861-6710
Fax. 901/850-9979
paulv@amvac.net

Vencill, William
University of Georgia
3111 Miller Plant Sci
Athens GA 30602
Tel. 706/542-3117
Fax. 706/542-0914
wvencill@uga.edu

Vidrine, P Roy
Dean Lee Res Sta LSU
8105 E Campus Ave
Alexandria LA 71302
Tel. 318/473-6520
Fax. 318/473-6535
rvidrine@agcenter.lsu.edu

Voth, Richard D
Monsanto Company E3NA
800 N Lindbergh Blvd
St Louis MO 63167
Tel. 314/694-7589
Fax. 314/694-6662
richard.d.voth@monsanto.com

Walker, Robert H
Auburn University
201 Funchess Hall
Auburn Uni AL 38649
Tel. 334/844-3994
Fax. 334/844-9345
walkerh@auburn.edu

Walls, F Bobby
FMC Corporation
501 Parkwood Ln
Goldsboro NC 27530
Tel. 919/735-3862
Fax. 919/736-2686
bobby walls@fmc.com

Waltz, Clint
C&SS Redding Bldg
1109 Experiment St
Griffin GA 30223
Tel. 770/228-7300
Fax. 770/412-4774
cwaltz@uga.edu

Warren, Leon S
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/515-5651
Fax. 919/515-5315
leon_warren@ncsu.edu

Watkins, Bobby
BASF Corporation
2220 Amelia Ln
Starkville MS 39759

Webber, Charles L
USDA ARS SCARL
PO Box 159
Lane OK 74555
Tel. 580/889-7395
Fax. 580/889-5783
cwebber-usda@lane-ag.org

Webster, Eric P
LSU AgCenter
104 M B Sturgis Hall
Baton Rouge LA 70803
Tel. 225/578-5976
Fax. 225/578-4673
ewebster@agcenter.lsu.edu

Webster, Ted
USDA ARS
PO Box 748
Tifton GA 31794
twebster@tifton.usda.gov

Wells, Jerry W
Syngenta Crop Protection
PO Box 18300
Greensboro NC 27419
Tel. 336/632-6324
Fax. 336/292-6374
jerry.w.wells@syngenta.com

Wells, Wayne
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-2331

Wersal, Ryan
Miss State Univ
Box 9562
Miss State MS 39762
Tel. 662/325-4595
Fax. 662/325-7692
rwersal@gri.msstate.edu

Whatley, Laura L
BASF Corporation
PO Box 13528
Res Tria Park NC 27709
Tel. 919/547-2291
Fax. 919/547-2880
whatlel@basf-corp.com

Wheeler, Kory
Gowan Co
4833 W 30th Pl
Yuma AZ 85364
Tel. 928/580-4802
Fax. 928/373-1843
kwheeler@gowanco.com

White, Lewayne
Univ of Georgia
115 Stephens St
Williamson GA 30292
Tel. 770/228-7335
lewayne@uge.edu

Whitehead, James
MANA
302 Deer Run North
Oxford MS 38655
Tel. 662/513-4333
james.whitemead1@worldnet.att.net

Whitehead, Keith
LSU AgCenter
350 Louisiana St
RoxieLA 39661
Tel. 225/683-5848
Fax. 225/683-3281
awhitehead@agctr.lsu.edu

Wilcut, John
North Carlina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/515-5647
Fax. 919/515-5315
john_wilcut@ncsu.edu

Wilde, David
Coastal Ag Research
PO Box 760
E Bernard TX 77435
Tel. 979/335-4451
Fax. 979/335-4183
car@intertex.net

Wiley, Gerald L
MANA
22401 Hwy 31 S
Underwood IN 47177
Tel. 812/294-3095
Fax. 812/294-4282
gwiley@manainc.com

Wilkerson, Gail
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/515-5816
Fax. 919/515-5855
gail_wilkerson@ncsu.edu

Willard, Teresa S
Monsanto Company
479 Elliott Rd
West Monroe LA 71292
Tel. 318/373-0616
Fax. 318/323-0616
teresa.s.willard@monsanto.com

Williams, Bill
LSU AgCenter
PO Box 438
St Joseph LA 71366
Tel. 318/766-4604
bwilliams@agctr.lsu.edu

Williams, Bob
DuPont
8170 Natures Way #22
Bradenton FL 34202
Tel. 940/907-0768
Fax. 941/907-8498
robert.w.williams@usa.dupont.com

Williamson, Dennis H
Monsanto Company
208 King George St
Charleston SC 29492
Tel. 843/697-1907
dennis.h.williamson@monsanto.com

Willingham, Sam
Texas A&M University
Soil & Crop Sci Dept
College Station TX 77845
Tel. 979/845-5384
swillingham@ag.tamu.edu

Willis, Greg
Clemson University
E-142 P&A Bldg
Clemson SC 29634
Tel. 864/656-6365
Fax. 864/656-4960
twillis@clemson.edu

Willis, John
Virginia Tech
435 Old Glade Rd
Blacksburg VA 24061
Tel. 540/231-5835
Fax. 540/231-5755
jbwillis@vt.edu

Wills, Gene
Delta Res & Extn Ctr
PO Box 197
Stoneville MS 38776
Tel. 662/686-9311
Fax. 662/686-7336
gwills@drec.msstate.edu

Wilson, Alan
Rayonier
PO Box 819
Yulee FL 32041
Tel. 904/225-5393
alan.wilson@rayonier.com

Wilson, David
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/515-2865
david_wilson@ncsu.edu

Wilson, Henry
Virginia Tech
33446 Research Dr
Painter VA 23420
Tel. 757/414-0724
Fax. 757/414-0730
hwilson@vt.edu

Wise, Aaron M
Univ of Georgia
127 Wesley Chapel Rd
Danielsville GA 30633
Tel. 706/540-2575
Fax. 229/386-7293
awise@uga.edu

Witt, William W
University of Kentucky
3205 Veterans Dr
Lexington KY 40546
Tel. 859/257-5020
Fax. 859/257-7874
wwitt@uky.edu

Wright, Denise
Pest Mgt Enterprises Inc
1258 Bayou Rd Box 302
Cheneyville LA 71325
Tel. 318/279-2165
Fax. 318/279-2165
wrightpme@aol.com

Wright, Scott
Miss State Univ
Box 9555
Miss State MS 39762
Tel. 662/325-8201
swright@pss.msstate.edu

Yager, Lisa
Camp Shelby Fiedl Office
CSTS-ENV Bldg 6678
Camp Shelby MS 39407
Tel. 601/558-3931
lyager@tnc.ord

Yeiser, Jimmie L
S F Austin State Univ
PO Box 4650
Nacogdoches TX 75962
Tel. 936/467-4806
Fax. 936/468-2489
jyeiser@sfasu.edu

Yelverton, Fred
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/515-5639
Fax. 919/515-5315
fred_yelverton@ncsu.edu

York, Alan C
North Carolina State Univ
Box 7620
Raleigh NC 27695
Tel. 919/515-5643
Fax. 919/515-5315
alan_york@ncsu.edu

Youmans, Cletus D
BASF Corp
1875 Viar Rd
DyersburgTN 38024
Tel. 731/445-8880
youmanc@basf.com

Zawierucha, Joe
BASF Corporation
26 Davis Dr
Res Tria Park NC 27709
Tel. 919/547-2095
zawierj@basf.com

Zhang, Wei
Louisiana State Univ
104 M B Sturgis Hall
Baton Rouge LA 70803
Tel. 225/578-1189
Fax. 225/578-4673
wzhang@agcenter.lsu.edu

SWSS Sustaining Members

ALMACO Company
99 M Street
Nevada, IA 50201

BASF Corporation
7 Cameroons Place
Durham, NC 27703

Bayer CropScience
PO Box 4913
Kansas City, MO 64120

Bellspray Inc dba R&D Sprayers
PO Box 267
Opelousas, LA 70571

Dow AgroSciences
314 N. Maple Glade Circle
The Woodlands, TX 77832

DuPont Ag Products
PO Box 274
Valdosta, GA 31603

Farm Press Publications
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Clarksdale, MS 38614

Farmers Supply Coop
PO Box 1799
Greenwood, MS 38930

Gylling Data Management Inc.
405 Martin Blvd.
Brookings, SD 57006

Helena Chemical Company
7654 Moore Rd.
Memphis, TN 38120

Kumiai America
11 Martine Ave, Suite 970
White Plains, NY 10606

Marathon Ag/Environment
205 E. Boutz, Bldg. 4 Suite 5
Las Cruces, NM 88005

Monsanto Company
1609 Iredell Dr
Raleigh, NC 27608

PBI/Gordon Corp.
PO Box 014090
Kansas City, MO 64101

Regal Chemical Company
PO Box 900
Alpharetta, GA 30239

Research Options, Inc.
Rt. 1, Box 399
Montezuma, GA 31063

SSI Maxim Company Inc.
PO Box 1954
Kilgore, TX 75662

Syngenta Crop Protection
8000 Centerview Pkwy, Suite 501
Cordova, TN 38018

Tennessee Farmers Coop
PO Box 3003
LaVergne, TN 37086

UAP Timberland LLC
PO Box 557
Monticello, AR 71655

Valent USA Corporation
PO Box 5008
Greenville, MS 38704

Weed Systems Equipment Inc.
154 Orange Lane
Hawthorne, FL 32640