Proceedings of the

Southern Weed Science Society

68th Annual Meeting

Hyatt Regency

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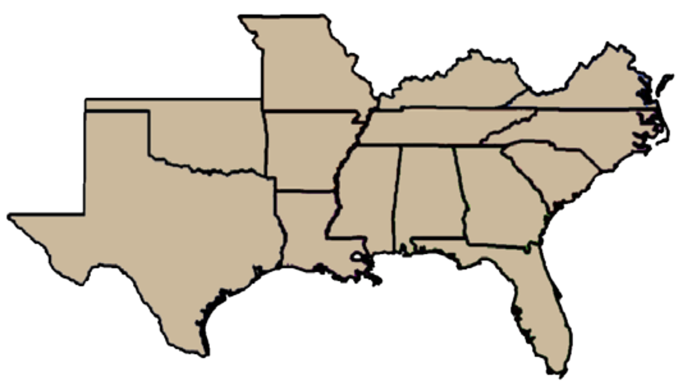

http://www.swss.ws/NewWebDesign/Search/search.asp

Dedication Statement

Paul W. Santelmann was born October 18, 1926, in Ann Arbor, Michigan. Paul grew up in Washington, D.C. and northern Virginia. He served in the U.S. Army Engineers in the Pacific theater in World War II and with the 8th Army Occupational Forces in Nagoya and Tokyo, Japan. After discharge as a staff sergeant he received his B.S. degree in agronomy from the University of Maryland. His M.S. degree was earned from Michigan State University followed by the Ph.D. from The Ohio State University.
Dr. Santelmann began his career as an Assistant Professor of Agronomy at the University of Maryland in 1954 and in 1959 was promoted to Associate Professor. Dr. Santelmann joined the agronomy department of Oklahoma State University as a Professor in 1962 and is considered by many to be the “father of weed science” at OSU. During his career at OSU, Paul served as major professor and thesis advisor for 55 Agronomy graduate students. From this generation of graduates and their graduates, 149 M.S. and 78 Ph.D. degrees have been earned. One of Paul’s greatest joys was in teaching in the classroom and in teaching his graduate students the proper scientific methods to obtain sound data and results that could be published in refereed scientific articles. Paul was demanding but fair minded and proud of his students. He continuously encouraged his graduate students to present oral papers and become involved in their professional societies. His classroom teaching inspired many undergraduate students to seek an advanced degree in weed science. Many of these graduates continued their careers in weed science and served the discipline as committee members and officers in many of their respective professional societies.

Dr. Santelmann not only served OSU where he was one of the first Regents Professors, but he also served four scientific societies with distinction. He was named Fellow in both the Weed Science Society of America (WSSA) and the Crop Science Society of America. He served as an officer in the Northeastern Weed Science Society and served as President of both the WSSA and the Southern Weed Science Society (SWSS). The SWSS awarded the Distinguished Service Award, the society’s most prestigious award, to Dr. Santelmann in 1981. He authored 62 refereed scientific articles, 8 book chapters and 8 research bulletins. His service to OSU included 11 years as the Department Head of the Agronomy Department. He returned to the faculty ranks in 1987 and retired in 1991 as a Regents Service Professor.

He is survived by his wife of 63 years, Susanna Santelmann; his brother Edward Carl Santelmann; two sons, Steven L. Santelmann and wife Cindy, and Douglas W. Santelmann and wife Sheryl; his daughter Patricia Emerick and her husband Tom; 10 grandchildren; and 9 great-grandchildren.

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Abstracts

Preface

These PROCEEDINGS of the 68th Annual Meeting of the Southern Weed Science Society contain papers and abstracts of presentations in Savannah, GA at the Hyatt Regency Hotel. Other information in these PROCEEDINGS include: biographical data of recipients of the SWSS Distinguished Service, Outstanding Educator, Outstanding Young Weed Scientist, and Outstanding Graduate Student Awards; lists of officers and committee chairpersons; minutes of all business meetings; abstracts of posters and oral papers; the Annual Weed Survey; list of registrants attending the annual meeting and sustaining members.

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). The use of commercial names in the PROCEEDINGS neither constitutes an endorsement, nor does the non-use of similar products constitute a criticism by the Southern Weed Science Society.

This document is available as a PDF at the SWSS web site (www.swss.ws).

Nilda R. Burgos
Proceedings Editor,
Southern Weed Science Society

Regulations and Instructions for Papers and Abstracts

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 website 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 crop death.

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 website (http://www.swss.ws/) at the time of title or abstract/paper submission.

Word templates will be available on the web to help ensure the proper format is followed. It is important that submission deadlines and instruction are carefully adhered to, as the abstracts are not edited for content.

Typing Instructions-Format

1**.** Margins, spacing, etc.: Use 8-1/2 x 11" paper. **Leave 1" margins on all sides.** Use 10 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 spacing before 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, Acknowledgements.

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.**

Acknowledgements - 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.

SWSS Presidential Address

Scott Senseman, President of the Southern Weed Science Society

The Southern Weed Science Society has had almost 7 decades of activity and history related to weed control and management of weeds. There have been many significant milestones of historical significance congruent with our society's history. I thought that it would be interesting to list some of those historical events along with our significant scientific weed science milestones to give perspective on how far we have come and to consider what our future impact may be and how far we will continue to go.

Our society had their first meeting in 1947. Six years earlier, 2,4-D was discovered and became the first selective herbicide. The world population at that time was estimated to be 2.5 million people.

In the 1950s, phenyl substituted ureas (1951) and triazines (1955) were discovered. During that same decade, Roger Bannister broke the 4-minute mile barrier (3:59.4). In 1956, the first annual meeting of the Weed Science Society of America was held in New York, NY. The world population was approximately 2.8 billion.

The decade of the 1960s began with President John F. Kennedy proposing to Congress that a man will land on the Moon and be brought safely back to Earth by the end of the decade. A year later, Operation Ranch Hand began in Vietnam where Agent Orange and other "Rainbow Herbicides" were applied to rural South Vietnam. In 1964, plans for the World Trade Center in NY were disclosed to the public. Also, in that decade, dinitroaniline herbicides were introduced. The world population rose to 3.3 billion. In 1970, Apollo 13 returned to Earth despite great hardship caused by limited power, loss of cabin heat, shortage of potable water, and the critical need to jury-rig the carbon dioxide removal system among several other challenges. That same year Dr. Norman Borlaug, "the Father of the Green Revolution", won the Nobel Peace Prize for his role in helping feed others and ultimately saving 1 billion lives. In 1971, glyphosate was discovered while the world population reached approximately 4 billion people. The decade of the 1980s began with the United States Hockey Team defeating the Soviet Union National Hockey Team who had won 6 of the previous 7 Olympic gold medals. Later that decade, the Public Broadcasting System (PBS) was seen by over 100 million viewers for the first time and the acetolactate synthase inhibitor herbicides were developed. During the decade, the world population added almost 1 billion new lives to reach 4.9 billion people. In the early 90s, Operation Desert Storm started the Gulf War. The estimated cost of a herbicide from discovery to getting a label was $50 to $60 million. One in 20,000 would make it to market. In 1996, the Roundup-Ready crop era began with the release of Roundup-Ready soybeans and the world population was estimated to be 5.6 billion people. The twenty-first century began with the harsh reality that terrorism was a part of our lives. In 2001, the World Trade Center and Pentagon were attacked along with a plane crash in rural Pennsylvania. During the decade, glyphosate resistance was becoming an issue in several crops and in multiple countries while the world population rose to 6 billion. In 2015, we face many challenges in our discipline. The estimated cost of a herbicide from discovery to market is approximately $250 million while only one in 140,000 will make it to market. Weeds have evolved resistance to 22 of the 25 known herbicide sites of action and to 155 different herbicides. Herbicide-resistant weeds have been reported in 84 crops in 66 countries and our world population needing to be fed has risen to 7.1 billion. No doubt, the challenges that lie ahead of us are profound. But, we are also a resilient group. Having weathered the great challenges that have lain before us both as a human race and as weed scientists in our previous history should give us confidence to move forward with the most positive of outlooks. Great challenges faced by intelligent and committed people have proven to ultimately result in incredible accomplishments. And so I believe this to be the case for all of us. We are needed as a discipline perhaps more today than at any other time in our society's history. Our ability to focus and cope with our challenges will no doubt be tested. But, I believe that history would tell us that we will prevail to manage these profound challenges to perhaps provide the weed science equivalent of breaking a supposedly impossible milestone like the sub 4-minute mile or walking on the moon. I look forward to going on this journey with all of you.

Respectfully submitted,

Outstanding Young Weed Scientist-Academia

Jim Brosnan

Dr. Brosnan is an Associate Professor in the Department of Plant Sciences at the University of Tennessee. In this role, he leads research and extension programs targeting the needs of individuals managing broadleaf and grassy weed control in various turfgrass systems, including golf courses, athletic fields, and residential landscapes.

He maintains an active research program focused on control of problematic weeds in turfgrass systems, particularly biotypes evolving herbicide resistance. Efforts have led to authorship of over 70 peer-reviewed scientific journal articles in his career and mentorship of six M.S and Ph.D. students, all whom moved into positions within academia or industry.

From an extension perspective, Dr. Brosnan coordinates the University of Tennessee Turf & Ornamental Field Day, the UT Turf Herbicide Resistance Field Day, as well as the annual Tennessee Turfgrass Conference and Trade Show. He also led the development of Mobile Weed Manual, a mobile application for selecting herbicides labeled for use in turf and ornamentals.

Jim is an active member in the Weed Science Society of America (WSSA) and the Southern Weed Science Society (SWSS). He currently serves on several WSSA committees and is an Associate Editor for Weed Technology. In 2011, Jim co-hosted the WeedOlympics, the first-ever national weed science contest involving student members of the SWSS, NEWSS, the North Central Weed Science Society, and the Western Society of Weed Science. Dr. Brosnan and his students have been actively involved in every SWSS meeting since 2009.

Dr. Brosnan's efforts have earned him several awards, including being named the Tennessee Turfgrass Association Professional of the Year in 2010, the highest honor bestowed by the Association. In 2013, the Northeastern Weed Science Society (NEWSS) recognized Dr. Brosnan with their Outstanding Researcher Award.

Previous Winners of the Outstanding Young Weed Scientist Award

Year	Name	University / Company
1980	John R. Abernathy	Texas A & M University
1981	Harold D. Coble	North Carolina State University
1982	Lawrence R. Oliver	University of Arkansas
1983	Ford L. Baldwin	University of Arkansas
1984	Don S. Murray	Oklahoma State University
1985	William W. Witt	University of Kentucky
1986	Philip A. Banks	University of Georgia
1987	Kriton K. Hatzios	VPI & SU
1988	Joe E. Street	Mississippi State University
1989	C. Michael French	University of Georgia
1990	Ted Whitwell	Clemson University
1991	Alan C. York	North Carolina State University
1992	E. Scott Hagood, Jr.	VPI & SU
1993	James L. Griffin	Louisiana State University
1994	David R. Shaw	Mississippi State University
1995	John C. Wilcut	North Carolina State University
1996	David C. Bridges	University of Georgia
1997	L.B. McCarty	Clemson University
1998	Thomas C. Mueller	University of Tennessee
1999	Daniel B. Reynolds	Mississippi State University
2000	Fred Yelverton	North Carolina State University
2001	John D. Byrd, Jr.	Mississippi State University
2002	Peter a Dotray	Texas Tech. University
2003	Scott A. Senseman	Texas A & M University
2004	David L. Jordan	North Carolina State University

2004	James C. Holloway	Syngenta
2005	Eric Prostko	University of Georgia
2005	no nomination	
2006	Todd A. Baughman	Texas A & M University
2006	John V. Altom	Valent USA Corporation
2007	Clifford "Trey" Koger	Mississippi State University
2007	no nomination	
2008	Stanley Culpepper	University of Georgia
2008	no nomination	
2009	Jason K. Norsworthy	University of Arkansas
2009	no nomination	
2010	Bob Scott	University of Arkansas
2010	no nomination	
2011	J. Scott McElroy	Auburn University
2011	Eric Palmer	Syngenta Crop Protection
2012	Jason Bond	Mississippi State University
2012	Cody Gray	United Phosphorus Inc.
2013	Greg Armel	BASF Company
2013	Shawn Askew	Virginia Tech
2014	Jason Ferrell	University of Florida
2014	Vinod Shivrain	Syngenta

Outstanding Educator Award

Nilda Roma-Burgos

Nilda Roma-Burgos graduated from the Visayas State College of Agriculture, Leyte, Philippines in 1983 with a B.S. in Agriculture, majoring in Soil Science. She attended the University of Arkansas, Fayetteville where she completed her M.S. in Agronomy-Weed Science in 1994 and her Ph.D. in Agronomy-Weed Science in 1997. She worked as Field Biologist for Zeneca Ag Products from 1997-1998 and served as Faculty in the Department of Crop, Soil and Environmental Sciences at the University of Arkansas for 16 years starting in October 1998.

Dr. Burgos conducts research on basic and applied aspects of weed physiology, molecular weed biology, and weed management; specifically, herbicide-resistant weeds; gene flow; evolution of weedy traits; weed population genetics; management options for weedy and volunteer rice; and weed management options for specialty crops. She has taught Principles of Weed Control from 2000-2006; Weed Physiology and Herbicide Resistance in Plants between 1999 and 2009; team taught Weed Science Practicum and co-coached the University of Arkansas Weed Team since 1999; taught Ecology and Morphology of Weedy and Invasive Species since 2011; and team taught Advanced Crop Science in 2014. Dr. Burgos was one of the pioneering UA Faculty Team that established the Global Community Development Service Project in Belize in 2006 and served as mentor for students participating in this Study Abroad Program from 2007 to 2011. The Agriculture Team developed teaching modules for elementary kids, established school gardens, and conducted community sanitation and beautification projects, among other activities. Before leaving the Belize Project, Dr. Burgos initiated the International Research Experience Program for the UA College of Agriculture, which was launched in 2012 in collaboration with Universities in Rio Grande do Sul, Brazil. The Program expanded to the Philippines in 2014 and will include Costa Rica in 2015. Dr. Burgos has served as resource speaker and invited lecturer for seminars, trainings, workshops, or conferences in the US and other countries including Bolivia, Brazil, China, Costa Rica, India, Nicaragua, Peru, Thailand, the Philippines, and Vietnam. She has served as Major Advisor and co-Advisor of 17 M.S. and 17 Ph.D. students; advised 5 undergraduate honors student research; served on 28 graduate student committees and 6 undergraduate student research committees. Collectively, graduate students mentored by Dr. Burgos won numerous awards for oral and poster competitions, competitive national and international travel grants to conferences, and various awards at the SWSS Weed Contest, and Outstanding Graduate Student awards. Her Ph.D. student won the first International Weed Science Larry Burrill Award for Outstanding Research in 2008. Dr. Burgos has served as the State Liaison for the IR-4 Program since 2005; Director of the IR-4 Research Center for Region 4 since 2009; Secretary and Chair of the SWSS Resistance Committee over several years; Past Secretary and current Chair of the SWSS Foundation; member, Outstanding Young Scientist Award Committee; member of the SWSS Weed Contest Committee across several years; Associate Editor of the Weed Science journal; was elected as Secretary-Treasurer of the International Weed Science Society (2008-2012) and elected as Vice-President of IWSS for 2012-2016. She also proposed, led the assembly, and served as co-Associate Editor of the upcoming Special Issue on Research Methods in Weed Science.

She is the daughter of Virgilio Roma and Dalia Oplimo, married to Redentor Burgos for 32 years and blessed with a son, Ronelo.

Previous Winners of the Outstanding Educator Award

Year	Name	University
1998	David R. Shaw	Mississippi State University
1999	Ronald E. Talbert	University of Arkansas
2000	Lawrence R. Oliver	University of Arkansas
2001	James L. Griffin	Louisiana State University
2002	Thomas F. Peeper	Oklahoma State University
2003	Daniel B. Reynolds	Mississippi State University
2004	William Vencill	University of Georgia
2005	John W. Wilcut	North Carolina State University
2006	Don S. Murray	Oklahoma State University
2007	Thomas C. Mueller	University of Tennessee
2008	James M. Chandler	Texas A&M University
2009	William W. Witt	University of Kentucky
2010	Peter Dotray	Texas Tech. University
2011	Eric Prostko	University of Georgia
2012	Gregory Mac Donald	University of Florida
2013	Tim Grey	University of Georgia
2014	Scott Senseman	University of Tennessee

Outstanding Graduate Student Award (MS)

Garret Montgomery

Garret was born and raised in rural northwest Tennessee near Union City, by his loving parents Bob and Amy. He received a B.S. degree in Plant and Soil Science with a row crop concentration from the University of Tennessee, Martin in 2012. After graduation, he began a M.S. degree with a concentration in Weed Science at Mississippi State University under direction of Dr. Jason Bond. In the spring of 2014, Garret completed his M.S. degree and started pursuit of a PhD in Weed Science at the University of Tennessee with Dr. Larry Steckel as his advisor. Beginning in 2007 and continuing through the fall of 2011 Garret worked as a crop scout to assess and help with management decisions in cotton, corn, soybean, and wheat production in northwest Tennessee, southeast Missouri, and northeast Arkansas. His thesis research was centered on the use of saflufenacil in rice and aided in achieving a supplemental label that allowed for postemergence applications. Garret is now working on his dissertation which is focused on integrating cover crops into traditional weed management programs to aid in controlling difficult weed species. During his M.S. and PhD endeavors, he has been involved with presenting data in extension, field day, and professional settings. Garret is a member of state, regional, and national agronomic and graduate student societies, and is the current president of SWSS Graduate Student Organization. He was a member of the Mississippi State University weed team that claimed 3rd place overall in the 2013 SWSS Weed Contest and placed 2nd in the M.S. paper presentation in the 2014 SWSS Graduate Student competition. He placed twice in the internal graduate student paper presentation contest at Mississippi State. He has authored 3 refereed journal articles, and authored or co-authored 12 extension or newsletter publications, and 20 professional society abstracts.

Previous Winners of the Outstanding Graduate Student Award (MS)

Year	Name	University
1998	Shawn Askew	Mississippi State University
1999	Patrick A Clay	Louisiana State University
2000	Wendy A. Pline	University of Kentucky
2001	George H. Scott	North Carolina State University
2002	Scott B. Clewis	North Carolina State University
2003	Shawn C. Troxler	North Carolina State University
2004	Walter E. Thomas	North Carolina State University
2005	Whitnee Barker	North Carolina State University
2006	Christopher L. Main	University of Florida
2007	no nomination	
2008	no nomination	
2009	Ryan Pekarek	North Carolina State University
2010	Robin Bond	Mississippi State University
2011	George S. (Trey) Cutts, III	University of Georgia
2012	Josh Wilson	University of Arkansas
2013	Bob Cross	Clemson University
2014	Brent Johnson	University of Arkansas

Outstanding Graduate Student Award (PhD)

Sushila Chaudhari

Sushila Chaudhari grew up on a farm in Sri Ganganagar, Rajasthan, India. After finishing the high school, she was awarded the National Talent Scholarship from the Indian Government to obtain her B.S. (Hons.) in Agriculture from Punjab Agricultural University. She received her degree in 2008. She participated in many activities and was awarded many honors in games, clay-modeling, and rangoli (a folk art in India). She was active in the National Service Scheme program organized by the university. Sushila earned her M.S. degree in weed science under the direction of Brent Sellers at the University of Florida. Her research focused on the management of paragrass (*Urochloa mutica*, an invasive weed) in the Florida Wetlands using chemical and cultural weed management practices. In 2011, Sushila began her PhD program in weed science with Katie Jennings and David Monks at North Carolina State University. Her dissertation research focused on determining the critical period for weed control, and herbicide tolerance of grafted tomato and eggplant. Sushila provided leadership for additional research projects in blueberry, strawberry, sweetpotato, bell pepper, tomato, and cucumber. Sushila also conducted tomato grafting and weed identification workshops for growers, extension agents, and visiting scholars from Mali and Senegal. Sushila has authored two peer reviewed journal publications and co-authored several others. Sushila has presented at numerous professional meetings, including the Florida Weed Science Society, Florida Exotic Pest Plant Council Symposium, Weed Science Society of North Carolina (WSSNC), Northeastern Weed Science Society (NEWSS), Southern Weed Science Society (SWSS), Weed Science Society of America (WSSA), and American Society for Horticultural Science. She has won several awards including 1st place overall individual at the 2013 NEWSS weed contest, WSSNC Outstanding Ph.D. Graduate Student, WSSNC Endowment Scholarship, SWSS Endowment Enrichment Scholarship, four travel grants, and five awards for poster and paper presentations. Her goal is to work for an agricultural chemical company in research and development contributing to cutting-edge research and addressing the critical needs of growers and weed science.

Previous Winners of the Outstanding Graduate Student Award (PhD)

Year	Name	University
1998	Nilda Roma Burgos	University of Arkansas
1999	A. Stanley Culpepper	North Carolina State University
2000	Jason K. Norsworthy	University of Arkansas
2001	Matthew J. Fagerness	North Carolina State University
2002	William A. Bailey	North Carolina State University
2003	Shea W. Murdock	Oklahoma State University
2004	Eric Scherder	University of Arkansas
2005	Ian Burke	North Carolina State University
2006	Marcos J. Oliveria	Clemson University
2007	Wesley Everman	North Carolina State University
2008	Darrin Dodds	Mississippi State University
2009	Sarah Lancaster	Texas A & M University
2010	Tom Eubank	Mississippi State University
2011	Sanjeev Bangarwa	University of Arkansas
2012	Edinalvo (Edge) Camargo	Texas A&M University
2013	Kelly Barnett	University of Tennessee
2014	James McCurdy	Auburn University

2015 Fellow Award

Bobby Walls

Bobby Walls, Ph.D., is a Product Development Manager in Turf & Ornamentals for FMC Corp. Bobby received both his Masters degree and his Ph.D. from North Carolina State University in Crop Science. His career has focused on agricultural research to discover and develop new products and technology to improve production of food, fiber, materials for shelter, aesthetic value of the landscape.

Dr. Walls holds five patents for currently used herbicides. His work has concentrated on development of products and technologies primarily across the United States. However, he has experiences working in Canada, Brazil, Argentina and Mexico. He is a Certified Crop Advisor and Certified Professional Agronomist by the American Society of Agronomy.
His service to the SWSS includes being Chair of Membership, Necrology, and Continuing Education Committees as well as the Agronomic Section; and as a member of Local Arrangements, Public Relations, Legislative, and Graduate Student Committees. He also has been session moderator numerous times and a graduate student contest judge. Dr. Walls has published 38 abstracts in the SWSS proceedings dealing with weed science and pest management in Agronomic and Horticultural crops.

His professional boards include the Crop Protection Society of North Carolina, Weed Science Society of North Carolina, and The Certified Crop Advisors of North Carolina. He is an active member of the Northeast Weed Science Society (NEWSS) and holds membership in many state and national organizations related to the Agricultural industry.

Dr. Walls awards include two Innovation Awards from Professional Group of FMC; American Home Products' Agricultural Legislator Communicator' Advocate Award and Distinguished Service Award Weed Science Society of North Carolina. Bobby received the Crop Protection Association of North Carolina's Spirit Award. Previously, Dr. Walls was a Senior Field Researcher for American Cyanamid.

Prior to coming to FMC he served as Assistant Director of Agronomic Division – North Carolina Department of Agriculture and Consumer Services. Bobby resides in Goldsboro, NC with his wife Susan. They are the proud parents of one son, one daughter and two granddaughters. Bobby and Susan are members of the Rosewood First Baptist Church.

2015 Fellow Award

John Harden

John received a B.S. degree in Plant Protection and a Master's degree in Crop Science and Botany from North Carolina State University. Growing up on a family farm in eastern North Carolina, his passion was remaining involved in the agricultural community. After graduation in 1974, he joined BASF at their research farm in Greenville, MS, screening herbicides. Over the years with BASF he remained in R&D serving as a Market Development / Tech Service Rep; Tech Service Manager, Field Research Manager and currently as a Biology Project leader. The current focus is the development of various herbicides projects in cotton, peanuts, rice, and soybeans.

John first attended the SWSS in 1974. He has served on Local Arrangements, several Awards committees, Weed Contest, Executive Board, and as President of the SWSS in 2004-05. He is currently active in the WSSNC and WSSA.

John resides in Raleigh, NC and been married to Patricia for 42 years. They have 4 daughters and 2 granddaughters

Previous Winners of the Distinguished Service Award
(Renamed Fellow Award in 2015)

Year	Name	University/Company
1976	Don E. Davis	Auburn University
1976	V. Shorty Searcy	Ciba-Geigy
1977	Allen F. Wiese	Texas Agric. Expt. Station
1977	Russell F. Richards	Ciba-Geigy
1978	Robert E. Frans	University of Arkansas
1978	George H. Sistrunck	Valley Chemical Company
1979	Ellis W. Hauser	USDA, ARS Georgia
1979	John E. Gallagher	Union Carbide
1980	Gale A. Buchanan	Auburn University
1980	W. G. Westmoreland	Ciba-Geigy
1981	Paul W. Santelmann	Oklahoma State University
1981	Turney Hernandez	E.I. DuPont
1982	Morris G. Merkle	Texas A & M University
1982	Cleston G. Parris	Tennessee Farmers COOP
1983	A Doug Worsham	North Carolina State University
1983	Charles E. Moore	Elanco
1984	John B. Baker	Louisiana State University
1984	Homer LeBaron	Ciba-Geigy
1985	James F. Miller	University of Georgia
1985	Arlyn W. Evans	E.I. DuPont
1986	Chester G. McWhorter	USDA, ARS Stoneville
1986	Bryan Truelove	Auburn University
1987	W. Sheron McIntire	Uniroyal Chemical Company
1987	no nomination	
1988	Howard A.L. Greer	Oklahoma State University

1988	Raymond B. Cooper	Elanco
1989	Gene D. Wills	Mississippi State University
1989	Claude W. Derting	Monsanto
1990	Ronald E. Talbert	University of Arkansas
1990	Thomas R. Dill	Ciba-Geigy
1991	Jerome B. Weber	North Carolina State University
1991	Larry B. Gillham	E.I. DuPont
1992	R. Larry Rogers	Louisiana State University
1992	Henry A. Collins	Ciba-Geigy
1993	C. Dennis Elmore	USDA, ARS Stoneville
1993	James R. Bone	Griffin Corporation
1994	Lawrence R. Oliver	University of Arkansas
1994	no nomination	
1995	James M. Chandler	Texas A & M University
1995	James L. Barrentine	Dow Elanco
1996	Roy J. Smith, Jr.	USDA, ARS Stuttgart
1996	David J. Prochaska	R & D Sprayers
1997	Harold D. Coble	North Carolina State University
1997	Aithel McMahon	McMahon Bioconsulting, Inc.
1998	Stephen O. Duke	USDA, ARS Stoneville
1998	Phillip A. Banks	Marathon-Agri/Consulting
1999	Thomas J. Monaco	North Carolina State University
1999	Laura L. Whatley	American Cyanamid Company
2000	William W. Witt	University of Kentucky
2000	Tom N. Hunt	American Cyanamid Company
2001	Robert M. Hayes	University of Tennessee
2001	Randall L. Ratliff	Syngenta Crop Protection

2002	Alan C. York	North Carolina State University
2002	Bobby Watkins	BASF Corporation
2003	James L. Griffin	Louisiana State University
2003	Susan K. Rick	E.I. DuPont
2004	Don S. Murray	Oklahoma State University
2004	Michael S. DeFelice	Pioneer Hi-Bred
2005	Joe E. Street	Mississippi State University
2005	Harold Ray Smith	Biological Research Service
2006	Charles T. Bryson	USDA, ARS, Stoneville
2006	no nomination	--
2007	Barry J. Brecke	University of Florida
2007	David Black	Syngenta Crop Protection
2008	Thomas C. Mueller	University of Tennessee
2008	Gregory Stapleton	BASF Corporation
2009	Tim R. Murphy	University of Georgia
2009	Bradford W. Minton	Syngenta Crop Protection
2010	no nomination	--
2010	Jacquelyn "Jackie" Driver	Syngenta Crop Protection
2011	no nomination	--
2011	no nomination	--
2012	Robert Nichols	Cotton Incorporated
2012	David Shaw	Mississippi State University
2013	Renee Keese	BASF Company
2013	Donn Shilling	University of Georgia
2014	Tom Holt	BASF Agricultural Products
2014	Dan Reynolds	Mississippi State University

Previous Winners of the Weed Scientist of the Year Award

Year	Name	University
1984	Chester L. Foy	VPI & SU
1985	Jerome B. Weber	North Carolina State University
1986	no nominations	--
1987	Robert E. Frans	University of Arkansas
1988	Donald E. Moreland	USDA, ARS, North Carolina
1989	Roy J. Smith, Jr.	USDA, ARS, North Arkansas
1990	Chester McWhorter	USDA, ARS, Mississippi
1991	Ronald E. Talbert	University of Arkansas
1992	Thomas J. Monaco	North Carolina State University
1993	A. Douglas Worsham	North Carolina State University
1994	Stephen O. Duke	USDA, ARS, Mississippi
1995	Lawrence R. Oliver	University of Arkansas
1996	William L. Barrentine	Mississippi State University
1997	Kriton K. Hatzios	VPI & SU
1998	G. Euel Coats	Mississippi State University
1998	Robert E. Hoagland	USDA, ARS, Mississippi
1999	James H. Miller	U.S. Forest Service
2000	David R. Shaw	Mississippi State University
2001	Harold D. Coble	North Carolina State University
2002	no nominations	--
2003	John W. Wilcut	North Carolina State University
2004	Gene D. Wills	Mississippi State University
2005	R. M. Hayes	University of Tennessee
2006	James L. Griffin	Louisiana State University
2007	Alan C. York	North Carolina State University

2008	Wayne Keeling	Texas A&M University
2009	W. Carroll Johnson, III	USDA, ARS, Tifton
2010	Don S. Murray	Oklahoma State University
2011	Krishna Reddy	USDA, ARS, Mississippi
2012	Daniel Reynolds	Mississippi State University
2013	Barry Brecke	University of Florida
2014	no nomination	

Past Presidents of the Southern Weed Science Society

1948-49 C.A. Brown
1949-50 E.C. Tullis
1950-51 O.E. Sell
1951-52 G.M. Shear
1952-53 D.A. Hinkle
1953-54 W.B. Ennis, Jr.
1954-55 W.C. Shaw
1955-56 G.C. Klingman
1956-57 W.B. Albert
1957-58 E.G. Rogers
1958-59 R. Behrens
1959-60 V.S. Searcy
1960-61 R.A. Darrow
1961-62 W.K. Porter, Jr.
1962-63 J.T. Holstun, Jr.
1963-64 R.F. Richards
1964-65 R.E. Frans
1965-66 D.E. Wolf
1966-67 D.E. Davis
1967-68 R.A. Mann
1968-69 W.L. Lett, Jr.
1969-70 J.B. Baker
1970-71 D.D. Boatright
1971-72 J.R. Orsenigo
1972-73 T.J. Hernandez
1973-74 A.F. Wiese
1974-75 W.G. Westmoreland
1975-76 P.W. Santlemann
1976-77 A.J. Becon
1977-78 G.A. Buchanan
1978-79 C.G. Parris
1979-80 M.G. Merkle
1980-81 C.E. Moore
1981-82 J.B. Weber
1982-83 J.E. Gallagher
1983-84 C.G. McWhorter
1984-85 W.S. McIntire
1985-86 R.E. Talbert
1986-87 H.M. LeBaron
1987-88 R.L. Rogers
1988-89 L.B. Gillham
1989-90 L.R. Oliver
1990-91 J.R. Bone
1991-92 J.M. Chandler
1992-93 J.L. Barrentine
1993-94 A.D. Worsham
1994-95 P.A. Banks
1995-96 S.O. Duke
1996-97 B.D. Sims
1997-98 R.M. Hayes
1998-99 R.L. Ratliff
1999-00 D.S. Murray
2000-01 L.L. Whatley
2001-02 J.E. Street
2002-03 J.W. Wells
2003-04 W.W. Witt
2004-05 J.S. Harden
2005-06 D.R. Shaw
2006-07 J.A. Driver
2007-08 D.W. Monks
2008-09 A.M. Thurston
2009-10 D.B. Reynolds
2010-11 T.J. Holt
2011-12 B.J. Brecke
2012-13 T.C. Mueller
2013-14 S.T. Kelly
2014-15 S.A. Senseman

List of SWSS Committee Members
January 31, 2014 – January 31, 2015

100. SOUTHERN WEED SCIENCE SOCIETY OFFICERS AND EXECUTIVE BOARD

100a. OFFICERS
President – Scott Senseman 2015
President Elect – Brad Minton 2016
Vice-President – Peter Dotray 2017
Secretary-Treasurer – Daniel Stephenson 2015
Editor – Nilda Burgos 2015
Immediate Past President – Steve Kelly 2015

100b. ADDITIONAL EXECUTIVE BOARD MEMBERS
Member-at-Large - Academia – Scott McElroy 2016
Member-at-Large - Academia – Jason Bond 2015
Member-at-Large - Industry - Drew Ellis 2014
Member-at-Large- Industry – John Richburg 2015
Representative to WSSA – Eric Palmer 2015

100c. EX-OFFICIO BOARD MEMBERS
Constitution and Operating Procedures – Carroll Johnson 2016
Business Manager - Phil Banks
Student Representative – Garrett Montgomery 2015
Web Master – David Kruger
Newsletter Editor - Bob Scott

101. SWSS ENDOWMENT FOUNDATION

101a. BOARD OF TRUSTEES - ELECTED
Nilda Burgos, President - 2015
Renee Keese, Secretary - 2016
James Holloway - 2017
Brent Sellers – 2018
Darrin Dodds - 2019

101b. BOARD OF TRUSTEES - EX-OFFICIO
Daniel Stephenson (SWSS Secretary-Treasurer)
Peter Dotray (SWSS Finance Committee Chair, VP)
Phil Banks (SWSS Business Manager)
Wiley C. Johnson (SWSS Constitution & Operating Proc. Committee Chair)
Ryan Miller (SWSS Student Representative)

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

Eric Prostko - 2015	Steve Enloe - 2015
Vernon Langston - 2015	Randall Ratliff – 2015
Steve Kelly** 2015	Greg Stapleton – 2015

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

102a. SWSS Fellow Award (Formerly Distinguished Service Award Subcommittee)

F. Carey	2015	Brent Sellers	2016	Dan Reynolds	2017
E. Prostko*	2015	Bob Scott	2016	Robert Nichols	2017
Randall Ratliff	2015	Tom Mueller	2016	John Byrd	2017

102b. Outstanding Young Weed Scientist Award Subcommittee

David Shaw	2015	David Gealy	2016	Eric Palmer	2017
G. Stapleton*	2015	Nilda Burgos	2016	Shawn Askew	2017

102c. Outstanding Educator Award Subcommittee

Stephen Enloe*	2015	S. Culpepper	2016	Greg Armel	2017
Shea Murdock	2015	Peter Dittmar	2016	James Griffin	2017

102d. Outstanding Graduate Student Award Subcommittee

Vern Langston*	2015	Neil Rhodes	2016	Vinod Shivrain	2017
Mike Barrett	2015	Stephen Enloe	2016	Neha Rana	2017

103. COMPUTER APPLICATION COMMITTEE (STANDING)

Shawn Askew*	2015	Michael Cox	2015	Angela Post	2015

104. CONSTITUTION AND OPERATING PROCEDURES COMMITTEE (STANDING)

Wiley C. Johnson* 2016

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

Peter Dotray*	2016		
Bruce Kirksey	2015	Brad Minton	2015
Daniel Stephenson	2017	Nilda Burgos (ex-officio)	

106. GRADUATE STUDENT ORGANIZATION

President – Blake Edwards (Miss. State)
Vice President – Garret Montgomery (Miss. State)
Secretary – Sandeep Rana (Virginia Tech)
Weed Resistance and Technology Stewardship rep – Matthew Wiggins (Tennessee)
Student Program Committee Rep – Andy Brown (Miss. State)
Endowment Committee rep – Ryan Miller (Arkansas)

107. WEED RESISTANCE AND TECHNOLOGY STEWARDSHIP (ad hoc)

Jason Bond*	Hubert Menne
Peter Dotray	Jason Norsworthy
Matthew Wiggins (2015)	Eric Palmer
Tom Eubank	Hunter Perry
Jim Griffin	Andrew Price
Griff Griffith	Eric Prostko
Andy Kendig	Larry Steckel
Ramon Leon	Daniel Stephenson

108. HISTORICAL COMMITTEE (STANDING)

William Witt* 2016
John Byrd 2017

109. LEGISLATIVE AND REGULATORY COMMITTEE (STANDING)

Bob Nichols* 2016
Director of Science Policy – Lee Van Wychen – *ad hoc*
Chair of the WSSA Science Policy Committee – Donn Shilling – *ad hoc*
Member – Bill Vencill
Member – Angela Post
At Large Member of Executive Board – James Holloway
At Large Member of Executive Board – Vernon Langston
At Large Member of Executive Board – Joyce Tredaway-Ducar
At Large Member of Executive Board – Scott McElroy
WSSA Liaison to EPA – Mike Barrett - *ad hoc*

110. LOCAL ARRANGEMENTS COMMITTEE - 2015 MEETING (STANDING)

Larry Newsome* 2015

111. LONG-RANGE PLANNING COMMITTEE (STANDING) - *Shall consist of the previous five presidents with the most recent past-president serving as Chair.*

Steve Kelly	2019	Tom Mueller*	2018	Barry Brecke	2017	Tom Holt	2016
Dan Reynolds	2015						

112. MEETING SITE SELECTION COMMITTEE (STANDING) - *Shall consist of six members and the SWSS Business Manager. The members will be appointed by the President on a rotating basis with one member appointed each year and members shall serve six-year terms. The Chairmanship will rotate to the senior committee member from the geographical area where the meeting will be held.*

G. Schwarzlose	2019	T. Grey	2015	Eric Webster	2020
J. Norsworthy	2016	M. Edwards	2017	G. Oliver	2018

P. Banks - Business Mgr. (Ex-officio)

113. NOMINATING COMMITTEE (STANDING) - *Shall be composed of the Past President as Chair and the Board of Directors as members who provide input and help solicit nominees.*

Steve Kelly* 2015

114. PROGRAM COMMITTEE - 2014 MEETING (STANDING)

Brad Minton - 2015

115. PROGRAM COMMITTEE - 2015 MEETING (STANDING)
Peter Dotray – 2016

116. RESEARCH COMMITTEE (STANDING)
Peter Dotray* - 2015

Alabama – Joyce Tredway Ducar	North Carolina – Wes Everman
Arkansas – Bob Scott	Oklahoma – Todd Baughmann
Florida – Ramon Leon	South Carolina – Mike Marshall
Georgia – Eric Prostko	Tennessee – Larry Steckel
Louisiana – Donnie Miller	Texas – Peter Dotray
Mississippi – John Byrd	Virginia – Shawn Askew
Missouri – Kevin Bradley	

117. RESOLUTIONS AND NECROLOGY COMMITTEE (STANDING)

David Black*	2016	Peter Dittmar	2016	Larry Walton	2016

118. SOUTHERN WEED CONTEST COMMITTEE (STANDING)

S. Askew	J. Griffin	
N. Burgos	G. MacDonald	W. Vencill
P Dotray	S. McElroy	E. Webster
T. Eubank*	T. Mueller	
W. Everman*	D. Reynolds	open to all SWSS members

119. STUDENT PROGRAM COMMITTEE (STANDING)

Hunter Perry, 2017	Drew Ellis*, 2015	Matt Goddard**, 2016

120. WEED IDENTIFICATION COMMITTEE (STANDING)

Angela Post	2015	Katelyn Venner 2015

121. SUSTAINING MEMBERSHIP COMMITTEE (STANDING)

Cheryl Dunne	2015	Bruce Kirksey*	2015	Daniel Stephenson	2015
Hunter Perry	2015	Trey Koger	2016		

122. CONTINUING EDUCATION UNITS COMMITTEE (SPECIAL)

Tim Adcock	2016	Matt Matocha	2016
Shawn Askew	2016	Pat McCullough	2016
Todd Baughmann	2016	Scott McElroy	2016
John Byrd	2016	Ken Muzyk	2016
Alan Estes	2016	Bob Scott	2016
Travis Gannon	2016	Ron Strahan	2016
Mike Harrell	2016	Bobby Walls*	2016

123. MEMBERSHIP COMMITTEE (SPECIAL)

Chad Brommer*	2015
Cecil Yancy	2015

Minutes SWSS Executive Board Meeting
Thursday, June 26 and Friday June 27, 2014
Hyatt Regency Hotel
1:00 pm to 10:00 am

Thursday, June 26, 2014:

Scott Senseman called meeting to order at 1:00pm, then made introductions. We made arrangements for dinner.

Attending: **Scott Senseman**-President; **Carroll Johnson**-Constitution and By-laws; **Larry Newsom**-Local Arrangements; **John Richburg**-Member at Large, Industry; **Vernon Langston**-Member at Large, Industry; **Steve Kelly**-Past President; **Garrett Montgomery**-President, Student; **Jason Bond**-Member at Large, Academia; **Daniel Stephenson**-Secretary/Treasurer; **Nilda Burgos**-Proceedings Editor; **Blake Edwards**-Vice President, Student; **Phil Banks**-Business Manager; **Eric Palmer**-WSSA Representative; **Peter Dotray**-Vice President; **Scott McElroy**-Member at Large, Academia; **Brad Minton**-President-Elect/Program Chair

Absent: **Bob Scott**-Newsletter Editor; **David Krueger**-WebMaster

Meeting Agenda, Scott Senseman: See last page. No changes required.

Jason Bond made motion to accept, Brad Minton second; PASSED UNAMINOUSLY

Past Minutes, Daniel Stephenson: Minutes of past board meetings read.

Jason Bond made motion to accept, Peter Dotray second; PASSED UNAMINOUSLY

Proceedings Update, Nilda Burgos: The 2014 proceedings are 399 pages. There were 259 abstracts submitted; however no abstracts were provided for 18 paper/poster submissions. Specific breakout of sessions was as follows: Agronomic Section: 110; Turf Section: 28; Pastures and Rangeland: 12; Horticulture: 9; Forestry: 5; Right-Of-Ways: 4; Physiological: 8; Education: 4; Most Common/Troublesome (Ted Webster). Uploading to the website is pending, waiting on a couple of committee reports and the President's address.

Carroll Johnson motioned to accept the Proceedings, Vernon Langston second; PASSED UNAMINOUSLY

Nilda Burgos began discussion of limiting abstracts to one page. Discussion occurred among BOD concerning possible methods. Brad Minton will discuss possible ways to limit abstracts to one page using the online abstract submission process with David Krueger, WebMaster.

2017 SWSS Annual Meeting Location, Phil Banks: Site Selection Committee has not provided a recommendation. Request for Proposals have been sent to Birmingham, AL (Hyatt – Winfrey Hotel), Memphis, TN (Peabody – downtown), Murfreesboro, TN (Embassy Suites).

Options for 2017 meeting will be voted on by BOD via an electronic vote to occur on Friday, July 25th.

2016 Joint Meeting with WSSA – San Juan, PR, Phil Banks: Contract has been adjusted to accommodate student rooms and all the rooms we need for SWSS sections not specifically covered by WSSA sections. Joyce Lancaster asked if SWSS wants to have joint summer BOD meeting with WSSA summer BOD meeting. WSSA BOD will meet July 6, 7, 8, 2015 at hotel in San Juan. $139/night without tax included. Sheraton Hotel is not on the beach. Banks asked if SWSS BOD would like to meet with WSSA BOD? Discussion among BOD followed. SWSS BOD will meet separately from WSSA BOD, but will tour facility with WSSA BOD. Scott Senseman said that meeting with WSSA would require an additional 0.5 days for the SWSS summer BOD meeting.

Eric Palmer made motion to meet have 2016 SWSS summer BOD meeting in conjugation with WSSA at hotel in San Juan, PR; Peter Dotray second; PASSED UNAMINOUSLY.

<u>Financial Report, Phil Banks</u>:

Business Manager Report submitted via email

Business Manager's Report for the Summer Board Meeting: Savannah Hyatt, June 26 and 27, 2014.

The attached financial forms detail our current situation. We had a net operating profit of $ 24,909 for the 2013-2014 fiscal year (ended May 31, 2014) which is $5,000 more than the previous fiscal year. This information was given to our tax accountant and we will be submitting all needed tax forms within the next few weeks. Total attendance at the 2014 Birmingham meeting was 355 (256 regular members and 99 students). Meeting attendance was almost identical to that of the Houston meeting in 2013. There were an additional 6 spouse/friend registrations (down from 11 in Houston, TX). It is expected that the Savannah meeting will draw a larger spouse/friend registration number due to location. Overall attendance is about the average over the past 10 meetings (see attached attendance and membership data sheet). The Society Membership is an estimate due to a glitch in the website. The golf tournament generated approximately $8,000 for the Endowment Fund (a $3,000 increase from the Houston meeting) with membership donations totaling $1,420.00 (down by over $1,600 from the previous year).

I recommend the same fee schedule as used for the Birmingham meeting: $ 275.00 for regular members, $100 for students, and $ 100 for walk-in one day registration. Walk-in full registration would be $ 325.00 for regular members and $ 125.00 for students.

I have worked with Joyce Lancaster of WSSA for our joint 2016 annual meeting in San Juan, Puerto Rico and we have signed a Memorandum of Understanding for the meeting. This has been shared with Program Chair, Pete Dotray and he will be working with the WSSA Program chair to ensure a smooth integration of the two programs. Upon the recommendation of the Site Selection committee, I submitted an RFP to hotels in Nashville, Memphis, Birmingham, Tunica, and surrounding areas. Proposals have been submitted by Birmingham Hyatt, the Memphis Peabody, and the Murfreesboro Embassy Suites. I have had communications with one hotel in Tunica but no proposal has been submitted. Nashville hotels (Omni and Opryland) either did not have availability for our proposed dates or had very high room rates (mid $200's). The proposals have been shared with the Site Selection committee.

The new website had a few glitches in it when first launched but worked adequately for the 2014 meeting registration and has been improved since then. We used the website to post information about the 2014 Weed Contest and I can do much of the updating without going through the web master for most things.

I will be relocating to Washington, DC in mid-July but all contact information for SWSS members will remain the same and my office in Las Cruces will continue to process much of the meeting registration paperwork.

Submitted by Phil Banks, Business Manager

Total Assets on May 31, 2008	242,242.37	-10,079.63
Total Assets on May 31, 2009	239,102.58	-3,139.79
Total Assets on May 31, 2010	247,056.17	7,953.59
Total Assets on May 31, 2011	264,386.91	17,330.74
Total Assets on May 31, 2012	283,708.14	19,321.23
Total Assets on May 31, 2013	303,001.03	19,292.89
Total Assets on May 31, 2014	327,910.57	24,909.54

Larry Newsom stated that BASF covers spouses program and has been for past 5 years and would continue: Banquet tickets are provided to spouses to encourage their attendance. Phil Banks pointed out that during online registration, the person registering has to click on the form that their spouse will be attending the banquet. They give banquet ticket to get them to come.

Peter Dotray stated that he noted decreased attendance at some sites where the SWSS annual meeting was held. He asked it that was a blip in the data. Phil Banks answered yes.

Brad Minton motioned to approve the Financial Report, Jason Bond second; PASSED UNAMINOUSLY.

Program Update, Brad Minton:

Potential Options for Program Topics:

Time Management – Continuation of McElroy's idea from 2014 annual meeting because speakers did not show up
Future Technologies - Application technologies, precision agriculture; RNA advancements; HR crops; drones; Update on Herbicide Resistance Summit
What's new from industry
Professional Activities - how not to get overwhelmed

Vernon Langston suggested merging some sections because of low number of papers. Carroll Johnson asked if it is worth approaching Forestry weed scientists to see if they wish to present at SWSS meeting. Steve Kelly stated that forestry scientist have their own society, but numbers are low and may come to our meeting. Nilda Burgos suggested the concept of virtual field tours (how, when, why?) as a possible topic for the 2015 meeting.

Brad Minton stated that the 2015 meeting theme has not been determined yet, but the theme will focus on something around new technologies. He mentioned a presentation concerning the Endowment Scholarship for the whole society. The possibility of interviewing scholarship winners about their experiences was discussed. Discussion among BOD continued and it was decided that Brad Minton would seek university public relations group to help. The primary objective is to advertise the Endowment Scholarship to get more applicants.

Brad Minton asked if the SWSS BOD should make it mandatory to upload presentations prior to meeting because many don't upload presentations prior to the meeting. That causes someone to sit for many hours (Shawn Askew has performed this task for many years), which is not fair. Brad Minton stated that if a presentation is not pre-uploaded, the presenter should find section chair and get presentation uploaded. Section Chair should download the presentations and get them prepared for presentation in section (give to moderators). Minton will get language in newsletter to tell membership.

Approval of Candidates for Elections, Steve Kelly:

Vice-President: Vernon Langston; Gary Schwarzlose

Member at Large – Academia: Patrick McCullough, Jay Ferrell; Joyce Tredaway-Ducar

Member at Large – Industry: Tim Adcock; Rene Keese; James Holloway

Endowment Trustee: Donnie Miller; David Black

Nilda Burgos made motion to approve candidates, John Richburg second; PASSED UNAMINOUSLY.

SWSS Fellow Award, Steve Kelly:

Ad-Hoc committee met at 2014 SWSS annual meeting in Birmingham and provided report shown in past minutes. Steve Kelly summarized report. Options are:

1. Convert all previous Distinguished Service Award (DSA) winner to SWSS Fellows;

2. Note past DSA winners and begin new Fellow Award. Currently active DSA winners can be nominated for Fellow Award.

Steve Kelly stated that he does not feel that all DSA winners should automatically become SWSS Fellows because that would give the SWSS over 100 Fellows and that the DSA and Fellow awards are not equal. Carroll Johnson stated DSA winners should remain as DSA recipients, but should be eligible for nomination as a Fellow. Steve Kelly also stated that the Weed Scientist of the Year (WSY) will be discontinued; therefore, the DSA and WSY will no longer be awarded. The SWSS Fellow award will be the highest honor awarded by the SWSS. Scott Senseman asked for a straw poll to determine the BOD's feelings about the two options presented by Steve Kelly. Straw poll results were:

1. Convert all previous Distinguished Service Award (DSA) winner to SWSS Fellows

    No votes in favor

2. Note past DSA winners and begin new Fellow Award. Currently active DSA winners can be nominated for Fellow Award.

    Unanimous yes

Motion stating the BOD vote is to be made the next day of the SWSS Summer BOD meeting by Steve Kelly.

Constitution and By-Laws, Carroll Johnson:

See details in the Reports Section.

Carroll Johnson presented errors or omissions in the SWSS Constitution that needed correcting. These changes require notification in the SWSS Newsletter and vote by SWSS membership at the 2015 Business Meeting in Savannah.

Vernon Langston made a motion to bring the proposed changes to SWSS Constitution to the SWSS membership, Brad Minton second; PASSED UNANIMOUSLY

Carroll Johnson presented errors or omissions in the SWSS MOP that needed correcting (shown in the Reports Section). These changes require vote of BOD.

Steve Kelly made a motion to accept the changes to SWSS MOP, Brad Minton second; PASSED UNANIMOUSLY

Old Business, Scott Senseman:

Jason Bond stated that the Weed Resistance and Technology Stewardship committee officers' succession plan has been determined. However, he asked the BOD to help determine who should be actual members of the committee and how many? How can this be determined? Need enough members to cover herbicide-resistance and technology components. BOD discussion followed. It was determined that the Manual of Operating Procedures (MOP) needs to state that committee officers will decide members, but the committee must have a minimum of 8 members representing university, USDA-ARS, and industry. Members of the committee will serve for five years.

New Business, Scott Senseman

Scott Senseman introduced Leadership Development of BOD members. He stated that David Shaw, Tom Mueller, and Scott Senseman attended a leadership conference in the past and that was really good training. The SWSS BOD paid for their trip. It would be good for three members of BOD to attend this training in the next couple of years. Senseman will pursue the investment to send BOD members to the leadership training.

Phil Banks stated that BOD training was offered at the 2013 SWSS annual meeting in Houston; however, there was no participation. BOD training was not offered at the 2014 meeting in Birmingham due to lack of time and that finding a time during to give the training during the annual meeting is difficult. The training teaches the structure of SWSS BOD and how it works. It is designed for future members of BOD. Discussion was not continued.

Scott Senseman asked the BOD about social media (LinkedIn, Twitter, and Facebook) possibilities to promote the SWSS. Jason Bond stated that he successfully utilizes Twitter as an extension tool. McElroy does it as well in a similar fashion. Senseman stated that social media a good way to market the SWSS. Discussion was not continued.

Hotel walk-through

Adjourn – 5:00 pm

Friday, June 27, 2014

Scott Senseman called meeting to order at 7:30am.

New Business continued, Scott Senseman:

Director Science Policy contract, Scott Senseman:

Discussion followed concerning the continued support of this position. BOD sees value in this position.

Carroll Johnson made motion to approve funding of Science Policy Contract, Peter Dotray second. Discussion: Carroll Johnson stated that Lee Van Wychen gives the SWSS a voice in Washington D.C. PASSED UNAMINOUSLY.

Legislative and Regulatory Committee, Scott Senseman:

Bob Nichols, chairman of the Legislative and Regulatory Committee, requested via email for more young members on the committee. Nichols asked for at least 6-8 members who are of age 30-50. Scott Senseman suggested that sometime during the 2nd year of a BOD's member at large tenure be spent with the Legislative and Regulatory Committee. Senseman felt that this was a good way to get younger SWSS membership on the committee. For BOD to help, Bob Nichols needs to make a formal request.

Membership Committee, Scott Senseman:

Chad Bonner, chairman of the Membership Committee, requested via email that the number of members on the Membership Committee be increased. Carroll Johnson stated that the Membership Committee is not in the MOP. Phil Banks added that it is an Ad-hoc committee; therefore, the president decides whether to add more members.

Endowment Foundation, Nilda Burgos:

A. Endowment Scholarship Update

Three recipients (three applicants):

1. Matthew Inman; mdinman@ncsu.edu (North Carolina State) – with Tim Adcock, Diligence Technologies, July 21 - 25. Going to Milan No-till Field Day.

2. Ethan Parker; etp0005@tigermail.auburn.edu (Auburn University) – with Peter Dittmar, University of Florida, last week of August. Will visit vegetable plots located near Tampa, and the blueberry/ peach research conducted with various growers in south Florida. Will participate in spraying plots on raised beds and laying plastic.

3. Vijay Singh; vijay@uark.edu (University of Arkansas) – with Syngenta Crop Protection, May 19 – 23. Visited research sites at Greensboro, NC; Syngenta Biotechnology Institute, NC; Vero Beach, FL

   Syngenta Site Leads & activity:

   Greensboro – Monika Saini (Lead). Formulation and pilot plant tour; Syngenta R&D overview; student research presentation

   SBI – Marie Sykes (Lead). General Biotechnology overview; Tour of Cornwallis Facility (Labs: Omics, BioStress, Product Safety, etc.); tour of the Advanced Crop Laboratory

   Vero Beach – Vinod Shivrain (Lead). Overview of research facility; greenhouse trials tour; field research tour; student research presentation

B. Meeting highlights from January 2014:

Hunter Perry was nominated to Steve Kelly for election to the Endowment Board. Organized the golf tournament in 2014. Pledged to do it again in 2015. James Holloway will assist.

The new graduate student representative is Ryan Miller, a Ph.D. student at the University of Arkansas. Ryan was added to the Endowment Board members at the end of the meeting.

Action plan for next year

- Have stickers to note Endowment contributors and items for auction.
- President and Secretary should meet with Phil Banks prior to the Endowment Committee Meeting (night before or a conference call).

- Check on SOP for Committee. If none, create one. Include responsibilities, meetings, solicitations for Enrichment Experience, judging the applications, golf tournament organization, etc.

Note: at the Board meeting - No MOP for the Endowment and present this at the January meeting 2015. This Organization is under the supervision of the Executive Board.

In addition, Nilda Burgos request help promoting the Endowment Scholarship because numerous applications were received the first year the scholarship was offered, but three applications were received the second year. She also suggested that the students who were awarded the scholarship make a presentation to the entire SWSS membership, not just the students in their annual luncheon, about their experience. Garrett Montgomery stated that the students enjoyed the presentations during their luncheon and would like the recipients to continue to address the students alone in addition to making a presentation to the entire membership. Blake Edwards stated that the scholarship opportunity needed to be advertised better to increase applications. Phil Banks said that the information is emailed and on www.swss.ws. Scott Senseman mentioned advertising via Facebook, Twitter, etc. to notify students.

Nilda Burgos stated that the annual golf tournament is the biggest fund raiser for the Endowment Foundation. Also, Hunter Perry will coordinate the 2015 golf tournament in Savannah. Nilda stated that Hunter Perry is very active with the Endowment Foundation even though he is not an elected member of the committee. Steve Kelly stated that he already had two candidates for the Endowment Foundation committee seat for the upcoming election and asked if the BOD wish to amend the motion to accept candidates for elections passed earlier. Scott Senseman stated that he would nominate Hunter Perry for the Endowment Fund committee at the 2016 summer BOD meeting. Nilda also requested that the Endowment Foundation President, Vice-President, and Secretary discuss finances of the Endowment via conference call with Phil Banks prior to the 2016 meeting in Savannah. Phil agreed.

Carroll Johnson pointed out that nothing concerning the Endowment Foundation committee is stated in the MOP and under the supervision of the BOD; thus needs to have a section in the MOP. Nilda agreed to create a draft proposal to be presented to the BOD at the first meeting prior to the 2016 meeting in Savannah.

Photos, Scott Senseman:

BASF requested use of photos in the “Weeds of the South” book. Scott directed them to contact Mike DeFelice. Mike DeFelice stated, via email to Scott Senseman, that the SWSS does not own the photos and that any company wishing to use the photos had to contact the photographer. However, photos can be used for education purposes without seeking photographer permission. Therefore, if any member of the BOD is asked about using photos from the “Weeds of the South” book, they are to direct them to contact Mike DeFelice.

Weed Contest, Scott Senseman:

Currently, Tom Eubank is the chair of the Weed Contest Committee. However, he is no longer with Mississippi State University and wishes to resign as chairman. He will continue his duties through the 2015 contest and Wes Everman will assume duties as chair of the committee after the 2015 contest. The contest will be held at the AgriCenter in Memphis. Banks stated that nine teams from seven universities will be competing. As of the summer BOD meeting, the SWSS had received $17,300 from companies sponsoring the Weed Contest. The budget from the AgriCenter to host the contest is close to $20,000.

Discussion began about the rotation of academia/industry sites hosting the event is working, but the event is very taxing for academic sites because only a single academic weed scientist will be stationed at the contest site; therefore, making is very difficult to coordinate the event. All agree that weed contest is valuable for training students. Scott McElroy stated that the SWSS should consider rotating with Northeastern Weed Science Society as host for contest. As of the summer BOD meeting, no site has agreed to host the 2016 weed contest.

Excellence in Regulatory Stewardship Award, Scott Senseman:

Steve Kelly and the Awards Committee will draft qualifications for award. Since this award will be sponsored by Monsanto, the committee will seek input of Monsanto. The Awards Committee will submit draft qualifications proposal to the SWSS BOD.

The draft qualifications proposals for the Excellence in Regulatory Stewardship Award will be voted on by BOD via an electronic vote to occur on Friday, July 25th.

Fellow Award, Senseman:

Scott Senseman asked Steve Kelly to read the motion. Kelly stated the following "The Distinguished Service Award and Weed Scientist of the Year are discontinued and the SWSS Fellow Award will be highest award from SWSS". Kelly also stated that this will be sent to committee and will be announced in next newsletter for nominations and that there will be a 2% of the total membership cap on the number of Fellow Awards given each year. John Richburg asked the Awards Committee to be sure to state that past DSA winners are eligible for Fellow Award also.

Steve Kelly made a motion to discontinue the Distinguished Service Award and Weed Scientist of the Year and institute the Fellow Award as the highest award given by SWSS. Carroll Johnson second. PASSED UNAMINOUSLY.

Carroll Johnson asked permission to correct MOP by removing DSA and WSY and add Fellow Award. Carroll will present draft change to MOP at next BOD meeting.

Travel grants for students to attend International Weed Science Society meeting, Nilda Burgos:

The IWSS has an abstract contest where 20-30 students are selected to receive monies to travel. The WSSA and European Weed Science Society are funding the travel grants. The request for abstracts was advertised early 2014. Winning abstract receives full funding for travel. The remaining 20-30 students will receive 50% funding depending upon the total amount of money IWSS has.

Student Oral/Poster Score Sheet changes, John Richburg:

Hunter Perry, chairman of the Student Contest committee, has revised the oral and poster score sheets. These revised score sheets will be emailed to BOD for consideration.

The proposed changes to the SWSS student contest oral and poster score sheets will be voted on by BOD via an electronic vote to occur on Friday, July 25th.

New Business, Scott Senseman:

Jason Bond stated that many M.S. students are taking positions with industry; thus, greatly reducing the number of students seeking a Ph.D. in weed science. Essentially, academic weed scientists are decreasing at an alarming rate. Also, academia is having a hard time educating students because weed science courses are not taught due to the decrease in number of academia weed scientists. Senseman stated that industry is hiring M.S. students by giving high salaries or seasoned weed scientists are getting overwhelmed by requirements of academia; thus, they see industry as a better position. John Richburg stated that U.S. states with stakeholder influence have stronger agriculture programs and that poor influence leads to weak academia programs. Carroll Johnson suggested to make stakeholders aware of issue and allow them to voice their opinions to academia administrators.

Scott Senseman made a motion to adjourn at 10:10 am, Jason Bond second. PASSED UNAMINOUSLY.

SWSS Executive Board Email Minutes
July 23rd through July 28th, 2014

The Site Selection Committee could not reach a consensus on which of the three choices for the 2017 meeting. The choices were Peabody in Memphis, TN, Embassy Suites in Murfreesboro, TN, or Hyatt in Birmingham, AL. Based on the prices for the meeting rooms as well as how well the hotel in Birmingham preformed in 2014, it was suggested we return to the Hyatt Birmingham for the 2017 meeting.

An email was sent to BOD members from President Scott Senseman on July 23, 2014 requesting a vote on (1) New score sheets for the SWSS Student Oral/Poster Contest; (2) Location of 2017 SWSS Annual Meeting. The questions put forth for vote were:

1. Do you accept the new changes suggested in the new graduate student forms for the student contest?

2. Do you support the Birmingham Hyatt as the meeting hotel for 2017?

Response from BOD members provided votes. They were as follows:

1. Do you accept the new changes suggested in the new graduate student forms for the student contest? 12 yes, 0 no, one did not vote; PASSED.

2. Do you support the Birmingham Hyatt as the meeting hotel for 2017? 11 yes, 1 no, one did not vote; PASSED.

The BOD was also scheduled to vote on the new "Excellence in Regulatory Stewardship Award" via email vote on July 25th as well. However, the vote on that award will be delayed since the Awards Committee, chaired by Steve Kelly, is still reviewing the award parameters.

October 9th through October 14th, 2014

Following the request for nominations of SWSS awards, Eric Prostko, chairman of the SWSS Fellow Award Subcommittee, asked for clarification as to whether past winners of the Distinguished Service Award (DSA) were eligible for the Fellow Award. Randy Ratliff, chairman of the ad hoc SWSS Fellow Award Subcommittee, responded that the ad hoc committee did not intend for past DSA winners to be eligible. This issue arose because the BOD voted at the summer meeting to allow DSA winners to be eligible. Minutes from the summer BOD meeting pertaining to the SWSS Fellow Award was circulated to BOD members. During discussion at the summer BOD meeting, Steve Kelly erred when he informed the BOD that past DSA winners would be eligible. Therefore, a change in the requirements for eligibility for the SWSS Fellow Award was requested.

Steve Kelly made a motion to amend the eligibility requirements to reflect those suggested by the ad hoc SWSS Fellow Award Subcommittee that would prohibit past DSA winners from being awarded Fellow status since this award has essentially been renamed SWSS Fellow, Eric Palmer second; 10 yes, 1 no, 2 did not vote; MOTION PASSED.

SWSS Summer Board Meeting
June 26 & 27, 2014
MEETING AGENDA

Thursday, June 26	**Agenda Item**
	Lunch
	Confirmation of dinner reservations - Phil Banks Introductions and approval of agenda - Scott Senseman Secretary's Report - Daniel Stephenson
	Proceedings update - Nilda Burgos Approval of 2015 meeting location - Phil Banks Joint meeting with WSSA update in San Juan, PR - Phil Banks Financial overview and report - Phil Banks
	Program update - Brad Minton Upcoming officer candidate elections - Steve Kelly SWSS Fellow Award - Steve Kelly Inconsistencies in SWSS Constitution and Board Membership - Carroll Johnson
	Break
	Old Business - Board New Business - Scott Senseman • Use of photos from books and Weed Identification Guides - Mike Defelice email • Approval of Director of Science Policy contract (yearly) • Membership Committee Members - Chad Brommer email • Legislative and Regulatory Committee Members - Bob Nichols email • Social media - LinkedIn, Twitter and Facebook • Leadership Development for SWSS Future • Board of Directors Training
	Hotel facilities walk-through - Larry Newsome and Hyatt Hotel Staff
	Adjourn
	TBD Dinner as a group
Friday, June 27	**Agenda Item**
	Breakfast - Provided by SWSS
	Recap and review - Scott Senseman

Thursday, June 26	**Agenda Item**
	SWSS Weed Contest Update - Tom Eubank
	Endowment Fund - Nilda Burgos • Enrichment Scholarships • Golf Tournament
	Old and New Business - Scott Senseman
	Adjourn

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1. Do you accept the new changes suggested in the new graduate student forms for the student contest? 12 yes, 0 no, one did not vote; PASSED.

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Steve Kelly made a motion to amend the eligibility requirements to reflect those suggested by the ad hoc SWSS Fellow Award Subcommittee that would prohibit past DSA winners from being awarded Fellow status since this award has essentially been renamed SWSS Fellow, Eric Palmer second; 10 yes, 1 no, 2 did not vote; MOTION PASSED.

Minutes
SWSS Executive Board Meeting
Sunday, January 25, 2015
Hyatt Regency Hotel, Savannah, GA
7:00 pm to 9:00 pm

Scott Senseman called meeting to order at 7:00pm and then made introductions.

Attending: **Scott Senseman** - President; **Phil Banks** - Business Manager, **Jason Bond** - Member-at-Large Academia, **James Holloway** - incoming Member-at-Large Industry, **Eric Palmer** - WSSA representative, **John Richburg** - Member-at-Large-Industry, **Vernon Langston** - Member-at-Large Industry, **Peter Dotray** - Vice-President, **Gary Schwarzlose** - incoming Vice-President, **Scott McElroy** - Member-at-Large Academia, **Steve Kelly** - Past President, **Brad Minton** - President-Elect and Program Chair, **Nilda Burgos –** Proceeding Editor, **Garret Montgomery** - President, Student, **Joyce Tredaway Ducar** - incoming Member-at-Large Academia, **Larry Newsom** - Local Arrangements, **Carroll Johnson** - Constitution and By-Laws, **Lee Van Wychan** - Director of Science Policy, **Sandeep Rana** - Vice-President, Student, **Daniel Stephenson** - Secretary/Treasurer, and **Donnie Miller** - member of Endowment Committee

Absent: **Bob Scott** - Newsletter Editor

Meeting agenda, Scott Senseman:

No changes to agenda

Motion to accept agenda, Jason Bond, second Scott McElroy; PASSED UNANIMOUSLY

Weed Resistance APP, Ted Webster:

Ted Webster introduced a speaker to present a potential computer application (APP) under development by the Southern IPM Center in Tifton, GA. The APP would be used for early detection of herbicide resistant weeds and developed similarly to EDDMAPS from Bugwood Network located in Tifton. They are asking for the SWSS BOD's input for usefulness and would the SWSS be interested as a partner and to provide funding. A general discussion followed and the general consensus was that there was sufficient interest.

Scott Senseman appointed the Weed Resistance and Technology Stewardship Committee to review and make a recommendation to the BOD.

Jason Bond, Weed Resistance and Technology Stewardship Committee chairman, asked Ted Webster and his colleagues to give their presentation concerning the APP to the committee Monday morning. Jason said he would report back to the BOD.

Secretary report, Daniel Stephenson:

Copy of minutes from summer board of directors (BOD) meeting held June 25-27, 2014 and email minutes on July 23-28, 2014 and October 9-14, 2014 provided via email to BOD members on January 23, 2015

Motion to accept minutes; Vernon Langston; Jason Bond second; PASSED UNANIMOUSLY.

Local Arrangement Committee report, Larry Newsom:

Local arrangements are going well. Few issues with room keys, but those were corrected by hotel. Poster room is located near the river and members will have to cross stone road to get there by exiting the main hotel building. Member will need their room key to gain access back into the main hotel building. Syngenta is funding Graduate

Student Luncheon meal. BASF is funding quiz bowl and food during the quiz bowl. A low-country boil, fried chicken, and brisket will be served at SWSS banquet. There will be no slide presentations at banquet. All meeting rooms for presentations have microphones. Presentation rooms are small, but should have enough room for the majority of presentations. The BOD thanked Larry Newsom for his service to the SWSS.

Director of Science Policy Report, Lee Van Wychen:

See details in the Reports Section.

Lee Van Wychen reported that the improper use of the term "superweed" is an issue. The WSSA is drafting a proper definition. He praised the annual weed survey published in the SWSS proceedings and a desire to develop a weed survey on a national basis and the other weed science societies desire this as well. Lee stated that he is working with Mike Barrett and Jill Schroeder on the herbicide stewardship program and further details are outlined in his report.

Nilda Burgos asked if the call for proposals for federal grants would be similar to past years, which was confirmed by Lee.

General discussion concerning the monarch butterfly and milkweed. The BOD members were asked if they see milkweed on roadsides and ditches. It was noted that honeyvine and tropical milkweed are found in Arkansas. Activist groups wish to place the monarch butterfly on the endangered species list by claiming that Roundup Ready crops are the reason milkweed populations are decreasing; thus, the monarch butterfly populations are decreasing. The BOD was asked where milkweed populations can be found and confirmed. It was stated that milkweed is found in the mid-western U.S. and that they may have better population information. Lee stated that data needs to be presented showing that milkweed control measures are not the reason the monarch butterfly populations are decreasing.

Lee stated that he is hearing of issues between universities and industry concerning publication of research results. There is a current trend of agreements between universities and industry, but Lee is receiving complaints about agreements that prohibit publication of data from experiments with commercialized pesticides. Lee is seeking more information.

Eric Palmer stated that he has not seen this type of language on a pesticide label, but has seen it on seed labels.

John Richburg stated that if a pesticide is not registered for commercial use, then industry wishes to see the data before publication. However, if the pesticide is registered for commercial use, then the company does not have an issue with publication.

Lee Van Wychen stated that some pesticide companies have an issue with data concerning a product that is currently off-patent and the company doesn't want a competitor to take the university data and seek to reregister it for use.

Lee Van Wychen also mentioned the registration of Roundup Ready tall fescue by Scotts Company. Scotts asked the USDA for approval because if did not require registration with APHIS because Roundup Ready tall fescue is not genetically modified (transformed from a gene in another plant). The issue is that Scotts did not consult university or federal weed scientists.

Financial Overview Report, Phil Banks:

Phil said that 315-320 individuals registered since the report below was written. Adding potential on-site registrations, the total number registered could be close to 350. The number of available in the SWSS room block has been only issue thus far. Due to hotel renovating some rooms, some members who attempted to book their room close to the deadline were asked to see rooms at other hotels near the conference hotel. Golf tournament went well, with a possible $8,000 donation to endowment fund from the golf tournament. The site selection committee has begun the process of finding a location for the 2018 SWSS meeting and will be making a recommendation to the BOD at its summer meeting. The SWSS will have a joint meeting with the WSSA in San Juan, PR in 2016. Phil stated that he and Peter Dotray will be meeting with Joyce Lancaster and Kevin Bradley at 2015 WSSA meeting to begin meshing the two programs.

Summary of Financial Status:

The society has total assets of $327,910.57 as of 5/31/2014 with no liabilities. The distribution of funds is as follows: Money Market = $116,305.06; RBC Account = $114,474.81; SWSS checking = $62,167.69; Wells Fargo Savings = $34,963.01.

	Net worth	**Net change from previous year**
Total Assets on May 31, 2008	242,242.37	-10,079.63
Total Assets on May 31, 2009	239,102.58	-3,139.79
Total Assets on May 31, 2010	247,056.17	7,953.59
Total Assets on May 31, 2011	264,386.91	17,330.74
Total Assets on May 31, 2012	283,708.14	19,321.23
Total Assets on May 31, 2013	303,001.03	19,292.89
Total Assets on May 31, 2014	327,910.57	24,909.54

The society showed cash inflows last year of $125,340.56 primarily from annual meeting registration, meeting support from donations, and member dues. The society also showed income from sales of the books (approx. $2,200) and DVD sales (approx. $782). Cash outflows last year were $100,431.02 primarily from annual meeting expenses, managerial fees, and director of science policy. Other significant outflows include transfer of funds to the endowment fund and website design. Overall the society showed a net gain of $24,909.54 in 2014.

Program Committee Update, Brad Minton:

The Program came together nicely. There are a total of 274 presentations (95 posters, 179 oral presentations). The student contest has 54 papers and 18 posters; therefore, the contest will have to start at 7:15 am on Tuesday. Four papers have dropped from the contest. If the total number of papers rises 54 papers in future, a fourth student contest paper section will need to be added. The total number of student papers/posters has increased from numbers in the past.

Dr. David Shaw was originally scheduled to provide an update on Weed Resistance Summit at the Opening - General Session Monday, but is unable to attend the meeting. Dr. Jill Schroeder update the membership in Dr. Shaw's place. The SWSS Christian Fellowship breakfast was moved to Savannah room. Regulatory session added to program this year; however, some papers have been removed from the session.

Endowment Committee Update, Nilda Burgos:

Recipients of student Endowment Scholarship will present short reports at the General Session and a more interactive presentation at the Graduate Student Luncheon. The Endowment Committee meant to increase publicity of the student Endowment Scholarship at the 2015 SWSS annual meeting, but that was not accomplished; however, the committee will work with the next batch of scholarship recipients to better publicize in the future. More participation of students needs to be encouraged by the membership.

Phil Banks suggested the Endowment Committee published information concerning the scholarship in the SWSS newsletter to increase visibility. Nilda agreed and will begin in 2015.

Nilda added that Donnie Miller is a new member of the Endowment Committee.

Charles Bryson has donated items for auction for the Endowment again in 2015.

Nilda will provide official MOP for SWSS BOD approval at SWSS BOD summer meeting.

Charles Bryson has donated items for auction to help Endowment raise funds.

Nilda wants to provide official MOP to BOD for approval at the summer 2015 BOD meeting. Carroll Johnson agreed to help her with the MOP.

Nilda will write an article for the SWSS newsletter about how the Endowment helps the membership and students, how membership can help the Endowment.

WSSA Representative Update, Eric Palmer:

500 participants at the 2014 WSSA meeting in Vancouver. The 2015 WSSA annual meeting will be held in Lexington, KY. In 2016, the SWSS and WSSA will have a joint meeting in San Juan, PR. At the 2015 WSSA annual meeting, a 1st ever student poster contest will held. An app for mobile phones entitled Guidebook is available for attendees to schedule events at the 2015 WSSA. Also, the long term strategic plan of the WSSA will be placed on their website. The WSSA summer BOD meeting will be in San Juan July 6-9, 2015. The 2017 WSSA meeting will be held in Tucson, AZ.

Old Business, Scott Senseman:

Excellence in Regulatory Stewardship Award update, Steve Kelly:

See report from Steve Kelly below.

Excellence in Regulatory Stewardship Award

- *This award is sponsored by Monsanto and will be awarded yearly for five years beginning in 2016. (Nominations for the first award to be received in fall 2015).*
- *This award is for specific collaboration in the emerging applications of science and technology that require regulatory and stewardship protocols. This award recognizes scientists that model great interaction and collaboration between public and private institutions, establish multiyear outreach and support of the new technologies, and provide nonbiased feedback while extending research findings to the scientific and farming communities through publication and extension activities. Coaching and mentoring students in collaborative projects should also be exhibited. Other criteria can be added by the Excellence in Regulatory Stewardship Award committee.*
- *Eligible nominees include Industry personnel, Primary research or extension project leaders and their primary graduate students actively involved in conducting the research.*

- *The awards committee will consist of five members: 3 from academia, one industry, and one standing Monsanto representative. If a nominated PI is serving on the committee and is nominated, he/she should recuse themselves from discussion or voting. The committee shall be appointed by the awards committee chair (Past President).*
- *The selected program will be awarded a plaque and monetary awards to be allocated as follows: Principal Investigator, $2000, and remainder of the graduate team ($250 each), to a maximum total award of $3,000 unless extenuating circumstances. The graduate students should be the primary researchers and does not include technicians. Team members should be named during the nomination process. If a project has two lead PI's they should be awarded and the primary funds divided evenly. Graduate students providing minimal assistance should not be nominated.*
- *Nomination for the award will be received from the membership at large, similar to other SWSS awards.*
- *Beginning in year 2, previous recipients of the award will no longer be eligible to be nominated or receive the award. It is suggested that all graduate students*

The above report is the draft MOP for the Excellence in Regulatory Stewardship Award. Following approval for wording by Carroll Johnson, chairman Constitution and By-Laws Committee, it will be presented to the SWSS BOD at the summer meeting for final approval. Incoming Awards and Nominating Committee chairman Scott Senseman will appoint the committee for this award.

<u>2015 SWSS Award winners, Steve Kelly</u>:

Outstanding Educator Award: Nilda Burgos, University of Arkansas

Outstanding Graduate Student Award - M.S.: Garrett Montgomery, Mississippi State University

Outstanding Graduate Student Award - Ph.D.: Sushila Chaudhari, NC State University

SWSS Fellow Award: Bobby Walls, FMC

SWSS Fellow Award: John Harden, BASF

Outstanding Young Weed Scientist - Academia: Jim Brosnan, University of Tennessee

Outstanding Young Weed Scientist - Industry: none

<u>New Business</u>:

<u>Registration of retirees, Scott Senseman</u>:

The WSSA allows emeritus members free registration to their annual meeting. Recently, an emeritus member requested the SWSS waive their registration for the SWSS annual meeting. Do we need to make this a standing rule for all retired members (university or industry) of the SWSS? Phil Banks stated that other weed science societies allow fellows of the society to receive membership for life and reduced registration rate if they want to come to the annual meeting.

Motion to allow any retired fellow or former DSA, Weed Scientist of the year, or Fellow award winners to have free registration to the annual meeting for life; Scott McElroy; second Carroll Johnson; PASS UNANIMOUSLY.

<u>Legislative Committee, Scott Senseman</u>:

Scott Senseman stated that Bob Nichols reported that there is a great deal of activity in Washington concerning weed science. Bob said the Legislative Committee needed more SWSS membership to participate on the committee. Scott stated that the SWSS BOD needs to find ways get new persons on the committee. Scott suggested the possibility of BOD at-large members to also be a member of Legislative committee to interject new/more individuals onto the committee.

Carroll Johnson stated that incoming President Brad Minton be allowed to make appointments as he sees fit and that the MOP has no specific rules concerning this.

Scott Senseman suggested that outgoing BOD members-at-large become new members of the Legislative committee and asked Brad Minton to make future decisions. Scott Senseman asked current members-at-large to go to Legislative committee meeting Monday morning.

Carroll Johnson stated that the MOP did not require changing to add new members-at-large on the Legislative committee. It was decided that Members-at-large will serve on the Legislative committee the 2 years they serve as members of the BOD.

Leadership opportunities for officers, Scott Senseman:

Scott Senseman informed the BOD that past members (Tom Mueller, Scott Senseman, David Shaw) were sent to the Institute for Conservation of Leadership to learn about leadership. This topic was briefly discussed at summer BOD meeting in Savannah. Scott Senseman researched this possibility by contacting the Institute for Conservation Leadership and provided the following opportunities:

1. Joint training with BOD membership of other weed science societies for a group training session.

2. A leadership trainer comes to a SWSS BOD meeting and provides leadership training. The session would last for one day and would cost $2,500/person plus travel expenses.

Scott Senseman asked the BOD to consider these options for discussion at a later date.

Historical Committee, Carroll Johnson:

See report from Carroll Johnson in the Reports Section:

Carroll posed the questions of whether to update the MOP for the Historical Committee or dissolve it.

Carroll also posed the following questions pertaining to archiving:

1. Do we need to continue to send historical items to the ISU Library?
2. Are the SWSS Proceedings and website adequate repositories for items of historical interest?
3. Given the present Historical Committee MOP, does that role need to be completely restructured?

Phil Banks stated that he has approximately 10 years of information he was given by Bob Schmidt, former SWSS Business Manager.

Jason Bond stated that historical weed science reports from Mississippi State Delta Research Center are housed in the library at Stoneville. This information is quite old, but very good historical information.

Nilda Burgos stated that the SWSS needed to archive the historical progress of science.

Phil Banks pointed out the Dan Reynolds has digitized many of the past SWSS Proceedings.

Carroll Johnson stated that he thought the SWSS BOD needed to keep the Historical Committee, but the committee needed to be changed.

Jason Bond noted that John Byrd, Mississippi State weed scientist, has thoroughly studied the history of weed science, but this information is maintained in his head, not written down.

Scott Senseman suggested that this topic be tabled and discussed at the SWSS summer BOD meeting.

It was decided by common consent that Carroll Johnson and John Byrd study the role of the Historical Committee and revise the MOP accordingly, with a report and possible recommendation presented at the SWSS summer BOD meeting.

Motion to adjourn; Jason Bond, Scott McElroy second: PASSED UNANIMOUSLY

Sunday Evening January 25, 2015 7:00 to 9:00 pm	Agenda Item	Presenters
	Introductions and approval of agenda	Scott Senseman
	Secretary’s Report	Daniel Stephenson
	Local Arrangements Committee Report	Larry Newsom
	Director of Science Policy Report	Lee Van Wychen
	Financial Overview and Report	Phil Banks
	Program Committee Update	Brad Minton
	Endowment Committee Update	Nilda Burgos
	WSSA Representative Report	Eric Palmer
	Old Business	Board of Directors
	New Business Registration for retirees Bob Nichols - Legislative Committee Leadership opportunities for officers Ted Webster - Potential App Carroll Johnson - Historical Committee	Scott Senseman

Minutes
SWSS Executive Board Meeting
Monday, January 26, 2015
Hyatt Regency Hotel, Savannah, GA
11:00 am to 12:00 pm

Meeting called to order by Pres. Senseman at 11:00 am.

Review of Sunday Evening meeting:

Legislative Committee Update, Bob Nichols:

Bob updated the SWSS BOD on the Legislative Committee activities. He stated that the Legislative Committee will work with Carroll Johnson to draft a new MOP for the committee to be presented at the 2015 SWSS BOD summer meeting

SWSS Weed Contest, Wes Everman:

The 2015 weed contest will be held at the Ohio State University on July 20-21. The NEWSS and NCWSS will participate with the SWSS and the format will be similar to the Weed Olympics held a couple of years ago. The WWSS will be asked to participate also. Awards will be given by society and overall.

Wes also stated that the hosts for the 2015 contest are looking for funding. The SWSS BOD will discuss possibly contributing to the fund for awards at their summer meeting.

Student Paper/Poster Contest Update, Drew Ellis:

See detailed report in the Reports Section.

Drew Ellis, chairman of the Student Contest Committee, stated that he is currently co-chair with Matt Goddard and that Hunter Perry is a working member of the committee. In 2016, Matt and Hunter will assume co-chair responsibilities.

Drew stated that the Student Contest Committee found the title submission on the internet needed to be stream-lined to make it easier for students to identify their desire to enter the contest (discussed in report). Peter Dotray will bring the suggested changes to the webmaster's attention.

Drew suggested having a student contest judge's social on Monday afternoon to give judges their packets so they would have more time to read the abstracts and prepare for judging the next day. No action was taken concerning this.

Drew Ellis also stated that something needs to be added to the SWSS MOP specifying eligibility for the contest.

Drew Ellis pointed out that moderators for the student contest sessions have had issues downloading student presentations.

Questions arose concerning the student contest at the 2016 meeting because it is a joint meeting of the SWSS and WSSA.

It was suggested to Drew that the Student Contest Committee look to the 2009 student contest program as a model since that year was a joint meeting of the SWSS and WSSA.

Old Business:

Historical Committee, Carroll Johnson:

Carroll Johnson has visited with John Byrd and they will work on the issues facing the Historical Committee.

Weed Resistance and Technology Stewardship Committee, Jason Bond:

After hearing the presentation concerning the resistance APP, Jason concluded that it could involve a great deal of effort.

New Business:

None

Motion to adjourn; Jason Bond, second Scott McElroy; PASSED UNANIMOUSLY

Monday Morning January 26, 2015 11:00 am to 12:00 pm	Agenda Item	Presenters
	Review from Sunday Evening	Scott Senseman
	SWSS Contest	Wes Everman
	Old Business	Board of Directors
	New Business	Scott Senseman
	Adjourn	

Minutes
SWSS Annual Business Meeting
Monday, January 26, 2015
Hyatt Regency Hotel, Savannah, GA
4:45 pm to 5:45 pm

The annual business meeting was called to order by President Senseman at 4:45pm.

Secretary-Treasurer's Report, Daniel Stephenson:

Minutes are included in the 2014 proceedings posted on the website and no changes were noted.

Motion to accept minutes, Vernon Langston; second, Jason Bond; PASSED UNANIMOUSLY.

The treasurer's report reflected those numbers included in the SWSS BOD January 25, 2015 meeting. Below is a highlight of what was covered:

The society has total assets of $327,910.57 as of 5/31/2014 with no liabilities. The distribution of funds is as follows: Money Market = $116,305.06; RBC Account = $114,474.81; SWSS checking = $62,167.69; Wells Fargo Savings = $34,963.01. This is a change from previous years, as reflected below:

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Total Assets on May 31, 2009	239,102.58	-3,139.79
Total Assets on May 31, 2014	327,910.57	24,909.54

The society showed cash inflows last year of $125,340.56 primarily from annual meeting registration, meeting support from donations, and member dues. The society also showed income from sales of the books (approx. $2,200) and DVD sales (approx. $782). Cash outflows last year were $100,431.02 primarily from annual meeting expenses, managerial fees, and director of science policy. Other significant outflows include transfer of funds to the endowment fund and website design. Overall the society showed a net gain of $24,909.54 in 2014.

Motion to accept treasurer report, Steve Kelley; second, Jason Bond, PASSED UNANIMOUSLY.

Nominating Committee Report, Steve Kelly:

Nominating Committee: Jason Bond and John Richburg are rotating off the SWSS BOD as members-at-large academia and industry, respectively. Joyce Tredaway Ducar and James Holloway were elected as members-at-large academia and industry, respectively. Donnie Miller was elected as a new member of the Endowment Committee. Gary Schwarzlose was elected Vice-President.

Awards Committee Report, Steve Kelly: Award winners will be presented at banquet. A new award called the "Excellence in Regulatory Stewardship Award" will be awarded beginning at the 2016 annual meeting. The maximum award will be for $3,000 total per group. More information concerning the details of this award will be published in the newsletter.

Program Committee Report, Brad Minton:

There are 274 total presentations at the 2015 SWSS annual meeting comprised of 95 posters and 176 oral papers. In the student contest, 54 papers in oral presentations will be judged; therefore, the start time for the contest is at 7:15am on Tuesday. Also, Regulatory Aspects in Weed Science has been included as a section this year.

Meeting Site Selection Report, Mike Edwards:

The 2016 SWSS annual meeting will be a joint meeting with the WSSA in San Juan, PR on February 8-11. The 2016 meeting should have been located in the western portion of the southern U.S., but the joint meeting with the WSSA precludes it. The 2017 SWSS annual meeting will be held in Birmingham, AL. The committee will provide a recommendation to the SWSS BOD at their summer meeting for the 2018 site. The 2018 meeting site will be the eastern portion of the southern U.S. (i.e. eastern Florida, Georgia, North or South Carolina, or Puerto Rico).

Resolutions and Necrology Report, David Black:

There are a few individuals who passed away within the last year that we honor at this time - **Dr. Norman Glaze, Dr. Paul Santelmann,** and **Dr. Joseph Antognini.** Information about their lifelong achievements are depicted in the Necrology Section.

Weed Contest Committee Report, Wes Everman:

The 2015 weed contest will be held at The Ohio State University on July 20-21. The NEWSS and NCWSS will participate with the SWSS and the format will be similar to the Weed Olympics held a couple of years ago. The WWSS will be asked to participate also. Awards will be given by society and overall.

Student Contest Committee Report, Drew Ellis:

A total of 69 students participated in the oral presentation and poster contests this year. The M.S. and Ph.D. oral presentations totaled 54 papers, but papers 121, 155, and 162 have withdrawn from the contest. Both the M.S. and Ph.D. oral presentations were divided into three sections each due to the number of presentations. A total of 18 posters were entered into the contest with 11 M.S. posters and 7 Ph.D. posters. Each were judged as a single M.S. or Ph.D. section. The committee had excellent participation from the membership for judging.

Additional information are in the Reports Section.

WSSA Representative Report, Eric Palmer:

500 participants at the 2014 WSSA meeting in Vancouver. The 2015 WSSA annual meeting will be held in Lexington, KY. In 2016, the SWSS and WSSA will have a joint meeting in San Juan, PR. At the 2015 WSSA annual meeting, a 1st ever student poster contest will held. An app for mobile phones entitled Guidebook is available for attendees to schedule events at the 2015 WSSA. Also, the long term strategic plan of the WSSA will be placed on their website. The WSSA summer BOD meeting will be in San Juan July 6-9, 2015. The 2017 WSSA meeting will be held in Tucson, AZ. The 10th edition of the Herbicide Handbook is available for purchase on the WSSA website.

Motion to accept reports, Vernon Langston; second, Steve Kelly, PASSED UNANIMOUSLY

Continuing Education Report, Bobby Walls:

Pesticide recertification credits are offered for the following states:

Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, and Texas. Also, 18 hours of CCA or GCA credit also offered.

Motion to accept, Bob Hayes; second, Carroll Johnson; PASSED UNANIMOUSLY

Endowment Foundation Committee Report, Nilda Burgos:

The Endowment Foundation has approximately $9,500 as of 9/30/2014. The committee spent $10,000 for student scholarships, which puts the Endowment Foundation at a $500 deficit. However, measures are in place to handle this. The Endowment Foundation Committee is working to raise funds. Nilda Burgos will be rotating off as the Endowment Foundation Committee chairman after this meeting. The Endowment Foundation Committee will submit a request to BOD for MOP to be heard at summer BOD meeting. The Endowment Foundation Committee is seeking a graduate student representative to participate on the committee for two terms. The Committee would like to expand the student scholarship program if funds are available. In addition, the Committee is asking graduate students to provide items for silent auction to raise money for the Endowment Foundation. At the 2016 joint meeting with the WSSA, the Committee will actively seek participation of WSSA membership for the golf tournament and are asking graduate students to enter golf tournament as well.

Additional Information are in the Reports Section.

Phil Banks pointed out that SWSS membership can donate to Endowment Foundation at this meeting or online anytime they want.

Editor's Report, Nilda Burgos:

Last year there was an increase in the number of abstracts compared to past proceedings. Unfortunately, there are sections of the SWSS annual meeting that don't have papers submitted. The agronomic section has majority of papers, particularly last year. Papers in other sections (topics) in the future in needed.

Additional information about the 2014 Proceedings are in the Reports Section.

Motion to accept the Endowment Foundation and Editor's reports, John Byrd; second, Vernon Langston, PASSED UNANIMOUSLY

Old Business:

None

New Business:

Constitution and By-Laws; Carroll Johnson:

See report from Carroll Johnson in the Reports Section.

Motion to accept changes to SWSS Constitution; Carroll Johnson; second T. Mueller; PASSED UNANIMOUSLY

Motion to adjourn, James Holloway; second, Bob Scott, PASSED UNANIMOUSLY

Executive Board Meeting Minutes
SWSS Annual Business Meeting
Hyatt Regency Hotel, Savannah, GA
Thursday, January 29, 2015
7:00 am to 10:00 am

Pres. Brad Minton called the meeting to order at 7:20 am and then made introductions.

Attendees: Brad Minton, Peter Dotray, Nilda Burgos, Eric Palmer, James Holloway, Scott Senseman, Sandeep Rana, Carroll Johnson, Phil Banks, Joyce Tredaway Ducar, Drake Copeland, Scott McElroy, Gary Schwarzlose, Vernon Langston, Daniel Stephenson, Darrin Dodds.

Review of 2015 SWSS annual meeting, Phil Banks:

Things with hotel went well during the meeting. There were 48 walk-in registrations with 2 one-day registrations. The total attendance was approximately 370 with about 15 individuals who paid registration, but did not show up. The SWSS fulfilled all the hotel rooms originally blocked, so there is no penalty. 10% of each room night charge is rebated back to the SWSS, which reduces the payment for the meeting. 23-24 spouses participated in the spouses program. BASF has sponsored the spouses program for many years; however, that sponsorship is ending. Consequentially, 2015 is most likely the final spouses program. The silent auction and donations provided approximately $1,500 for the Endowment Foundation.

Peter Dotray asked Phil to compare this year's total attendance to past years. Phil said this year was equal to attendance in Birmingham (2015) and 15-20 more than Houston (2014).

Peter Dotray asked about individuals who submitted a title (oral or poster) who did not show up for the meeting. Phil said the no-show is a scientist from Brazil who has a history of submitting titles and not showing up for meeting.

Brad Minton asked Phil how donations to Endowment Foundation compares to past years: Phil said donations were similar to last year, but funds raised from the golf tournament was less past years.

Phil Banks stated that the Site Selection Committee submitted the following locations for 2017 meeting:

Tampa, FL
Destin, FL
Spartanburg, SC
Raleigh, NC
Atlanta, GA

The SWSS BOD will vote on the 2017 site at the summer BOD meeting in San Juan, PR.

Phil Banks reported that all checks for awards had been issued; however, the BOD had not decided on a monetary award for the new Fellow Award. Recognizing this issue, Steve Kelly, chairman of the Awards Committee, and Phil Banks decided to award each Fellow Award winner with $500 at the banquet. Peter Dotray asked Phil whether the other regional weed science societies give a monetary award for their Fellow Award winners. Phil stated that no other regional weed science societies or the WSSA give monetary awards for the Fellow Award. Phil pointed out that the SWSS provides a monetary award for all other awards it gives. Carroll Johnson stated that the number of Fellow Awards given each year depends upon the number of nominations and is based upon a percentage of membership.

Motion to provide SWSS Fellow Award winners with at $500 monetary award; Scott Senseman; Nilda Burgos second, PASSED UNANIMOUSLY.

SWSS Summer BOD meeting, Phil Banks:

The WSSA has scheduled their summer BOD meeting for July 6-8, with Monday the 6th is a travel day. Actual meeting date is the 7 and 8th. The majority of the time the SWSS will be meeting separately from the WSSA, but we will meet jointly at times. The room block will be extended a few days before and after the meeting time in case BOD members wish to stay in San Juan before or after the BOD meeting times. The summer BOD meeting and the annual meeting will be held at the Sheraton Puerto Rico. The SWSS summer BOD meeting will begin at 12:00pm on July 7 and 8:00 am on July 8.

Daniel Stephenson, Secretary/Treasurer, notified the BOD that he has a conflict with annual field day at LSU, so he will not be able to attend the summer BOD meeting. Peter Dotray volunteered to take the minutes in Daniel's absence.

Old Business:

Historical Committee, Carroll Johnson:

John Byrd and Carroll Johnson will provide proposal to BOD at summer BOD meeting to revise MOP for Historical Committee. Carroll noted that Dan Reynolds has all past SWSS proceedings scanned, but not in format that is searchable. Carroll and Dan will work to correct this. John Byrd and Carroll Johnson will work to put as much SWSS historical information as they can on the website and then ask future committee chairs to provide committee progress reports to the BOD. The committee decided not to abandon the Iowa State library agreement that the SWSS uses to store historical information, but the SWSS website may become main depository in the future.

Graduate Student Paper/Poster Contest, Brad Minton:

Brad Minton stated that the 2015 SWSS contest went smoothly, but pointed out that precise planning will be needed next year due to the joint meeting with the WSSA.

Peter Dotray stated that based upon the reaction of the BOD at the Sunday night BOD meeting, the SWSS should maintain the SWSS contest separate from the WSSA. However, he pointed out that a student from outside our region actually won an oral presentation session this year.

Scott McElroy commented that scientist from universities outside of the SWSS region may wish to have students compete in the SWSS student paper/poster contest.

Phil Banks stated that if a student pays registration to attend the SWSS annual meeting, then they can become members of SWSS for that year.

Scott Senseman stated that if the SWSS excludes someone from outside our region, then the SWSS may exclude them forever. If they are registered, then they are technically members. Darrin Dodds suggested that students could actually enter both the WSSA and SWSS poster contests with separate posters.

Carroll suggested to allow the Student Contest Committee (chair, Matt Goddard) to decide for the future and that the SWSS proceed as we always have and allow the WSSA follow our lead.

Scott McElroy stated that before a student competes, their advisor should be a member of the SWSS the year prior.

Phil Banks stated that McElroy's suggestion would be complicated due to the online submission process.

Carroll Johnson stated that a joint contest between the SWSS and WSSA could be difficult when considering who provides the prize money.

Phil Banks pointed out that not many students typically attend the WSSA.

Brad Minton stated that he and Drew Ellis discussed the admission of the student from outside the SWSS region (student was from California) and decided to allow him to compete.

Peter Dotray asked if other regional weed science societies who have had joint meetings with the WSSA have kept their contest separate from WSSA?

Carroll Johnson suggested that this should be a discussion topic with WSSA at joint BOD summer meeting or Peter Dotray discuss this with the WSSA planners when planning meeting the joint meeting.

Scott Senseman suggested the SWSS contest be separate like Darrin Dodds suggested.

Phil Banks stated that online registration will have to be set up to keep everything separate if the SWSS BOD desires to maintain a separate contest.

Peter Dotray stated that if the SWSS BOD allows students who are attending only the WSSA to compete in the SWSS contest, then that will put strain on the SWSS Student Committee. The SWSS Student Committee has pointed out that do not wish to have a joint contest.

Carroll Johnson stated that a joint contest would be good public relations for the SWSS.

The BOD asked Eric Palmer, WSSA representative, to discuss this with the WSSA BOD at their meeting to gauge interest.

Program chair (Peter Dotray) will have to be sure the website can handle a joint contest properly. The Student Contest Committee made great suggestions for website stream-lining. David Kruger, SWSS webmaster, Phil Banks, and Peter Dotray will work to implement changes.

Vernon Langston suggested that Matt Goddard, Student Contest Committee chairman, should be brought into the planning of a potential joint contest (if that is the direction) ASAP.

Eric Palmer stated that he will talk to WSSA

Peter Dotray plans to talk with Matt Goddard, then he will speak with Matt again after speaking with WSSA in Lexington, KY.

Brad Minton asked the student representatives on the BOD (Sandeep Rana-President and Drake Copeland-Vice President) their opinions. Both suggested that the SWSS BOD keep the SWSS and WSSA poster contest separate.

Sandeep and Drake relayed comments from students that judges need to provide more input on score sheets. Also, asked if judges could be allowed access to abstract and presentations prior to the contest to assist the judges in providing more comments for the betterment of the students? No action was taken concerning the students request.

Leadership Training Opportunity, Brad Minton:

The SWSS has the opportunity either send BOD members to training, which will require the SWSS BOD to join with other societies or bring a person to meet with the BOD for a one day leadership training session.

Scott Senseman suggested the possibility of have the training at the SWSS summer BOD meeting.

Phil Banks stated that when the WSSA BOD had a similar training, there was homework involved prior to the training that each BOD member would have to do to provide trainers with information to tailor the training.

Scott Senseman suggested that the SWSS BOD schedule a training session at the summer BOD meeting. Times will be proposed via email to decide upon.

New Business:

Dedication of Proceedings, Brad Minton:

The possibility of dedicating SWSS Proceedings to an individual was presented. It was discussed among the BOD of dedicating the 2015 SWSS Proceedings to Paul Santelmann, former Oklahoma State faculty. Dedication of SWSS Proceedings has occurred in the past. The BOD decided to ask Don Murray, weed scientist at Oklahoma State University, to write the dedication to be included in the 2015 Proceedings. Phil Banks and Nilda Burgos will see that Don Murray writes the dedication and that the proceedings are dedicated as directed by the SWSS BOD.

Motion to dedicate the 2015 proceedings to Paul Santelmann, former OK State faculty; Carroll Johnson; James Holloway second; PASS UNANIMOUSLY.

Officers for BOD, Scott Senseman:

Scott Senseman is working on getting members to run for election to BOD. He asked for suggestions from the BOD for potential candidates. Members of the BOD provided suggestions for BOD members and members of the Endowment Foundation Committee to explore.

Tuesday night social with or instead of Quiz Bowl, Brad Minton:

Daniel Stephenson stated that some SWSS members has approached him about replacing the Quiz Bowl with a social that is sponsored by industry.

Gary Schwarzlose stated that if the SWSS asked industry for sponsorship, would the money go to the Endowment Foundation or to a social?

Scott Senseman felt that the SWSS needed to work to have more social functions at our annual meeting. If the SWSS loses the social aspect, then it could ultimately hurt the society.

The BOD felt that requesting monies for a social may reduce donations for sponsorship of the SWSS or to the Endowment Foundation, so the BOD would like to continue the Quiz Bowl.

Peter Dotray spoke with Tom and he stated that he was willing to host the Quiz Bowl in 2016 at the SWSS/WSSA joint meeting.

Drake Copeland and Sandeep Rana stated that they both like the quiz bowl because it allows students to relax.

Carrol Johnson stated that the SWSS has always done a good job of welcoming students and focusing on them, so opening the Quiz Bowl to students from outside the SWSS region would be a positive.

Vernon Langston suggested that tables be set up in back of Quiz Bowl room to allow people to sit, watch, and interact allowing the membership to fellowship as well as watch the Quiz Bowl.

Peter Dotray will inform Tom of the SWSS BOD's desire for him to host the Quiz Bowl next year. Peter also stated that the WSSA has booked a room for the SWSS Quiz Bowl in Puerto Rico.

Motion to adjourn; Scott McElroy, Vernon Langston second; PASSED UNANIMOUSLY.

SWSS Board Meeting Agenda– Thursday, January 29, 2015

Agenda

- Introductions
- Review of 2015 Annual Meeting
- Summer Board Meeting Dates – July 7-8, July 6th is a travel day
- Old Business
    - Historical Committee
    - Graduate Student Paper/Poster Contest at WSSA
    - Leadership Training Opportunity
- New Business
    - Dedication of Proceedings
    - Officers for BOD
    - Tuesday night social with or instead of Quiz Bowl

End of 2014-2015 SWSS BOARD minutes

Committee Reports
Proceedings Editor's Report of the 2014 Meeting

The 2014 Proceedings of the Southern Weed Science Society contained 398 pages, including 259 abstracts (Birmingham, AL). By comparison, the 2013 Proceedings of the Southern Weed Science Society contained 387 pages, including 274 abstracts (Houston, TX), the 2012 Proceedings had 277 abstracts and 375 pages (Charleston, SC), the 2011 Proceedings had 342 abstracts and 515 pages (San Juan, Puerto Rico), the 2010 Proceedings had 245 abstracts and 365 pages, the 2009 WSSA/SWSS joint meeting, contained 588 pages, 2008 Proceedings contained 315 pages, 2006 Proceedings contained 325, 2005 Proceedings contained 363 pages, and 2004 Proceedings contained 521pages.

The 2014 Proceedings was not dedicated to anyone. The proceedings contained the Presidential Address, list of committees and their members, Executive Board minutes from the January and summer board meetings, committee reports (including reports from: Program Chair, Editor, Business Manager, Legislative & Regulatory Committee, Director of Science Policy, Constitution & By-Laws, Weed Resistance & Technology, Endowment, and Necrology), award winners, as well as abstracts. The Proceedings were complete by the summer board meeting, except for the Presidential Address and the list of Sustaining Members. There were 16 missing abstracts from the Poster and Oral Presentations. The two symposium presentations also did not have abstracts. Three numbers were skipped in the paper numbering namely: 116, 174, and 241.

Section	Number of Pages
SWSS 2014 Awardees	16
Past Presidents	1
List of Committees and Committee Members Jan 31, 2013 – Jan 31, 2014	5
Minutes of Executive Board, Committee Reports, etc	39
Posters	98
Weed Management in Agronomic Crops	110
Weed Management in Horticultural Crops	9
Weed Management in Turf	28
Weed Management – Pastures and Rangelands	12
Weed Management in Forestry	5
Vegetation Management In Utilities, Railroads & Highway Rights-Of-Way, and Industrial Sites	4
Physiological and Biological Aspects of Weed Control	8
Regulatory Aspects of Weed Science	0
Educational Aspects of Weed Science	4
Symposium: Balancing Life and Career	2
Weed Survey (Most Common & Most Troublesome)	11
Registrants of 2014 Annual Meeting	13

Objectives for Next Year: Limit abstract length to one page

Finances (if any) Requested: None.

Respectively submitted,
Nilda Roma-Burgos, Editor

2015 SWSS Program Report
Hyatt Regency – Savannah, GA

Brad Minton, Program Chair

The theme for the program this year was "Technology and Education for the Future". The General Session included presentations from Dr. Scott Angle, Dean and Director of the UGA College of Agricultural and Environmental Sciences, on "The Changing Face of Agriculture" and Dr. Jill Schroeder providing an update on the 2Nd Herbicide Resistance Summit held late last year. There were also presentations by the three students receiving the 2014 SWSS Endowment Enrichment Scholarships highlighting activities of their enrichment experiences. A symposium was held on "New Technologies in Weed Science". Dr Scott Senseman presented at the Graduate Student Symposium on "Getting Yourself Organized – Finding the Right System".

The program consisted of the following sections this year:

- Poster Section
- General Session
- Weed Management in Forestry
- Regulatory Aspects
- Educational aspects of Weed Science
- Graduate Student Contest Sections (I, II and III)
- Weed Management in Agronomic Crops (I, II and III)
- Weed Management in Horticultural Crops
- Weed Management in Turf
- New Technologies in Weed Science Symposium
- Weed Management in Pasture and Rangeland
- Graduate Student Symposium
- Physiological & Biological Aspects of Weed Management

There were 274 total presentations that included 95 posters and 179 oral presentations. The student contest oral presentation section contained 54 papers. This caused us to start the program at 7:15 to accommodate all of the papers in three sessions prior to the lunch break. There were 7 Ph.D. posters and 11 M.S. student posters included in the competition as well. The student posters were organized by Ph.D., M.S. and general membership to help make it more convenient for judging.

Director of Science Policy Report
2015 SWSS Annual Meeting, Savannah, GA
January 25, 2015

Lee Van Wychen

2014-15 Science Policy Committee Members

1. Lee Van Wychen	Director of Science Policy	WSSA
2. Donn Shilling	Chair	WSSA
3. Joe DiTomaso	President	WSSA
4. Dallas Peterson	President-elect	WSSA
5. Kevin Bradley	Vice President	WSSA
6. Jim Kells	Past President	WSSA
7. Michael Barrett	EPA Liaison	WSSA
8. David Shaw	E-12b Chair	WSSA
9. Jeffrey Derr	CAST rep	WSSA
10. Harold Coble	At-Large	WSSA
11. Janis McFarland	At-Large	WSSA
12. Jill Schroeder	At-Large	WSSA
13. Michael Horak	At-Large	WSSA
14. Cody Gray	President	APMS
15. Rob Richardson	President-elect	APMS
16. John Hinz	President	NCWSS
17. Mark Bernards	WSSA Rep	NCWSS
18. Greg Armel	President	NEWSS
19. Prasanta Bhowmik	WSSA Rep	NEWSS
20. Scott Senseman	President	SWSS
21. Robert Nichols	Legislative Chair	SWSS
22. Drew Lyon	President	WSWS
23. Chad Clark	Legislative Chair	WSWS

Discussion Items

1. Superweed Definition
2. National Weed Survey
3. Herbicide Resistance Summit II- steps forward
4. EPA Herbicide Stewardship Program

Updates

1. Election Changes
2. FY 2015 Appropriations
3. WOTUS
4. NPDES
5. USDA-ARS NPL for Weed Science
6. WSSA-USDA NIFA Liaison
7. Noxious Weed Compliance Clause in Farm Bill

8. Foundation for Food and Agriculture
9. NISAW – Feb. 22-28, 2015

<u>1. Superweed Definition</u> –How do we correct the scientific misinformation online and in dictionaries, while still capitalizing on the press coverage that has helped increase awareness of weed resistance issues?

WSSA DRAFT: Superweed- A slang term used to describe a weed that has evolved characteristics that make it much harder to manage than previously due to the repeated use of the same management tactic. **Poor use of best management principles, particularly lack of weed management diversity, can lead to superweeds.**

The most common use of the term refers to a weed that has become resistant to one or more herbicide mechanisms of action (www.weedscience.org) due to their repeated use. Repeated use of the same mechanical, biological, or cultural management tactics has also led to superweeds (e.g. barnyardgrass mimicking rice morphology or prostrate dandelions in a mowed lawn).

Two common misconceptions about superweeds are that they are the result of gene transfer from genetically altered crops and that they have superior competitive characteristics. Both of these superweed myths have been addressed by the Weed Science Society of America (WSSA) at www.wssa.net/weed/wssa-fact-sheets.

The WSSA has created a variety of free educational materials and recommendations concerning weed resistance and how to avoid it, available at www.wssa.net/weed/resistance.

<u>2. National Weed Survey</u>. We will be conducting a national survey of the "most troublesome" and "most common" weeds. The current **DRAFT SURVEY** is at: www.surveymonkey.com/s/2014weeds
During the 1st year we will collect baseline data for all weed management categories: 1) grass crops; 2) broadleaf crops; 3) horticultural crops, ornamentals, and turf; and 4) natural areas, range, pasture, rights-of-way, and aquatic. In subsequent years, we will survey one management category, and thus begin a four year rotation. Initially, I was just going to identify one extension weed scientist in each state to be the lead for all categories. But that thought has evolved into creating an online survey where any member of a National or Regional Weed Science Society can log in to enter the most common and troublesome weeds for the management systems they are familiar with. The goal would be to compile the survey data each year and make it available publicly. **Question**: Would you take time to do this survey? Should there be separate categories for resistant weed biotypes?

<u>3. Herbicide Resistance Summit II</u>. Sept. 10, 2014 in Washington DC. Webcasts of the entire summit are at: http://wssa.net/weed/resistance-summit-ii/. A special open access issue of Weed Science in the works. Both USDA and EPA have pointed to WSSA as their go to source of science based information for herbicide resistance management. **Discussion of feasibility of Area-Wide Management (AWM) programs**. A successful example would be the TEAM Leafy Spurge AWM program in the Dakota's, Montana, and Wyoming. The Sugarbeet Growers Association is looking for assistance with a community-based pilot program for proactively managing herbicide resistance. A second pilot effort is being developed, targeting elimination of Palmer amaranth in Iowa. There have been many successful Cooperative Weed Management Areas (CWMA's) in the western U.S. for managing invasive weeds. Can this concept be successfully deployed for counties? States? Regions?

<u>4. EPA's Herbicide Stewardship Program</u>. EPA's registration requirements for Enlist Duo represents precedent setting requirements for a Herbicide Resistance Management Plan. In the future, the agency intends to apply this approach to weed resistance management for all existing and new herbicides used on herbicide-tolerant crops. **Are there concerns you have heard?** The pesticide Stewardship Program (SP) requirements include extensive surveying and reporting to EPA, grower education, and remediation plans. EPA asked WSSA to comment on the proposed stewardship program for Enlist Duo. Those comments are at: http://wssa.net/wp-content/uploads/WSSA-EPA-Enlist-Duo-Comments_FINAL.pdf. We identified a number of significant concerns in the SP proposal for Enlist Duo and EPA addressed all of them. WSSA will continue to work with EPA and discuss its goals for a herbicide resistance management SP and how to determine its effectiveness. Other requirements on the Enlist Duo label included restrictions to avoid pesticide drift. These requirements include a 30-foot in-field "no-spray" buffer zone around the application area, no pesticide application when the wind speed is more than 15 mph and only ground applications are permitted. The Enlist Duo registration will expire in six years, allowing EPA to revisit the issue of resistance.

On Dec. 12, APHIS signed off on dicamba tolerant soybeans and cotton. EPA's proposed registration requirements for crop traits are expected to be released shortly. WSSA will likely submit comments on those registration requirements as well.

Updates

1. Election Changes
2. FY 2015 Appropriations
3. WOTUS
4. NPDES
5. USDA-ARS NPL for Weed Science
6. WSSA-USDA NIFA Liaison
7. Noxious Weed Compliance Clause in Farm Bill
8. Foundation for Food and Agriculture
9. NISAW – Feb. 22-28, 2015

1. Election Changes. With the November 4 elections in the rear view mirror, there is a new campaign on Capitol Hill for committee leadership assignments. Due to a 20 year old self-imposed House GOP rule that limits its committee chairs to three terms, nearly half of the current chairs in the House will have to step aside, including Ag Committee Chair Frank Lucas of Oklahoma. Michael Conaway of Texas will take over as House Ag Committee chairman. He grew up in Odessa, TX and was a member of Odessa Permian High School football team that won a state championship in 1966 (which eventually led to the movie "Friday Night Lights"). He has a B.A. in accounting from Texas A&M. He worked at Price Waterhouse after serving in the army, and then was the chief financial officer for Bush Exploration. Rep. Colin Peterson of Minnesota will remain as the Ranking Member of the House Ag Committee.

In the Senate, Thad Cochran of Mississippi, the current Ranking Member of the Senate Ag Committee, will be named as the new Chair of the Senate Appropriations Committee, a position he occupied from 2005-2007. Sen. Pat Roberts of Kansas will be named as the new Chair of the Senate Ag. Committee. As House Ag Committee Chair in the 1990's, Roberts was a driving force behind the "freedom to farm" commodity policy in the 1996 Farm Bill. He is a fourth generation Kansan from Topeka, KS, has a journalism degree from Kansas State, and served four years in the Marine Corps. He was elected to the U.S. House of Representatives in 1980 and then to the Senate in 1996 where he has served since. Senator Roberts has been a proponent of research and technology and had led efforts in promoting food safety and biosecurity. Sen. Deb Stabenow of Michigan, the current Sen. Ag Committee Chair will likely be the Ranking Member.

2. FY 2015 USDA Appropriations. The "old" Congress passed the "Cromnibus" before leaving town for the year, which funds the federal government for FY 2015 (for most agencies). Things look pretty good for USDA budget items overall with NIFA, APHIS, NRCS, the Economic Research Service (ERS), and National Ag Statistics Service (NASS) all receiving higher budgets compared to FY 2014. Within NIFA, the Agriculture and Food Research Initiative (AFRI) grants program increased 2.8% from $316 million to $325 million. Meanwhile, FY 2015 funding for the Hatch Act ($244 million), Smith Lever 3b and 3c ($300 million), and the IR-4 program ($11.9 million) remain the same as last year. The new Farm Bill that was passed in February also revived 2 programs that would have expired. The Specialty Crop Research Initiative (SCRI) will get $80 million per year in mandatory funding. The Organic Agriculture Research and Extension Initiative (OREI) will get $20 million per year.

3. "Administrative Rule" Clarifying Waters Of The United States (WOTUS). On April 21, the EPA and Army Corp of Engineers jointly published an "administrative rule" meant to clarify what are "Waters Of The United States" (WOTUS). The proposed rule would expand Clean Water Act (CWA) jurisdiction to almost all waters in the United States subjecting thousands of streams, ditches, and other "small" waters to federal permitting and citizen lawsuits, including those on agricultural property. The expanded jurisdiction and the imprecision of the terms used by the agencies will result in significant added legal and regulatory costs. To minimize the potential effect on agriculture, EPA issued an "interpretive rule", effective March 25, which exempted 56 NRCS conservation practices from CWA permits. However, this "interpretive rule" only added confusion to the "administrative rule" attempting to clarify what is a WOTUS. NRCS has more than a 160 approved conservation practices. Would the remaining 104 NRCS conservation practices still be considered normal farming practices? Or would they be subject to citizen lawsuits under the administration's new WOTUS rule? Thankfully Congress "ditched" EPA's interpretive rule of NRCS approved conservation practices with a rider in the "Cromnibus" that was passed on Dec. 12. However, the "administrative rule" that greatly expands EPA's authority under the CWA is still moving forward. While the Certified Crop Advisors asked WSSA to submit comments on the administrative rule that closed on Nov. 14, the Science Policy Committee decided to steer clear of the legal controversy for the time being. EPA Administrator McCarthy has said that the CWA exemptions for ag stormwater runoff and irrigation return flow will be upheld. We'll see. The bottom line is that EPA (and ACOE) are going to adopt the rule, whether we like it or not. The issue is going to be settled between the administration and the new 114th congress and that's where the National and Regional Weed Science Societies will likely expend our efforts.

4. NPDES Fix Bill There will be renewed effort to get legislation passed that would "fix" the National Pollutant Discharge Elimination System (NPDES) permit requirements that resulted from a 2009 Circuit Court ruling. There is bipartisan support in both houses of Congress that would clarify Congress's intent for the regulation of pesticides applied to or near water. The NPDES permits impose additional resource and liability burdens on small businesses, farms, municipalities, state agencies, and federal agencies. The National and Regional Weed Science Societies have supported a legislative fix for this issue since the Circuit Court ruling and will continue to support efforts to resolve this issue going forward.

5. USDA-ARS NPL for Invasive Pests of Crops. Dr. Rosalind James started at end of March in Beltsville, MD. She worked previously at the USDA-ARS Bee Biology and Systematics Lab in Logan, UT as a bee pathologist. Joe DiTomaso, Mike Barrett, Donn Shilling and I met with her to discuss the National and Regional Weed Science Society's recommendations for the NP304 Crop Protection research program. She will be attending and speaking at the WSSA annual meeting in Lexington.

6. WSSA – USDA NIFA Liaison – Dr. Donn Shilling, University of Georgia, was selected as the first ever WSSA – USDA NIFA Liaison. He is finalizing details of his liaison visits to USDA, which will begin in 2015.

7. "Noxious Weed Compliance" in Farm Bill. A reminder that farmers shall agree --- "to effectively control noxious weeds and otherwise maintain the land in accordance with sound agricultural practices, as determined by the Secretary" in order to be eligible for commodity support payments/crop insurance subsidies.

8. Foundation for Food Agricultural Research (FFAR). Authorized as part of the 2014 Farm Bill. FFAR is non-profit, nonfederal entity that will leverage public and private resources to increase the scientific and technological research, innovation, and partnerships critical to boosting America's ag economy. Congress authorized up to $200 million which must be matched by non-federal funds as the Foundation identifies and approves projects. FFAR's 15 member board was selected this summer. It will be chaired by Dan Glickman, former U.S. Secretary of Ag. Two FFAR board members we are hoping for support of weed science issues are Dr. Doug Buhler, Director of AgBioResearch and Senior Associate Dean for Research for the College of Agriculture and Natural Resources, Michigan State University and Dr. Mark E. Keenum - President, Mississippi State University. The full FFAR Board of Directors is at: http://www.ars.usda.gov/is/FFARBios2014.pdf

9. National Invasive Species Awareness Week (NISAW) – Feb. 22-28, 2015 In September, we learned that Lori Williams would be retiring as the Executive Director of the National Invasive Species Council (NISC). Chris Dionigi of NISC is serving in that role in the interim. As for NISAW, I am working with Phil Andreozzi, NISC's Assistant Director for International and Regional Affairs. We are coordinating some state focused webinars during the week as well as planning a NISAW Awards Ceremony, and an Invasive Species Kid's Day at the U.S. Botanic Garden. Please see www.nisaw.org

Business Manager's Report for the 2015 SWSS Meeting:
Savannah, GA
January 25, 2015

All tax forms and bills were paid on time during the past year. The attached financial statements show that SWSS is in good financial order and posted an increase in net worth ($24,909.54) during the last fiscal year (ended May 31, 2014). Most income for SWSS comes from annual meeting registration, annual meeting support from Industry, Sustaining Member dues, rebates from meeting hotels, and sale of books or DVDs, in order of greatest to least. We have moved all of our assets that were with Merrill-Lynch to an investment account with the Royal Bank of Canada. That fund has been flat or lost value in the past year. We have a substantial amount of funds in our money market account (over $116,000.00) that is earning a low rate of interest. The Finance Committee should look at using up to $100,000 to buy 5 CDs from 1 to 5yr in maturity. By laddering these, the return over 5 year period would be maximized with no risk.

Preregistration for the Savannah meeting has run smoothly with the only exception being that the block of rooms at the Hyatt Regency Savannah ran out about 10 days prior to our cut-off. This is mainly due to the hotel not increasing our room block above contract and some members reserving more than one room. The hotel provided us with a list of alternative hotels that are within a short distance of the Hyatt. As of January 21, 2015, we have 308 preregistered for the meeting (232 regular members, 76 students, and 14 spouses/friends registered). I also handled the registration of the SWSS Golf Tournament (22 golfers). I have worked closely with Larry Newsom and his local arrangements committee, the hotel (Cindy Miletich) as well as Brad Minton, Program Chair. The posting and printing of the program went smoothly and was done in a timely manner. Award plaques and the Awards Program were printed well ahead of the meeting.

I will be working with Site Selection Chair, Mike Edwards, to choose a location for our 2018 meeting. They will have a recommendation at our summer Board meeting. Our next meeting will be joint with WSSA in San Juan, PR. Program Chair, Peter Dotray and I will be meeting with WSSA Program Chair, Kevin Bradley, and WSSA Exec. Secretary, Joyce Lancaster, at the upcoming WSSA meeting in Lexington, KY to do some preliminary planning for the 2016 meeting.

Submitted by: Phil Banks, Business Manager

2015 SWSS ENDOWMENT BOARD MEETING Minutes
Hyatt Regency Savannah, Vernon Room, Savannah, GA
January 26, 2015

SWSS Endowment Foundation Board Members (Elected) 2014-2015
Nilda Burgos – President 2015*
Renee Keese - Secretary 2016
James Holloway - 2017
Brent Sellers - 2018
Darrin Dodds – 2019
Ryan Miller – graduate student representative
Ex-Officio: David Jordan, Phil Banks (SWSS Business Manager)

Present: Nilda Burgos, Brent Sellers, James Holloway, Donnie Miller, Ryan Miller and Renee Keese.
Absent: Darrin Dodds, David Jordan

Meeting called to order by Nilda Burgos at 8:00 am. Donnie Miller and Ryan Miller (graduate student) were introduced as new members and other members introduced themselves.
Discussion of graduate student term – should it be extended to 2 years? Ryan will have discussion at grad student meeting. We would like to see the grad student get more involved on the Board.

2014 Minutes were circulated and approved and will be sent to Nilda Burgos (Editor).

SWSS Endowment Board Composition 2015-2016

Renee Keese – President 2016	renee.keese@basf.com	919-824-2739 (m)
James Holloway – Secretary 2017	james.holloway@syngenta.com	731-803-1730 (m)
Brent Sellers – 2018	sellersb@ufl.edu	863-441-3064 (m)
Darrin Dodds – 2019	darrind@ext.msstate.edu	662-418-1024 (m)
Donnie Miller – 2020	DMiller@agcenter.lsu.edu	318-614-4044 (m)
Ryan Miller, Grad student rep.	mrm032@uark.edu	863-661-3232 (m)
Ex-Officio:		
Nilda Burgos	nburgos@uark.edu	479- 530-8987 (m)
Phil Banks (SWSS Business Manager)	swss@marathonag.com	575-649-7157

Golf tournament - approximately 23 players and $7,500 in income for the fund. Thanks to Hunter Perry for organizing the event. We would like to see the graduate student rep get involved in publicizing and soliciting participation. James Holloway mentioned he offered a company sponsorship to U Tennessee graduate students to play golf – this was encouraged for other companies to do the same.

SWSS Student Enrichment Scholarship: Summaries will be presented by the students at the General Session. Phil Banks and Caroll Johnson (Constitution & Operating Procedures) are looking for summaries of the Endowment Board activities - what it does, historical perspective for Caroll. Nilda will work on history article, Renee to write short article for Phil to be included in a Newsletter. Start confirming the host list to be able to circulate a call for applications.

Financial Review: Brief notes from Phil Banks: total assets are $375,201.08 as of FYE 9-30-14. We have $90,156.27 available to spend (for graduate student contest, enrichment experience, etc.). 2014 donations totaled $9,420. We spent more than the donation income for 2014. Discussion around increasing to 4 scholarships (2 Ph.D. and 2 MS), or holding at 3 for 2015 due to overspending last year. Suggested to keep 3 awards for another year. Silent Auction: A Charles Bryson painting was donated and art pieces by Dr. Bararpour (Nilda's donor) will be bid on at the registration desk. Expected expenses for the year – prizes for oral and poster contest, Enrichment Experience Scholarships, and potentially Weed Contest expenses.

MOP: The Board discussed the MOP previously circulated and edited by Nilda and others. Board has 4 members that each serve 5 years. This will be clarified in the document (appended at the end of this Report). A graduate student representative is elected and currently serves 1 year. 2 Ex-officio members: the past president and the SWSS Business Manager. Terms will be clarified as starting at the conclusion of the SWSS Annual Meeting. Secretary will be the person who is president-elect, and has already served 3 years on the Endowment Foundation Board.

Role of the Board was clarified – 3.e. to be clarified as a summary of activities to be presented to the SWSS Executive Board at the summer meeting and the annual meeting.

Section 4. Meetings. To be held during the SWSS annual meeting.

Schedule of Activities: An Operational Calendar was also circulated, as reference for committee members (see below). This outlines timing of critical deadlines for Enrichment Scholarship.
Nominations for the Endowment Board this year: Hunter Perry was nominated to serve, and his name will go to the Nominating committee. A new graduate student rep will be elected at this meeting.
Discussion of potential videos of Student Enrichment Winners: video clip, do we need a format? This could be shown at the annual meeting, have it running at poster session? Who would make the video, edit? Could be used for potential PR. Needs more discussion for future use.

Operational Calendar

January

- Board President and Secretary meet with Business Manager prior to annual meeting to review financial documents (night before the Board meeting or via conference call).
- Endowment Board meets at the SWSS Annual meeting (President to send meeting invite early January)
- New member is recommended for nomination to the Nominations Committee; graduate student member is elected
- Review financial documents, circulate By-Laws and SOP to new members
- Board President reports to SWSS Executive Board

February

- Solicit Student Enrichment Experiences – Academic/Industry/Government
- Review Enrichment Experience Documents for circulation to membership

March

- Solicit Enrichment Experience Applications – deadline early April (TBD)
- Thank you notes/receipts for donations received with registration and at annual meeting.
- Write newsletter article

April

- Judge Enrichment Applications and select winners

May

- Notify winners first week of May – they will contact their host to schedule timing
- Announce winners in Newsletter article

July/August

- Board President provides update (in person or written) to SWSS Executive Committee Summer Meeting
- Begin preparing for annual conference – determine when winners will present on their experiences (graduate student session, posters, as a highlight during general session?)
- Golf tournament fundraiser – be sure preparations are made, announcements in newsletter, etc.
- Solicit donations for the silent auction (such as Charles Bryson painting, Shawn Askew weed photos, others)

December

- Thank you notes/receipts for donations received March-November

Action Items:

Revise MOP for this Board, with responsibilities during the year.

Write Endowment Board articles (Nilda and Renee)

Update Enrichment Application, and list of opportunities.

More graduate student involvement – assist golf tournament contact (Hunter Perry), other fund raising.

Meeting adjourned at 9:13 am.

Respectfully submitted,

Renee J. Keese, Secretary

SWSS Endowment Foundation Board MOP (DRAFT)

The Following MOP will be presented to the SWSS Board at the 2015 Summer Meeting.

Manual of Operating Procedures

1. Composition of the Board. The Board shall consist of a President, Secretary, and four members, including a graduate student. Ex-Officio members will be the Past Foundation Board President and SWSS Business Manager.

2. Term of Office. The President and Secretary shall each serve a one-year term, with the Secretary taking office after having served as member of the Board for three years. The Secretary will then assume the post of the President as the latter rotates off. Each year, as the President finishes his/her term, a new member will be elected to the Board. Each Board member will serve as President of the Board to complete the service cycle. The immediate past-President will serve as ex-Officio member, in an advisory role. Terms of office commence at the close of the SWSS Annual Meeting.

3. Role of the Board.
    a. Oversee the financial health and disbursement of the Endowment Foundation Fund. The Board shall work closely with the SWSS Business Manager in all financial matters.

    b. Conduct fundraising activities to generate funds for the Endowment.

    c. Support student activities for educational and professional advancement. This includes helping support the SWSS Weed Contest, Graduate Student Oral Presentation and Poster competitions, the student enrichment scholarship program, and other programs that the Board pursues in any given period.

    d. Promote the projects and activities funded by the SWSS Endowment Foundation and encourage support for the Foundation from the general SWSS membership.

    e. Submit report of yearly activities to the SWSS Executive Board.

4. Meetings. The Board shall conduct an annual meeting during the SWSS Professional Meeting. Other meetings as needed via conference call to decide on Scholarship winners.

2015 SWSS Graduate Student Contest Report
Savanna, GA

Submitted by Drew Ellis, Chair

Objective: Streamline the process of submitting research paper titles for the Graduate Student contest.

Proposed Process:

Step 1. Student should indicate that he/she is a student

Step 2. Provide an option for students to choose “Yes” to be judged in the contest

Step 3. For students who select “Yes” in step 2, the next options would only be the following.

- MS Poster Contest
- PhD Poster Contest
- MS Oral Paper Contest
- PhD Oral Paper Contest
-

Step 4. Students then proceed to enter the author and co-author information.

The website should restrict the same student contest participant to one contest, either a poster or an oral presentation, as stated in the rules section of the MOP. To alert the student, the system should generate an error message stating the following **“ERROR. Students can only enter one contest either a poster or oral presentation as stated in the MOP for the student contest”.**

The Contest Chair and Program Chair spend a significant time each year searching for the authors’ titles that are hidden in other non-contest sections. Regardless of how many times Faculty and students are reminded that a student can enter in only one contest, several students continue to indicate participation in more than one contest. It takes a lot of time to fix this problem in the electronic system.

The website fix mentioned above would solve this problem.

SWSS- Legislative and Regulatory Committee Report
Savannah, Georgia
January 26, 2015

Chair: Robert L. Nichols

To: Scott Senseman, Immediate Past President and Brad Minton, Incoming President

From: Chair: R. L. Nichols, and Members: Lee Van Wychen, Director of Science Policy; Donn Shilling, Chair WSSA Science Policy Committee; Michael Barrett, WSSA Liaison to EPA; Bill Vencill, Angela Post, Joyce Treadaway-Ducar, James Holloway, Scot McElroy, and Jill Schroeder, USDA-IPM, *ad hoc* member.

Report of the Meeting:

During 2014 the membership attended to legislative and regulatory issues impacting weed science; reviewed documents and issues together with other WSSA technical committees, and advised the SWSS Executive Committee on developments verbally on 1/26/15, and to the membership by this report and the report of Dr. Lee van Wychen similarly submitted to the Society for inclusion in the 2014 Proceeding. Members of the SWSS Legislative & Regulatory Committee functioned integrally with the Science Policy Director and the Weed Science Society of America (WSSA) Science Policy Committee, and participated in Herbicide Summit II.

Administrative Issues:

Expansion of Committee

In July Bob Nichols expressed concerns to President Senseman that while membership in the SWSS Legislative and Regulatory Committee required experience, several of the committee members were senior in their respective careers, and some might be nearing retirement. He urged President Senseman to appoint some younger members of the society to the Committee to allow them to gain experience and ensure continuity. President Senseman appointed the At Large Representatives to the Legislative and Regulatory Committee. At the January meeting Bob Nichols further suggested that the committee needed a functional group of about 8-10 members in attendance to cover and consider the issues and suggested to incoming President Minton at the report to the SWSS Executive Committee that the Committee solicit and vet, and the President appoint a few additional volunteers members. Such a process may raise the visibility of the Committee, recruit interested and able members, and make Committee membership a valued appointment.

Updating the Manual of Operating Procedures (MOP)

Superseded WSSA Committees & Communication with the SWSS Constitution Committee

The Chair of the Constitutional Committee, Carroll Johnson, requested that all SWSS Committee Chairs review their respective responsibilities in the MOP, and petition to update or change them as may be necessary. Bob Nichols noted that two provisions are obsolete in that they refer to WSSA Committees that no longer exist. Rather than as currently stated with reference to obsolete committees, the SWSS Leg. & Reg. Chair or his/her designated representative shall also serve on the WSSA Science Policy Committee and thereby communicate issues, deliberations, or actions of that WSSA Committee Science Policy Committee to the SWSS Executive Committee.

Issues Reviewed at the Meeting and Reported to the Executive Committee:

Research Funding by Federal Agencies - USDA-National Institute for Food and Agriculture:

WSSA–USDA NIFA Liaison

Donn Shilling, Department Head of Plant Sciences at the University of Georgia, has been selected by the WSSA Executive Committee as the first WSSA–USDA NIFA Liaison. Dr. Shilling is finalizing details for his liaison with USDA to begin in 2015.

We need to train the next generation of weed scientists. In large part, funding determines our capacity to provide graduate training. It is incumbent on us to see that the discipline trains individuals in biology, ecology, and genetics as well as training them to evaluate herbicides. Dr. Shilling stated that his goals were to make contacts, establish relationships, and ensure that weed science has a permanent source of funding from federal agencies and programs.

Water Quality Protection:

EPA has the responsibility to protect the safety and quality of U. S. waters. Both FIFRA and the Clean Water Act include provisions for this purpose. To this point, pesticide applications near water have been governed solely by FIFRA. Recent court decisions have forced EPA to consider applying the permitting requirements of the Clean Water Act to pesticide applications. Such an imposition would potentially create dual regulation and possibly create a secondary permitting process that could complicate and delay pesticide treatments. Agricultural and other interests are naturally concerned. The implications of these judicial reviews have sufficiently concerned Congress that legislative relieve is being considered.

National Pollutant Discharge Elimination System - NPDES Fix Bill

(Summarized from Lee van Wychen's report)

There is renewed effort to pass legislation to fix the National Pollutant Discharge Elimination System (NPDES) permit requirements that resulted from a 2009 Circuit Court ruling. There is bipartisan support in both houses of Congress that would clarify Congress's intent for the regulation of pesticides applied to or near water. The NPDES permits would otherwise impose additional resource and liability burdens on small businesses, farms, municipalities, state agencies, and federal agencies. The National and Regional Weed Science Societies have supported a legislative revision of such provisions since the ruling and continue to support efforts to resolve this issue.

Waters of the United States - Administrative Rule Clarifying Waters Of The United States (WOTUS)

(Summarized from Lee van Wychen's report)

EPA and the Army Corp of Engineers jointly published an administrative rule meant to clarify the extent of the Waters of The United States (WOTUS). The proposed rule would expand Clean Water Act (CWA) jurisdiction to almost all waters in the United States, thereby subjecting thousands of streams, ditches, and other small bodies of waters to federal permitting and citizen lawsuits, including those on agricultural property. The expanded jurisdiction and the imprecision of the terms used by the agencies will result in significant added legal and regulatory costs. To minimize the potential effect on agriculture, EPA issued an interpretive rule, effective March 25, which exempted 56 NRCS conservation practices from CWA permits. However, this interpretive rule only added confusion to the aforementioned administrative rule. NRCS has more than a 160 approved conservation practices. Conceivably the ruling would relegate the remaining 104 NRCS conservation practices to be considered normal farming practices. Would such practices be subject to citizen lawsuits under the administration's new WOTUS rule? Congress eliminated EPA's interpretive for NRCS approved conservation practices. However, the administrative rule is still moving forward. EPA Administrator McCarthy has said that the CWA exemptions for agricultural storm water runoff and irrigation return flow will be upheld. The bottom line is that EPA (and ACOE) are going to adopt the rule. The issue is going to be settled between the administration and the new 114th congress.

EPA's New Criteria for Herbicide Registration:

Endangered Species Act

As with the case of the of the Clean Water Act, recent court actions have forced EPA to work with the U. S. Fish and Wildlife Service to consider endangered species criteria in herbicide registration decisions. Thus the Enlist Duo® registration includes a provision for state-by-state registration of the 2,4-D plus glyphosate product, following approval for use in the vicinity of endangered species within the jurisdictions considered. By this arrangement, Enlist Duo will be available only in six states in 2015. Other states will follow after consideration of endangered species therein.

Weed Resistance Aversion and Abatement

(adapted from Lee van Wychen's report)

EPA's Herbicide Stewardship Program (SP) for Enlist Duo. EPA's registration of Enlist Duo for corn and soybean sets forth precedent setting requirements for herbicide resistance management. In the future, the agency intends to apply this approach to all existing and new herbicides used on herbicide-tolerant crops. The Herbicide Stewardship Program requires grower education by the registrant, extensive surveying and reporting to EPA, and documentation of remediation plans. EPA asked WSSA to comment on the proposed stewardship program for Enlist Duo. Those comments are found at: http://wssa.net/wp-content/uploads/WSSA-EPA-Enlist-Duo-Comments_FINAL.pdf We identified a number of significant concerns in the SP proposal for Enlist Duo and EPA addressed all of them. WSSA will continue to work with EPA and discuss its goals for a herbicide resistance management SP and how to determine its effectiveness. Other requirements on the Enlist Duo label included restrictions to avoid pesticide drift. These requirements include a 30-foot in-field no-spray buffer zone on the down-wind side of the application area. No pesticide application may be made when the wind speed is more than 15 mph, and only ground applications are permitted. The Enlist Duo registration will expire in six years, allowing EPA to revisit the issue of resistance.

APHIS Releases the Roundup Ready Xtend® Stacked Herbicide Resistance Trait:

On Dec. 12, APHIS signed off on the dicamba-resistance trait for soybeans and cotton. EPA's proposed registration requirements for the crop traits are expected to be released shortly. WSSA will likely submit comments on those registration requirements as well.

SWSS Weed Resistance and Technology Stewardship Committee Report
January 28, 2015

Summary of Progress:
The SWSS Weed Resistance and Technology Stewardship Committee met on Monday, January 26, 2015. Peter Dotray served as Vice Chairman for 2015. The Manual of Operating Procedures states succession among officers as Secretary to Vice Chairman to Chairman. Due to his other SWSS duties, Dotray was relieved of service as Chairman of the Weed Resistance and Technology Stewardship Committee for 2016. Jason Bond will as Chairman for 2016. Eric Prostko was Secretary in 2015 and will be Vice Chairman in 2016 and Chairman in 2017. Hunter Perry volunteered to serve as Secretary in 2016 and assume duties as Vice Chairman and Chairman in 2017 and 2018, respectively.

Joe Laforest and Rebecca Wallace of the Bugwood Network at the University of Georgia were in attendance and proposed the development of a potential computer application for the early detection and reporting of herbicide resistance. Laforest wished to gauge the interest of the Weed Resistance and Technology Stewardship Committee and the SWSS in this potential application. The consensus of the committee was a computer application to track herbicide-resistant weeds has utility if developed correctly. Concerns and/or questions to be addressed during future discussions were as follows:

1. Increase in the number of calls/requests to specialists/researchers
2. Funding sources for potential increases in the collection/processing of samples
3. Failure issues not related to herbicide issues
4. What would be reported and who has access to the data?
5. Potential pilot program in one or two states
6. Interactions with Ian Heap
7. Laforest was encouraged to meet with HRAC at WSSA meeting

A current list of herbicide-resistant weeds in the SWSS region was prepared by Prostko. The list was circulated among the committee prior to the SWSS meeting. After minor editing, the list will be submitted for inclusion in the SWSS Proceedings.

Most states in the SWSS region were represented in the committee meeting by university, USDA, or industry personnel. The following states were-under-represented: South Carolina, North Carolina, Virginia, Kentucky, Tennessee, Missouri, and Oklahoma.

Objective(s) for Next Year:

1. Seek representation from all states in SWSS region, specifically targeting South Carolina, North Carolina, Virginia, Kentucky, Tennessee, Missouri, and Oklahoma
2. Update list of herbicide-resistant weeds in SWSS region
3. Contribute to the SWSS newsletter
4. Provide additional feedback to Joe LaForest regarding computer application

Recommendation or Request for Board Action:

None

Respectfully submitted,

Jason Bond, Peter Dotray, Eric Prostko, Jason Norsworthy, Andy Kendig, Bob Hayes, Hunter Perry, Les Glasgow, Ted Webster, Carroll Johnson, Daniel Stephenson, James Holloway, Joyce Tredaway-Ducar, Matt Goddard, Ramon Leon, Nilda Burgos, Ned French, Drake Copeland, and a few unnamed participants.

Weed Science Society of America Representative Report
2015 SWSS Board Meeting, Savannah, GA

Submitted by: Eric Palmer

Annual Meeting -

The 2014 WSSA annual meeting was held in Vancouver, BC and attendance was approximately 500.

The 2015 WSSA meeting will be held February 9-12 at the Downtown Hilton in Lexington, KY.

A new meeting app for your mobile devices (Guidebook) will be introduced at the 2015 meeting and will allow participants to download the program, view abstracts, select favorites, and type notes. This may be something to consider for future SWSS meetings.

Also, there will be a student poster contest at the 2015 meeting in Lexington.

Plans are already underway for the 2016 meeting which will be a joint meeting between SWSS and WSSA in San Juan, PR. The 2016 meeting will be held February 8-11 at the Sheraton Puerto Rico.

The summer Board meeting for SWSS and WSSA is scheduled for July 6-9 at the Sheraton Puerto Rico.

The 2017 WSSA meeting is planned for February 6-9 at the Hilton El Conquistador in Tucson, AZ.

Other Activities –

Joe DiTomaso formed the ad hoc Strategic Planning Committee to further discuss a plan to try and reverse the trend of declining membership in recent years and to update the WSSA long-term strategic plan.

WSSA submitted the NP 304 letter and it was reported that the letter appeared to have positive results based on the published long-range plan by USDA-ARS.

WSSA developed a fact sheet to properly define a superweed and refute misconceptions on this topic.

Publications –

The 10th Edition of the Herbicide Handbook is now available for purchase at www.wssa.net

Continuing Education Committee Report

Summary of Progress:

Ten states in Southern Weed Science Society approved various sections of the 2015 program to received pesticide credit for those attending and completing required sign in procedures. 18 hours of CCA and CPAg credit were approved by Agronomy Society of America for this year's meeting. Good participation from membership was observed as indicated by those that signed in or picked up require state forms for the various sections.

Objective(s) for Next Year:

Obtain and provide CEUs for membership with various state agencies for pesticide credits, Certified Crop Advisor (CCA) program, Certified Professional Agronomist program of America Society of Agronomy (CPAg)

Recommendation or Request for Board Action:

Continue to provide CEUs for Pesticide credit, CCA and other groups as deemed appropriate by the program.

Finances (in any) Requested:

None

Respectively submitted;

Bobby Walls, Chairperson
Tim Adcock
Todd Baughman
John Byrd
Allan Estes
Travis Gannon
Mike Harrell
Matt Matocha
Ken Muzyk
Patrick McCullough
Scott McElroy
Bob Scott
Ron Strahan

Constitution and By-Laws Committee Report
2015 SWSS Annual Meeting
Savannah, GA

Submitted by: Carroll Johnson

Proposed Changes to the SWSS Constitution

The Southern Weed Science Society Constitution, By-laws, and Manual of Operating Procedures need constant revision to reflect changes in our organization and science.

The following errors or omissions in the SWSS Constitution need to be corrected.

1. Article III, Section1. The entire list of Executive Board members needs to be corrected.
    a. Delete CAST representative, as per 1/24/10 action.
    b. Add additional Ex-Officio members; Newsletter Editor and Graduate Student Representative.
    c. The suggested inclusive changes:
        i. "The officers of this Society shall be the President, President-Elect, Vice-President, Secretary-Treasurer, Editor, and immediate Past-President. The officers, four elected members-at-large, and Representative to the Weed Science Society of America (WSSA) shall constitute the Executive Board. The Business Manager, Chairman of the Constitution and Operating Procedures Committee, Newsletter Editor, and Representative to the Graduate Student Organization shall be ex-officio members of the Executive Board."
2. Article V. The committee structure has been revised, as per vote at the SWSS Business Meeting in Birmingham. This includes adding the Weed Resistance and Technology Stewardship Committee to full standing and deletion of the Weed Identification Committee.

These proposed changes to the SWSS Constitution require vote by the membership.

The following errors or omissions in the SWSS Bylaws/MOP also need to be corrected.

1. Executive Board Section
    a. Section 1 addresses voting privileges of SWSS Board. The language needs to be revised and updated since the SWSS Board now has additional ex-officio members.
    b. Section 1 lists the representative to the Endowment Foundation as being on the SWSS Board and having voting privileges. A representative to the Endowment Foundation is not listed as being on the SWSS Board.
    c. The suggested inclusive changes:
        i. "All officers, elected representatives, and appointed Ex-Officio members of the Executive Board (except the Business Manager and Website Editor) have full voting privileges."
2. Business Manager Section.
    a. Numbering of items needs to be corrected.
    b. For the arrangement of plaques to be presented, the listing of awards needs to be corrected (change Weed Scientist of the Year to SWSS Fellow).
3. Newsletter Editor Section.
    a. Change from 'Can attend the Executive Board meeting' to 'Serves as an ex-officio member of SWSS Executive Board, with voting privileges'.
4. Website Editor Section.
    a. This position is a 'for-hire' position, not a voluntary position and that needs to be stated in MOP.
5. Correct the Awards Committee MOP to reflect new award (SWSS Fellow) and delete mention of SWSS Distinguished Service Award and SWSS Weed Scientist of the Year.

Necrologies and Resolutions

Submitted by: David Black

DR. NORMAN CLINE GLAZE, 80, died November 18th, 2014. He was born on January 16th, 1934 in Washington, D.C.

Norman attended the University of Maryland where he received his Bachelors of Science degree in 1957, followed by his Masters of Science degrees in 1963. Following completion of his PhD from the University of Florida, Norman began his nearly 30 year carrier with the USDA-ARS. Norman's research focused on weed science in horticultural crops. Additionally, Norman was a long-time supporter of the IR-4 program and conducted numerous trials to support registration of herbicides on minor-use crops such as vegetables and ornamentals. In 1993, Norman retired from the USDA-ARS in Tifton, GA. Dr. Glaze is also a veteran of the Unites States Army.

Norman was member of many professional societies and a long standing member of SWSS.

He is survived by his wife Joan Vivian Stark Glaze, and sister Ruthanna Lehnert.

WHEREAS Dr. Glaze served with distinction with the United State Department of Agriculture and,

WHEREAS Dr. Glaze provided numerous contributions to weed science and the Southern Weed Science Society,

THERFORE BE IT RESOLVED that the officers and membership of the Southern Weed Science Society do hereby take special note of the loss of our coworker, Norman C. Glaze, and by copy of this resolution, we express to his family our sincere sympathy and appreciation for his contributions.

DR. PAUL W. SANTELMANN, 88, died November 17th, 2014. He was born October 18th, 1926 in Ann Arbor Michigan. He grew up in Washington D.C. and northern Virginia. On December 28th, 1950 Paul married Susanna Porter in Oakland, Maryland.

Paul served in the U.S. Army engineers in the Pacific theater in World War II and with the 8th Army Occupational Forces in Nagoya and Tokyo, Japan. After his discharge as a staff sergeant he attended the University of Maryland where he received his bachelor's degree in agronomy in 1950. He subsequently received his master's degree from Michigan State University in 1952 and his Ph.D. in agronomy from The Ohio State University in 1954.

Dr. Santelmann began his career as assistant professor of agronomy at the University of Maryland in 1954 and in 1959 was promoted to associate professor. In 1962, he accepted the position as full-time professor of agronomy at Oklahoma State University in Stillwater. In 1972 Dr. Santelmann was named one of Oklahoma State Universities first Regents Professors after receiving awards for his teaching and research activities. Dr. Santelmann served as Head of the Department of Agronomy for 11 years before returning to research and teaching in 1987, retiring from Oklahoma State University in 1991.

Dr. Santelmann served as president of three national professional organizations, including Weed Science Society of America, and as a director of the American Institute of Biological Sciences (AIBS), the American Association for the Advancement of Science (AAAS), Center for Applied Special Technology (CAST), and ARPACS. He was a Fellow of the American Society of Agronomy and of the Weed Science Society of America.

Paul was member of many professional societies. He was a long standing active member, past president, and recipient of the Distinguished Service Award from the SWSS.

He is survived by his wife of 63 years, Susanna Santelmann; his brother Edward Carl Santelmann; two sons, Steven L. Santelmann and wife Cindy, and Douglas W. Santelmann and wife Sheryl; his daughter Patricia Emerick and her husband; 10 grandchildren; and 9 great-grandchildren.

WHEREAS Dr. Santelmann served with distinction at Oklahoma State University and,

WHEREAS Dr. Santelmann provided numerous contributions to weed science and the Southern Weed Science Society,

THERFORE BE IT RESOLVED that the officers and membership of the Southern Weed Science Society do hereby take special note of the loss of our coworker Paul Santelmann, and by copy of this resolution, we express to his family our sincere sympathy and appreciation for his contributions

DR. JOSEPH ANTOGNINI, 91, died December 21st, 2014. He was born on September 15th, 1923 and grew up on a dairy farm in Sonoma County, California, near the town of Freestone. He was married to his wife Jean Antognini for 70 years.

Joe served overseas during WWII in the US Army. Following his years of service in the US Army, Joe received his BS from UC Davis and his PhD in Vegetable Crops from Cornell University.

Dr. Antognini held several positions within the agricultural industry during his career including positions with Geigy (1951 – 19550; Stauffer Chemical (1955 – 1972); Zoecon Corporation (1972 – 1975); and BASF Corporation (1975 – 1988). In 1988 Joe became the National Program Leader in Weed Science for the United State Department of Agriculture in Beltsville, MD. Joe retired from the USDA in 1994 at the age of 71.

During Joe's career, he was instrumental in the development of the herbicides atrazine, thiocarbamates, bentazon, fluchloralin, quinclorac, and sethoxydim. In cotton, Joe guided the development of the plant growth regulator mepiquat chloride. In addition, Joe served as the President of WSSA in 1992.

Joe was member of many professional societies and a long standing member of SWSS.

He is survived by his wife Jean Antognini. Joe and Jean had two sons, a daughter and five grandchildren.

WHEREAS Dr. Antognini served with distinction with the United State Department of Agriculture and,

WHEREAS Dr. Antognini provided numerous contributions to weed science and the Southern Weed Science Society,

THEREFORE BE IT RESOLVED that the officers and membership of the Southern Weed Science Society do hereby take special note of the loss of our coworker, Joe Antognini, and by copy of this resolution, we express to his family our sincere sympathy and appreciation for his contributions.

EFFECT OF RYE SEEDING RATE, COVER CROP PLANTING METHOD, AND HERBICIDE PROGRAM ON WEED CONTROL IN COTTON. M.G. Palhano*[1], J.K. Norsworthy[2], J.C. Moore[2], C.J. Meyer[2], Z.D. Lancaster[2], J.K. Green[2]; [1]University of Arkansas, fayetteville, AR, [2]University of Arkansas, Fayetteville, AR (60)

ABSTRACT

Weed control in reduced tillage systems has been reported as a challenge in cotton production. Cost related to herbicide usage has increased tremendously due to development of herbicide-resistant weeds. The use of cover crops in conservation tillage offers many advantages such as weed suppression through physical and chemical allelopathic effects. Federal conservation payments are available for growers that want to include cover crops as a means to reduce tillage and increase weed suppression. A field study was initiated in the fall of 2013 at the Arkansas Agricultural Research and Extension Center in Fayetteville to determinate the adequate cereal rye seeding rate and planting method for optimum weed control and cotton yield. This experiment was a split-plot design with the main plot being cereal rye seeding rates at 50, 100 and 150 lb/A in absence or presence of a herbicide program. Subplots consisted of drilled and broadcasted planting methods. Cereal rye biomass was collected at cotton planting and weed control was visually assessed at 2, 4, 6, and 8 weeks after planting. Seedcotton yield was also collected. No significant differences were observed between planting methods in any parameter evaluated. Cereal rye biomass production increased as seeding rate increased. Cereal rye by itself was more effective on Palmer amaranth suppression than barnyardgrass. When herbicides were not applied, cereal rye at 50 lb/A provided the least weed control. Cereal rye at 100 and 150 lb/A provided comparable levels of weed control. All plots treated with a standard herbicide program had weed control greater than 98% for all species, regardless of the seeding rate. Yields from plots with the standard herbicide program were significantly higher than from plots without herbicide, independent of seeding rates. Yield improvement was observed due to use of cereal cover crop in the system compared to no cover crop.

NARROW WINDROW BURNING OF SOYBEAN CHAFF AND EFFECTS ON WEED SEED VIABILITY.
J.K. Green*[1], J.K. Norsworthy[1], J.C. Moore[1], M. Walsh[2], R. Scott[3]; [1]University of Arkansas, Fayetteville, AR, [2]University of Western Austraila, Crawley, Australia, [3]Universitiy of Arkansas, Lonoke, AR (61)

ABSTRACT

Herbicide-resistant weeds are a growing problem in the U.S. and around the world. To preserve the efficacy of the herbicides that are currently in use, diverse weed control tactics must be brought into current production systems. Harvest Weed Seed Control measures similar to those currently used in Australian cropping systems are being evaluated for use in U.S. soybean production at the University of Arkansas. A field experiment was conducted in 2014 at the University of Arkansas Northeast Research and Extension Center in Keiser, Arkansas to characterize the amount of heat resulting from narrow-windrow burning of soybean chaff passing through a 41-cm wide chute attached to the rear of a combine. Additionally, the effectiveness of the burn in destroying weed seed was determined. The amount of soybean chaff was varied by adjusting the swath width on the combine (10, 9, 8, 7, 6, & 5 rows, respectively), and chaff was collected and weighed in 1-m of chaff row near the location in which the burn took place. Small aluminum tins (5-cm diameter) each containing 100 Palmer amaranth, barnyardgrass, johnsongrass, and pitted morningglory seeds were placed inside the windrows at the soil surface and the temperature and duration of the burn near the seed was recorded with a thermocouple. Maximum temperatures recorded during the burn, depending upon wind speed and amount of chaff present, ranged from 188 C to 680 C. The duration in which the burn was above 100 C near the seed was generally 8 to 33 minutes. Based on visual inspection, most of the Palmer amaranth, barnyardgrass, and johnsongrass were ash following the burn. Pitted morningglory appeared to be the most resilient to burning. Seed germination and viability estimates of these seeds were conducted and it was concluded that none of the seeds survived any of the burning treatments. It appears that a Harvest Weed Seed Control strategy such as narrow-windrow burning has great potential for helping manage the soil seedbank in U.S. soybean production and this seed destruction practice should aid resistance management in fields in which it is practiced.

COTTON AND WEED RESPONSE TO PYROXASULFONE APPLIED PREEMERGENCE AND POSTEMERGENCE. C.J. Webb*[1], W. Keeling[2], P. Dotray[3]; [1]Texas A&M Research, Lubbock, TX, [2]Texas A&M Agrilife, Lubbock, TX, [3]TAMU Ag Experiment STation, Lubbock, TX (62)

ABSTRACT

The most common annual broadleaf weed in Texas High Plains cotton is Palmer amaranth (*Amaranthus palmeri*). For many years it has been controlled successfully with a combination of soil residual herbicides, glyphosate, and cultivation. Glyphosate-resistant Palmer amaranth, first identified in this region in 2011, has increased dramatically in recent years. Pyroxasulfone, marketed alone as Zidua or in a pre-mix with carfentrazone-ethyl (Aim) and sold as Anthem Flex, has excellent activity on Palmer amaranth. Previous research suggests that there is potential for cotton injury when these products were applied preemergence, especially in coarse textured soils.

Field studies were conducted in 2014 on different soil textures to evaluate cotton response and Palmer amaranth control following Zidua and Anthem Flex applied early-preplant (EPP), preemergence (PRE), and postemergence-directed (PDIR). Early-preplant and PRE treatments of Zidua (1.5oz/a), Warrant (48oz/a), and Dual Magnum (20oz/a) were applied at Halfway (clay loam soil) and Lamesa (sandy loam soil). Preemergence treatments of Anthem Flex (1.38, 1.84, 2.75, 3.68, 5.54, 7.7oz/a) and Caparol (26, 38oz/a) were applied at Lamesa and Lubbock (loam soil). Postemergence treatments of Zidua (1.27oz/a), Warrant (48oz/a), Anthem Flex (2.76oz/a), Direx (32oz/a), Roundup (22oz/a), and Aim (1.23oz/a) were applied at Lamesa and Lubbock. Treatments were applied using a CO_2-pressurized backpack sprayer calibrated to deliver 10 gallons per acre. Plots, 4 rows by 30 feet in length, were replicated three times. Cotton injury and Palmer amaranth control was estimated visually based on a standard scale of 0 to 100%, where 0 = no injury and no weed control, and 100 = complete crop loss and complete weed control.

Cotton was injured 20 to 65% following Zidua applied EPP and PRE, and greater injury was observed on course textured soils. Cotton yield was not reduced by any Zidua treatment. Zidua applied EPP and PRE at either location controlled Palmer amaranth 88 to 92% 109 days after planting. Cotton injury from 5 to 30% was observed following Anthem Flex applied PRE at the sandy loam location and greater injury was observed with increased rates at both locations. No injury or yield reduction was observed following Zidua or Anthem Flex applied PDIR and both herbicides provided excellent residual Palmer amaranth control.

NARROW ROW SPACING IN WINTER WHEAT AS A TOOL FOR MANAGING ITALIAN RYEGRASS (*LOLIUM MULTIFLORUM*). Z.R. Taylor*, W.J. Everman; North Carolina State University, Raleigh, NC (63)

ABSTRACT

Italian Ryegrass (*Lolium multiflorum*) is one of the most problematic weeds in the production of winter wheat in the southeast. As herbicide resistance issues continue to develop and expand throughout the area, our options for control post emergence continue to decline. As a result we are looking at some cultural practices that may help to suppress the problem when combined with a variety of chemical control plans. One method studied was to improve the crops ability to compete by changing row spacing. We compared wheat planted in 7.5 rows with a drill to those planted in approximately 3.75 inch rows. Each row spacing received the following treatments; non-treated check, Zidua (pyroxasulfone) at 1.25 oz/a pre, Zidua at 1.25 oz/a pre fb Zidua at 1.25 oz/a post, Zidua at 1.25 oz/a pre fb Osprey (mesosulfuron) at 4.75 oz/a and non-ionic surfactant at 0.25% v/v post, Zidua at 1.25 oz/a pre fb Axial XL (pinoxaden) at 16.4 oz/a post, Zidua at 1.25 oz/a pre fb Osprey at 4.75 oz/a and Zidua at 1.25 oz/a and non-ionic surfactant at 0.25 % v/v post, Zidua at 1.25 oz/a pre fb Zidua at 1.25 oz/a and Axial XL at 16.4 oz/a post, Osprey at 4.75 oz/a and non-ionic surfactant at 0.25% v/v post, Axial XL at 16.4 oz/a post, Osprey at 4.75 oz/a and Zidua at 1.25 oz/a and non-ionic surfactant at 0.25 % v/v post, Zidua at 1.25 oz/a and Axial XL at 16.4 oz/a post, Axiom (flufenacet and metribuzin) at 8 oz/a at spike. Visual ratings did not show differences in control between the two planting arrangements. One location had very little ryegrass population, but population densities were recorded in the other location. Densities did not show differences between row spacing practices.

DIFFERENTIAL TOLERANCE OF GLYPHOSATE-RESISTANT PALMER AMARANTH TO MESOTRIONE IN ARKANSAS. S. Singh[1]*, N.R. Burgos[1], R.A. Salas[1], V. Singh[1], V. Shivrain[2]; [1]University of Arkansas, Fayetteville, AR; [2]Syngenta Crop Protection, Vero Beach, FL (64)

ABSTRACT

Palmer amaranth is an economically troublesome and difficult-to-control weed in the United States. Rapid and widespread evolution of resistance to glyphosate and Group 2 herbicides has limited the chemical control options in infested fields. The response of Palmer amaranth populations to alternative herbicides in HR (herbicide-resistant) crops was evaluated to determine inherent variability among and within populations to aid in the proactive approach to resistance management. These populations were generally resistant to glyphosate. Bioassays were conducted in the greenhouse at the Arkansas Agricultural Research Station, Fayetteville, in 2013-14. Seeds were collected from crop fields across Arkansas between 2008 and 2012. Seedlings (7-10 cm tall) were treated with mesotrione, 1x rate (105 g ai ha^{-1}) with COC (1% v/v) and liquid AMS (2.5% v/v). The bioassays were conducted twice with two replications, with 50 seedlings per replication. Injury was recorded at 3 wk after treatment on a scale of 0-100% where 100% is complete death. Mesotrione killed 97% of plants in 51 of 57 populations; the remaining 7 populations had survivors with different levels of injury ranging from 67% - 90%. The populations with survivors showing lower injury levels were selected for estimation of tolerance level. Dose response assays were conducted with 4 putative tolerant populations. A mesotrione-resistant population of tall waterhemp was used as reference. In the dose-response assays, survivors were observed only at sub-lethal doses and the average predicted rate of mesotrione that would control these populations 50% (GR_{50}) was 21.5 g ai ha^{-1}. Mesotrione controlled the glyphosate-resistant accessions 88%-97%. It is an effective supplemental tool for managing glyphosate-resistant Palmer amaranth and should be used in combination with other herbicides to avoid escapes.

NEXT GENERATION PREEEMERGENCE PROGRAMS FOR CONTROLLING PALMER AMARANTH AND WATERHEMP IN SOYBEAN. C.J. Meyer*[1], J.K. Norsworthy[1], L.E. Steckel[2], G.R. Kruger[3], V.M. Davis[4], B.G. Young[5], W.G. Johnson[5], K.W. Bradley[6], M.M. Loux[7]; [1]University of Arkansas, Fayetteville, AR, [2]University of Tennessee, Jackson, TN, [3]University of Nebraska-Lincoln, North Platte, NE, [4]University of Wisconsin, Madison, WI, [5]Purdue University, West Lafayette, IN, [6]University of Missouri, Columbia, MO, [7]Ohio State Unversity, Columbus, OH (65)

ABSTRACT

Palmer amaranth (*Amaranthus palmeri*) and common waterhemp (*Amaranthus tuberculatus*) have become increasingly troublesome weeds throughout the United States. Both species are highly adaptable, dioecious, exhibit rapid growth, and are highly fecund, capable of producing hundreds of thousands of seeds per plant. These weedy characteristics contribute to the competitiveness of *Amaranthus* spp. with agronomic crops and facilitate the rapid spread of herbicide resistance. The effectiveness of nineteen future preemergence (PRE) herbicide programs were evaluated on glyphosate-resistant Palmer amaranth in 2013 and 2014 at locations in Arkansas, Indiana, Nebraska, Illinois, and Tennessee. These same programs were also evaluated on glyphosate-resistant waterhemp at locations in Illinois, Missouri, and Nebraska. Locations evaluating the same species were analyzed together with location and year as a random effect. The PRE programs were also subjected to a regression analysis to determine how percent control for each treatment degraded over time. PRE programs for Palmer amaranth were evaluated for percent control up to 8 weeks after application and for waterhemp up to 5 weeks after application. Inverse prediction using a regression analysis was conducted on these data for each herbicide treatment to predict the amount of time each program will provide greater than 75% control. Comparing the inverse prediction means and confidence intervals for those means provides a measure of the strength and consistency of each program across environments and years. Dicamba at 0.5 lb ae/A, metribuzin at 0.375 lb ai/A, and 2,4-D at 0.5 and 1.0 lb ae/A provided less than three weeks of acceptable control (>75%) of Palmer amaranth across all site-years. Dicamba + *S*-metolachlor + metribuzin, isoxaflutole + metribuzin, isoxaflutole + metribuzin + *S*-metolachlor, pyroxasulfone, flumioxazin + pyroxasulfone, and mesotrione + *S*-metolachlor all provided greater than 8 weeks of acceptable control across all site years. Results were similar for waterhemp except that locations were only rated up to 5 weeks after application. Except for dicamba at 0.5 lb/A and 2,4-D at both rates, all treatments provided at least 3 weeks of acceptable control of tall waterhemp. Isoxaflutole + S-metolachlor, isoxaflutole + metribuzin, isoxaflutole + metribuzin + *S*-metolachlor, pyroxasulfone, flumioxazin + pyroxasulfone, and mesotrione + *S*-metolachlor all provided greater than 5 weeks of acceptable control across all site-years. In both experiments, treatments providing less than three weeks of acceptable control also had significantly less control of each species according to visual ratings collected 3 to 4 weeks after application.

GRASS CONTROL WITH COMBINATIONS OF SHARPEN® AND ACCASE-INHIBITING HERBICIDES. R.R. Hale*[1], T. Barber[2], J.K. Norsworthy[1], R. Scott[3]; [1]University of Arkansas, Fayetteville, AR, [2]University of Arkansas, Lonoke, AR, [3]Universitiy of Arkansas, Lonoke, AR (66)

ABSTRACT

Barnyardgrass [*Echinochloa crus-galli*] is the most problematic weed in Arkansas rice production. The physiological and biochemical capability of barnyardgrass to quickly evolve resistance continues to limit herbicide options for control. Sharpen®is a new contact herbicide labeled for broadleaf weed control in rice. Acetyl-CoA carboxylase (ACCase)-inhibiting herbicides, often referred to as graminicides, are systemic and provide an effective barnyardgrass control option in rice. When tank-mixing graminicides with contact herbicides, a reduction in graminicide efficacy is often observed. Hence, a greenhouse study was conducted at the University of Arkansas Altheimer Laboratory in Fayetteville, AR to evaluate ACCase-inhibiting herbicides alone and tank-mixed with two rates of Sharpen® for barnyardgrass control. The two rates of Sharpen were evaluated in separate experiments, both of which were setup as a randomized complete block design with three tank-mix partners applied with and without Sharpen® along with a nontreated control. All treatments contained crop oil concentrate (COC) at 1% v/v. Barnyardgrass was maintained under saturated conditions in pots containing potting mix. Graminicides evaluated alone and with Sharpen® included Clincher® (cyhalofop) at 15 fl oz/A, Ricestar HT® (fenoxaprop) at 24 fl oz/A, and Targa® (quizalofop) at 20.7 fl oz/A. All herbicides were applied to 6- to 8-leaf barnyardgrass. Tank-mixing Sharpen® with either of the three graminicides, regardless of Sharpen rate, did not reduce barnyardgrass control, and for several combinations barnyardgrass control improved with the addition of Sharpen® over the graminicide applied alone. Based on these results, Sharpen® tank-mixed with graminicides labeled for use in rice should be a good option in fields where both broadleaf and grass weeds are present.

OPTIMIZING QUIZALOFOP RATE STRUCTURE FOR SEQUENTIAL APPLICATION IN PROVISIA.
Z.D. Lancaster*, J.K. Norsworthy, M.R. Miller, S.M. Martin, J.C. Moore, C.J. Meyer; University of Arkansas, Fayetteville, AR (67)

ABSTRACT

With the stress that herbicide-resistant weeds put on our current production systems, new technologies are needed to control these weeds. BASF is currently developing a new non-GMO rice trait that will be resistant to quizalofop, an acetyl coenzyme A carboxylase (ACCase)-inhibiting herbicide. The Provisia™ rice system will provide an additional herbicide trait to be used in Midsouth rice production systems. A field experiment was conducted in the summer of 2014 at the University of Arkansas Rice Research and Extension Center in Stuttgart, Arkansas to determine the best rate structure for sequential applications of quizalofop when the first application is made at either the 2- or 6-leaf stage of grass weeds. The experiment was set up as a two factor, randomized complete block design with factor-A being the growth stage at first application and factor-B being the rate structure of quizalofop. This experiment was evaluated for two different growth stages of initial herbicide application. Herbicide rate structures were 80, 120, or 160 g ai/ha followed by 80, 120, or 160 g/ha sequential application 14 days after the initial application. The highest total amount of quizalofop applied in a rate structure was 240 g/ha total. Barnyardgrass and broadleaf signalgrass control were rated at 2, 4, and 6 weeks after treatment. Greatest control of both barnyardgrass and broadleaf signalgrass was recorded with the 120/120 g/ha treatment with 99 and 98% control, respectively. The 80/80 g/ha sequence had the least control of both barnyardgrass and broadleaf signalgrass with 89 and 90% control, respectively. Control for barnyardgrass and broadleaf signalgrass was reduced by making the first application on 6-leaf grass compared to 2-leaf grass. The results of this experiment suggest that the most likely recommended rate structure for quizalofop will be 120 g/ha on 2-lf grasses followed by a subsequent application at the same rate approximately 14 days after the initial application.

EVALUATION OF APPLICATION DATES AND RESIDUAL HERBICIDES FOR CONTROL OF HENBIT (*LAMIUM AMPLEXICAULE*). B.C. Woolam*, D. Stephenson, R.L. Landry; LSU AgCenter, Alexandria, LA (68)

ABSTRACT

Louisiana crop producers typically apply a burndown herbicide four to six wk prior to seeding summer annual crops; however, these treatments often provide inadequate henbit (*Lamium amplexicaule*) control. Determination of programs to effectively manage henbit are needed. Therefore, experiments were conducted at the LSU AgCenter Dean Lee Research and Extension Center near Alexandria, LA in 2012/2013 and 2013/2014 to evaluate fall application dates for henbit control with residual herbicides. A factorial arranged in a randomized complete block with four replications was used in all experiments. Factors consisted of five herbicide application dates and seven residual herbicides. The five application dates were October 15, November 1, November 15, December 1, and December 15. The seven residual herbicides were diuron 840 g ai ha^{-1}, flumioxazin at 72 g ai ha^{-1}, oxyfluorfen at 280 g ai ha^{-1}, pyroxsulfone at 150 g ai ha^{-1}, preformulated mixture of rimsulfuron:thifensulfuron at 8:18 g ai ha^{-1}, *S*-metolachlor at 1420 g ai ha^{-1}, and no residual herbicide. Paraquat at 840 g ai ha^{-1} plus non-ionic surfactant at 0.25% v/v was co-applied with all residual herbicide treatments to control any emerged henbit at the time of application. Visual evaluations of henbit control (0 = no control; 100 = total henbit death) were collected in late-January, mid-February, and late-March of 2013 and 2014. Only control data collected in late-March of each year is presented. Henbit density m^{-2} and height (10 plants $plot^{-1}$) were recorded in late-March of 2013 and 2014. Henbit density and height in the non-residual herbicide treatment averaged 13 m^{-2} and 127 mm in late-March of each year. Henbit density and height were converted to the percent of the non-residual herbicide treatment prior to analysis.

Regardless of residual herbicide, November 1 through December 1 applications provided 69 to 84% henbit control in late-March. Applications on October 15 controlled henbit 36% in late-March. A lack of activating rainfall and warmer soil temperatures possibly leading to accelerated herbicide degradation may be the reason poor henbit control was observed following the October 15 application date of residual herbicides. Averaged across application date, flumioxazin, oxyflurofen, and rimsulfuron:thifensulfuron provided 73, 86, and 84% henbit control, respectively, in late-March. However, diuron, pyroxasulfone, and *S*-metolachlor controlled henbit 46, 46, and 56%, respectively, in late-March. Regardless of residual herbicide, henbit density was 36% of the non-residual herbicide treatment following the November 1 and December 1 applications. Similarly, henbit height was 28 and 18% of the non-residual herbicide treatment following a residual herbicide application on November 1 and December 1, respectively. However, these data did not differ from density and height observations following the November 15 and December 15 applications. Similar to control data, flumioxazin, oxyflurofen, and rimsulfuron:thifensulfuron reduced henbit density and height to an average of 16 and 18% of the non-residual herbicide treatment, respectively, in late-March. Henbit density (64 to 100%) and height (52 to 61%) as a percent of the non-residual herbicide treatment following diuron, pyroxasulfone, and *S*-metolachlor applications was unacceptable. Poor control in late-March following diuron and *S*-metolachlor application was a combination of greater henbit density and height. However, poor control following pyroxasulfone application was a function of decreased henbit height alone in late-March. Data indicates that flumioxazin, oxyflurofen, or rimsulfuron:thifensulfuron applied November 1 through December 1 will provide the greatest henbit control and density and height reduction prior to seeding a summer annual crop in late-March.

MIXTURES OF PARAQUAT AND UREA-AMMONIUM NITRATE FOR WINTER ANNUAL WEED CONTROL. A.A. Howell*[1], H.M. Edwards[1], J.A. Bond[1], B.R. Golden[1], H.T. Hydrick[2]; [1]Mississippi State University, Stoneville, MS,[2]Stoneville - Delta Research and Extension Center, Stoneville, MS (69)

ABSTRACT

CONTROL OF NEALLEY'S SPRANGLETOP (*LEPTOCHLOA NEALLEYI*). E.A. Bergeron*, E.P. Webster, B.M. McKnight, J.C. Fish; LSU AgCenter, Baton Rouge, LA (70)

ABSTRACT

A study was established in a greenhouse on the Louisiana State University campus in Baton Rouge, Louisiana. The objectives were to evaluate herbicides for the control of Nealley's sprangletop (*Leptochloa nealleyi Vasey*). The study was a completely randomized design with nine replications. The study was repeated. Nealley's sprangletop seed was planted in plastic planting flats with 50 – 2.5 by 2.5 cm cells filled with potting mix until reaching one- to two-leaf growth stage. The Nealley's sprangletop was transplanted into 6 by 10 cm cone containers filled with potting mix and placed into racks. The racks were placed in plastic containers and filled with 67 L of water for subsurface irrigation for the length of the study. Urea fertilizer, 46-0-0, was added to the water at 280 kg/ha.

Nealley's sprangletop had one- to two-tillers with a height of 20- to 30-cm at herbicide application. Herbicides applied were: propanil at 2240 g ai/ha, propanil at 4480 g/ha, propanil plus thiobencarb at 3360 g ai/ha, propanil plus thiobencarb at 6720 g/ha, quinclorac at 420 g ai/ha, thiobencarb at 4480 g ai/ha, bispyribac at 28 g ai/ha, imazethapyr at 105 g ai/ha, imazomox at 44 g ai/ha, penoxulam at 40 g ai/ha, clethodim at 150 g ai/ha, cyhalofop at 314 g ai/ha, fenoxaprop at 122 g ai/ha, quizalofop at 185 g ai/ha, glufosinate at 450 g ai/ha, glyphosate at 840 g ai/ha. Nealley's sprangletop control, leaf number, tiller number, and height were evaluated at 0, 5, 10, and 14 days after treatment (DAT). Fresh plant biomass was obtained at 14 DAT.

At 14 DAT, Nealley's sprangletop treated with clethodim, fenoxaprop, and quizalofop was controlled 91 to 98%. Height and number of leaf and tillers were reduced with these herbicides compared with the nontreated. Nealley's sprangletop treated with glyphosate and glufosinate, common burndown herbicides, controlled Nealley's sprangletop 88 and 87%, respectively. Penoxulam and quinclorac had little to no activity on Nealley's sprangletop. Fresh plant biomass of Nealley's sprangletop treated with propanil or propanil plus thiobencarb at both rates, cyhalofop, fenoxaprop, clethodim, glyphosate, or glufosinate was less than 3 grams, compared with the nontreated with a fresh weight of 15 grams.

Nealley's sprangletop is a prolific seed producer with high seed viability at maturity. It is important to correctly identify this weed in order to select the appropriate weed management program. Fenoxaprop is the best option for controlling Nealley's sprangletop in rice production. Although not labeled in rice, Nealley's sprangletop treated with clethodim and quizalofop was controlled 91 and 98%, respectively.

TOLERANCE OF AVS-4002 EDAMAME TO SULFENTRAZONE. S.E. Abugho*, N.R. Burgos, L.E. Estorninos Jr., R.A. Salas; University of Arkansas, Fayetteville, AR (71)

ABSTRACT

Edamame (*Glycine max* L.), a vegetable soybean, is considered an emerging industry in Arkansas. However, limited herbicides are available for this crop compared to field soybean. AVS-4002 edamame, the first commercialized variety from the University of Arkansas breeding program, was tested with different herbicides to expand herbicide options. Field studies were conducted in the summer of 2013 and 2014 at the Vegetable Research Station, Kibler, Arkansas to determine its response to different rates and time of application of herbicides, especially sulfentrazone. The study was conducted in a randomized complete block design consisting of 11 herbicide treatments with three replications. Weedy and weed-free check plots were established for crop response and weed control evaluation reference. Stand count, crop injury, weed control, and yield were recorded. Major weeds such as red sprangletop (*Leptochloa panicia* Retz.), Palmer amaranth (*Amaranthus palmeri* L.) and barnyardgrass (*Echinochloa* spp.) were effectively controlled at 21 d after planting (DAP). Theh application of Flexstar (0.42 kg ai ha^{-1}) resulted in the highest weed control (82-100%) among the postemergence herbicides. At 21 DAP, Spartan applied preemergence (PRE) at a higher rate (0.42 kg ai ha^{-1}) resulted in the lowest crop stand (24% and 32%) relative to the non-treated weed-free check and highest crop injury (68% and 70%), resulting in the lowest crop yield (77% lower than weed-free) in both years. Spartan Charge applied PRE caused cosmetic injury (e.g. stunting). Whether applied PRE or pre-plant, Spartan Charge resulted in excellent weed control (93-96%) and did not reduce yield. This study showed that sulfentrazone, at 0.21 kg ai ha^{-1}, provides good weed control and is safe for AVS-4002 edamame.

SEQUENTIAL APPLICATIONS FOR RESCUE CONTROL OF GLYPHOSATE RESISTANT PALMER AMARANTH. D. Denton*[1], D.M. Dodds[1], D. Reynolds[2], A. Mills[3], J. Copeland[1], C.A. Samples[1]; [1]Mississippi State University, Mississippi State, MS, [2]Mississippi State University, Starkeville, AR, [3]Monsanto, Collierville, TN (72)

ABSTRACT

Glyphosate-resistant (GR) Palmer amaranth was first reported in 2005 in Georgia. Since that time, GR-Palmer amaranth has spread throughout the mid-south and southeastern U.S. Growers have been forced to dramatically alter weed control practices in areas where this weed is problematic. Crops that are tolerant to glyphosate, glufosinate, and dicamba are under development and will be commercially available as Roundup Ready Xtend® crops. While timely herbicide applications will be critical with this technology, timely herbicide applications are not always feasible due to unforeseen circumstances such as weather. Therefore, data is needed regarding control of GR-Palmer amaranth that is larger than recommended at the time of herbicide application. Substantial previous research is available regarding postemergence applications of glufosinate on GR-Palmer amaranth; however, little previous research has been conducted evaluating GR-Palmer amaranth control with dicamba. Therefore, this research was conducted to evaluate control of GR-Palmer amaranth following sequential timings application in a rescue scenario with glyphosate + dicamba and glufosinate + dicamba.

An experiment was conducted in 2014 at Hood Farms in Dundee, MS to determine the effect of timing between sequential applications and herbicide program on GR-Palmer amaranth control. The experiment was initiated in a grower field with heavy natural infestations of GR-Palmer amaranth. Herbicide applications were initiated when Palmer amaranth plants were 20 to 25 cm in height and 40 to 50 cm in height. A sequential application for each growth stage was made at five different timings which included 1, 2, 3, 4 and 5 weeks after initial treatment of each growth stage. Applications were made with a CO_2 powered backpack sprayer at a pressure of 317 kPa and an application volume of 140 L/ha. Treatments utilized in this experiment included: glyphosate + dicamba at 0.8 kg ae/ha and 0.6 kg ai/ha as well as glufosinate + dicamba at 0.6 kg ai/ha each. All herbicide treatments were applied using Turbo Teejet Induction 110015 tips. Visual estimates of weed control, the number of Palmer amaranth plants per square meter, count reduction of Palmer amaranth plants per square meter, height of Palmer amaranth plants per square meter, and height reduction of Palmer amaranth plants per square meter were collected at two and four weeks after each herbicide application. Experiments were conducted using a factorial arrangements of treatments in a randomized complete block design with four replications. Visual estimates of weed control, number of plants per square meter, count reduction, plant height, and plant height reduction data were subjected to analysis of variance and means were separated using Fisher's Protected LSD at $p = 0.05$.

Four weeks after final applications, GR-Palmer amaranth percent height reduction was significantly greater when applications were made $\leq$ 3 weeks after initial treatment with height reductions ranging from 78 to 82% for plants initially treated at 20 to 25 cm in height. Sequential applications following initial application to 20 to 25 cm Palmer amaranth made $\geq$ 2 weeks after initial application significantly reduced Palmer amaranth counts from 59 to 82%. Sequential applications containing glufosinate + dicamba applied 1, 2, and 3 weeks after initial application maximized height reductions compared to other treatments when initial applications were made to 40 to 50 cm GR-Palmer amaranth. Sequential application tank mixtures containing glufosinate + dicamba provided more consistent control of 40 to 50 cm Palmer amaranth.

Sequential herbicide applications provided effective rescue control of Palmer amaranth. Control was not ideal but can facilitate crop harvest. Sequential applications should be made no later than 3 weeks after initial application regardless of Palmer amaranth size.

INFLUENCE OF ITALIAN RYEGRASS ON CORN GROWTH AND YIELD. H.T. Hydrick*[1], J.A. Bond[2], T.W. Eubank[3], H.M. Edwards[2], A.A. Howell[2], G.B. Montgomery[4]; [1]Stoneville - Delta Research and Extension Center, Stoneville, MS, [2]Mississippi State University, Stoneville, MS, [3]Dow AgroSciences, Greenville, MS, [4]University of Tennessee, Jackson, TN (73)

ABSTRACT

Glyphosate-resistant (GR) Italian ryegrass (*Lolium perenne* ssp. *multiflorium*) has been identified in 70 counties across Mississippi. Multiple resistance to glyphosate, acetolactate synthase- and Acetyl CoA carboxylase-inhibiting herbicides is also common in Mississippi. Previous research in Mississippi has demonstrated that a minimum of two herbicide applications were required for >90% control of GR Italian ryegrass and that corn yield and economic returns were optimized following herbicide programs that included fall and spring herbicide applications. Additional research is needed to identify the optimum timing for GR Italian ryegrass control and to understand the effect of GR Italian ryegrass residue on corn growth and yield. The objective of this research was to determine the effect on corn growth and yield of GR Italian ryegrass residue present at the time of planting.

Research was conducted in 2014 at the Mississippi State University Delta Research and Extension Center in Stoneville, MS, at a site known to be infested with GR Italian ryegrass. Individual plots were four 40-inch rows that were 40 feet in length. The experimental design was a randomized complete block with four replications. Treatments were defined as intervals at which GR Italian ryegrass was controlled prior to corn planting and included 49, 28, 21, 14, 7, and 0 days before planting (DBP). A nontreated control (NTC) was included for comparison. At each prescribed interval, designated plots were treated with paraquat at 1 lb ai/A plus nonionic surfactant. After reaching the prescribed interval for each treatment, complete control of GR Italian ryegrass was maintained thereafter. All plots received at least two herbicide applications prior to planting. Corn was planted March 20, 2014, at a rate of 26,000 seed/A. All plots except the nontreated control were maintained weed-free after planting. Nontreated control plots were treated with glyphosate at 0.77 lb ae/A plus atrazine at 1.5 lb ai/A to control all weed species except GR Italian ryegrass. Corn height in each plot was recorded at weekly intervals from emergence through canopy closure. Crop growth rate (CGR) was calculated from corn height data. Corn yield data were adjusted to 15.5% moisture content. Gross economic returns were calculated by multiplying the yield for each plot by average farm price for corn of $5.35 per bushel received by Mississippi producers in 2013. All data were subjected to ANOVA with means separated by Fisher's Protected LSD test at $P \leq 0.05$.

When GR Italian ryegrass was left uncontrolled (NTC), crop growth rate for corn was 80% lower than when GR Italian ryegrass was controlled at planting (0 DBP). Crop growth rate was similar for control intervals of 7, 14, and 21 DBP. However, an increase in CGR of ≥ 1 cm/day was observed when GR Italian ryegrass control was initiated >21 DBP. No corn was present at harvest where GR Italian ryegrass was not controlled prior to planting. Corn yield and gross economic returns increased as the interval before planting for GR Italian ryegrass control increased from 0 to 7, from 7 to 21, and from 14 to 28 DBP. However, corn yield and gross economic returns were optimized when GR Italian ryegrass control was triggered at least 21 DBP. Gross economic returns were $190/A greater when GR Italian ryegrass was controlled at 21 compared with 0 DBP.

Glyphosate-resistant Italian ryegrass should be controlled ≥ 28 DBP to optimize CGR; however, corn yield and gross economic returns were optimized with control at 21 DBP. When GR Italian ryegrass was controlled 21 DBP, corn compensated for reduced CGR observed early in the season because yield following control initiated 21 DBP was similar to when control was initiated 28 or 49 DBP. All GR Italian ryegrass was completely controlled at planting, and plots were maintained weed-free from planting to harvest. Therefore, reductions in CGR and yield were strictly due to interference from GR Italian ryegrass residue. Although not evaluated in this experiment, interference was likely due to the quantity of GR Italian ryegrass residue or possible allelopathic effects.

INFLUENCE OF SOYBEAN MATURITY GROUP ON RECOVERY FROM DICAMBA INJURY. M.S. McCown*[1], T. Barber[2], J.K. Norsworthy[1]; [1]University of Arkansas, Fayetteville, AR, [2]University of Arkansas, Lonoke, AR (74)

ABSTRACT

Commercial introduction of soybean cultivars genetically modified with resistance to the synthetic auxin herbicide dicamba will provide growers an alternative weed management option, but may expose susceptible soybean cultivars to non-target herbicide movement and tank contamination. A study was conducted to simulate tank contamination by applying low rates of dicamba to susceptible soybean cultivars. This trial was conducted in 2014 at Lon Mann Cotton Research Station in Marianna, Arkansas. The purpose of this study was to determine if soybean cultivar and maturity group has an influence on recovery from dicamba injury. Four susceptible soybean cultivars were chosen based on relative maturity and included Progeny 4650, Go Soy 5111, HBK 4950, and Halo 5.45. Dicamba was applied at 1.42g ae ha^{-1} (1/64x rate) at V3 and R1 soybean growth stages. Treatments were applied depending on when the cultivar reached each growth stage. Crop injury was visually evaluated at 2 and 4 weeks after treatment and average heights were gathered using five randomly chosen plants from each plot. During this experiment weeds were managed with a glufosinate herbicide weed control program consisting of pre-emerge herbicides and glufosinate plus metolachlor POST. Significant difference in recovery from herbicide injury was observed between maturity groups. Progeny 4650 and Go Soy 5111 cultivars reached maturity 7 days prior to the HBK 4950 and Halo 5.45 cultivars. With treatments applied at V3, 1-6% yield loss was observed for early maturing cultivars (Progeny 4650, Go Soy 5111) whereas later maturing cultivars expressed 6-12% yield loss (HBK 4950, Halo 5.45). With treatments applied at R1, yield loss of 7-23% was observed for early maturing cultivars whereas 40-42% yield loss was observed for later maturing cultivars. Early maturing cultivars had a greater amount of recovery in comparison with later maturing cultivars; however, the yield potential of each cultivar influenced yield loss. Progeny 4950 treated with dicamba averaged greater yields than untreated Go Soy 5111 cultivars. Future studies will be conducted to determine if cultivar variety in comparison with maturity group have an effect on recovery from dicamba injury.

DICAMBA SOYBEAN WEED MANAGEMENT SYSTEMS. A.M. Growe*[1], D. Williamson[2], T. White[3], W.J. Everman[4];[1]NCSU Crop Science, Raleigh, NC, [2]Monsanto, Raleigh, NC, [3]Monsanto, Lake St. Louis, MO, [4]North Carolina State University, Raleigh, NC (75)

ABSTRACT

Due to glyphosate-resistant weed biotypes becoming more common in North Carolina agricultural systems, new technologies, such as the development of dicamba tolerant soybeans, will be available to integrate into current weed management systems. An experiment was conducted at the Upper Coastal Plain research station in Rocky Mount, NC to examine the effectiveness of weed management strategies involving experimental dicamba, dicamba premixes and flumioxazin in dicamba- tolerant soybeans. Various weed species, including Palmer amaranth (Amaranthus palmeri), were treated with various rates and herbicide combinations to determine greatest control. Plots were rated 23, 38 and 52 DAP. Results exhibited greater Palmer amaranth control when an effective PRE followed by a POST was utilized. All POST systems obtained statistically similar weed control. The experimental dicamba PRE followed by POST of dicamba/glyphosate premix had greater control than a PRE of dicamba alone. All treatments with a PRE followed by POST exhibited more than 89% control of Palmer amaranth.

EFFECTIVENESS OF INSECTICIDE SEED TREATMENTS IN LESSENING RICE INJURY FOLLOWING HERBICIDE DRIFT. S.M. Martin*[1], J.K. Norsworthy[1], R. Scott[2], G. Lorenz[3], J. Hardke[4], Z.D. Lancaster[1]; [1]University of Arkansas, Fayetteville, AR, [2]Universitiy of Arkansas, Lonoke, AR, [3]Deptartment of Entomology, Lonoke, AR, [4]University of Arkansas, Stuttgart, AR (76)

ABSTRACT

Every year there are multiple reports of drift occurrences in rice. With a large percentage of other crops being Roundup Ready (glyphosate-resistant) and approximately 50% of Arkansas rice being non-Clearfield (imidazolinone-tolerant), the majority of drift complaints in rice are from Newpath (imazethapyr) and Roundup (glyphosate). In 2014, a field experiment was conducted at the Rice Research and Extension Center in Stuttgart, Arkansas and at the University of Arkansas Pine Bluff Farm in Lonoke, Arkansas to evaluate whether or not insecticide seed treatments could reduce injury from Roundup or Newpath drift or decrease the recovery time of the rice. Roy J rice was planted and simulated drift events of a 1/10X rate of Newpath or Roundup was applied to each plot. Each plot had either a seed treatment of CruiserMaxx Rice, NipSit Inside, Dermacor X-100, or no seed treatment. The simulated drift event was applied at the 2- to 3-leaf growth stage. Crop injury was assessed immediately prior to establishing the permanent flood (preflood) and two and four weeks after flooding. At preflood, all insecticide seed-treated rice showed reduced injury from low rates of Roundup, and rice treated with NipSit Inside or CruiserMaxx Rice showed reduced injury from Newpath. At Stuttgart, CruiserMaxx Rice and NipSit reduced injury from Newpath initially while NipSit Inside also provided reduced injury from Roundup. Eight weeks after application, the rice treated with CruiserMaxx Rice had recovered significantly from both Newpath and Roundup drift at both locations based on visual estimates of injury. The rice treated with NipSit Inside had recovered from Roundup drift at both locations and Newpath drift at one location. CruiserMaxx Rice protected the yield potential of the rice after Roundup and Newpath drift at both locations. NipSit Inside protected rice against yield loss from Roundup drift at both locations. Based on these results, CruiserMaxx Rice and NipSit Inside have potential to provide some safening against Newpath and Roundup drift whereas Dermacor X-100 will provide marginal of no safening to these herbicides.

EVALUATION OF PRE HEBICIDES AND SEED TREATMENT ON THRIPS INFESTATION AND COTTON GROWTH, DEVELOPMENT, AND YIELD. J. Copeland*[1], D.M. Dodds[1], A.L. Catchot[1], D. Reynolds[2], J. Gore[3], D. Wilson[4], D. Denton[1], C.A. Samples[5]; [1]Mississippi State University, Mississippi State, MS, [2]Mississippi State University, Starkeville, AR, [3]Mississippi State University, Stoneville, MS, [4]Monsanto, St. Louis, MO, [5]Mississippi State University, Starkville, MS (77)

ABSTRACT

Since 2011, foliar treatments for thrips in cotton in Mississippi have increased to nearly two applications per acre on 80% of total acres in spite of these acres being planted with seed treated with an insecticidal seed treatment. Additionally, glyphosate-resistant Palmer amaranth has become problematic for Mississippi producers. As a result, the use of preemergence (PRE) herbicides has increased dramatically since 2008. From 2008 to 2012 the number of cotton bales lost due to thrips damage increased from 152 bales lost in 2008 to 5,057 bales lost in 2012. In cotton, both thrips damage and PRE herbicides can interfere with emergence and early season growth. Previous research on thiamethoxam and imidacloprid has shown both to be effective in controlling thrips in cotton. Given the increased use of PRE herbicides in Mississippi cotton production, it has been suggested that PRE herbicides may be contributing to the increase in damage from thrips observed over the past several growing seasons. Therefore, the objective of this research was to evaluate the use of PRE herbicides and seed treatments on thrips populations as well as cotton development and yield.

Studies were conducted at three locations in Mississippi which included the Black Belt Branch Experiment Station near Brooksville, the R.R. Foil Plant Science Research Center near Starkville, and the Delta Research and Extension Center in Stoneville in 2013 & 2014. Seed treatments included thiamethoxam + fungicide, imidacloprid + fungicide, and fungicide only. Preemergence herbicides included fluometuron at 1.12 kg ai/ha, diuron at 1.12 kg ai/ha, fomesafen ay 0.28 kg ai/ha, S-metolachlor at 1.07 kg ai/ha, S-metolachlor at 1.07 kg ai/ha + fluometuron at 1.12 kg ai/ha, as well as an untreated check. Experiments were conducted using a factorial arrangement of treatments in a randomized complete block design, with the two factors being PRE herbicide and seed treatment. All data were subjected to analysis of variance and means were separated using Fishers Protected LSD at $p = 0.05$.

Cotton seed treated with imidacloprid had significantly less injury from thrips than cotton seed treated with thiamethoxam and fungicide only treatments. Thrips counts at the four leaf stage indicated significantly greater infestation on cotton treated with thiamethoxam compared to cotton treated with imidacloprid. Cotton seed treated with imidacloprid resulted in significantly taller cotton plants throughout the season than those grown from thiamethoxam treated seed. Averaged across seed treatments, cotton treated with with fluometuron and fomesafen was significantly shorter at first bloom; however, heights were not significantly different than cotton treated with s-metolachlor alone. Cotton seed receiving treatment of fungicide only as a seed treatment had significantly increased nodes above cracked boll when compared to cotton seed treated with imidacloprid and thiamethoxam, indicating a delay in maturity. Cotton treated with imidacloprid produced the highest yields. No significant differences in seed cotton yield were present due to PRE herbicide. Cotton seed treatments had a significant effect on yield when averaged over PRE herbicides. Treatments that include imidacloprid produced seed cotton yields of 6017 kg/ha whereas cotton seed treated with thiamethoxam produced seed cotton yields of 5858 kg/ha. Trends in reduced thrips control with seed treatments are present, specifically with cotton treated with thiamethoxam. Even if seed treatments are applied, it is still critical to scout and treat thrips according to threshold.

ALS HERBICIDE EFFECTS ON SENSITIVE CORN HYBRIDS. O.W. Carter*, E.P. Prostko; University of Georgia, Tifton, GA (78)

ABSTRACT

Currently, the major corn hybrid companies (i.e. Pioneer and Dekalb) screen their hybrids using unsafened ALS formulations. Therefore, research was conducted in 2014 to determine if ALS herbicides that contain isoxadifen could be used on field corn hybrids with reported ALS sensitivity.

A small plot field trial was conducted in 2014 near Tifton, GA to investigate the potential effects of a various ALS herbicides on field corn growth and yield. Two popular corn hybrids with reported ALS sensitivity (DKC 62-08, DKC 64-69) were planted on March 24. Accent 75WG, Steadfast Q 37.7WG, and Capreno 3.45SC were applied at 1X and 2X labeled use rates in combination with Aatrex 4L (64 oz/A) and COC (1% v/v). Both Steadfast Q and Capreno formulations include a crop safener (isoxadifen). Treatments were applied 18 DAP to corn in the V3 stage of growth. The plot area was maintained weed-free.

Treatments were arranged in a split-plot design [whole plot = corn hybrid (2), sub-plot = herbicides (7)] with 4 replications. Herbicides were applied using a CO_2 -propelled backpack sprayer calibrated to deliver 15 GPA using 11002DG nozzles. Data collected included above-ground biomass, plant height, and grain yield.

DKC 62-08 produced less above-ground biomass than DKC 64-69. All herbicides caused significant reductions in biomass.All herbicides caused significant plant height reductions at 28 DAT. However, plants recovered by 61 DAT and at this point DKC 64-69 was taller than DKC 62-08. There was no difference in yield between DKC 62-08 and DKC 64-69. The only herbicide treatment that caused a significant yield reduction was the 2X rate of Capreno. Although these corn hybrids were reported to be sensitive to ALS herbicides, these data suggest that they are sufficiently tolerant of the formulations used in this test at 1x rates.

WEED CONTROL WITH ALS HERBICIDE RESISTANT GRAIN SORGHUM (*SORGHUM BICOLOR*) IN NORTH CAROLINA. L.J. Vincent*, W.J. Everman, T.E. Besancon, Z.R. Taylor, A.M. Knight, A.M. Growe; North Carolina State University, Raleigh, NC (79)

ABSTRACT

Creating a fit for grain sorghum in North Carolina cropping systems has proven a difficult challenge for several reasons, particularly in achieving effective weed management. However, DuPont Pioneer has introduced the Inzen-Z sorghum system to provide relief for sorghum growers. Inzen is an ALS-herbicide resistant grain sorghum variety created from traditional breeding methods and is paired with their proprietary herbicide, Zest. The proprietary herbicide Zest is a re-formulated liquid nicosulfuron product, the same active ingredient as Accent typically used for post emergence grass control in corn. The product is awaiting final approval from the Environmental Protection Agency (EPA) and the system as a whole is expected to be available for the 2015 growing season. Thus far, Zest has been said to control foxtail species, barnyardgrass, crabgrass, witchgrass, and non-ALS resistant shattercane. However, experimentation conducted this year expanded that weed control spectrum.

From summer 2014 field experimentation results; Zest has proven to provide excellent post emergence control of grass weeds in grain sorghum. In the 10 treatment protocol, four plots of each replication received a pre emergence application of s-metolachlor + atrazine. Of those four plots, Zest at a rate of 5 oz ai/A was combined with 2, 4-D + atrazine, pyrasulfotole + bromoxynil + atrazine, and dicamba + atrazine. The other five plots did not receive a pre emergence herbicide application and only received a MPOST herbicide application. Zest was applied at MPOST with atrazine, pyrasulfotole + bromoxynil + atrazine, clarity + atrazine, 2, 4-D + atrazine, and 2, 4-D + atrazine + metsulfuron. Regardless of timing, each plot received crop oil concentrate at 1% v/v and ammonium sulfate at a rate of 2 lb/A. The final plot of each replication was a non-treated check.

Based on herbicide efficacy ratings taken 7, 14, and 28 days after treatment (DAT) evaluating three different herbicide application timings; pre emergence (PRE), mid-post emergence (MPOST), and post emergence (POST); results were clear that including a pre emergence component is essential to staying weed-free. In every plot, texas panicum, yellow nutsedge, goosegrass, broadleaf signalgrass, and large crabgrass were better controlled in applications which contained a pre emergence herbicide application versus those which did not. At the alpha = 0.05 level, the PRE only herbicide application provided statistically significant better control of texas panicum and large crabgrass. In addition, the treatment tank mix of Zest + atrazine + pyrasulfotole + bromoxynil which received a PRE, proved to be a statistically significant leader in control of tough to tackle weeds such as texas panicum, goosegrass and compared to the same tank mix which did not receive a PRE. Finally, when comparing the Zest + 2,4-D + atrazine treatment which received a PRE and the treatment which did not, results are clear that including the PRE component provides a significant difference.

BROOMSEDGE CONTROL IN PERENNIAL RYEGRASS TURF. J.R. Brewer*, S. Askew; Virginia Tech, Blacksburg, VA (80)

ABSTRACT

Broomsedge (*Andropogon virginicus*) (BS) is a native, perennial grassy weed that is found throughout the eastern United States. Common in pastures, cleared timber areas, rights of way, and other uncultivated areas, BS is a bunch-forming grass that can grow 2 to 4 feet tall. Broomsedge is often associated with low fertility and low pH areas but can also be problematic in fertile pastures and lawns. Research has been conducted to evaluate methods that can efficiently control BS in pasture areas using chemicals and cultural practices. The chemical control methods include treatments of certain herbicides like glyphosate, substituted ureas (diuron), and organic arsenicals (MSMA). The cultural practices mainly focus on annual fertilizer programs that can increase desired grass competition and lower the BS percentage in the pasture over multiple years. Currently available cultural practices and herbicides are unacceptable for BS control in lawn turf because previously reported herbicides are not available or not selective in lawn turf and homeowners require immediate results and a higher degree of turf quality than typically associated with pastures. Since few studies have evaluated lawn herbicides for BS control, our objective was to evaluate several lawn herbicides for BS in a lawn setting.

The study was conducted in Blacksburg, VA on a residential perennial ryegrass lawn mown at 6.4 cm. The trial was initiated on August 15, 2014. The following treatments were applied twice at a 3-week interval: mesotrione at 186 g ai/ha^{-1} plus triclopyr at 1120 g ai/ha^{-1}, topramezone at 70 g ai/ha^{-1} plus triclopyr at 1120 g ai/ha^{-1}, quinclorac at 1.12 kg ai/ha^{-1}, fenoxaprop at 140 g ai/ha^{-1}, fluazifop at 88 g ai/ha^{-1}, and metamifop at 400 g ai/ha^{-1} and 1600 g ai/ha^{-1}. These treatments were compared to MSMA at 2250 g ai/ha^{-1} applied twice at one week interval and a nontreated check. All mesotrione treatments included NIS, while treatments containing topramezone and quinclorac included MSO. These treatments were applied with a hooded sprayer at 280 L/ha^{-1} and a speed of 4.8 km/h, and the sprayer had a 71.12 cm spray width.

Initial BS cover in the lawn plots ranged from 10 to 70%. At 3 WAIT, MSMA had completely controlled BS. Metamifop at 1600 g/ha controlled BS 82% and more than all other herbicides except MSMA. Fenoxaprop, fluazifop, and metamifop at 400 g/ha controlled BS 48-65%. Quinclorac, mesotrione, and topramezone programs did not control BS more than 22%. At 5 WAIT, MSMA controlled BS 100% and more than all other treatments. Metamifop at 1600 g/ha controlled BS 72% and equivalent to metamifop at 400 g/ha (60%). All other herbicides controlled BS 40% or less, and metamifop and fluazifop had controlled BS greater than 50%. All other treatments had less than 50% control of BS. At 5 WAIT, MSMA was the only treatment that completely controlled BS, and all other treatments had controlled BS 60% or less. Only MSMA significantly injured turf in this study. Injury was expressed as necrotic tissue and stunting and varied between 30 and 50% depending on rating date. These data suggest metamifop, if registered, could have some utility for BS control in lawn turf while currently-registered herbicides are ineffective.

EVALUATION OF INTERVAL REQUIRED FOR SEEDLING MISCANTHUS TO BECOME PERENNIAL AND EFFECTS OF CUTTING ON RHIZOME DEVELOPMENT. D.N. Barksdale*, J. Byrd, M.L. Zaccaro, D.P. Russell; Mississippi State University, Mississippi State, MS (81)

ABSTRACT

In 2014, greenhouse experiments were conducted at the Plant Science Research Center, Mississippi State University, Mississippi State, MS with two objectives in mind: 1) evaluate the time interval required for *Miscanthus* to become perennial after germination and 2) determine if cutting seedling *Miscanthus* stimulates rhizome production. A variety of *Miscanthus* seed, 'Powercane' TM, was germinated in 6" x 5.5" size pots that were filled with Miracle Grow potting mix, then transplanted into 24" x 2" x 12" plexiglass sided rhizotrons after reaching an average height of 35 cm. Plexiglass sides were covered with foam board insulation to exclude sunlight. When plants reached an average height of 52 cm, half of the plants were cut to a height of 4 inches to simulate mowing. All plants were monitored weekly for rhizome initiation. The number of shoots and plant height was also recorded weekly. Rhizomes were visible on uncut plants 15 weeks after germination (WAG). *Miscanthus* that had the terminal removed by cutting produced visible rhizomes at 19 WAG. Cutting young *Miscanthus* plants delayed rhizome development up to 4 weeks. Data collected on the number of shoots and rhizomes produced, shoot height, total aboveground biomass, and rhizome biomass, revealed a significant difference ($P < 0.05$) in these biomass measurements between uncut and cut plants. A 65.4% decrease in the number of rhizomes produced was noted in *Miscanthus* plants with terminals removed compared to plants with intact terminals, respectively. However, plants with terminals removed produced 25.7% more aboveground shoots than their counterparts, respectively. This corresponded to a 45.3% increase in aboveground biomass and 11.1% increase in height for *Miscanthus* plants that had been cut once. Terminal removal in *Miscanthus* that has not been established appeared to impede rhizome development, but stimulated shoot number and height. The implications for control of escaped seedling *Miscanthus* is mowing seedlings will retard rhizome development, but will stimulate lateral shoot development which increases aboveground biomass and results in a thicker and denser *Miscanthus* stand which may be more difficult to eradicate.

TOLERANCE OF SEVERAL LEGUME SPECIES TO SOIL APPLIED IMAZAPYR. M.L. Zaccaro*, J. Byrd, D.P. Russell, D.N. Barksdale; Mississippi State University, Mississippi State, MS (82)

ABSTRACT

The use of nitrogen-fixing plants in pastures is an important element to provide valuable nutrients to the animal diet and contribute nitrogen to the forage system. The objective of this experiment was to evaluate the residual effects of imazapyr on the early development of several legume crops. Herbicide treatments were applied August 8, 2014 through a spray chamber that delivered 25 GPA to greenhouse containers filled with a mixture of 2:1 sand and silty clay loam soil. The design of the experiment was a complete randomized design with a factorial arrangement of treatments with 4 repetitions, which the factors were legume species, herbicide rates and planting dates. The herbicide treatments were Arsenal 2L (imazapyr) at 0, 4, 8 and 16 fl oz/A. White clover (*Trifolium repens* L.) 'Durana', crimson clover (*T. incarnatum* L.), lespedeza (*Kummerowia stipulacea* (Maxim.) Makino) 'Kobe' and 'AG4934' RR/STS soybean (*Glycine max* (L.) Merr.) were planted 0, 1 and 3 MAT to produce 48 treatment combinations. Average fresh weight measurements were taken six weeks after each planting. Data were analyzed in PROC GLM of SAS v. 9.3, to test interactions and main effects, then means were separated by the LSMEANS with $\alpha=0.05$. The interaction between plant species, imazapyr rates and planting dates was significant. Of the species tested, soybean presented superior tolerance to imazapyr, followed by lespedeza and the clovers had similar lower tolerance, with respect to mean fresh weight reduction. When considering only lespedeza, crimson and white clover, the treatment combinations with 4, 8 and 16 fl oz of imazapyr and seeding date 0 MAT, injury occurred as failed emergence or early death just as seedlings were emerging. The same treatment combinations resulted on tolerance for soybean, although the fresh weight of the plants was significantly lower when compared to 1 MAT combinations. The treatment combinations 8 fl oz and 16 fl oz of imazapyr, with soybean planted 1 MAT are the best treatments, but similar to 0 fl oz of imazapyr and 0 MAT combination. For lespedeza, crimson and white clover, the treatment combinations of 4, 8 and 16 fl oz of imazapyr applications, seeding date delayed to 1 MAT and 3 MAT, reduced the negative impact fresh weight. Therefore, for better early development of white clover, crimson clover, soybean and lespedeza in forage systems, it is recommended to delay planting at least 1 month after imazapyr applications between 4 and 16 fl oz/A to avoid significant injury to the seedlings that could affect the stand establishment.

GROWTH AND YIELD RESPONSE OF BOLLGARD II XTENDFLEX™ TO SEQUENTIAL GLYPHOSATE/DICAMBA APPLICATIONS. M. Zwonitzer*[1], W. Keeling[2], J.D. Everitt[3], C.J. Webb[4], J. Spradley[1]; [1]Texas A&M AgriLife Research, Lubbock, TX, [2]Texas A&M Agrilife, Lubbock, TX, [3]Monsanto Company, Lubbock, TX, [4]Texas A&M Research, Lubbock, TX (83)

ABSTRACT

Bollgard II® XtendFlex™ Cotton* is an innovative technology with tolerance to dicamba, glyphosate and glufosinate herbicides (pending regulatory approval). This technology—while still offering insect protection—has been designed to help maximize weed control by encompassing three unique modes of action allowing farmers the choice and flexibility to apply multiple combinations of herbicides before, during and after planting. In 2014 studies were conducted at three locations in the Texas High Plains to evaluate crop response and yield potential following single and sequential post emergence topical (POST) applications of MON76832, an enhanced dicamba/glyphosate premix. This was compared with a single application of Liberty®280 SL plus MON119096 at different timings. The objective of these studies was to determine the possible impact application timing and potential crop response of glyphosate and dicamba premix products and glufosinate and dicamba tank mix products have on the yield potential of a candidate Bollgard II® XtendFlex™ variety. Small plot field trials were conducted in Halfway (Hale County), Lorenzo (Crosby County), and Seminole (Gaines County), Texas to evaluate crop injury and growth rate following application of glyphosate, dicamba and glufosinate at 4, 8, 12 and 16 node (A, B, C and D timings, respectively) growth stages. Applications included four (A+B+C+D timings) sequential applications of MON76832 at 64 oz/A, a single 128 oz/A application of MON76832 to individual plots at each timing, sequential applications of 128 oz/A at both A+C and B+D timings, as well as a tank mix of Liberty + MON119096 applied at the B timing at rates of 32 oz/A + 22 oz/A or 32 oz/A + 44 oz/A, respectively. Crop response ratings were collected 3-, 7- and 14-days after application and recorded as percent injury and percent growth reduction. Yield (lbs/A) was also recorded for each plot at each location. All treatments were applied at 10 GPA using TTI 11015 nozzles at 30 psi. Experimental design at each location was RCBD with four replications. Across the three locations significant crop response was observed following the application at the C timing, for the 64 and 128 oz/A application rates. Crop response ratings for this timing were 20, 21.3 and 11.3% from Lorenzo, Seminole and Halfway, respectively. Following a sequential application of MON76832 at 128 oz/A, the greatest crop response were observed at Lorenzo (A+C timing, 16.3 and 23.8%, respectively) and Seminole (B+D timing, 11.3 and 22.6%, respectively). Crop response levels declined within two weeks following application. No significant yield differences were observed across locations with any treatment. Results from these experiments indicate that some crop response may be observed with MON76832 applied POST, but no effect on cotton growth or yield should occur.

TOLERANCE PROFILES AND MECHANISM OF TOLERANCE TO GLUFOSINATE IN PALMER AMARANTH FROM ARKANSAS. R.A. Salas*[1], N.R. Burgos[1], B.C. Scott[2], R.L. Nichols[3]; [1]University of Arkansas, Fayetteville, AR,[2]University of Arkansas, Lonoke, AR, [3]Cotton Incorporated, Cary, NC (84)

ABSTRACT

Palmer amaranth (*Amaranthus palmeri* S Watson) is an economically troublesome weed threatening the sustainability of crop production in the US. The rapid increase in glyphosate-resistant weeds prompted a shift in weed management strategies. Glufosinate, in glufosinate-resistant crops, is an alternative tool for controlling glyphosate-resistant weeds. A study was conducted to examine the tolerance profile of 61 *Amaranthus* populations and to investigate the tolerance mechanism to glufosinate in PA-AR08-Lee-C Palmer amaranth population from Arkansas. Whole-plant bioassays were conducted in the greenhouse to screen for tolerance to glufosinate in 59 Palmer amaranth and 2 tall waterhemp populations from Arkansas collected between 2008 and 2013. One-hundred offsprings were grown in cellular trays, at 1 plant/cell, and sprayed with 0.16 and 0.49 lb ai/A glufosinate when seedlings were three- to four-inches tall. Differential response of *Amaranthus* populations to glufosinate was observed. Nine Palmer amaranth populations were controlled 88 to 97% with 0.49 lb ai/A glufosinate. The frequency of tolerant plants was relatively low, but the majority of survivors showed 31-80% injury, indicating potential for reproduction. The progenies of PA-AR08-Lee-C (F1) glufosinate survivors were used for tolerance mechanism experiments. Six confirmed susceptible plants from the original population and six confirmed tolerant plants from the F1 population were used for ammonia accumulation assay and copy number determination of glutamine synthetase 2 (*GS2*) gene. The susceptible plants accumulated two times more ammonia than the tolerant ones indicating that tolerant plants have mechanism(s) that slows or hinders glutamine synthetase inhibition. *GS2* copy number did not differ between tolerant and susceptible plants, ranging from 1 to 3 in all plants. Therefore, the tolerance mechanism to glufosinate in PA-AR08-Lee-C population is not due to target gene amplification. Other potential mechanisms will be investigated. For now, we know that some individuals in this population, or other similar populations, can escape glufosinate treatment when application conditions or plant growth stage is suboptimal. The survivors should be prevented from producing seeds using supplemental weed control practices and best management strategies should be practiced to delay the evolution of a resistant population and conserve the utility of glufosinate.

UTILITY OF AMINOCYCLOPYRACHLOR PLUS METSULFURON IN TALL FESCUE FORAGE SYSTEMS. T.D. Israel*[1], G. Rhodes, Jr.[2], T.C. Mueller[2], G.E. Bates[2], J.C. Waller[2]; [1]University of Tennessee Knoxville, Knoxville, TN,[2]University of Tennessee, Knoxville, TN (85)

ABSTRACT

Tall fescue (*Lolium arundinaceum*) is the predominant grass species in pastures in the mid-South. Most tall fescue is infected with a fungal endophyte, *Neotyphodium coenophialum*, which imparts certain advantages to the plant such as drought tolerance, insect feeding deterrence, and enhanced mineral uptake. However, the endophyte also produces ergot alkaloids that are detrimental to livestock and contribute to fescue toxicosis. Common symptoms of fescue toxicosis include increased body temperature, rough hair coats, nervousness, and reduced average daily gain (ADG). Since the alkaloids are highly concentrated in seeds and stems, a potential way to reduce the likelihood of fescue toxicosis is by suppressing seed heads with herbicides. Metsulfuron is an acetolactate synthase (ALS) inhibitor and is well documented to limit seed head formation, but also injures tall fescue. Aminocyclopyrachlor, hereafter abbreviated MAT28, a new synthetic auxin herbicide, has been registered for use in non-cropland and right-of-way applications; registration in pastures is expected in 2015. The first pasture herbicide product to be registered is anticipated to be a premixture of MAT28 and metsulfuron.

Research was conducted in 2012 and 2013 using metsulfuron applied alone and in combination with other herbicides to determine the growth response of tall fescue, effects on forage quality, and potential to reduce the impact of fescue toxicosis by reducing ergot alkaloid concentration. Trials were conducted on endophyte-infected tall fescue pastures in Alcoa and Crossville, Tennessee. Experimental design was a randomized complete block with four replications and all herbicide treatments included non-ionic surfactant at 0.25%. In addition to the anticipated use rates of MAT28 plus metsulfuron, other treatments were metsulfuron alone, aminopyralid plus metsulfuron, and MAT28 plus 2,4-D. Clipping at early boot stage was also included to compare effects of herbicide applications versus mechanical removal. Visual ratings were performed monthly to evaluate fescue discoloration and stunting on a 0-99% scale. Plots were harvested in late spring and summer to determine yield, seed head density, fescue leaf proportion, and fescue stem proportion. Forage quality measurements were determined using NIRS. Alkaloid concentrations were determined by ELISA.

MAT28 plus metsulfuron (78 + 12 g ai/ha), metsulfuron alone (12 g ai/ha), and aminopyralid plus metsulfuron (65 + 12 g ai/ha) stunted tall fescue more than 50% at four weeks after treatment (WAT). At 8WAT, tall fescue was stunted 24 to 28% by those same treatments. Clipping or metsulfuron applied alone or in combination with MAT28 or aminopyralid reduced seed head density by 36% or more compared to the untreated control. Clipping, metsulfuron alone (12 g ai/ha), MAT28 plus metsulfuron (78 + 12 g ai/ha) and aminopyralid plus metsulfuron (65 + 12 g ai/ha) reduced tall fescue stem proportions by 8.4 to 15.6% at first harvest. Yields from the spring harvest ranged from 49 to 65% of untreated for all treatments containing metsulfuron. No differences in yield were observed in the summer harvest. Tiller densities for all treatments containing metsulfuron ranged from 80 to 94% of untreated after spring harvest and 99 to 121% of untreated after summer harvest, further indicating tall fescue had recovered by the summer. Forage quality was improved in treatments containing metsulfuron applied alone or in combination with MAT28 or aminopyralid, as shown by increased crude protein and total digestible nutrients (TDN) and decreased acid detergent fiber (ADF). Metsulfuron applied alone or in combination with MAT28 or aminopyralid reduced total ergot alkaloid concentration 26 to 34% from untreated forage in the spring harvest.

When applied alone or in combination with MAT28 or aminopyralid, metsulfuron reduced seed heads and improved forage quality in tall fescue, but also caused injury and reduced spring yield. Also, metsulfuron applied alone or in combination with MAT28 or aminopyralid reduced total ergot alkaloid concentration and therefore can potentially reduce the severity of fescue toxicosis. Additional research includes determining effects of application timing on tall fescue growth and yield.

GREEN ASH AND MULTIFLORA ROSE: CONTROLLING WOODY BRUSH IN BLACK BELT PASTURES. D.P. Russell*, J. Byrd; Mississippi State University, Mississippi State, MS (86)

ABSTRACT

Woody brush species has potential to severely reduce pasture production if left unmanaged. In the Black Belt Prairie region of Mississippi, green ash (*Fraxinus pennsylvanica*) and multiflora rose (*Rosa multiflora*) are two woody perennial species that infests the fine-textured clay soils in unimproved pastures. Our purpose was to evaluate several pasture herbicides based on their effective, seasonal control.

A randomized complete block design was conducted on each species population in pastures used for cattle production. Both locations had a history of weed pressure and was maintained by mowing. The population of multiflora rose was somewhat sparse with approximately one established plant per 60 m^2 plot, while green ash was more heavily populated with 8-10 established stems per m^2. Two rates of Remedy Ultra (60.45% triclopyr), Arsenal (27.8% imazapyr), Invora (7.3% aminocyclopyrachlor + 14.6% triclopyr), Cimarron (60% metsulfuron), and Tordon 22K (24.4% picloram) were applied to green ash in May 2014 at a 14 inch height. Mature plants of multiflora rose were treated with Remedy Ultra, Arsenal, and Invora in October 2013.

Cimarron at two and four oz/A exhibited the most significant green ash control nearly three months after treatment. Remedy at 48 fl oz/A was the next, most significant, treatment after 81 days. No difference in control was observed between the two rates of Cimarron, therefore, a single low rate application would provide season-long control without causing damage to bermudagrass forage.

Multiflora rose visually exhibited the greatest response from 12 and 24 fl oz of Arsenal with 75 and 100% control, respectively, at 264 DAT. Remedy Ultra applied at 48 fl oz/A provided 63% control, followed by 53% control from 24 fl oz/A of Invora. However, there was no significant difference between any herbicide treatments nearly nine months after application. Arsenal hindered all pasture forage growth through spring, but forage species recovered by late summer. Therefore, if Arsenal is applied for multiflora rose control, only individual plants should be treated. Neither Remedy Ultra nor Invora had a negative effect on pasture grasses.

INTERACTION OF KUDZU, *PUERARIA LOBATA* VAR. *MONTANA*, WITH THE KUDZU BUG, *MEGACOPTA CRIBRARIA*, AS A PEST OF SOYBEANS. J.L. Blount*, D. Buntin; University of Georgia, Griffin, GA (87)

ABSTRACT

The kudzu bug, *Megacopta cribraria* F. is an Old World pest of soybeans in Japan, China, India and several other far eastern countries. In 2009 adult *M. cribraria* were discovered in Northeast Georgia aggregating on homes near patches of kudzu. Kudzu is an invasive vine introduced into North America from China in 1876 for erosion control and as an ornamental. Today kudzu covers over two million acres of forest land in the Southeastern United States. Kudzu and soybean are the primary hosts of kudzu bug in the U.S. In this study the role kudzu plays as a source of kudzu bug infestations in soybean fields in GA was investigated. Flight intercept traps were placed near kudzu patches and soybean fields within proximity of kudzu patches. Adults collected in flight intercept traps at soybean and kudzu locations were counted weekly from 2012 to 2014. Traps were put out from late spring when overwintering adults became active to late fall when overwintering adults began to enter diapause. Adults and nymphs were counted from sweep samples and egg masses from kudzu shoot tips. As adults become active in the spring they disburse to the first available host and readily lay eggs. When kudzu is available populations build to high numbers. Early planted soybeans may be more heavily infested than later planted soybeans, though high infestations may build on soybeans planted later in the year. Two generations occur on kudzu and one to two generations on soybean depending on planting date. Kudzu is critical as a source of infestation for adults dispersing to soybean but it is not understood if populations could survive in its absence.

DEVELOPING BASELINE SENSITIVITY OF ANNUAL GRASSES TO INDAZIFLAM. P.C. Aldahir*[1], S. McElroy[1], M.L. Flessner[2], D. Spak[3]; [1]Auburn University, Auburn, AL, [2]Virginia Tech, Blacksburg, VA, [3]Bayer Environmental Science, Research Triangle Park, NC (88)

ABSTRACT

Indaziflam is a cellulose biosynthesis inhibitor herbicide reportedly more effective than isoxaben and quinoxyphen for annual bluegrass (*Poa annua* L.) control, representing an alternative for managing annual bluegrass resistance. Annual bluegrass can be controlled via PRE and early POST indaziflam applications, however, information on sensitivity of other annual grass species to indaziflam is limited. It is important to understand a species' baseline sensitivity for proper rate recommendation, and for resistance screening in the future. The objective of this study was to develop baseline sensitivity curves for annual grasses to indaziflam.

A greenhouse study was conducted from June to October 2013 at Auburn University in Auburn, AL to determine baseline sensitivity of annual grasses to indaziflam. Eight annual bluegrass, 4 goosegrass (*Eleusine indica* (L.) Gaertn.), 1 large crabgrass (*Digitaria sanguinalis* (L.) Scop.), and 1 smooth crabgrass (*Digitaria ischaemum* (Schreb.) Schreb. ex Muhl.) populations were treated with indaziflam as in Specticle Flo (Bayer Environmental Sciences; Research Triangle Park, NC) PRE seeding. Pots containing a screened, native Wickham Sandy Loam (fine-loamy, mixed, semiactive, thermic Typuc Hapludult) with pH 6.3 and organic matter 1.7%, were sprayed at 0.25, 0.5, 1, 2, 4, 8, 16, 32, and 48 g ai ha^{-1} in a spray chamber at 280 L ha^{-1} spray volume. Sprayed pots were seeded with 100 seeds of the desired weed population, lightly topdressed with sand, covered with germination cloth for 2 weeks, and mist irrigation was applied frequently to encourage germination. Seeds were lightly scarified by rubbing between sand paper just before sowing into pots. Fertility was applied every two weeks with Miracle-Gro (The Scotts Miracle-Gro Company; Marysville, OH) soluble plant food. Data was collected every two weeks for eight weeks and included seedling counts and visual estimation of percent cover. At eight weeks, aboveground biomass was harvested, and dried in an air forced, mechanical convection oven (VWR International; Radnor, PA) at 80Ëš F until constant weight was reached. Dried biomass for each population was then weighed. Data were analyzed in SAS 9.2 (SAS Institute; Carry, NC) using non-linear regression analysis with PROC NLIN with α level = 0.05. I_{50} values were also obtained, using 95% confidence intervals in PROC GLIMMIX. Results were plotted in SigmaPlot 11.2 (Systat Software Inc.; San Jose, CA).

Overall, grass species differed in sensitivity to indaziflam. Annual bluegrass was the most sensitive species, followed by goosegrass and crabgrass. Goosegrass and crabgrass did not differ amongst each other for indaziflam sensitivity. The most sensitive goosegrass population to indaziflam was 'W', whereas large crabgrass was more sensitive than smooth crabgrass. Despite greater sensitivity of annual bluegrass to indaziflam, little differences between species were found. All species tested were controlled by indaziflam rates lower than label recommendations. Future research should investigate early POST indaziflam activity, as well as herbicide and soil interactions that might interfere on herbicide availability to target plants.

INFLUENCE OF XTEND® PRODUCTS AND NOZZLE SELECTION ON EFFICACY AND DROPLET SIZE WHEN TANK-MIXED WITH LIBERTY® . M.R. Miller*[1], J.K. Norsworthy[1], G.R. Kruger[2], A. Cotie[3], C.J. Meyer[1], J.K. Green[1]; [1]University of Arkansas, Fayetteville, AR, [2]University of Nebraska-Lincoln, North Platte, NE, [3]Bayer CropScience, Research Triangle Park, NC (89)

ABSTRACT

Chemical applicators need to consider numerous factors including nozzle size and nozzle type in order to make an effective herbicide application. In the near future, auxin-resistant crops will be introduced into the marketplace and herbicide programs may utilize auxin-type herbicides tank-mixed with other postemergence herbicides such as Liberty. While decreasing droplet size has been known to increase efficacy of contact herbicides like Liberty, influence of droplet size on efficacy of systemic herbicides such as auxin herbicides has been variable. Therefore trials were conducted in the summer of 2014 to determine the influence of nozzle selection and efficacy of Liberty and low volatility diglycolamine (DGA) formulations of dicamba, containing a proprietary Monsanto product, alone and in mixture with Liberty. Field trials were conducted at the Northeast Research and Extension Center in Keiser, Arkansas as well as complimentary droplet spectra analysis using laser diffraction at the University of Nebraska-Lincoln West Central Research and Extension Center in North Platte, Nebraska using the same nozzles from the field trial. The experimental design for the field trial was a randomized complete block with a two-factor factorial treatment structure. Factors included herbicide treatment: Liberty at 29 fl oz/A, a low volatility DGA dicamba formulation (hereafter referred to as MON 119096) at 22 fl oz/A, Roundup PowerMax at 32 fl oz/A, a low volatility DGA dicamba + glyphosate premix formulation (hereafter referred to as MON 76832) at 64 fl oz/A, Liberty + MON 119096 at 29 and 22 fl oz/A, and Liberty + MON 76832 at 29 + 64 fl oz/A across three nozzle types: TTI 11004, TDXL-D 11004, and ULD 11004. Palmer amaranth and barnyardgrass were the weeds present in the trial, and these weeds were larger than what would be recommended for a typical application of these products. Median droplet size decreased and percent fines increased for the MON 119096 or MON 76832 when Liberty was added. Nozzle selection had a significant impact on droplet size over the products tested and significantly impacted barnyardgrass control. However, nozzle selection did not impact glyphosate-resistant Palmer amaranth control possibly due to the narrow range of droplet sizes evaluated. The MON 76832 alone or tank-mixed with Liberty provided suppression of Palmer amaranth and barnyardgrass, but effective control was not achieved in this trial as a result of the large weed sizes at application. There appears to be no negative effect of tank-mixing Liberty with either of the dicamba-containing products evaluated in this research.

EFFECT OF FORMULATION AND CLEANOUT PROCEDURE ON DICAMBA EQUIPMENT CLEANOUT. G.T. Cundiff*[1], D. Reynolds[2], W.E. Thomas[3]; [1]Mississippi State University, Starkville, MS, [2]Mississippi State University, Starkeville, AR, [3]BASF Corporation, Research Triangle Park, NC (90)

ABSTRACT

The introduction of new herbicide tolerant crops may provide many benefits for producers such as alternative control options for resistant weed species, decreased costs, and different modes of action. Along with these benefits, the use of auxin containing herbicides may also increase concern for issues such as herbicide drift, volatilization, and tank contamination. Tank contamination can occur by the ability of a molecule to either adsorb or absorb within the spray system. Due to this sorption factor, dilution along with chemical means may be needed to completely ensure proper cleanout of the system.

Two studies were conducted to assess a new dicamba formulation known as Engenia. One study focused on determining if Engenia persistence would differ among two different cleanouts on one type of hose, flushed four separate times with each flush applied to soybean used as a bio-indicator to assess cleanout efficiency. While the second study focused on determining if Engenia persistence would differ with four different cleanouts on one type of hose flushed four separate times with each flush applied to soybean used as a bio-indicator to assess cleanout efficiency.

For the first study, two cleanout procedures of water and ammonia were used to clean a manifold system. Each cleanout method was incubated with the same treatment of Engenia at 120 ml and 266 ml of Roundup PowerMax for 12 hours. A total of eleven treatments were run in a randomized complete block, three treatments were a known working solution of Engenia at 0.0, 0.56 and 0.056 g ai/ha; while eight of those treatments constituted the lines of each cleanout method run as a factorial arrangement of treatments with cleanout and wash timing as the factors. Samples were collected for analytical analysis before incubation, after incubation and after each flush of cleanout method. Solutions of 500 ml were retained after each flush for field applications on Roundup Ready soybean at the V2 growth stage with each hose from each cleanout method representing a rep, and the process was repeated four times. Field applications were made with a non-ionic surfactant at 0.25% v/v and a two row boom with TTI 80015. Weekly visual ratings were taken 7, 14, 21 and 28 DAT with height and height reductions at 14, 21, and 28 DAT and yield and percent yield reductions.

For the second study, four cleanout procedures of BUC 328, BUC 349, BUC 690, and BUC 760 were used to clean a manifold system. Each cleanout method was incubated with the same treatment of Engenia at 120 ml and 266 ml of Roundup PowerMax for 12 hours. A total of sixteen treatments were run in a randomized complete block, four treatments were a known working solution of Engenia at 0.0, 0.56 and 0.056 g ai/ha and no cleanout; while twelve of those treatments constituted the lines of each cleanout method run as a factorial arrangement of treatments with cleanout and wash timing as the factors. Samples were collected for analytical analysis before incubation, after incubation and after each flush of cleanout method. Solutions of 500 ml were retained after each flush for field applications on Roundup Ready soybean at the V2 growth stage with each hose from each cleanout method representing a rep, and the process was repeated four times. Field applications were made with a non-ionic surfactant at 0.25% v/v and a two row boom with TTI 80015. Weekly visual ratings were taken 7, 14, 21 and 28 DAT and yield and percent yield reductions.

Results show that cleanout procedures did significantly differ with respect to water and ammonia in experiment one. Data showed water significantly increased percent soybean visual injury 28 DAT when compared to ammonia in experiment one. Cleanout with BUC 690 significantly increased visual injury when compared to other procedures in experiment two. Cleanout timings differed with respect to soybean percent visual injury 28 DAT in both experiments, but no differences were observed with respect to height reduction, yield or percent yield reduction. Results show that the known concentrations of Engenia significantly differed with respect to percent injury at 7, 14, 21, 28 DAT, percent height reductions, and yield in both experiments. In experiment one the parts per million (PPM) of Engenia analytes significantly increased in the second wash when compared to other washes. Analytical work for experiment two is still pending. Results indicate a decrease in injury with subsequent cleanings of Engenia. This research would indicate more than two rinses of any cleanout procedure would be necessary to alleviate injury to subsequent crops that are sensitive to dicamba.

SUGARCANE TOLERANCE TO A PREMIX OF ATRAZINE, MESOTRIONE AND S-METOLACHLOR.
J.V. Fernandez*; University of Florida, Belle Glade, FL (91)

ABSTRACT

Sugarcane (*Saccharum* spp. interspecific hybrids) is cultivated on 165,000 ha on organic soils of the Everglades Agricultural Area (EAA) and minerals soils of the surrounding region in south Florida. Weed management is the main production cost associated with sugarcane cultivation in Florida. Although several herbicides are labeled on sugarcane, growers commonly use atrazine, metribuzin or pendimethalin as PRE herbicides and mainly depend on POST application of asulam to manage grasses later in the season. Field studies were conducted in 2014 on organic and mineral soils in Belle Glade, FL and near Loxahatchee, FL, respectively to evaluate sugarcane tolerance and weed control using a commercial premix of atrazine, mesotrione, and *s*-metolachlor. The premix was applied PRE or early POST at 850 + 220 + 2200 g ai ha^{-1}, 1,700 + 440 + 4,400 g ai ha^{-1}, and 3,400 + 880 + 8,800 g ai ha^{-1} of atrazine + mesotrione + *s*-metolachlor, respectively (equivalent to 1×, 2×, and 4× rates) and compared with commercial standards used by growers. The commercial PRE standard included 4490 g ai ha^{-1} of atrazine + 4270 g ai h^{-1} of pendimethalin and the commercial early POST standard included 730 g ae ha^{-1} of 2,4-D amine + 4490g ai $ha^{-1}$of atrazine + 560 g ai ha^{-1} of ametryn. Sugarcane varieties 'CPCL02-0926' and 'CC97-2730' were used on organic and mineral soils, respectively. Fall panicum (*Panicum dichotomiflorum* Michx.) was the predominant weed species on both soils while spiny amaranth (*Amaranthus spinosus* L.) and common ragweed (*Ambrosia artemisiifolia* L.) were present at the organic and mineral soil locations, respectively. There was no difference in sugarcane population on organic soils at 56 days after PRE treatment application (equivalent to 27 days after early POST application). Also, there was no phytotoxicity from all the herbicides on sugarcane. Fall panicum control was 73% at 56 DAT following PRE application of the 1× rate of atrazine + mesotrione + *s*-metolachlor compared to 89% control provided by the PRE commercial standard. The 2× and 4× rates of atrazine + mesotrione + s-metolachlor applied PRE provided 85 and 94% fall panicum control, respectively 56 DAT. All the PRE treatments provided >96% spiny amaranth control at 56 DAT. Fall panicum control was 68, 89, and 100%, respectively at the 1×, 2×, and 3× rate of early POST atrazine + mesotrione + *s*-metolachlor compared to 96% provided by the commercial standard. All early POST treatments provided complete spiny amaranth control. On mineral soil, herbicide treatments resulted in significantly higher sugarcane population compared to the nontreated control. Similar to organic soil, there was no phytotoxicity of the treatments on sugarcane on mineral soil. On mineral soil, all rates of PRE atrazine + mesotrione + *s*-metolachlor and the commercial standard provided >95% fall panicum control 70 DAT. The PRE atrazine + mesotrione + *s*-metolachlor provided significantly higher common ragweed control (90 to 100%) compared to the commercial standard (43%). Fall panicum control on mineral soil with early POST atrazine + mesotrione + *s*-metolachlor at 1× rate (58%) was significantly lower than the control provided by the 2× rate (85%), 4× rate (100%), and the commercial standard (78%). These results show that atrazine + mesotrione + *s*-metolachlor provided variable weed control on sugarcane depending on use rate and soil type. Studies are currently ongoing to corroborate these results.

CORN WEED MANAGEMENT PROGRAMS FOR TROUBLESOME WEEDS IN NORTH CAROLINA.
B.W. Schrage*, W.J. Everman; North Carolina State University, Raleigh, NC (92)

ABSTRACT

The increase in corn acreage in North Carolina has proven to be a beneficial rotational crop in production systems determined to limit the presence of troublesome and herbicide-resistant weed species. To explore methods of optimizing control strategies, a study was conducted in Rocky Mount and Kinston, NC in 2014 evaluating certain residual overlapping residuals in maize. 11 WAP, *amaranthus palmeri* control was similar among all treatments ranging from 80-98%. Additional weed species were similarly managed by all treatments except for cases which experienced lesser control when applied with treatment 4 [atrazine + pyroxasulfone (Anthem ATZ) fb glyphosate (Roundup Powermax)] or 6 [thiencarbazone-methyl (Corvus) + atrazine (Aatrex 4L) fb tembotrione (Laudis) + atrazine + glyphosate]. In Rocky Mount, NC treatments 4 and 6 provided 21-47% less control of*Ipomoea hereacea*. There was no evidence of yield differences; however, treatment 4 resulted in 16-20% less control of*Ipomoea lacunosa* 37 DAP in Kinston, NC. Sublevel control of *digitaria sanguinalis* was also achieved by treatments 4 and 6 72 DAP.

HOST STATUS OF SHOWY CROTALARIA (*CROTALARIA SPECTABILIS*) FOR THE STING NEMATODE AND ALTERNATIVES FOR ITSÂ CONTROL. G.B. Braz*[1], R.S. Oliveira Jr.[1], W.T. Crow[2], C.A. Chase[2]; [1]Universidade Estadual de Maringá, Maringá, Brazil, [2]University of Florida, Gainesville, FL (93)

ABSTRACT

One of the indirect adverse effects of weeds is the possibility of serving as alternative hosts of pests and diseases, including plant-parasitic nematodes. Showy crotalaria is designated as a noxious weed in many states within the southern region of the United States, where its presence is undesirable particularly because of its toxicity to livestock. It is noteworthy that, in other countries, showy crotalaria has been used as a cover crop due to its potential to suppress some species of plant parasitic nematodes. *Belonolaimus longicaudatus* (sting nematode) is one of the most important plant-parasitic nematodes in Florida, infesting fields that are used to growth a wide variety of crops. The first step of the present work was to evaluate the host status of showy crotalaria to the sting nematode. Nine different accessions (2 from Australia, 3 from Brazil, 3 from India and 1 from South Africa) of showy crotalaria the USDA-ARS Plant Genetic Resources Conservation Unit (Griffin, GA), were evaluated for suppression of nematode reproduction in comparison with corn, which is a good host for the sting nematode. The greenhouse experiment was conducted using potted plants arranged in a randomized complete block design (RCBD), with five replications. Among the nine accessions evaluated, two showed numbers of nematode similar to corn (PI 316945 and PI 337081 from Brazil), indicating susceptibility to *B. longicaudatus*. The other accessions effectively suppressed sting nematode populations in the soil, particularly PI 244597 and PI 217908 , from South Africa and India, respectively. The second aim of this study was to evaluate the chemical control of showy crotalaria at two stages of development with postemergence herbicide applications. This field experiment was conducted, using an RCBD, with a factorial arrangement of treatment, and four replications. The first factor corresponded to the herbicides flumioxazin (25 g ha^{-1}), fomesafen (250 g ha^{-1}), lactofen (150 g ha^{-1}), saflufenacil (35 g ha^{-1}), atrazine (2500 g ha^{-1}), diuron (2000 g ha^{-1}), glufosinate-ammonium (500 g ha^{-1}) and glyphosate (1944 g ha^{-1}). The second factor consisted of herbicide rates: 1X and 0.75X and a nontreated check. The variable analyzed was the percentage of showy crotalaria control at different periods after application. Except for diuron at the 0.75X, all the other treatments effectively controlled showy crotalaria plants when applications were performed at Stage I (2 to 4 leaves). For Stage II (6 to 8 leaves) applications, only diuron (both rates) and fomesafen at the 0.75X rate failed to control showy crotalaria.

IMPACT OF GROWTH REGULATOR RATE AND APPLICATION TIMING ON SORGHUM GROWTH AND YIELD. T.E. Besancon*, L.J. Vincent, W.J. Everman; North Carolina State University, Raleigh, NC (94)

ABSTRACT

Weed control remains a major challenge for economically viable sorghum production in North Carolina due to sorghum sensitivity to weed competition during early growth stages. Palmer amaranth (*Amaranthus palmeri*) is one of the broadleaf weeds that may be the most problematic in sorghum production (Moore et al. 2004). 2,4-D is the most common and inexpensive herbicides used POST to control Palmer amaranth. However, recent studies have reported toxic effects of 2,4-D applied POST on sorghum plants (Dan et al. 2010, Petter et al. 2011). No research data on grain sorghum response to growth regulator herbicides exists in North Carolina. Consequently, this study was conducted to investigate the effects on sorghum growth and yield of 2,4-D and Dicamba POST applications over-the-top beyond the recommended height (15 to 20 cm). Field experiments were conducted from 2012 to 2014 at the Upper Coastal Plain Research Station (Rocky Mount, NC), Caswell Research Farm (Kinston, NC), and Central Crops Research Station (Clayton, NC). Experiments were conducted as a factorial arrangement of 2 factors in a randomized complete block design. Main factors consisted of different rates of growth regulators applied POST (2,4-D amine at 100, 217 and 333 g $ai.ha^{-1}$, Dicamba at 280 g $ai.ha^{-1}$) and different stages of sorghum growth at application (25, 35, 45, 55, 65, and 75 cm). Crop height at harvest, yield, test weight, and grain moisture were measured. No interaction was observed between herbicide treatments and stage of application. Growth regulator applications on 35 to 75 cm tall sorghum resulted in taller plants compared to earlier treatments. Consequently, an important lodging effect was observed later in the season. Yield was negatively affected by growth regulator applications where sorghum was planted on sandy soils with a low field capacity, resulting in increased crop sensitivity to herbicides due to environmental stress. By contrast, sorghum grown on a fine sandy loam soil was more tolerant to hydric stress with higher yield and decreased sensitivity to growth regulator applications. Our results confirm previous reported data on the negative impact on sorghum yield of growth regulators applied beyond the actual recommended height. Nevertheless, when planted in favorable soils, sorghum can tolerate growth regulators applied over-the-top up to 50 cm crop height at application without significant yield reduction.

EXPLORING THE INFLUENCE OF ZOYSIAGRASS BREEDING LINES QUALITY ON FLUAZIFOP-P INJURY. W. Liu*[1], R.G. Leon[1], K.E. Kenworthy[2], B. Unruh[1], L. Xing[2], P.R. Munoz[2]; [1]University of Florida, Jay, FL, [2]University of Florida, Gainesville, FL (95)

ABSTRACT

Fluazifop-P-butyl is a postemergence herbicide that can be used for selective control of grass weeds in zoysiagrass. Two field experiments were conducted to compare the response of 80 zoysiagrass cultivars to fluazifop-P-butyl. In the first experiment cultivars were treated with 88 g ai ha^{-1} (1X label rate) and in the second experiment with 264 g ai ha^{-1} (3X label rate). Injury was determined at 2 and 5 weeks after treatment (WAT). Quality data of these zoysiagrass breeding lines were also collected to examine its influence on fluazifop-P-butyl injury. Moderate correlations were found between quality and percentage injury at 2 WAT with both application rates (Spearman's correlation coefficient <0.5). Correlation values were higher at 2 than 5 WAT due to recovery of most zoysiagrass breeding lines. There was a clear trend that cultivars with higher quality also exhibited higher tolerance to fluazifop-P-butyl, but exceptions were observed in which high quality lines exhibited similar injury to that of low quality lines. Additionally, among the most tolerant lines at 88 g ha^{-1} (<10% injury) there were clear differences when treated with 264 g ha^{-1}, and several lines reached >65% injury while others had <35%. The results of the present study indicated that high quality will likely contribute to fluazifop-P-butyl tolerance, but quality should not be used as a surrogate marker to select for fluazifop-P-butyl tolerance.

SYN-205: A TECHNICAL OVERVIEW. R. Jackson*[1], S. Payne[2], R.D. Lins[3], G.D. Vail[4], M. Saini[5]; [1]Syngenta Crop Protection, Carrollton, MS, [2]Syngenta Crop Protection, Slater, IA, [3]Syngenta Crop Protection, LLC, Byron, MN, [4]Syngenta Crop Protection, Greensboro, NC, [5]Syngenta Crop Protection, LLC, Greensboro, NC (1)

ABSTRACT

SYN-A205 is a multiple mode-of-action herbicide premix that provides preemergence and early postemergence control of grass and broadleaf weeds in corn. SYN-A205 will be labeled for preemergence and postemergence use in field corn and seed corn and for preemergence use only in sweet corn, and yellow popcorn. SYN-A205 contains mesotrione, *S*-metolachlor, and bicyclopyrone, a new HPPD (4-hydroxyphenyl-pyruvate dioxygenase) inhibitor, with anticipated first commercial applications in the 2016 growing season. Field trials demonstrate that SYN-A205 is safe when applied to field corn, seed corn, sweet corn and yellow popcorn. SYN-A205 is effective on difficult-to-control weeds, including giant foxtail (*Setaria faberi*), common lambsquarters (*Chenopodium album*), common ragweed (*Ambrosia artemisiifolia*), giant ragweed (*Ambrosia trifida*), Palmer amaranth (*Amaranthus palmeri*) and waterhemp (*Amaranthus rudis*) with improved residual control and consistency compared to commercial standards.

POST-HARVEST SEED PRODUCTION POTENTIAL OF PALMER AMARANTH AND WATERHEMP IN THE SOUTHERN US. M.V. Bagavathiannan*[1], P. Dotray[2], J.K. Norsworthy[3]; [1]Texas A&M University, College Station, TX,[2]TAMU Ag Experiment STation, Lubbock, TX, [3]University of Arkansas, Fayetteville, AR (2)

ABSTRACT

Palmer amaranth and waterhemp are two major herbicide-resistant weeds infesting Southern US cropping systems. While tremendous emphasis has been placed on in-crop weed management, plants that emerge after crop harvest are often ignored. The resources available after the harvest of crops such as corn and sorghum may be sufficient for some weeds to emerge and produce viable seeds prior to killing frost. Experiments were conducted in late summer/fall 2014 in College Station (CS), Lubbock (LB), Texas and Fayetteville (FY), Arkansas to understand post-harvest seed production potential of Palmer amaranth, and in CS and FY to quantify seed production in common waterhemp. Seedlings that emerged at weekly intervals were monitored from Aug 19 (Palmer amaranth) or Sep 9 (waterhemp) in CS, Sep 11 for Palmer amaranth in LB and from Sep 12 for both species in FY. The plants pertaining to each emergence time were harvested individually on Nov 11 in Texas sites and on Oct 31 in FY, following killing frosts. Average Palmer amaranth seed production/plant for the first cohort indicated above was 19,510 (max 28,260), 270 (max 450), and 2 (max 5), respectively in CS, LB and FY. Mature seed production was observed when Palmer amaranth seedlings emerged as late as Oct 14 (CS, max 22 seeds), Oct 10 (LB, max 12) or Sep 17 (FY, max 2). Waterhemp did not produce any mature seed when emerged on or after Sep 11 in FY, but mature seed production was found in the CS location, with an average of 820 seeds/plant (max 1700) when emerged on Sep 9 and continuing for as late as Oct 14 (average 8, max 17 seeds) in this location. Results strongly suggest the need for managing post-harvest recruits of Palmer amaranth and waterhemp to minimize seedbank replenishment.

THE EFFECTS OF REDUCED RATES OF TOPRAMEZONE AND ATRAZINE COMBINATIONS FOR WEED MANAGEMENT IN CORN. K.M. Vollmer*[1], T.E. Hines[2]; [1]Virginia Tech, Blacksburg, VA, [2]Virginia Tech, Painter, VA (3)

ABSTRACT

Atrazine continues to be a major component of weed management programs in corn. However, the use of atrazine has raised environmental concerns in many areas. The p-hydroxyphenyl pyruvate dioxygenase (HPPD)-inhibiting herbicides have been shown to be effective in controlling many grass and broadleaf weed species. Furthermore, the effectiveness of this mode-of-action is has been shown to improve with the addition of atrazine to the tank mix. Current label recommendations suggest applying topramezone at 18.4 g ai ha^{-1} with 560 g ai ha^{-1} atrazine. The objective of this study was to determine if the recommended rates of the topramezone/atrazine tank mix could be reduced by half and maintain the same weed control efficacy. In 2013 and 2014, field studies were established in conventional–tillage corn system at the Virginia Tech Eastern Shore Agricultural Research and Extension Center in Painter, VA. The study was a two-way factorial with topramezone and atrazine rate as factors arranged in a randomized complete block design with 3 replications. Treatments were applied when weeds reached 10 to15 cm in height. The rates of 18.4 g ai ha^{-1} topramezone with 560 g ai ha^{-1} atrazine were chosen as standards and applied alone at 0X,1X, and ½X rates alone or in combinations of 1X + 1X, ½X + 1X, 1X + ½ X, and ½X + ½X topramezone and atrazine, respectively. Each application also contained methylated soybean oil and urea ammonium nitrate at 1% and 1.25% v/v respectively according to label recommendations. Plots were visually evaluated for percent control 7 and 35 days after treatment (DAT) on a scale of 0 to 100 with 0 being no control and 100 being complete weed control. Data were analyzed using the generalized linear model in JMP Pro 11 (SAS Institute Inc., Cary, NC). Data were combined over repetitions in time if there was no trial by treatment interaction. Appropriate means were separated using Fisher's least protected LSD ($\alpha = 0.05$). There were no significant trial by treatment interactions for smooth pigweed control 7 DAT ($p = 0.52$), ivyleaf morningglory control 35 DAT ($p = 0.46$), and corn yield ($p = 0.69$), so data was pooled over years. All topramezone/atrazine combinations controlled common ragweed, ivyleaf morningglory, and smooth pigweed 85% or greater 7 DAT and 96% or greater 35 DAT. This study shows that the recommended rates for the topramezone/atrazine tank mix can be reduced by half without a significant reduction in the control of certain weed species.

USDA-ARS-OFFICE OF PEST MANAGEMENT POLICY: ROLES, RESPONSIBILITIES, AND ACTIVITIES IN WEED SCIENCE. J. Schroeder*[1], S. Kunickis[2]; [1]USDA-ARS-OPMP, Washington, DC, [2]USDA Office of Pest Management Policy, Washington, DC (4)

ABSTRACT

ï»¿The Office of Pest Management Policy (OPMP) was established in September 1997 with the mandate to integrate the Department's strategic planning and activities related to pest management, coordinate the Department's role in the pesticide regulatory process and related interagency affairs, primarily with the Environmental Protection Agency (EPA), and strengthen the Department's support for agriculture by promoting the development of new pest management approaches that meet the needs of an evolving and sustainable U.S. agricultural system. The OPMP is an administrative unit within the Agricultural Research Service (ARS); however, the OPMP reports to the Office of the Secretary of Agriculture. Key issues before the OPMP include EPA Pesticide Registration Review, Resistance Management, Endangered Species, Invasive Species, Methyl Bromide Critical Use Exemptions (CUEs), Pollinators, Maximum Residue Limits, and the National Plant Disease Recovery System (NPDRS). The OPMP role in all matters is to ensure that grower stakeholders are involved and informed regarding activities that affect pest management. In addition, OPMP staff are expected to provide technical expertise throughout the interagency review and public comment process on decisions related to pest management. Weed science colleagues are needed to provide information to help explain the diversity of weed management practices, grower needs, and issues across the southern region.

GLUFOSINATE AND GLYPHOSATE TOLERANT WEED MANAGEMENT SYSTEMS IN NORTH CAROLINA SOYBEANS. A.M. Knight*[1], W.J. Everman[1], A. Simpson[2]; [1]North Carolina State University, Raleigh, NC, [2]Bayer, Memphis, TN (5)

ABSTRACT

With increasing herbicide tolerance in the southeastern U.S., it is important for scientists to consider best management programs for herbicides on the market. Scientists must also consider the best way in which to preserve current modes of action for which resistance has not occurred. One way in which modes of action can be preserved is by utilizing crops with tolerance to herbicides of varying modes of action. Field studies were conducted in 2014 at the Upper Coastal Plain Research Station near Rocky Mount, NC comparing multiple glyphosate and glufosinate tolerant soybean varieties. These varieties were applied with herbicide programs of flumioxazin PRE, followed by a POST and late POST of S-metalochlor, fomesafen, and their respective tolerant herbicide. The study design was a randomized complete block. The success of these varieties with herbicide programs left minimal weeds for rating. Preliminary results indicated yield differences between treatments.

INFLUENCE OF IMPACT® BASED HERBICIDE PROGRAMS ON WEED MANAGEMENT IN FIELD CORN IN THE SOUTHERN US. N.M. French*; AMVAC, LITTLE ROCK, AR (6)

ABSTRACT

Weed interference from Palmer amaranth (Amaranthus palmeri) and other weed species limits yield in field corn, and herbicides are a key tool for minimizing weed competition. In recent years, selection for glyphosate-resistant weeds has exacerbated the challenge of managing key broadleaf weeds in field corn. Consequently, corn growers are modifying herbicide programs. A series of field trials was conducted to compare Impact® based herbicide programs with competitive programs. Findings are reported here.

Nine trials were conducted by University and Extension weed scientists across the southern US from North Carolina to west Texas. The objective was to evaluate the influence of Impact® and other herbicide programs on management of difficult to control weeds and yield in glyphosate tolerant field corn. Each experiment was arranged in a randomized completed block design with four replications. Across locations, glyphosate-tolerant corn hybrids were planted from 21-Mar to 14-June 2014.

Herbicide programs of Impact® (topramezone) at 0.75 oz./A + Roundup PowerMAX® (glyphosate) at 22 oz./A + AAtrex® (atrazine) at 1 qt./A, Impact® (topramezone) at 1.0 oz./A + Roundup PowerMAX® (glyphosate) at 22 oz./A + AAtrex® (atrazine) at 1 qt./A, Impact® at 0.75 oz./A + Roundup PowerMAX® at 22 oz./A + AAtrex® at 1 qt./A + Warrant® (acetochlor) at 3 pt./A, Impact® at 0.75 oz./A + Sequence® (s-metolachlor + glyphosate) at 2.5 pt./A + AAtrex® at 1 qt./A, Halex® GT (s-metolachlor + glyphosate + mesotrione) at 3.6 pt./A + AAtrex® at 1qt./A, Impact® at 0.75 oz./A + Roundup PowerMAX® at 22 oz./A + AAtrex® at 1 qt./A + Zidua® (pyroxasulfone) at 2 oz./A, and Capreno® (thiencarbazone-methyl + tembotrione) at 3 oz./A + Roundup PowerMAX® at 22 oz./A + AAtrex® at 1 qt./A were assessed. A nontreated check was included for comparison. All herbicide programs included ammonium sulfate at 8.5 lbs./100 gal. or liquid equivalent and adjuvant (methylated seed oil or non-ionic surfactant) as directed by herbicide label. Post-emergence application timings were scheduled to target 2-4" weeds and corn at V3-V4. Weeds observed were ABUTH, ACCOS, AMAPA, BRAPP, CASOB, CUMMD, CYPES, DIGSA, ECHCG, IPOHE, IPOLA, PANRA, PANTE, and SIDSP. Herbicide efficacy findings focus on weed species observed at two or more locations. Measurements included plant stand, visual estimates of crop safety, weed control, lodging, and yield. Eight trial locations were harvested. Data were subjected to ANOVA, and means were separated using Student-Newman-Keuls test (p=0.05, protected).

All herbicide programs averaged 93-99% control of Palmer amaranth, morningglory spp., and velvetleaf compared with the untreated check, and results against annual grasses and yellow nutsedge were quite good. Impact® + atrazine + Sequence® and Halex® GT + atrazine offered equivalent control of Palmer amaranth, pitted and ivyleaf morningglory, annual grasses, velvetleaf, and yellow nutsedge. The addition of a WSSA Group 15 residual herbicide (HRAC Group K3), acetochlor, s-metolachlor, or pyroxasulfone, to the weed management program tended to improve overall weed control compared with herbicide programs lacking a residual herbicide and offered an additional mode of action for resistance management. All herbicide programs significantly increased grain yield by 53 to 63 bushels per acre above the untreated check, which averaged 108 bu./A.

Across nine replicated, small plot trials designed to investigate herbicide performance in field corn, Impact® based herbicide programs provided excellent weed control and corn yields compared with other commercial herbicide programs.

INTRODUCTION OF NEW TRICLOPYR HIGH LOAD FORMULATION BY DOW AGROSCIENCES LLC. V.B. Langston*[1], V. Peterson[2], P.L. Burch[3], S. Flynn[4], C. Cummings[5], M. Halstvedt[6], J. Nelson[7], L. Brinkworth[8]; [1]Dow AgroSciences LLC, The Woodlands, TX, [2]Dow AgroSciences LLC, Ft. Collins, CO, [3]Dow AgroSciences, Christiansburg, VA,[4]Dow AgroSciences LLC, Lees Summit, MO, [5]Dow AgroSciences LLC, Perry, OK, [6]Dow AgroSciences LLC, Billings, MT,[7]Dow AgroSciences LLC, Indianapolis, IN, [8]Dow AgroSciences LLC, Hitchin, England (7)

ABSTRACT

Vastlan™ is a herbicide developed by Dow AgroSciences for the control of woody plant species and annual and perennial broadleaf weeds on industrial vegetation management, aquatic, Conservation Reserve Program (CRP), range and permanent grass pastures sties and grasses grown for hay. Vastlan herbicide is formulated as a soluble liquid (SL) and contains 480 g ae per liter (4 lbs ae/gallon) of triclopyr choline. This higher concentration of triclopyr and "Caution" and instead of "Danger" signal word sets Vastlan herbicide apart from its predecessor Garlon® 3A. Vastlan herbicide provides broad spectrum control required to manage brush and weed species complexes common to many industrial vegetation management sites. Grass tolerance and efficacy field trials were established in 2011 – 2014. Bermudagrass (*Cynodon dactylon*), tall fescue (*Festuca arundinacea*), orchard grass (*Dactylis glomerata*), timothy (*Phleum pretense*), smooth bromegrass (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*) were equally tolerant to Vastlan herbicide when compared to Garlon 3A. There was no statistical difference between Vastlan and Garlon 3A for control of sweetgum (*Liquidamber styraciflua*), white oak (*Quercus alba*), southern red oak (*Quercus falcate*) black cherry (*Prunus serotina*) and water oak (*Quecus nigra*) when applied as a foliar spray. Vastlan will be commercially available in the summer of 2016.

Always read and follow the label directions.

MANAGING TALL FESCUE SEEDHEAD SUPPRESSION WITH CHAPARRAL HERBICIDE. S. Flynn*[1], P.L. Burch[2]; [1]Dow AgroSciences LLC, Lees Summit, MO, [2]Dow AgroSciences, Christiansburg, VA (8)

ABSTRACT

Multiple management practices have been developed over the years to alleviate the effects of fescue toxicosis on beef cattle performance. These practices include inter-seeding complementary forage species to improve forage quality and dilute the harmful alkaloids; and supplementing animals with grain, plant by-products, or mineral supplements to alleviate fescue toxicosis. Another method that was studied during the 1970s and 1980s was application of plant growth regulators that suppressed the formation of tall fescue (*Lolium arundinaceum* (Schreb.)) seedheads, which contain a higher concentration of ergot alkaloid than leaf tissue. This method prevents grazing of the seedheads via suppression and maintains tall fescue in a high quality vegetative state throughout the growing season. However, these growth regulators were never registered for use in range and pasture systems despite their benefits, and grower interest in the concept diminished. Recently, the concept was reintroduced by Dow AgroSciences, LLC with the introduction of Chaparral® specialty herbicide, which not only suppresses tall fescue seedhead formation but also provides broadleaf weed control. Tall fescue pastures treated with Chaparral for seedhead suppression have been shown to have 16% greater crude protein, 9% greater water soluble carbohydrates, and 11% greater in vitro dry matter digestibility. Due to increased grazing pressure by non-stressed cattle and the removal of seedheads a reduction in carrying capacity may be incurred. However, improved cow pregnancy rates (10-18% unit increase)and average daily gain (0.11-0.23 kg/day) may compensate for this reduction in stocking rate.

Fescue seedhead suppression can mitigate fescue toxicosis and thereby improve herd performance through increased average daily gains, weaning weights, and pregnancy rates. Using Chaparral for tall fescue seedhead suppression and weed control requires increased management to reach optimal levels of suppression, forage yield, and forage quality improvements. For the highest level of seedhead suppression Chaparral® should be applied at 140 g product/ha, 2 to 3 weeks prior to seedhead emergence. Forage managers should limit Chaparral application to 50% or less of their tall fescue acres in a grazing season, targeting areas that can be utilized during the summer grazing seasons (May-July). It is also recommended that grazing managers treat pastures every other year to avoid long-term reduction in tall fescue stands.

WEED MANAGEMENT IN HIGH RESIDUE CONSERVATION TILLAGE CORN. A.J. Price*[1], J. Ducar[2], S. McElroy[2]; [1]USDA-ARS, Auburn, AL, [2]Auburn University, Auburn, AL (9)

ABSTRACT

Use of winter cover crops is an integral component of conservation systems in corn. However, guidelines concerning cover residue and herbicide use intensity is needed. Field experiments were conducted from autumn of 2010 through cash crop harvest in 2014 at the Alabama Agricultural Experiment Station's E.V. Smith Research Center at Shorter, AL to evaluate weed management in a high-residue crimson clover system compared to a winter fallow system, both managed with conservation practices and utilizing glyphosate resistant corn. The entire experimental area rolled with a cover crop roller crimper and then treated with glyphosate at 1.12 kg ae/ha to terminate the cover crop. The experiment involved a factorial arrangement of the following: 1) crimson clover presence and absence, 2) atrazine at 0.56 lb ai/ha applied preplant burndown (PPBD), PRE, PPBD+PRE, or none, and 3) glyphosate at 1.12 lb ae/ha plus atrazine applied POST, glyphosate applied POST alone, or none. The POST application was applied when corn reached V-8. Weeds evaluated included Palmer amaranth, smooth crabgrass, and a pitted and tall morningglory complex. Results show that utilizing a high residue crimson cover crop significantly increased weed control in lower input systems while weed control was maintained in high input systems in most comparisons compared to the winter fallow system. Crimson clover alone provided 33% morninggory control, 37% pigweed control, and 60% crabgrass control. Treatments integrating atrazine applied PPBD or PRE plus clover provided excellent weed control without additional input. Corn population was decreased without herbicide; cover crop use did not affect stand establishment. Use of herbicides increased grain yield over non-treated controls in both clover and fallow systems. Similar to weed control, atrazine applied PPBD or PRE protected grain yield while the glyphosate POST only systems resulted in grain loss likely due to early season weed competition.

COTTON VARIETY RESPONSE TO PREEMERGE APPLICATION OF ANTHEM FLEX^{R}. A.W. Ross*[1], T. Barber[1], L.M. Collie[1], R.C. Doherty[2], D.M. Dodds[3]; [1]University of Arkansas, Lonoke, AR, [2]University of Arkansas, Monticello, AR,[3]Mississippi State University, Mississippi State, MS (10)

ABSTRACT

Anthem Flex is a pre-mix combination of pyroxasulfone and carfentrazone. In previous research pyroxasulfone was found to injure cotton when applied preemerge. A trial was initiated to determine if cotton varieties respond differently to preemerge applications of Anthem Flex. This trial was conducted one year (2014)- in Starkville, MS at the R.R. Foil Plant Science Research Center on a Leeper silt loam soil and in Rohwer, AR at University of Arkansas Rohwer Research Station on a Herbert silt loam. Treatments at both locations consisted of three rates of Anthem Flex -0, 3, and 6oz/A. Ten varieties were planted on 38 inch rows at both locations. Ten varieties evaluated were Stoneville 4946 GLB2, Fiber Max 1944 GLB2, Stoneville 5289 GLT, Delta Pine 1321 B2RF, Delta Pine 1311 B2RF, Nex-Gen 1511 B2RF, Pyhtogen 499 WRF, Pyhtogen 339 WRF, Phytogen 427 WRF and Dyna-Grow 2570 B2RF. Both studies were arranged in a randomized complete block design and data was analyzed using Fisher's protected LSD at $P \leq 0.05$ for significance. Applications were made using a tractor mounted, compressed air broadcast sprayer with Greenleaf Air-Mix nozzles on 19 in spacing at 12 gallons per acre (GPA). The main type of injury observed at 28 days after treatment (DAT) was stunting. Results show there are significant differences in stunting among the varieties at both locations. All applications of Anthem Flex caused significant injury at Rohwer. Numerically injury was greater for the 6oz/a rate with Stoneville 4946 GLB2, Stoneville 5289 GLT, and Phytogen 339 WRF at Rohwer. Delta Pine 1311 B2RF appeared to be the most sensitive variety at Rohwer, with injury above 30% for both rates of Anthem Flex. Anthem Flex injury at Starkville was highest on Phytogen 339 WRF at 14%, 28 DAT with the 6oz/a rate. All varieties were significantly injured at the 6oz/a rate over the untreated check. The 3oz/a rate of Anthem Flex did not result in significant injury for Stoneville 4946 GLB2, Phytogen 449 WRF, and Phytogen 427 WRF at Starkville. Yields at Rohwer were highest for Stoneville 4946 GLB2 and Phytogen 499 WRF regardless of Anthem Flex rate. Injury from Anthem Flex did not negatively affect yield with the exception of Stoneville 5289 GLT, where yield was significantly reduced with the 6oz/a rate. There was no difference in yield with any rate of Anthem Flex at the Starkville location.Based on the amount and consistency of injury observed in these results, Anthem Flex should not be applied as PRE in Mid-South cotton production. However, Anthem Flex provides excellent control for glyphosate-resistant pigweed in cotton and should be considered as a post-directed option, once cotton reaches the appropriate size.

MANAGEMENT OF OPUNTIA SPP. IN FLORIDA PASTURES. M.W. Durham*[1], J.A. Ferrell[1], B.A. Sellers[2]; [1]University of Florida, Gainesville, FL, [2]University of Florida, 33865, FL (11)

ABSTRACT

Experiments were conducted throughout central Florida from 2010-2014 to determine if fluroxypyr or aminopyralid could effectively manage spreading pricklypear. Aminopyralid + 2,4-D was not effective and provided only 15% control by 18 months after application (MAT). However, fluroxypyr at 0.55 kg ha^{-1}, or sequential applications of 0.27 kg ha^{-1}, provided greater than 82% control at 18 MAT. Reducing fluroxypyr rates to 0.32 kg ha^{-1} reduced control to 40 and 71% for spring versus fall applications, respectively. However, the addition of aminopyralid + 2,4-D to fluroxypyr at 0.32 kg ha^{-1} improved pricklypear control to 92%, regardless of application timing.

COMBINATIONS OF FLURIDONE AND FOMESAFEN FOR PREEMERGE WEED CONTROL IN ARKANSAS COTTON. L.M. Collie*[1], T. Barber[1], R.C. Doherty[2], J.K. Norsworthy[3], A.W. Ross[1]; [1]University of Arkansas, Lonoke, AR,[2]University of Arkansas, Monticello, AR, [3]University of Arkansas, Fayetteville, AR (12)

ABSTRACT

Combinations of fluridone and fomesafen were evaluated at different rates to compare preemerge weed control to other commonly used cotton residual herbicides. These trails were conducted in 2014 on 38 in rows at Marianna and Rohwer, AR using Stoneville 4946 cultivar. The soil types for this trial were a Commerce silt loam at the Marianna AR, location and a Herbert silt loam at the Rohwer, AR site. Palmer amaranth (Amaranthus palmeri), pitted morningglory (Ipomoea lacunose), and barnyardgrass (Echinochloa crus-galli) were over seeded at planting to provide a consistent weed population. Residual herbicides were applied at planting at 12 gal/A. Fluridone and fomesafen were applied alone and in tankmix combinations at rates 0.125, 0.2, and 0.25 lb ai/A. These applications were compared to fluometuron at 1 lb ai/A and an untreated check. No significant differences among treatments in regards to weed control were noted at the Rohwer, AR location 14 DAT. Obvious differences in weed control were noted at 30 DAT. Fluridone applied alone at any rate, did not provide equivalent control as industry standards fluometuron or fomesafen at 1.0lb ai/A or 0.25lb ai/A, respectively. The combination of fluridone and fomesafen at 0.25lb ai/A provided the greatest control (80%) of Palmer amaranth and barnyardgrass at 30 days after treatment, but control was not significantly different than fomesafen applied alone at 0.2lb ai/A. It was also noted that fluridone at any rate alone did not provide equivalent control of morningglories as fluometuron at 1.0lb ai/A. At Marianna, the highest control of Palmer amaranth and barnyardgrass at 20 days after application was achieved with fluometuron 0.75lb ai/A plus fomesafen 0.2lb ai/A and combinations of fluridone plus fomesafen at 0.2 or 0.25 lb ai/A. Morningglory control was less for fomesafen 0.125lb ai/A than any other treatment. By 40 days after treatment, weed control decreased for all treatments, but the combination of fluridone and fomesafen at 0.25lb ai/A continued to control Palmer Amaranth and morningglory greater than 80%.

WEEDY RICE MANAGEMENT THROUGH CROP ROTATION. E.P. Webster[1], S.Y. Rustom, Jr.*[1], R.J. Levy, Jr.[2], B.M. McKnight[1], E.A. Bergeron[1], J.C. Fish[1]; [1]LSU AgCenter, Baton Rouge, LA, [2]LSU AgCenter, Crowley, LA (13)

ABSTRACT

Clearfield hybrid rice (*Oryza sativa* L.) was introduced in 2003, and is resistant to the imidazolinone family of herbicides. Newpath and Beyond are the two herbicides labeled for use on Clearfield rice in the United States. Hybrid rice seed has a history of dormancy, and it can become a weedy plant if allowed to establish the following growing season as an F2. Clearfield F2 plants can vary in phenotype and are often resistant to imazethapyr and imazomox. These resistant F2 plants can become a tremendous weed problem when Clearfield hybrid rice is grown in consecutive years. Another problem with the Clearfield rice technology is outcrossing potential of Clearfield rice with red rice (*Oryza sativa* L.). The outcrosses and the F2 rice plants coupled with red rice form a complex of rice weeds that will be referred to as weedy rice.

A producer location was identified in 2008 near Esterwood, Louisiana with a history of 3 consecutive growing seasons of Clearfield hybrid rice production. This location was determined to have a complex weedy rice infestation. A long term study was established in 2009 through 2012 to evaluate four different rotations to better determine the best management practices for managing weedy rice. The rotations used in this time period were: rotation 1) Roundup Ready soybean (2009)/Clearfield hybrid rice (2010)/Roundup Ready soybean (2011)/Clearfield hybrid rice (2012); rotation 2) Roundup Ready soybean (2009)/Roundup Ready soybean (2010)/ Roundup Ready soybean (2011)/Clearfield hybrid rice (2012); rotation 3) fallow (2009)/fallow (2010)/ Roundup Ready soybean (2011)/Clearfield hybrid rice (2012); rotation 4) fallow (2009)/Clearfield hybrid rice (2010)/ Roundup Ready soybean (2011)/Clearfield hybrid rice (2012). The herbicide programs and cultural practices were consistent across a given rotation.

In 2013, a second four year study was established consisting of five different rotations. The same size blocks were established, 0.5 acre. The second four year rotational study utilizes the use of Provisia Rice which contains a non-genetically modified trait allowing the use of Provisia herbicide, quizalofop. The study also added Liberty Link soybean which allows the use of Liberty herbicide, glufosinate. The utilization of these two herbicides in conjunction with the other herbicides further expands the flexibility of active ingredient and mode of action rotation. The rotations used were: rotation 1) Roundup Ready soybean (2013)/Provisia Rice (2014)/Roundup Ready soybean (2015)/Clearfield Hybrid Rice (2016); rotation 2) Fallow (2013)/Provisia Rice (2014)/Roundup Ready soybean (2015)/Clearfield Hybrid Rice (2016); rotation 3) Clearfield Hybrid Rice (2013)/Liberty Link soybean (2014)/Provisia Rice (2015)/Clearfield Hybrid Rice (2016); rotation 4) Roundup Ready soybean (2013)/Liberty Link soybean (2014)/Roundup Ready soybean (2015)/Clearfield Hybrid Rice (2016); rotation 5) Roundup Ready soybean (2013)/Clearfield Hybrid Rice (2014)/Roundup Ready soybean (2015)/Clearfield Hybrid Rice (2016). However, rotation 4 received Roundup at 1qt/A plus Outlook at 18 oz/A plus Zidua at 2.5 oz/A at the first trifoliate leaf stage in 2013 and 2014. Prior to rice harvest weedy rice plant counts were determined. In 2013, weedy rice plants for each rotation were: rotation 1 - 17.2 plants/m²; rotation 2 - 25.1 plants/m²; rotation 3 - 0.3 plants/m²; rotation 4 - 5.2 plants/m²; rotation 5 - 7.8 plants/m². In 2014, weedy rice weedy rice plants for each rotation were: rotation 1 - 0.005 plants/m²; rotation 2 - 0.004 plants/m²; rotation 3 - 2.6 plants/m²; rotation 4 - 3.1 plants/m²; rotation 5 - 39.6 plants/m².

In 2014, rotations 1 and 2 were planted with Provisia Rice. Rotation 1 contained 34,796/0.5 acre weedy rice plants in 2013 and only 10/0.5 acre in 2014 at the end of the growing season. Rotation 2 contained 50,777/0.5 acre weedy rice plants in 2013 and only 8/0.5 acre in 2014 at the end of the growing season. Rotation 3 was planted with CLXL 745 and contained 544/0.5 acre weedy rice plants in 2013 and planted with Liberty Link soybean in 2014 resulting in an infestation of 5,259/0.5 acre weedy rice plants at the end of the growing season. Rotation 4 was planted with Roundup Ready soybean and contained 15,779/0.5 acre weedy rice plants in 2013 and planted with Liberty Link soybean in 2014 resulting in an infestation 6,271//0.5 acre weedy rice plants at the end of the growing season. Rotation 5 was planted with Roundup Ready soybean in 2013 and contained 15,779/0.5 acre weedy rice plants in 2013 and planted with CLXL 745 in 2014 resulting in an infestation of 80,111/0.5 acre weedy rice plants at the end of the growing season. The utilization of Provisia vastly improved rotational flexibility in 2014 and will serve as an excellent rotational tool in conjunction with Clearfield Rice for weedy rice control. This research indicates that long term crop rotation, herbicide rotation, and employing different production practices can be used to manage weedy rice plants.

WEED MANAGEMENT IN OKLAHOMA SOYBEAN. T.A. Baughman*, R. Peterson; Oklahoma State University, Ardmore, OK (14)

ABSTRACT

Weed control has always been a major component of crop production. However, with the increased difficulties with weed resistance, the emphasis on a good herbicide foundation has increased. Several soybean weed management studies were conducted in Oklahoma to investigate different programs and herbicide modes of action to determine the most efficacious. Trials (10) were conducted at the Vegetable Research Station near Bixby, OK and the Wes Watkins Agricultural Research and Extension Center near Lane, OK.

Typical small plot research techniques were employed in all trials. Various preemergence herbicide programs were investigated including various preemergence combinations of acetochlor, chlorimuron, clomazone, cloransulam, dimethenamid, flufenacet, fomesafen, flumioxazin, imazethapyr, metolachlor, metribuzin, pendimethalin, pyroxasulfone, saflufenacil, sulfentrazone and thifensulfuron. These were followed by postemergence application of dicamba, fomesafen, glyphosate or glufosinate.

Soybean injury was less than 10% in 7 of 10 soybean herbicide trials. Trials containing preemergence combinations of pyroxasulfone + saflufenacil alone or with metribuzin resulted in 10% or greater soybean injury at Bixby in both Roundup Ready and Liberty Link systems. Fomesafen + metolachlor + metribuzin treatments resulted in over 10% injury at Lane in the Roundup Ready soybean system. Injury decreased over the season in all trials. No soybean injury was observed in Roundup Ready Xtend soybean regardless of herbicide combination.

Palmer amaranth (AMAPA) control was greater than 95% with PRE combinations of chlorimuron alone or with flumioxazin + thifensulfuron, flumioxazin + metribuzin, or metribuzin + metolachlor. Tall waterhemp (AMATU) control was 99 to 100% control with all treatment combinations. Broadleaf signalgrass (BRAPP) control was 100% late season with all herbicide combinations. In a second trial, only flumioxazin in combination with pyroxasulfone or metribuzin + sulfentrazone followed by glyphosate controlled AMAPA at least 95%. AMATU control was 100% when flumioxazin was combined with cloransulam or chlorimuron + thifensulfuron, and followed by glyphosate POST. BRAPP control was at least 93% when flumioxazin was combined with chlorimuron alone or with thifensulfuron, or when sulfentrazone was combined with cloransulam, metolachlor or metribuzin and followed by glyphosate POST.

Various preemergence herbicides were evaluated in both Roundup Ready and Liberty Link soybean. The only preemergence treatments that controlled AMAPA at least 95% and AMATU 99% were pyroxasulfone + saflufenacil + metribuzin, and sulfentrazone + metolachlor + metribuzin, followed by fomesafen + glyphosate POST. BRAPP control was over 85% except when pyroxasulfone + saflufenacil and fomesafen + metolachlor + metribuzin was followed by fomesafen alone POST. In Liberty Link soybean, the only treatment that controlled AMAPA at least 94% was fomesafen + metribuzin PRE, followed by fomesafen + glufosinate POST. The only treatments that did not control prostrate pigweed at least 98% were flufenacet + metribuzin or pendimethalin PRE followed by fomesafen + glufosinate POST.

The final study was conducted with the Roundup Ready Xtend system. Preemergence combinations of acetochlor, pyroxasulfone + saflufenacil alone or in combination with dimethenamid, followed by POST applications of dicamba + glyphosate applied alone or in combination with dimethenamid controlled AMAPA at least 97%.

These trials indicate that effective weed control systems can be developed with the judicious use of various preemergent herbicide combinations.

PREEMERGENCE WEED CONTROL OPTIONS FOR DIRECTED SEEDED LETTUCE. R.E. Strahan*, K. Fontenot; LSU AgCenter, Baton Rouge, LA (15)

ABSTRACT

Commercial lettuce producers struggle with weed control in direct-seeded fields. Preemergent herbicides with the ability to control weeds without injuring the crop would be beneficial to producers. In this study, 'Green Salad Bowl' leaf lettuce was seeded into plots arranged in a randomized complete block with 4 replications three days prior to pre-emergent herbicide application. Precision single row push seeders were used to direct seed the crop. Plot size was 4 rows totaling 16 ft x 20 ft. The 2 center rows were used for data collection. Eight herbicide treatments were evaluated for weed control efficacy as well as crop safety.

Pronamide is currently labeled for use in leaf lettuce production was used as the standard. Treatments included: Pronamide at 1 and 2 lbs/A rates, imazapic at 2, 4, and 6 oz/A rates and and imazethapyr at 6 oz/A rate. An untreated weed-free check was maintained by weekly cultivation and an untreated check receiving no cultivation served as a control treatment. Herbicides were sprayed at the listed rates with a CO_2 backpack sprayer delivering 15 GPA.

Throughout the 78d study, lettuce germination rates and heights were recorded. Final lettuce fresh and dry weights were collected and analyzed. Data were subjected to analysis of variance (P=0.05) and means were separated using Fisher's LSD. Plots treated with pronamide at the 1lb/A rate and 2lb/A rate and the untreated weed-free check produced significantly more fresh and dry tissue weight than all other treatments. Although lettuce germinated and grew in the imazapic and imazethapyr treated plots, growth was severely stunted. Preliminary results suggest that imazapic and imazethapyr should not be considered for preemergent weed control in direct seeded leaf lettuce due to excessive injury and yield loss.

BROADLEAF WEED CONTROL OPTIONS IN TRANSPLANTED WATERMELONS. R.E. Strahan*, K. Fontenot; LSU AgCenter, Baton Rouge, LA (16)

ABSTRACT

Managing broadleaf weeds in watermelon is very difficult due poor crop tolerance to most PRE and POST herbicides. A field study was conducted at the Burden Research Center in Baton Rouge, LA in 2014 to evaluate preemergence herbicides for large crabgrass (*Digitaria sanguinalis*), redroot pigweed (*Amaranthus retroflexus*) and pitted morningglory (*Ipomoea lacunosa*) control in transplanted watermelon.

Legacy variety watermelon seed from Reimer were planted on March 1, 2014 and placed on heating pads at 85F for 24 hours then grown out in a greenhouse with a max temp of 85 and a min temperature of 60F. After seedlings had reached first true leaf stage, they were fertigated with 20-20-20 soluble fertilizer weekly prior to field transplanting at a rate of 200 ppm N.

Field areas selected had a natural population of broadleaf weeds but to insure uniform pressure, research areas were seeded with redroot pigweed, pitted morningglory, and large crabgrass 2 days prior to herbicide treatment. Three days prior to transplanting (March 29, 2014), preemergence herbicide treatments were applied to a prepared seedbed. Treatments included a premix of Strategy (clomazone + ethalfluralin) at 5 pt/A, Command (clomazone) at 0.67 pt/A, Sinbar (turbacil) at 4 oz/A, Strategy + Sinbar at 5 pt/A and 4 oz/A, respectively, Valor (flumioxazin) @ 1 and 2 oz/A, Specticle 20 WP (indazaflam) at 5 oz/A, and an untreated check. All plots except the untreated check received a mid-season application of sethoxydim at a rate of 1 pt/A. Herbicides were applied with a CO_2 backpack sprayer delivering 15 GPA. Watermelons were transplanted on April 1, 2014 in the field plots. Plots were three rows each 10 plants per row for a total of 30 plants per plot. There were 4 replications. Plots were three rows with 10 plants per row for a total of 30 plants per plot. All plots had drip irrigation with 12 inch separation between emitters.

Data collected included bi-weekly visual percent weed control (0 = no control and 100 = complete control). 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.

Specticle and Valor at the 2 oz rate provided the highest level of pitted morningglory control (90% and 80%) and pigweed control (80% and 70%) 45 days after treatment. However, plant maturity was delayed with Specticle applications. Sinbar or Sinbar + Strategy provided no greater than 40% control. Crabgrass control for all treatments ranged from 60 to 75%.

IWM IN *AVENA STRIGOSA* AND *STILOZOBIUM ATERRIMUM* TREATED WITH ATRAZINE. E.D. Marchesan[1], M.M. Trezzi*[1], P.T. Fernondez-Moreno[2], R. Alcantara-de la Cruz[2], R.A. De Prado[3]; [1]Universidade Tecnologica Federal do Parana, Pato Branco, Brazil, [2]Universidad de Cordoba, Cordoba, Spain, [3]Universidad de Córdoba, Córdoba, Spain (17)

ABSTRACT

HIGH LEVEL OF TOLERANCE TO GLYPHOSATE IN *PHYSALIS* SP. COLLECTED IN MEXICO. R. Alcantara-de la Cruz*[1], P.T. Fernondez-Moreno[1], M.M. Trezzi[2], J.A. Dominguez-Valenzuela[3], R.A. De Prado[4]; [1]Universidad de Cordoba, Cordoba, Spain, [2]Universidade Tecnologica Federal do Parana, Pato Branco, Brazil, [3]Universidad Autï¿½noma Chapingo, Texcoco, Mexico, [4]Universidad de Córdoba, Córdoba, Spain (18)

ABSTRACT

PROACTIVE CONTROL OF *ELEUSINE INDICA* AND *PASPALUM DISTICHUM* TREATED WITH GLYPHOSATE. R. Alcantara-de la Cruz*[1], P.T. Fernondez-Moreno[1], P.L. Alves[2], M.M. Trezzi[3], R.A. De Prado[4];[1]Universidad de Cordoba, Cordoba, Spain, [2]Universidade Estadual Paulista, São Paulo, Brazil, [3]Universidade Tecnologica Federal do Parana, Pato Branco, Brazil, [4]Universidad de Córdoba, Córdoba, Spain (19)

ABSTRACT

MULTIPLE RESISTANCE TO IMAZAMOX AND GLUFOSINATE IN WHEAT CROPS. P.T. Fernondez-Moreno[1], R. Alcantara-de la Cruz[1], M.M. Trezzi[2], R.A. De Prado*[3]; [1]Universidad de Cordoba, Cordoba, Spain, [2]Universidade Tecnologica Federal do Parana, Pato Branco, Brazil, [3]Universidad de Córdoba, Córdoba, Spain (20)

ABSTRACT

TEMPORAL EMERGENCE OF *AMARANTHUS* SPP. ACROSS THE MIDSOUTH AND MIDWEST. J.C. Moore*[1], C.J. Meyer[1], J.K. Norsworthy[1], R. Smeda[2], B.G. Young[3], G.R. Kruger[4], V.M. Davis[5], M.M. Loux[6], W.G. Johnson[3], L.E. Steckel[7]; [1]University of Arkansas, Fayetteville, AR, [2]University of Missouri, Columbia, MO, [3]Purdue University, West Lafayette, IN, [4]University of Nebraska-Lincoln, North Platte, NE, [5]University of Wisconsin, Madison, WI, [6]Ohio State Unversity, Columbus, OH, [7]University of Tennessee, Jackson, TN (21)

ABSTRACT

A thorough understanding of the emergence pattern of weeds is critical to developing effective season-long management strategies. Research was conducted across eight states in the Midsouth and Midwest in 2013 and 2014 to characterize the emergence pattern of Amaranthus species, particularly Palmer amaranth, waterhemp, and redroot pigweed. These experiments assessed whether one or two tillage events during the growing season would substantially change the emergence pattern at each site. Soil moisture and temperature at a 2.5-cm depth was recorded in the plots and emergence was determined weekly beginning in early spring until the first killing frost. Only the 2013 data will be reported here. The first documented emergence for waterhemp occurred between April 20th and April 26th. In comparison, the first emergence of Palmer amaranth was over a broader range with some sites not observing the emergence of seedlings until the second week of May. One of the more interesting observations is that the peak emergence (date with the greatest number of emerged seedlings) for Palmer amaranth was commonly in mid- to late-May, while waterhemp peak emergence was in the early portion of June. Thus, even though Palmer amaranth had a later start for emergence, seedling emergence peaked earlier than waterhemp. Redroot pigweed serves as a more common and well-managed A*maranthus* species for comparison to the other two problematic *Amaranthus* species. First emergence and peak emergence for both waterhemp and Palmer amaranth were typically prior to redroot pigweed. This provides further evidence, over the broad geographies encompassed in this research, that the early and persistent emergence of waterhemp and Palmer amaranth are critical aspects that contribute to the challenge in managing these species. In addition, it highlights the importance of residual herbicides as a foundation for an effective management system.

CRESTED FLOATING HEART (*NYMPHOIDES CRISTATA*) VEGETATIVE REPRODUCTION FROM LEAF TISSUE. E. Haug, R.J. Richardson*; North Carolina State University, Raleigh, NC (22)

ABSTRACT

Crested floating heart (*Nyphoides cristata*) has been rapidly spreading northward since it was first observed in Naples, Florida in 1996. Despite the apparent threat to our waterways, little published data on the growth characteristics of this highly invasive plant are currently available. It is widely recognized that crested floating heart can reproduce vegetatively via the production of daughter plants, much like water lettuce and water hyacinth. In 2014 research was initiated at North Carolina State University to document reproductive potential. In particular, studies focused on the production of seed and on vegetative reproduction via leaf and stem fragmentation. On average 10 ovules were observed per crested floating heart fruit. Of mature fruit harvested, an average of 1 or 2 seeds appeared to be mature and the remaining ovules appeared to be aborted. In cut stem fragmentation studies, 100% of the plants cut at the stem approximately one inch below the leaf produced new roots and 83% produced new daughter leaves. In leaf fragment studies in which leaves were cut from the stem and then segmented in half, 87% of the leaf fragments produced mature roots and daughter leaves and only one of the leaves died prior to the production of mature roots. These preliminary findings and their potential impacts to management strategies and concerns will be discussed.

AT-PLANT FLURIDONE AND NORFLURAZON BASED HERBICIDE PROGRAMS IN LIBERTY-LINK COTTON. M.W. Marshall*, C.H. Sanders; Clemson University, Blackville, SC (23)

ABSTRACT

Palmer amaranth is the most troublesome herbicide-resistant weed in row-crop production in the southern United States. Currently, PPO-inhibitor herbicides (Group 14) including fomesafen and flumioxazin are used extensively for Palmer amaranth control in the Southeastern United States across many cropping systems. Norflurazon, a Group 12 herbicide, is currently labeled for use in cotton, but not used to a significant degree. Currently, fluridone, a member of the same mode-of-action group as norflurazon, is being evaluated as an at-plant herbicide for Palmer amaranth control in cotton. In an effort to broaden the modes-of-action available in the cotton herbicide portfolio and delay resistance to the PPO-inhibitor family, field experiments were conducted at the Edisto Research and Education Center in 2014 near Blackville, SC to evaluate the efficacy of at-plant norflurazon and fluridone herbicide programs on Palmer amaranth control in glufosinate-tolerant cotton. Experimental design was a randomized complete block design with individual plot sizes of 3.8 by 12 m. Treatments were replicated 4 times in all experiments. Herbicides were applied in water using a tractor mounted air pressurized sprayer calibrated to deliver 240 L/ha with a pressure of 234 kPa. Each site was naturally infested with pitted morningglory, mixed population of glyphosate-resistant and sensitive Palmer amaranth, and large crabgrass. At-plant preemergence (PRE) treatments included norflurazon at 1.4 kg ai/ha, fluridone at 0.22 kg ai/ha plus fomesafen at 0.14 kg ai/ha, fomesafen at 0.28 kg ai/ha, and fomesafen at 0.28 kg ai/ha plus diuron at 0.28 kg ai/ha. Over-the-top postemergence treatments included glufosinate at 0.59 kg ai/ha plus *s*-metolachlor at 1.1 kg ai/ha (POST1) followed by glufosinate at 0.59 kg ai/ha plus acetochlor at 1.26 kg ai/ha (POST2). The layby treatment of MSMA at 2.23 kg ai/ha plus diuron at 0.90 kg ai/ha was applied shortly before row closure. Data collected included percent visual weed control and crop injury on a scale of 0 to 100 with 0 being no control or injury and 100 indicating complete weed control or crop death. Cotton was machine harvested from the middle 2 rows of each plot. Data were subjected to ANOVA and means were separated using Fisher's Protected LSD at the $p = 0.05$ level. Fluridone plus fomesafen and norflurazon at 14 days after treatment (DAT) [POST1 application] provided 100% control of Palmer amaranth. Fomesafen and fomesafen plus diuron also provided excellent control of Palmer amaranth at 14 DAT. At the POST2 application, Palmer amaranth control was greater than 95% except for the fomesafen PRE alone treatment (80%). Cotton injury from the treatments was minor (less than 10%) throughout the study. Seed cotton yields among the herbicide treatments ranged from 2828 to 3137 kg/ha. In summary, norflurazon and fluridone PRE programs provided good to excellent control of Palmer amaranth, pitted morningglory, and large crabrass. Aside from the cost, the addition of these two herbicides will provide a viable mode-of-action alternative for PPO-inhibitors in cotton production.

BARNYARDGRASS CONTROL AS AFFECTED BY APPLICATION TIMING OF TANK-MIXTURES OF CLETHODIM AND GLUFOSINATE. A.N. Eytcheson*[1], D. Reynolds[2]; [1]Mississippi State University, Starkville, MS,[2]Mississippi State University, Starkeville, AR (24)

ABSTRACT

BARNYARDGRASS CONTROL AS AFFECTED BY APPLICATION TIMING OF TANK-MIXTURES OF CLETHODIM AND GLUFOSINATE. A.N. Eytcheson and D.B. Reynolds; Department of Plant and Soil Sciences, Mississippi State University, Mississippi State, MS 39762.

Abstract

The development of genetically modified (GM) crops with tolerance to non-selective herbicides has been rapidly adopted in the United States. The LibertyLink® system utilizes the GM crop resistance to the herbicide glufosinate. Glufosinate is a non-selective, non-residual postemergence (POST) herbicide that has the ability to control weeds considered to be difficult to control with glyphosate as well as glyphosate resistant weeds. However, previous research has reported grass weed control with glufosinate may be inadequate and may require additional management inputs. Clethodim, a graminicide herbicide is a POST annual and perennial grass control product that does not cause injury to dicotyledonous weeds or crops. Producers often chose to tank mix herbicides to broaden the spectrum of weed control, improve efficacy and reduce application cost by combining applications. However, combinations of graminicides with herbicides used to control broadleaves typically result in antagonism. There have been conflicting reports of annual grass antagonism from graminicides applied before or after glufosinate. This could be due to the size of the grasses at the time of glufosinate application or that the antagonism is species specific. Barnyardgrass is considered to be one of the most troublesome grasses in soybean production systems in the Southern United States. Therefore, field experiments were conducted at the Black Belt Research Station in 2013 and 2014 to determine if sequential applications of glufosinate either before or after clethodim will reduce or alleviate antagonism. In 2013, the experiment was conducted in a fallow field with an average barnyardgrass population of 1,205 plants/m^2. In 2014, Pioneer 95L01 soybeans were planted May 19 to evaluate the potential effect on yield, with an average barnyardgrass population of 269 plants/m^2. In both 2013 and 2014, the experimental design was a randomized complete block with plots 2.8 by 9.1 m in size. Treatments included glufosinate (594 g ai/ha) applied 7, 3 or 1 day(s) before (DB) clethodim (76 g ai/ha), clethodim (76 g ai/ha) tank-mixed with or without glufosinate (594 g ai/ha), and glufosinate (594 g ai/ha) applied 1, 3 or 7 day(s) after (DA) clethodim (76 g ai/ha). A crop oil concentrate (1% v/v) was included in all clethodim applications. Clethodim applications were applied on day 0 to eliminate any control differences due to barnyardgrass plant size. Data collected included barnyardgrass control 7, 14, 21, 28 and 56 DAT, barnyardgrass biomass (g/m^2) collected at 56 DAT and soybean yield.

At 14 DAT, all treatments had greater barnyardgrass control compared to clethodim applied alone, except when glufosinate was applied 3 DA clethodim. By 28 DAT, all treatments effectively controlled barnyardgrass greater than clethodim applied alone. However, by 56 DAT, significant regrowth from the crown occurred in all treatments except when glufosinate was applied 7 DB clethodim. When compared to the tank-mix of clethodim + glufosinate, barnyardgrass biomass was reduced 88 and 76% when glufosinate was applied 7 DB and 7 DA clethodim, respectively. Differences in soybean yield were not significant due to time of glufosinate application in relation to the application of clethodim, with soybean yield ranging from 1,958 to 2,713 kg/ha.

Glufosinate alone may not adequately control annual grasses, thus requiring additional management inputs. In times of less than adequate grass weed control, producers may consider tank-mixing glufosinate and clethodim. Our data suggests that applying glufosinate 7 DB clethodim provides greater season long control of ECHCG compared to clethodim applied alone or the tank-mix of glufosinate and clethodim. Data from previous research of glufosinate and clethodim antagonism with goosegrass and other summer annual grass species differ from our results, suggesting that the glufosinate-graminicide antagonism complex may be species specific.

THE IMPACT OF DELIVERY VOLUME VS SPRAY DROPLET SIZE ON HERBICIDE EFFICACY. G.R. Oakley*[1], D. Reynolds[2], G.R. Kruger[3]; [1]Mississippi State University, Starkville, MS, [2]Mississippi State University, Starkeville, AR,[3]University of Nebraska-Lincoln, North Platte, NE (25)

ABSTRACT

SOIL ACTIVITY OF AMINOCYCLOPYRACHLOR ON VARIOUS ROW CROP SPECIES. R.J. Edwards*[1], D. Reynolds[2]; [1]Mississippi State University, Starkville, MS, [2]Mississippi State University, Starkeville, AR (26)

ABSTRACT

The effects of aminocyclopyrachlor (AMCP) uptake by crop species is not well understood, nor is the impact that uptake may have on developing crop species. Three studies were performed to better understand the effects of AMCP on key crop species.

A greenhouse study was implemented to examine root and shoot absorption of AMCP by isolation in treated layers with activated charcoal. Seven cone designs were employed to test different scenarios of absorption and corresponding controls to rule out carbon influence on seed development. AMCP was applied at 0.07 kg ai ha^{-}1 to cones of pure sand, to prevent soil binding, planted with *Zea mays*, *Gossypium hirsutum*, *Glycine max* and *Sesbania herbacea.* A second greenhouse study was performed to examine the soil breakdown half-life of AMCP. A dose titration bioassay was performed with 545, 272, 136, 68, 34, 17, 8.5, 4.25, and 0 µg kg^{-1} on three soil types (e.g. sand, silt and clay). Crop species examined included *Z. mays*, *G. hirsutum* and *G. max.* Finally, a field study was performed examining carryover of AMCP on *G. max*. Plants showed auxinic symptomology 21 days after planting, indicating root absorption of small concentrations of AMCP applied the year before.

Results showed that *Z. mays* was highly tolerant to AMCP and showed minimal responses except when both root and shoot absorption occurred at the same time. However, *G. hirsutum*, *G.max* and *S. herbacea* were more sensitive to aminocyclopyrachlor, especially through root absorption. These results may shed light on the carryover and persistence of AMCP in soil that could be detrimental to crops like soybeans and cotton. In effect, due to the hydrophilic nature and low soil binding of aminocyclopyrachlor, proliferation deeper into the soil profile following application can occur, creating a potential belowground surplus of the chemical below the planted roots of susceptible seedlings

POSTEMERGENCE CONTROL OF YELLOW FOXTAIL IN HYBRID BERMUDAGRASS HAY MEADOWS. R.E. Strahan*, E. Twidwell; LSU AgCenter, Baton Rouge, LA (27)

ABSTRACT

Yellow foxtail is a difficult weed to manage in hybrid bermudagrass pastures. Yellow foxtail germinates early and infests hay meadows throughout the growing season. The following research evaluates glyphosate and glyphosate combinations with Prowl H_2O for controlling yellow foxtail infesting bermudagrass hay meadows.

A field study was conducted in 2014 at the Ben Hur Research Station in Baton Rouge, LA in an established Alicia hybrid bermudagrass hay meadow with a very heavy natural population of yellow foxtail (average 4 plants/foot^2). The study was initiated June 30. Herbicides were applied 10 days after hay harvest. Bermudagrass was approximately at 30% green up following hay harvest. Yellow foxtail was 3 to 6 inches tall at the time of treatment. Herbicides evaluated in single application included glyphosate (Cornerstone 4 lbs. active ingredient per gallon) applied at 6, 8, 12, 16, and 24 oz/A. These glyphosate treatments were also evaluated tank-mixed with pendimethalin (Prowl H_2O) at 4 pt/A. Additionally, Pastora (nicosulfuron + metsulfuron) at 1 oz + glyphosate @ 8 oz/A was included as well as an untreated check.

Herbicides were applied with a CO_2 pressurized backpack sprayer equipped with 11003 XR flat fan nozzles that delivered 15 GPA at 23 psi. Plot size was 6 ft x 10 ft. Visual ratings of percent weed control and bermudagrass injury data were collected bi-weekly. The experiment was conducted as a randomized complete block with 3 replications. Data were subjected to analysis of variance (P=0.05) and means were separated using Fisher's LSD.

By 35 days after treatment, glyphosate applied at 6 oz/A provided acceptable bermudagrass injury (10%) but the poorest level of yellow foxtail control (55%). Acceptable yellow foxtail control (>75%) was obtained by glyphosate rates greater than 8 oz/A. Glyphosate at 12 oz/A controlled 95% of the yellow foxtail and casused an acceptable level of bermudagrass injury. Glyphosate applied at 16 and 24 oz per acre provided 97% yellow foxtail control but caused excessive bermudagrass injury (>35%). Pastora + glyphosate provided 95% glyphosate control and acceptable bermudagrass injury by 35 days after treatment. Prowl H_2O appeared to antagonize glyphosate at most rates evaluated. Only glyphosate + Prowl H_2O at 16 and 24 oz/A provided acceptable yellow foxtail control.

Results of this study indicate that successful control yellow foxtail with minimal bermudagrass injury can be achieved by glyphosate rates as low as 8 oz/A.

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ACURON HERBICIDE: BURNDOWN AND RESIDUAL WEED CONTROL IN NO-TILL CORN. V.J. Mascarenhas*[1], G.D. Vail[2], M. Saini[3]; [1]Syngenta, Nashville, NC, [2]Syngenta Crop Protection, Greensboro, NC, [3]Syngenta Crop Protection, LLC, Greensboro, NC (29)

ABSTRACT

Acuron is a new selective herbicide for weed control in field corn, seed corn, popcorn and sweet corn. Acuron contains a new active herbicide ingredient Bicyclopyrone. The mode of action of Bicyclopyrone is inhibition of HPPD (4-hydroxyphenyl-pyruvate dioxygenase) enzyme which ultimately causes the destruction of chlorophyll followed by death in sensitive plants. Upon registration, Acuron will be the first bicyclopyrone containing product launched with anticipated first commercial application in the 2015 growing season. Acuron is a multiple mode-of-action herbicide premix that provides preemergence and postemergence grass and broadleaf weed control. Field trials were conducted to evaluate Acuron for burndown and residual weed control compared to commercial standards. Results show that Acuron will control many difficult weeds in no-till corn and provides improved residual control and consistency compared to the commercial standards.

PEANUT RESPONSE TO PYRAFLUFEN-ETHYL APPLIED POSTEMERGENCE. P.A. Dotray*[1,2,3], W.J.Grichar[4], T.A. Baughman[5], T.S. Morris[2], R.M. Merchant[1], and M.R. Manuchehri[1]; [1]Texas Tech University, Lubbock, [2]Texas A&M AgriLife Research, Lubbock, [3]Texas A&M AgriLife Extension Service, Lubbock, [4]Texas A&M AgriLife Research, Corpus Christi, and [5]Oklahoma State University, Ardmore, OK.

ABSTRACT

Pyraflufen-ethyl (ET) was labeled in 2013 for postemergence use in peanut. The label lists over 60 weeds that are controlled or suppressed when applications are made to broadleaf weeds up to 4 inches in height or to rosettes up to 3 inches in diameter. Previous research suggested that ET applied postemergence-topical caused significant peanut injury. The objective of this research was to determine peanut response to postemergence-topical applications of ET when applied according to the 2013 label. ET applications were made to peanut at the 6-leaf, 30 days after (DA) 6-leaf, 60 DA 6-leaf, and 90 DA 6-leaf in single and in all possible 2-application sequential treatments. Trials were conducted in the Texas Southern High Plains (Halfway in 2013 and Seagraves in 2014), South Texas (Yoakum in 2013 and 2014), and in Oklahoma (Fort Cobb in 2014). Applications were made using 10 to 20 GPA and included a non-ionic surfactant (0.25% v/v). Visual injury was recorded during the growing season with yield and grade determined at the end of the season. At Halfway, 15 to 28% peanut injury was noted following single application treatments when evaluated 14 days after treatment (DAT), whereas 35 to 45% peanut injury was noted in 2-application treatments when evaluated 14 days after the second application. No treatment reduced peanut yield when compared to the non-treated control. At Seagraves, ET applied at 6-leaf injured peanut 33% when evaluated 14 DAT. Injury following other single application treatments caused 8 to 18% injury. Injury following 2-application treatments ranged from 10 to 42%, with the greatest injury observed in the 6-leaf followed by (fb) 30 days treatment. Peanut yield loss averaged 734 lb/A in plots that received single or 2-applications that involved treatments made at 60 days after 6-lf and 90 days after 6-lf applications, with the exception of the 60 days after 6-lf fb 90 days after 6-lf treatment, which produced the lowest yield (4975 lb/A) when compared to the non-treated control (7008 lb/A). At Fort Cobb, stunting was observed following the last application in all treatments and ranged from 9 to 14% in single application treatments and 5 to 18% in 2-application treatments. No yield reductions were noted at this location. At Yoakum in 2013, no peanut injury was noted 28 days after the last application in each treatment; however, average yield decreased by 941 lbs/A relative to non-treated control for all single and 2-application treatments that involved the 60 days after 6-lf treatment. At Yoakum in 2014, the greatest visual injury 3 DAT was noted following the 6-lf application (27%). YIELD DATA FORTHCOMING. The use of ET in peanut may provide postemergence control of troublesome broadleaf weeds, but visible peanut injury (leaf burn and stunt) was noted at all locations and yield loss was noted at 3 of 5 locations.

SELECTIVE JOHNSONGRASS WEED CONTROL ON OKLAHOMA BERMUDAGRASS ROADSIDES.
C.Z. Hurst*, L.J. Tomlinson; Oklahoma State University, Stillwater, OK (31)

ABSTRACT

BAHIAGRASS GROWTH REGULATION AND SEEDHEAD CONTROL WITH HERBICIDES. S. Williams*, P. McCullough; University of Georgia, Griffin, GA (32)

ABSTRACT

USE OF NON-TRADITIONAL DATA MANAGEMENT TOOLS FOR EXTENSION IMPACT REPORTING. J.D. McCurdy*[1], J.A. Hoyle[2], C.R. Boyer[2]; [1]Mississippi State University, Starkville, MS, [2]Kansas State University, Manhattan, KS (33)

ABSTRACT

With technological developments in smartphones, tablets and applications, extension personnel are able to record, store, and analyze data efficiently. New non-traditional tools are able to collect information through normal extension operating procedures relating to turfgrass weed science. These tools include an automated field operation application, doForms™. doForms™ is a free application that allows users to build and customize electronic forms that can be used to record detailed information. The objective of this study is to survey the non-traditional outreach tool, doForms™, for efficiency, effectiveness, and application to extension in turfgrass weed science. doForms™ was downloaded, installed and forms were created for use during May 2013. For duration of the survey period, extension personnel testing doForms™ spent approximately 70% of extension related activities conducting on site visits with turfgrass managers. From conception to deployment of doForms™ approximately 3 hours was required. Information that was able to be collected by initial form included, date and time of contact between extension personnel and turfgrass manager, category of turfgrass manager (golf course superintendent, sod producer, athletic field manager, residential/commercial landscape operator, etc.), nature of contact (telephone, email, text, social media, etc.), nature of response, subject matter (weeds, diseases, cultural practices, undetermined, etc.), specific weed species, and location. Information that was obtained from initial testing included time allocated to data acquisition, effort to extract data, and practicality. Extension personnel discovered that minimal effort was required to operate doForms™. After the conclusion of extension site visit data could be recorded in less than one minute. Ability to extract data from computer interface required negligible effort. Extension personnel also noted that the ability for the user to record data on devices that were already in their position increased practicality. Although, doForms™ greatly increased extension personnel in efficiency and effectiveness of data collection disadvantages were also observed. Extension personnel were not able to alter forms previously created and must create new forms if desired. The inability to alter forms negatively impacts data extraction. Ultimately, the use of applications such as doForms™ can allow extension personnel to obtain information efficiently and effectively. Due to the minimal time required to record data with applications such as doForms™, Extension personnel are able to devote additional time to other activities, ultimately increasing efficiency. Most importantly this allows issues in turfgrass weed science from extension outreach practices to become location and time stamped for the development of focused Extension programs and current research projects.

WEED CONTROL PROGRAMS IN INZEN GRAIN SORGHUM.. M.T. Bararpour*[1], J.K. Norsworthy[1], T. Barber[2], B.C. Scott[2], S.M. Martin[1], M. Palhano[1]; [1]University of Arkansas, Fayetteville, AR, [2]University of Arkansas, Lonoke, AR (34)

ABSTRACT

Grain sorghum is one of the most important cereal crops worldwide and is the third largest grain crop grown in the United States after corn and wheat. Weed management programs are an essential component of crop production. A field study was conducted at the Agricultural Experiment Station, Fayetteville, Arkansas, in 2014 to evaluate the effectiveness of Zest™ (liquid formulation of nicosulfuron) herbicide in tank-mix combination with either Aatrex, Huskie, Clarity, 2,4-D, and Ally or a combination of these herbicides for broadleaf and grass control in Inzen™ grain sorghum. The experiment was designed as a randomized complete block with ten treatments and four replications. The experiment was established in a natural weed population of Palmer amaranth (*Amaranthus palmeri*), pitted morningglory (*Ipomoea lacunosa*), yellow nutsedge (*Cyperus esculentus*), and broadleaf signalgrass (*Urochloa platyphylla*). Treatments were as follows: 1) Zest at 12 oz/A + Aatrex at 13.3 fl oz/A postemergence (POST); 2) Zest + Huskie at 13 fl oz/A + Aatrex POST; 3) Zest + Clarity at 8 fl oz/A + Aatrex POST; 4) Zest + 2,4-D (Weedar) at 8 fl oz/A + Aatrex POST; 5) Zest + Ally at 0.05 oz/A + 2,4-D + Aatrex POST; 6) Cinch ATZ at 3.20 pt/A preemergence (PRE) followed by (fb) Zest + 2,4-D + Aatrex POST; 7) Cinch ATZ PRE fb Zest + Huskie + Aatrex POST; 8) Cinch ATZ PRE fb Zest + Clarity + Aatrex POST; 9) Cinch ATZ PRE; and 10) nontreated check. All POST treatments were applied to 2- to 4-inch grass and included a crop oil concentrate at 1% v/v and ammonium sulfate at 2 lb/A in the tank. There was no grain sorghum injury from Cinch ATZ applied PRE 1 week after emergence (WAE). Grain sorghum injury ranged from 8 to 18% from tank-mix applications of Zest at 1 week after POST application (WAPO) and 2 to 3% at 4 WAPO from treatments 1 through 9. Most injury appeared to be result of the tank-mix partner or adjuvant rather than Zest (minimal ALS-type injury). There was no grain sorghum injury by 7 WAPO. Single application of Zest + Aatrex and Zest + Huskie + Aatrex provided significantly less Palmer amaranth control (87 to 88%) compared to the other treatments (Trts 3 through 9) at 1 WAPO. However, all treatments provided 96 to 100% control of Palmer amaranth by 7 WAPO. A single application of Zest + Aatrex applied at 2- to 4-inch grass and Cinch ATZ applied PRE provided the same level of Palmer amaranth control (97 to 99%). All treatments provided excellent (98 to 100%) control of pitted morningglory. Broadleaf signalgrass control was weak (78 to 84%) from a single application of Zest + Aatrex and from Zest + Huskie + Aatrex compared to the two applications (PRE fb POST; 99% control) at 1 WAPO. However, broadleaf signalgrass control was >90% from all treatments by 7 WAPO. All treatments provided excellent control of yellow nutsedge (97 to 99% control) by 7 WAPO.

INSECTICIDE SEED TREATMENT IMPROVES RICE TOLERANCE TO LOW DOSES OF GLYPHOSATE AND IMAZETHAPYR. R. Scott*[1], G. Lorenz[2], J.K. Norsworthy[3], J. Hardke[4], B.M. Davis[5], J.W. Dickson[5]; [1]Universitiy of Arkansas, Lonoke, AR, [2]Deptartment of Entomology, Lonoke, AR, [3]University of Arkansas, Fayetteville, AR, [4]University of Arkansas, Stuttgart, AR, [5]University of Arkansas, Lonoke, AR (35)

ABSTRACT

Studies were conducted in 2013 and 2014 to determine the effect of an insecticide seed treatment (CruiserMaxx Rice®) on conventional rice tolerance to low doses of the herbicides glyphosate and imazethapyr applied early postemergence. Treated seed included the insecticide thiamethoxam and “untreated” seed contained only the fungicide and other components of the commercial seed treatment which was applied at a rate of 7 ounces per 100 pounds of seed. Herbicide treatments included glyphosate applied at 1, 2 and 4 ounces per acre and imazethapyr applied at 0.25, 0.5 and 1.0 ounces per acre. The results of the test revealed a significant decrease in crop response when thiamethoxam treated rice was exposed to any rate of either glyphosate or imazethapyr applied at the 3- to 4-leaf stage. Additional studies revealed that this effect was true across multiple rice varieties.

VISTA FOR HEMP DOGBANE (*APOCYNUM CANNABINUM* L.) CONTROL ON ROADSIDES. V.L. Maddox*[1], J. Byrd[1], V. Langston[2]; [1]Mississippi State University, Mississippi State, MS, [2]Dow Agrosciences, Houston, TX (36)

ABSTRACT

Off-site movement of herbicides due to volatility can be a serious issue, particularly with sensitive crops. Occasionally this is an issue in Mississippi with herbicides applied to rights of way and other noncropland areas. The Mississippi Department of Transportation maintains 75,181 lane miles of roadside right of way, many of which are adjacent to crops sensitive to certain herbicides. Since broadleaf weeds are problematic on roadsides, herbicides like triclopyr could be a problem if applied close to sensitive crops and during climatic conditions favorable for volatility. This objective of this study was too evaluate the use of Vista XRT (2.8 lb ae fluroxypyr/gal) as a potential alternative to triclopyr for hemp dogbane (*Apocynum cannabinum*) control in sensitive areas along roadsides in Mississippi. Two applications on 12 May and 2 June 2014 of Vista XRT were applied to hemp dogbane at early flower and full-flower growth stages on a roadside in Noxubee County, Mississippi. Herbicide treatments were Vista XRT at 8 or 12 oz, Vista XRT at 12 oz plus Milestone (2 lb ae aminopyralid/gal) at 7 oz, Vista XRT at 12 oz plus Capstone (1 lb ae triclopyr plus 0.1 lb ae aminopyralid/gal) at 6 pts, Garlon 3A (3 lb ae/gal triclopyr) at 32 oz, and Triclopyr HL (4 lb ae/gal triclopyr) at 24 oz product per acre. Application rates on 2 June 2014 were the same, except the addition of Capstone alone at 8 pts product per acre. A non-ionic surfactant at 0.25 % v/v was added to each herbicide treatment. Herbicides were applied using a CO_2 backpack sprayer at 20 PSI. The boom was 6 ft wide with 8003 flat fan nozzles delivering 25 GPA. Environmental conditions were recorded at the time of the applications. Data was analyzed using ARM software's Least Significant Difference mean separation. AT 1.5 and 1 MAT for Application 1 and Application 2, respectively, burn down ranged from 72 to 90 percent. At 2 MAT, burn down was higher in Application 2 treatments, ranging from 92 to 98 percent burn down compared to 72 to 92 percent for Application 1. This pattern was the same 3 MAT. It is possible that these treatments more effectively control hemp dogbane at later growth stage. Still, some regrowth was observed in all treatments by 3 MAT. Thus, sequential retreatment at a later date would be required for complete control. No significant differences were observed between treatments made either Application timing. Although the Vista XRT 12 oz rate showed slightly more burn down, it was not significantly better than the 8 oz rate in this study. This research indicates Vista XRT would be an acceptable alternative to triclopyr in areas were volatility is a concern.

BIOHERBICIDAL EFFECTS OF *MYROTHECIUM VERRUCARIA* ON GLYPHOSATE-RESISTANT AND -SUSCEPTIBLE PALMER AMARANTH BIOTYPES. R.E. Hoagland*[1], C.D. Boyette[2], N.D. Teaster[3]; [1]USDA-ARS, CPSRU, Stoneville, MS, [2]USDA-ARS, Stoneville, MS, [3]USDA-ARS, Stuttgart, AR (37)

ABSTRACT

Bioherbicidal activity of the fungus *Myrothecium verrucaria* (MV) on glyphosate-resistant and -susceptible Palmer amaranth was examined on whole plants and in leaf bioassays of young and mature plants. Leaf bioassays using MV mycelia (obtained from the fermentation) indicated that excised leaves of young greenhouse-grown (glyphosate-resistant and -susceptible) and mature field-grown (glyphosate-resistant) plants exhibited injury. Generally, injury was directly proportional to the MV mycelial concentration applied, and glyphosate-susceptible and -resistant plant leaves were equally sensitive to the MV phytotoxic effects as measured by reduction of chlorophyll content. Similar effects occurred on whole plants challenged by MV spray applications to foliage, as substantiated by plant growth reduction (fresh and dry weight accumulation) at termination of the time course. MV disease progression over a 7-d period in young (2-week-old) plants increased with time, and at 48 to 72 h after treatment, disease was severe with nearly 100% mortality occurring and there were no significant response differences in the glyphosate-susceptible and -resistant plants. Disease progression in 4-week-old plants was slower than for younger seedlings, indicating more tolerance to the bioherbicide, but injury was moderately severe at the endpoint (168 h) of treatment. Results demonstrate that under greenhouse and laboratory conditions, MV can control both glyphosate-resistant and -susceptible Palmer amaranth seedlings which could make this bioherbicide a possible candidate for use against this economically important weed.

WEED CONTROL IN A WHITE CLOVER-COTTON LIVING MULCH SYSTEM. W. Vencill*; University of Georgia, Athens, GA (38)

ABSTRACT

Field studies were conducted at the Plant Sciences Farm near Athens, GA to examine the feasibility of a living white clover – cotton production system. White clover was established in the Fall 2013. Four weeks prior to cotton establishment in the Spring 2014, white clover was treated with one of four treatments applied in a 20 cm band, dicamba applied at 275 g ai/ha; dicamba plus flumioxazin applied at 275 + 70 g ai/ha; and dicamba plus glyphosate applied at 275 + 840 g ai/ha. Within each of these preplant treatments, either fomesafen plus pendimethalin applied at 275 + 840 g ai/ha or glyphosate applied at 840 g ai/ha was applied PRE followed by either metolachlor plus glyphosate applied at 990 + 840 g ai/ha applied EPOST when cotton was at the 2-leaf stage followed by diuron plus glyphosate applied at 550 + 840 g ai/ha layby. PRE and EPOST treatments were applied broadcast. White clover and cotton injury were monitored throughout the season. Volumetric soil moisture was evaluated within the white clover and cotton row to determine if there was competition for water during the season.

Early season white clover ranged from 0-50% after application of PRE cotton herbicides. Glyphosate caused the most injury (50%) and the pendimethalin + fomesafen treatment caused 30% injury. White clover injury dissipated by 60 DAT. No cotton injury was observed throughout the season. Soil moisture readings indicated that white clover was competing with cotton for moisture after cotton flowering began. There were no significant differences in cotton height among the treatments or from an adjacent field of conventional cotton. It should be noted that early season thrips injury was not detected in the white clover-cotton areas. Early season thrips injury was severe in an adjacent field of conventional cotton without a soil applied insecticide.

All treatment combinations provided excellent season-long Palmer amaranth control (>95%). Tall morningglory and large crabgrass control were not as robust. Late season tall morningglory control ranged from 70 to 90%. Treatements that included fomesafen + pendimethalin provided better tall morningglory control (85-90%). No treatment provided more than 85% large crabgrass control at the end of the season.

Cotton yield reflected successful white clover competition with cotton for water during the drier parts of the season. For a white clover-cotton intercropping system, water management will be essential. This would consist of providing greater irrigation than was available in this study and killing a larger strip of white clover before cotton establishment. Future studies will examine if killing a larger strip of white clover will still provide early season thrips control and successful Palmer amaranth suppression observed in these studies.

VIRGINIA BUTTONWEED CONTROL WITH POSTEMERGENCE METSULFURON TANK-MIXTURES. G.M. Henry*, R. Grubbs, K. Tucker, C.M. Straw; University of Georgia, Athens, GA (39)

ABSTRACT

Virginia buttonweed (*Diodia virginiana*) is a difficult to control broadleaf perennial weed. Field experiments were conducted at Pine Hills Golf Club in Winder, GA to examine the control of Virginia buttonweed in a 'Tifway 419' hybrid bermudagrass fairway. The soil was an Appling sandy loam (Fine, kaolinitic, thermic Typic Kanhapludult). Research was conducted on a mature hybrid bermudagrass fairway maintained at a 1.0 cm height. Virginia buttonweed cover (25 to 35%) within each plot was determined at the time of initial herbicide application. Treatments were applied to plots (1.2 m x 1.5 m) arranged in a randomized complete block design with four replications. Treatments included a non-treated check, metsulfuron (0.021 kg ai ha^{-1}) alone, metsulfuron (0.021 kg ai ha^{-1}) + dicamba (0.14 kg ai ha^{-1}), metsulfuron (0.021 kg ai ha^{-1}) + halosulfuron (0.053 kg ai ha^{-1}) + dicamba (0.14 kg ai ha^{-1}), metsulfuron (0.021 kg ai ha^{-1}) + sulfentrazone (0.070 kg ai ha^{-1}), metsulfuron (0.021 kg ai ha^{-1}) + sulfentrazone (0.070 kg ai ha^{-1}) + dicamba (0.14 kg ai ha^{-1}), and thiencarbazone + iodosulfuron + dicamba [Celsius (0.17 kg ai ha^{-1})]. All treatments included a non-ionic surfactant (NIS) at 0.25% v/v. Treatments were applied on 29 July 2013 using a CO_2 pressurized backpack sprayer equipped with XR8004VS nozzle tips calibrated to deliver 375 L ha^{-1} at 221 kPa. Virginia buttonweed cover was visually evaluated 1, 2, 4, and 8 weeks after treatment (WAT). Percent Virginia buttonweed control for each treatment was calculated relative to initial Virginia buttonweed cover. Analysis of variance was performed in SAS and means were separated according to Fisher's protected LSD at the 0.05 significance level. No bermudagrass phytotoxicity was observed throughout the length of the trial, regardless of treatment. Virginia buttonweed control was 4 to 14% 1 WAT, regardless of treatment. At 2 WAT metsulfuron + halosulfuron + dicamba resulted in 100% Virginia buttonweed control. All other treatments resulted in 74 to 89% control 2 WAT. Metsulfuron + dicamba and metsulfuron + halosulfuron + dicamba resulted in 100% Virginia buttonweed control 4 WAT followed by (fb) metsulfuron + sulfentrazone (93%) fb metsulfuron (88%) fb Celsius (87%) fb metsulfuron + sulfentrazone + dicamba (80%). At 8 WAT significant Virginia buttonweed regrowth was observed, regardless of treatment. Metsulfuron + sulfentrazone resulted in the greatest Virginia buttonweed control (71%) 8 WAT. Metsulfuron + dicamba, metsulfuron + halosulfuron + dicamba, and metsulfuron + sulfentrazone + dicamba resulted in 65 to 68% control 8 WAT, regardless of treatment. Virginia buttonweed control in response to metsulfuron 8 WAT was reduced to 31%, while control with Celsius was reduced to only 9%. Sequential applications may have increased long-term Virginia buttonweed control in response to all treatments.

SESAME RESPONSE TO POST-DIRECTED HERBICIDE APPLICATIONS. W. Grichar*[1], P. Dotray[2], D. Langham[3];[1]Texas A&M AgriLife Research, Yoakum, TX, [2]TAMU Ag Experiment STation, Lubbock, TX, [3]Sesame Research LLC, San Antonio, TX (40)

ABSTRACT

Sesame (*Sesamum indicum* L.) is one of the oldest crops known to humans. It has been planted for over 7,500 years in Asia and Africa in very poor growing conditions. Sesame cultivars in those areas were tall, had very long internodes, and grew above the weeds. Letters from Thomas Jefferson document his trials with sesame between 1808 and 1824. Jefferson stated that sesame "…is among the most valuable acquisitions our country has ever made. … I do not believe before that there existed so perfect a substitute for olive oil." He talks about the rule of thumb that still exists today - that sesame will do well where cotton (*Gossypium hirsutum* L.) does well.

The presence of weeds can negatively influence sesame yields. It has been reported that the major factor influencing sesame yield loss in a competitive situation between the crop and weed is the ratio between the relative leaf area of the weed and the crop at the time of crop canopy closure. In direct combining, the weeds can be a big problem in that they are normally green and add moisture to the combine bin. There are many cases where the sesame seeds are dry and weed seeds are not. Thick stems can add moisture, but the major problem is weed seeds. Since it is logistically difficult to scalp off the weed seeds at harvest, moisture from the weeds will transfer to sesame seeds. Sesame is 50% oil and needs to be harvested at 6% moisture or below in order to be transported by trucks and stored in silos. High moisture under these conditions can lead to heating and ruining of the seed. A second concern is that mechanically harvested sesame moves through a series of augers from the combine screen, to the combine bin, to the truck, to the silo, to the cleaning equipment, and within the cleaning process. Moist sesame can be damaged by this movement forming free fatty acids and leading to spoiling.

Field studies were conducted during the 2006 and 2007 growing seasons under weed-free conditions in south Texas and the Texas High Plains to determine sesame tolerance to herbicides applied postemergence-directed to the lower 5 and 15 cm of the sesame main stem. Sesame injury was greatest when herbicides were applied to 15 cm of the main stem compared to herbicide applications made to 5 cm of the main stem height. Glyphosate at 0.84 kg ae/ha and pyrithiobac at 0.07 kg ai/ha resulted in the greatest sesame stunting (28 to 90%) when applied up to 15 cm main stem height. When glyphosate was applied up to 5 cm main stem height, sesame injury was 20% or less. Glyphosate applied up to the 15 cm stem height and pyrithiobac applied 5 and 15 cm stem height consistently reduced sesame yield when compared with the non-treated control. Glufosinate-ammonium and the premix of linuron plus diuron applied up to the 5 cm stem height caused the least sesame stunting and resulted in no reduction in sesame yield when compared with the non-treated control.

POPULATION DYNAMICS OF ENDEMIC AND NON-ENDEMIC GRASS AND SEDGE SPECIES OF GUANA ISLAND, BRITISH VIRGIN ISLANDS. G.M. Henry*, C.M. Straw; University of Georgia, Athens, GA (41)

ABSTRACT

The Caribbean Biogeographic Unit, comprising the Caribbean and south Florida, has been identified as the third most important global biodiversity hotspot in the world. This is based on the percentage of endemic plants and remaining primary vegetation. Guana Island, British Virgin Islands, is roughly 343 hectares of tropical forest, mountains, hills, and valleys that contain more flora and fauna than any other island similar in size. However, several non-native grass species (*Digitaria* spp., *Setaria* spp.,*Sporobolus* spp., etc.) have been documented to exist on Guana Island. The introduction and competitive nature of several of these non-native species may result in a loss in biodiversity and the extinction of certain endemic grass populations. The previous identification of grass species on the island may not accurately depict what is currently present in the salt flats. Therefore, we conducted a systematic survey of the grasslands of Guana Island in October of 2013 in order to determine the abundance and distribution of endemic and non-endemic grass species. A total of 59 transects measuring 40 to 67 m were run northeast to southwest approximately 3 m apart from one another from the salt pond to White Bay beach. Grass or sedge species were identified and geo-referenced (Trimble GeoExplorer 6000 series gps unit) every 3 m along each transect for a total of 1,087 data points. Data were imported into ArcGIS in order to create spatial distribution maps of grass and sedge species across the salt flats. Data points for each species were counted to determine overall abundance (%). Eight grass/sedge species were identified: broadleaf panicum [*Brachiaria adspersa* (Trin.) Parodi], Indian bluegrass [*Bothriochloa pertusa* (L.) A. Camua], thin paspalum (*Paspalum setaceum* Michx.), goosegrass [*Eleusine indica* (L.) Gaertn.], common bermudagrass [*Cynodon dactylon*(L.) Pers.], southern sandbur (*Cenchrus echinatus* L.), crowfootgrass [*Dactyloctenium aegyptium* (L.) Beauv.], and tropical fimbry (*Fimbristylis cymosa* R. Br.). The most abundant species present was Indian bluegrass (76%), while all other species constituted < 10% of the total area, respectively. Indian bluegrass may have been introduced as forage for livestock during the 18th century when the island was primarily used for sugar cane production. Thin paspalum, although poorly distributed (4% abundance), is endemic to Guana and several surrounding islands within the Caribbean. Coastal sandbur (Cenchrus incertus M. A. Curtis.) is indigenous to the island; however, our surveys only revealed a small population of non-endemic southern sandbur. Land use and anthropogenic activity may have created a population of goosegrass exclusively inhabiting a utility road that traverses the salt flats from east to west. Tropical fimbry, a sedge native to several other islands in the Caribbean, had the second highest abundance (10%). Tolerance to high levels of soil moisture may increase the competitive ability of tropical fimbry present in the salt flats. Most of these plants were observed in small depressions where water runoff collects and/or depth to the water table is less. Information obtained from this survey will be used to understand the conservation significance of several of these species and determine strategies to enhance the growth and survival of endemic plants and the biodiversity of the island flora.

SEQUENTIAL APPLICATIONS OF FENOXAPROP AND BISPYRIBAC IN RICE. H.M. Edwards*[1], J.A. Bond[1], B.H. Lawrence[1], J.P. Mangialardi[1], C.B. Edwards[2]; [1]Mississippi State University, Stoneville, MS, [2]Monsanto Co., Scott, MS (42)

ABSTRACT

Fenoxaprop is a selective herbicide used for postemergence (POST) control of grasses in rice, and bispyribac has been used for selective POST control of barnyardgrass and other weeds in rice. Previous research has shown that bispyribac is the most effective herbicide for control of barnyardgrass that exceeds one to two tillers in size. Fenoxaprop is effective for control of small barnyardgrass prior to flooding. The efficacy of fenoxaprop and bispyribac for barnyardgrass control in rice has been documented. However, there are no published reports on sequential applications of fenoxaprop and bispyribac at different application timing combinations. The objective of this research was to evaluate sequential applications of fenoxaprop and bispyribac at different application timing combinations for barnyardgrass control in rice.

Research was conducted in 2014 at the Mississippi State University Delta Research and Extension Center in Stoneville, MS. Soil at Stoneville was a Sharkey clay with a pH of 8.2 and 2.1% organic matter. Individual plots were eight 8-in rows measuring 15 feet in length. All broadleaf weeds were controlled throughout the growing season. Nitrogen was applied at 180 lb/A as urea prior to flooding at the one- to two-tiller rice stage. The experimental design was a randomized complete block with four replications. Sequential applications of fenoxaprop at 0.109 lb ai /A followed by (fb) bispyribac at 0.025 lb ai/A or bispyribac fb fenoxaprop at the same rates were applied at five different application timing combinations. All bispyribac applications included a blended methylated seed oil/organosilicon/urea-ammonium nitrate adjuvant. Application timing combinations were (1) early-postemergence (EPOST) fb mid-postemergence (MPOST), (2) EPOST fb late-postemergence (LPOST), (3) MPOST fb LPOST, (4) MPOST fb 7 d after flooding (PTFLD), and (5) LPOST fb PTFLD. The EPOST, MPOST, and LPOST applications were made to rice in the two- to three-leaf, three- to four-leaf, and four-leaf to one-tiller stages, respectively. A nontreated control was included for comparison of rough rice yield. Barnyardgrass control was visually estimated at 7, 14, and 28 days after each treatment (DAT). Rough rice yield was adjusted to 12% moisture content. Rough rice yield data were analyzed in comparison to the nontreated control. Yield of the nontreated control was averaged for each site year and then subtracted from the yield of each plot in that site year to provide a number for relative yield. Data were subjected to ANOVA and means were separated using Duncan's multiple range test at p=0.05.

Fenoxaprop fb bispyribac controlled more barnyardgrass 28 DAT than sequential applications of bispyribac fb fenoxaprop regardless of application timing combination. Differences in barnyardgrass control between the two sequential herbicide treatments ranged from 11% for EPOST fb MPOST to 35% for the EPOST fb LPOST application timing combination. Barnyardgrass control was ≥95% with fenoxaprop fb bispyribac at application timing combinations EPOST fb MPOST or EPOST fb LPOST. For all treatments beginning with bispyribac, the greatest barnyardgrass control was with the EPOST fb MPOST application timing combination. Barnyardgrass control with bispyribac EPOST fb fenoxaprop MPOST was similar to fenoxaprop fb bispyribac applied MPOST fb LPOST or MPOST fb PTFLD. For both sequential herbicide treatments, barnyardgrass control 28 DAT decreased as the initial treatment in each application timing combination was delayed from EPOST to MPOST or MPOST to LPOST. Barnyardgrass control was ≤ 80% when either sequential application was triggered MPOST or LPOST. Similar to barnyardgrass control, relative rough rice yield was optimized with sequential applications of fenoxaprop fb bispyribac applied EPOST fb MPOST or EPOST fb LPOST. Barnyardgrass was one- to two-leaf at time of EPOST application, which explains the level of control with fenoxaprop fb bispyribac at EPOST fb MPOST or EPOST fb LPOST. It was expected that bispyribac fb fenoxaprop at EPOST fb MPOST or EPOST fb LPOST would provide similar control to fenoxaprop fb bispyribac at the same application timing combinations. However, barnyardgrass had reached the tillering stage for application timing combinations initiated at MPOST. Barnyardgrass control and relative rough rice yield were reduced with sequential applications initiated after beginning of tillering in barnyardgrass.

Sequential applications of fenoxaprop fb bispyribac were more effective than bispyribac fb fenoxaprop with all application timing combinations. Therefore, when circumstances necessitate a total POST barnyardgrass control program in rice, optimum control will be achieved when fenoxaprop is applied to one- to two-leaf barnyardgrass and then bispyribac is used to control plants that survived fenoxaprop.

ENLIST 360 EDUCATION SERIES: EDUCATION, TRAINING AND OUTREACH ON THE ENLIST WEED CONTROL SYSTEM. A. Asbury[1], D.E. Hillger[2], R. Keller[3], J. Laffey[4], R. Lassiter*[5], J. Siebert[6], J. Wiltrout[7]; [1]Dow AgroSciences, Dahinda, IL, [2]Dow AgroSciences, Noblesville, IN, [3]Dow AgroSciences, Rochester, MN, [4]Dow AgroSciences, Maryville, MO, [5]Dow AgroSciences, Raleigh, NC, [6]Dow AgroSciences, Greenville, MS, [7]Dow AgroSciences, Indianapolis, IN (43)

ABSTRACT

Dow AgroSciences has developed the Enlist™ Weed Control System, breakthrough weed control technology that advances herbicide and trait technology by building on the Roundup Ready® system. The Enlist system will help control herbicide-resistant and hard-to-control weed populations. Enlist traits give corn, soybeans and cotton tolerance to Enlist Duo™ herbicide in the same application window as Roundup® herbicide. Enlist Duo herbicide is a proprietary blend of glyphosate and a new 2,4-D choline. Just as important as the trait and herbicide, Enlist™ Ahead is a benefits-based management resource that helps growers get the best results from the Enlist system—today and in the future. Built on a three-pillar foundation, Enlist Ahead will offer farmers, applicators and retailers management recommendations and resources, education and training, and technology advancements. Continued in 2014, Enlist 360 education and training provides growers, ag retailers and applicators with information they need to know about the Enlist™ system. Participants learned about advanced herbicide and trait technology, best management practices for applying Enlist Duo herbicide and weed resistance management. Dow AgroSciences has used the latest science and technology to address problem weeds, and Enlist will be a very effective solution.

EVALUATION OF AMICARBAZONE AND MESOTRIONE FOR ANNUAL BLUEGRASS CONTROL IN TALL FESCUE. J. Yu*, P. McCullough; University of Georgia, Griffin, GA (44)

ABSTRACT

A field experiment was conducted from March to May 2013 in Griffin, Georgia to evaluate annual bluegrass control programs from sequential applications of amicarbazone and mesotrione combinations in tall fescue. The experiment was conducted as a randomized complete block design with four replications of 1 x 3-m plots. Treatments were applied with a single flat-fan nozzle calibrated to deliver 374 L ha^{-1} of spray volume on March 1, 2013. Results showed that all treatments caused minimal tall fescue injury (<5%). Three sequential treatments of mesotrione at 175 g ai ha^{-1} alone on a two-week interval provided 50 to 61% annual bluegrass control from April 4 to 25. Amicarbazone at 98 g ai ha^{-1} applied twice sequentially on a two-week interval provided <40% annual bluegrass control. Sequential applications of amicarbazone at 98 g ai ha^{-1} combined with mesotrione at 175 g ai^{-1} significantly increased annual bluegrass control from March 27 to April 11 compared to the herbicides alone, but did not improve final control. Ethofumesate sequentially applied at 840 g ai ha^{-1} provided <50% control of annual bluegrass. Increasing the amicarbazone rate from 98 to 196 g ai ha^{-1} generally increased efficacy on annual bluegrass. Results suggest that mesotrione use with amicarbazone may improve the speed of annual bluegrass control compared to amicarbazone alone in spring. However, application rates and regimens warrant further investigation to improve annual bluegrass control in spring.

RESIDUAL HERBICIDES FOR PALMER AMARANTH CONTROL IN SOYBEAN. J.D. Peeples*[1], H.M. Edwards[1], J.A. Bond[1], C.B. Edwards[2], T.W. Eubank[3]; [1]Mississippi State University, Stoneville, MS, [2]Monsanto Co., Scott, MS, [3]Dow AgroSciences, Greenville, MS (45)

ABSTRACT

Recommended programs for control of glyphosate-resistant Palmer amaranth begin with residual preemergence (PRE) herbicides. Research suggests that the critical weed-free period for soybean is through the R1 growth stage. Herbicides applied PRE are one tool that can be utilized to minimize weed interference in soybean. The efficacy of PRE herbicide treatments is evaluated annually in Mississippi to provide producers with up-to-date information on management of glyphosate-resistant Palmer amaranth in soybean. The objective of this research was to compare the efficacy of residual herbicides applied PRE for control of Palmer amaranth in soybean.

Research to evaluate control of Palmer amaranth with residual herbicides was conducted from 2010 to 2014 at seven sites in Mississippi. Soil textures each site year ranged from very fine sandy loam to silty clay. Field preparation each site year consisted of fall disking and field cultivation. The experimental sites were left fallow during the winter. Emerged weeds were controlled prior to planting with an application of paraquat at 1 lb ai/A. Individual plots were four 30-in rows measuring 30 or 40 feet in length. Late maturity group IV or early maturity group V soybean cultivars adapted to the local environment were planted from mid-April to mid-May each site year. Herbicide resistance technology varied across site years. The experimental design was a randomized complete block with four replications. Treatments were applied within 48 hours of planting each site year. A nontreated control was included for comparison. Palmer amaranth control was visually estimated 14, 28, and 35 days after treatment (DAT) on a scale of 0 (no control) to 100% (complete control). An arcsin-square root transformation did not improve homogeneity of variance, so nontransformed data were used in analyses. Nontransformed data were subjected to the Mixed Procedure with site year and replication (nested within site year) as random effects. Least square means were calculated and mean separation ($p \leq 0.10$) was produced using PDMIX800.

All treatments except Canopy EX controlled Palmer amaranth ≥92% 14 DAT. Authority MTZ and Prefix, which are mixtures containing multiple herbicide modes of action, controlled more Palmer amaranth 14 DAT than Canopy EX, Prowl H2O, TriCorr, and Valor SX. Prowl H2O, TriCorr, and Valor SX contain a single herbicide mode of action. Palmer amaranth control 28 DAT was ≥92% with Authority MTZ, Boundary, Canopy, Dual Magnum, Envive, Fierce, Gangster, Prefix, Valor SX, Valor XLT, and Zidua. At the same evaluation, Envive, Fierce, Prefix, and Valor XLT controlled more Palmer amaranth than Canopy EX, Prowl H2O, or TriCorr. In contrast to 28 DAT, Palmer amaranth control 35 DAT was greater following Envive, Fierce, Prefix, and Valor XLT compared with Canopy, Dual Magnum, and TriCorr. Prowl H2O and TriCorr or Canopy EX provided <80 or 70% control, respectively, 35 DAT.

Herbicide treatments that were mixtures containing protoporphyrinogen oxidase (PPO) and/or very long chain fatty acid synthesis inhibitors (VLCFA) were among the treatments that provided approximately 90% Palmer amaranth control as late as 35 DAT. Valor SX (PPO) and Zidua (VLCFA) each contain only a single active ingredient, but these herbicides provided control similar to mixtures containing PPO and/or VLCFA. Resistance to acetolactate synthase (ALS) inhibitors is prevalent in Palmer amaranth throughout the southern U.S. Consequently, control with Canopy EX, which is a mixture of multiple ALS herbicides, was poor. Results indicate several currently labeled PRE herbicides provide early-season control of Palmer amaranth in soybean. However, even at 14 DAT, no treatment provided complete control, so additional management would be required for season-long control. In the event that a glyphosate-resistant population of Palmer amaranth evolves multiple resistance to PPO and/or VLCFA herbicides, control options will be severely limited with currently labeled herbicides.

SICKLEPOD AND MORNINGGLORY CONTROL AND SEED PRODUCTION OF SURVIVING PLANTS AFTER TREATMENT WITH TANK MIXTURES OF GLYPHOSATE WITH 2,4-D AND DICAMBA. R.G. Leon*[1], J.A. Ferrell[2]; [1]University of Florida, Jay, FL, [2]University of Florida, Gainesville, FL (46)

ABSTRACT

New cotton varieties with stalked tolerance to 2,4-D, dicamba, and glyphosate will likely be quickly adopted by growers to control glyphosate resistant (GR) weeds. However, due to budget constraints growers are considering the possibility of not using glyphosate tank-mixed with synthetic auxins in fields with GR weeds. Field experiments were conducted in 2013 and 2014 to determine the need to use tank mixtures of glyphosate with 2,4-D or dicamba to control sicklepod and pitted morningglory, two important weed species in cotton production in Florida. Different herbicide treatments including dicamba, 2,4-D amine, and glyphosate, alone and in combination were applied to sicklepod and pitted morningglory populations when individuals were 3 to 6 and 6 to12 inches tall. Applications at 3-6 inches provided inconsistent control, but plots treated with combinations of dicamba and glyphosate were among those exhibiting the lowest weed biomass in both years. When averaging across application timings, plots treated with tank-mixtures exhibited the highest sicklepod control (82 to 98%) in both years regardless of the rates used at 3 WAT. Herbicides applied alone at full label rates provided in many cases >80% control, these results were not consistent, especially at the low rates. Conversely, tank mixtures provided more consistent sicklepod and pitted morningglory control regardless of the rate. At 6 WAT, differences between treatments was similar to 3 WAT, but control level was at least 10% lower due to recovery of surviving plants. Overall, plants that survived herbicide applications exhibited seed production similar to the nontreated control. Also, seed viability and germinability was not affected by herbicide treatments. The results of the present study showed that dicamba or 2,4-D alone are not sufficient to ensure proper control of important broadleaved weed species such as sicklepod and pitted morningglory and tank-mixtures of glyphosate with these auxinic herbicides might still be necessary for their control.

PALMER AMARANTH CONTROL WITH FLURIDONE IN SOYBEAN. S. Steckel*, L.E. Steckel; University of Tennessee, Jackson, TN (47)

ABSTRACT

Palmer amaranth (*Amaranthus palmeri*) is one of the most problematic weed species in Mid-South soybean systems. Lack of diversity in soybean weed management has led to almost total reliance on herbicides, particularly glyphosate for weed control, which in turn has led to glyphosate-resistant Palmer amaranth. Clearly new tools are needed for consistent weed control in this crop. Fluridone, a potentially new herbicide mode of action in soybean, has shown some promise providing residual Palmer amaranth control in cotton.

Fluridone needs at least 1.25 cm of precipitation to activate, whereas fomesafen requires very little moisture to activate. Therefore, fomesafen was added to fluridone in a premix which, in limited cotton research, has provided more consistent Palmer amaranth control than fluridone alone. Evaluation of the effectiveness of fluridone for residual control is necessary in order to make recommendations for its use in alternative weed management programs in soybeans.

A field study was conducted at the West Tennessee Research and Education Center in Jackson, TN and on a production field in Medina, TN in 2014. The objective of this research was to compare preemergent applications of fluridone (alone or mixed with fomesafen) to local standard herbicides for residual weed control and crop injury in Mid-South soybean systems. Visual evaluations were used to determine Palmer amaranth control and soybean injury 14 days after treatment (14 DAT). Yield was taken at the Medina location.

The three higher rates of fluridone alone and the tank-mixtures of fomesafen + fluridone injured soybeans more than the other treatments 14 DAT at Jackson. All treatments containing fluridone dramatically injured soybeans (23-70%) at Medina. The higher rate of fomesafen, the highest rate of fluridone, all fomesafen + fluridone tank-mixtures, and the fomesafen + *S* – metolachlor premix provided acceptable Palmer amaranth control (>90%) across both locations. The visual injury 14 DAT translated into yield loss for the highest rate of fluridone applied alone at Medina. Moreover, the fomesafen + fluridone tank-mixtures reduced soybean yield 40-90% compared with the untreated at that location.

Fluridone alone and fluridone + fomesafen tank-mixtures provided residual control of Palmer amaranth similar to the fomesafen + *S* – metolachlor standard. This result is similar in cotton weed control research where fluridone was found to have value.

Fluridone crop injury was minimal at Jackson and severe at Medina. This is likely due to soil type differences where the Medina location was a silty loam and the Jackson location was a silty clay loam.

Fluridone can have value in soybean weed control as it could add a new herbicide mode of action for preemergence control of Palmer amaranth. However, future research would need to be conducted to determine the influence of soil type in fluridone efficacy and crop tolerance in Mid-South soybean systems before a label could be pursued.

EFFECT OF MOWING TIMING ON JOHNSONGRASS HERBICIDE EFFICACY. J. Omielan*, M. Barrett; University of Kentucky, Lexington, KY (48)

ABSTRACT

Johnsongrass (*Sorghum halepense*) is a perennial warm season grass, listed as a noxious weed, and a common problem on right-of-way sites. There are a number of herbicides labeled and available to control johnsongrass and most rely on translocation from the leaves to the rhizomes for greatest efficacy. However, mowing is part of roadside management and one question is how does the timing of mowing after herbicide application affect efficacy?

This study was initiated August 14, 2014 to answer the questions asked above at an interchange near Bardstown KY. Four herbicide treatments were applied to 10 ft x 60 ft strips at 337 L/ha. Six time of mowing treatments were applied as 10 ft x 40 ft strips across the herbicide treatments in a split block design, replicated three times. The herbicide treatments were Outrider (sulfosulfuron), Fusilade II (fluazifop), Acclaim Extra (fenoxaprop), and Fusilade + Acclaim. The time of mowing treatments were as follows: no mowing, same day as herbicide application, as well as 1 day, 2 days, 1week, and 2 weeks after application. Visual assessments of percent johnsongrass control were done 34 (9/17/2014) and 70 (10/23/2014) days after herbicide treatment (DAT).

While Outrider had the lowest visual control (70%) without mowing 34 DAT it had the greatest control (83%) (compared to the other herbicide treatments) when mowed the same day as application. Outrider still had the greatest control (88%) when mowed the same day 70 DAT while the other herbicides ranged from 0 to 17% control. Control in the top set of treatment combinations ranged from 88 to 100% 70 DAT. Only the no mowing and 2 weeks after combinations with Acclaim Extra were in this top group. Final assessments will be done in 2015.

EVALUATION OF ANTHEM HERBICIDES IN LOUISIANA SOYBEAN PRODUCTION SYSTEMS. T.
Batts*[1], D.K. Miller[2], M. Mathews[2]; [1]LSU AgCenter, Baton Rouge, LA, [2]LSU AgCenter, St. Joseph, LA (49)

ABSTRACT

A field study was conducted in 2014 at the LSU AgCenter Northeast Research Station near St. Joseph, La to evaluate PRE herbicides for effectiveness in Liberty Link soybean production systems in Louisiana. The study was conducted in a randomized complete block design with treatments replicated four times. Soil was a silt loam with pH 6.8. ‘HBKLL4653” soybean was planted on April 30. Treatments were applied via compressed air sprayer at 15 GPA on May 1. At planting treatments included Authority Maxx at 5 oz/A alone or in combination with Accolade at 0.89 oz/A; Anthem at 6.5 oz/A alone or in combination with Authority Maxx at 5 oz/A, Authority MTZ at 14 oz/A, or Accolade at 0.89 oz/A; Authority MTZ at 14 oz/A alone or in combination with Accolade at 0.89 oz/A; Authority Elite at 24 oz/A; Fierce at 3 oz/A; Zidua at 2 oz/A; Valor XLT at 3 oz/A; and Prefix at 32 oz/A. A nontreated control was included for comparison. All treatments with the exception of the nontreated received a POST application of Liberty at 29 oz/A at the V5/V6 growth stage on June 3. Parameters measured included weed control 30 and 60 d after PRE application, crop injury 20 and 40 d after PRE application, and soybean yield.

At 30 d after PRE application, complete control of barnyardgrass was achieved with Anthem + Authority Maxx, Anthem + Authority MTZ, Zidua, and Prefix. Control was equivalent to Anthem (99%), Authority Elite (99%), Authority Maxx + Accolade (99%), Anthem + Accolade (99%), Authority MTZ + Accolade (98%), and Fierce (99%), but greater than that for Authority Maxx (97%), Authority MTZ alone (92%) and Valor XLT (86%). All treatments resulted in equivalent crabgrass control of at least 96%. Complete control of broadleaf signalgrass was achieved with Authority Maxx, Anthem + Authority MTZ, and Anthem + Accolade. Control was equivalent to Anthem + Authority Maxx (98%), Authority Elite (99%), Authority Maxx + Accolade (99%), Authority MTZ + Accolade (99%), Fierce (99%), and Prefix (99%), but greater that all other treatments (93 to 98%). All treatments resulted in equivalent sicklepod control of at least 85%. Authority MTZ alone or in combination with Anthem resulted in complete control of hemp sesbania. Control was equal to all other treatments except Authority alone (70%), Authority Maxx + Accolade (72%), Anthem + Accolade (73%), and Prefix (82%). All treatments resulted in at least 100, 99, and 99 percent control of redroot pigweed, entireleaf morningglory, and pitted morningglory. Authority Elite resulted in 100% control of yellow nutsedge, which was equal to all other treatments, except Authority alone (90%), and Fierce (91%).

At 60 d after PRE application, Anthem + Authority Maxx Controlled barnyardgrass 98%, which was equal to control with Anthem alone (89%), Anthem + Authority MTZ (96%), Authority Elite (95%), Anthem + Accolade (93%), Fierce (95%), and Zidua (94%). All other treatments controlled barnyardgrass (66 to 85%). Control of crabgrass, broadleafsignalgrass, sicklepod, hemp sesbania, redroot pigweed, entireleaf morniongglory, pitted morningglory, and yellow nutsedge was at least 100, 100, 97, 98, 100, 100, 100, 83%, respectively, and equivalent for all treatments.

At 20 DAT, Anthem + Authority MTZ (10%) and Anthem + Accolade (10%) resulted in injury that was equal to that for Fierce (8%), Valor XLT (6%), and Prefix (5%), and greater than all other treatments (1 to 4%). At 40 DAT, injury was not observed for any treatment. Anthem + Authority Maxx resulted in a yield of 55 bu/A, which was equal to all other treatments (51 to 53 bu/A) and greater than yield observed following application of Anthem alone (49 bu/A).

In Liberty Link soybean production systems in Louisiana, residual soil applied herbicides evaluated in this study provide an excellent preemergence foundation for weed management and with the excpetion of Anthem alone maximized yield.

EVALUATION OF AUTHORITY HERBICIDES IN LOUISIANA SOYBEAN PRODUCTION SYSTEMS.

D.K. Miller*1, M. Mathews1, T. Batts2; 1LSU AgCenter, St. Joseph, LA, 2LSU AgCenter, Baton Rouge, LA (50)

ABSTRACT

A field study was conducted in 2014 at the LSU AgCenter Northeast Research Station near St. Joseph, La to evaluate PRE herbicides for effectiveness in Roundup Ready soybean production systems in Louisiana. The study was conducted in a randomized complete block design with treatments replicated four times. Soil was a silt loam with pH 6.8. ‘Pioneer 94Y82 RR” soybean was planted on April 30. Treatments were applied via compressed air sprayer at 15 GPA. PRE treatments were applied on May 1 and POST application on May 21 to V2/V3 soybean. Treatments included Roundup Powermax at 22 oz/A POST; Authority Elite PRE at 24 oz/A fb, Authority Maxx PRE at 5 oz/A, or Authority MTZ PRE at 14 oz/A all fb Anthem at 6.5 oz/A or Marvel at 7 oz/A POST; Anthem at 6.5 oz/A in combination with Authority Maxx at 5 oz/A or Authority MTZ at 14 oz/A PRE fb Cadet at 0.6 oz/A in combination with Accolade at 0.12 oz/A POST; and Fierce PRE at 3 oz/A, Boundary PRE at 32 oz/A, or Valor XLT PRE at 3 oz/A fb Prefix at 32 oz/A POST. A non-treated was included for comparison. All POST treatments included Roundup Powermax at 22 oz/A in combination with NIS at 0.25%. All treatments excluding the non-treated received an application of Roundup Powermax at 22 oz/A at the V5/V6 growth stage. Parameters measured included weed control 15 and 60 d after PRE application and 28 d after the POST application, crop injury 20 d after PRE application and 7 and 15 d after POST application, and soybean yield.

At 15 d after PRE application, control of barnyardgrass, crabgrass, broadleaf signalgrass, sicklepod, hemp sesbania, redroot pigweed, entireleaf morningglory, pitted morningglory, and yellow nutsedge was at least 98, 100, 98, 99, 79, 100, 99, 100, and 84%, respectively, and equal among all treatments.

At 28 d after POST application, barnyardgrass was controlled at least 94% by all treatments except sequential application of Roundup Powermax (79%). Crabgrass, broadleaf signalgrass, sicklepod, hemp sesbania, redroot pigweed, entireleaf morningglory, pitted morningglory, and yellow nutsedge were controlled at least 100, 94, 100, 97, 100, 100, and 94%, respectively, and equally among all treatments.

At 60 d after PRE application, the program that included Boundary PRE resulted in 100% control of barnyardgrass, which was equal to control with programs that included Authority Elite PRE fb Anthem POST (99%), Authority Maxx PRE fb Anthem POST (99%), Anthem MTZ PRE fb Anthem POST (99%), and Fierce PRE (96%), and greater than all other treatments (73-94%). Control of crabgrass, broadleaf signalgrass, sicklepod, hemp sesbania, redroot pigweed, entireleaf morningglory, pitted morningglory, yellow nutsedge, and browntop millet was at least 100, 100, 99, 94, 100, 100, 100, 95, and 90%, respectively, and equal among all treatments.

At 20 d after PRE application, injury was not observed from any treatment. At 7 d after POST application, injury with POST application of Marvel following PRE application of Authority MTZ was 13%, which was equal to injury with Anthem POST following Authority Elite PRE (11%), Anthem following Authority Maxx PRE (10%), and greater than all other treatments (4 to 9%). All treatments resulted in equal soybean yield ranging from 43 to 62 bu/A.

In Roundup Ready soybean production systems in Louisiana, residual and soil applied herbicides evaluated in this study provide an excellent PRE foundation for weed management.

EVALUATION OF SONIC HERBICIDE IN LOUISIANA SOYBEAN PRODUCTION SYSTEMS. D.K. Miller*[1], M. Mathews[1], T. Batts[2]; [1]LSU AgCenter, St. Joseph, LA, [2]LSU AgCenter, Baton Rouge, LA (51)

ABSTRACT

A field study was conducted in 2014 at the LSU AgCenter Northeast Research Station near St. Joseph, La to evaluate PRE herbicides for effectiveness in Liberty Link soybean production systems in Louisiana. The study was conducted in a randomized complete block design with treatments replicated four times. Soil was a silt loam with pH 6.8. 'HBKLL4653" soybean was planted on April 30. Treatments were applied via compressed air sprayer at 15 GPA on May 1. Treatments included Sonic at 3, 4, 5, or 6 oz/A; Surveil at 2.12, 2.83, 3.53, or 4.23 oz/A; Valor XLT at 4 oz/A; Prefix at 2 pt/A; Fierce at 3 oz/A; Authority MTZ at 14 oz/A; and Valor at 2 oz/A. All treatments excluding the non-treated received an application of Liberty at 29 oz/A on July 29 to preserve treatment effects. Parameters measured included weed control 28 and 42 d after PRE application, crop injury 14 and 28 d after PRE application, and soybean yield.

At 28 d after PRE application, control of barnyardgrass, crabgrass, broadleaf signalgrass, sicklepod, hemp sesbania, redroot pigweed, pitted morningglory and entireleaf morningglory was at least 98, 99, 95, 64, 63, 100, 100, and 100%, respectively, and equal among all treatments. Surveil at 4.23 oz/A controlled yellow nutsedge 99%, which was equal to all treatments except Fierce (83%) and Valor (81%).

At 42 d after PRE application, control of barnyardgrass, crabgrass, broadleaf signalgrass, sicklepod, redroot pigweed, pitted morningglory, entireleaf morningglory and goosegrass was at least 82, 100, 85, 56, 100, 100, 100, and 91%, respectively, and equal for all treatments. Authority MTZ controlled hemp sesbania 75%, which was equal to all treatments except Sonic @ 3 oz/A (45%) and 5 oz/A (44%) and Prefix (29%). Prefix resulted in 100% control of yellow nutsedge, which was equal to all treatments except Surveil at 3.5 oz/A (90%), Fierce (79%), and Valor (82%).

Soybean injury at 14 d after application was no greater than 3% for any treatment. Soybean injury at 28 d after application was not observed for any treatments. All treatments resulted in equal yield ranging from 32 to 40 bu/A.

In Liberty Link soybean production systems in Louisiana, residual and soil applied herbicides evaluated in this study provide an excellent PRE foundation for weed management.

GROWTH RATE CHARACTERIZATION OF *ECHINOCHLOA* SPP. IN ARKANSAS. C.E. Rouse*, N.R. Burgos; University of Arkansas, Fayetteville, AR (52)

ABSTRACT

Historically, barnyardgrass (*Echinochloa crus-galli*) has been reported as the most troublesome species impacting Arkansas rice producers. Recent research has identified three species in Arkansas rice fields: barnyardgrass, junglerice (*E. colona*), and rough barnyardgrass (*E. muricata*). To date, no research has been conducted to evaluate the growth rates of these three species in comparison to rice under field conditions. A field study was conducted in the summer of 2014 to determine if these species grow at different rates at the vegetative stage. Thirty-nine accessions (populations) representing various ecotypes of the three species from Arkansas and a rice cultivar were used in the study. Of the 39 accessions 26 were junglerice (ECO), 9 were barnyardgrass (ECR), and 4 were rough barnyardgrass (EMU). The rice used was an early line indica type Provisia® rice developed by BASF. Seed were drill-planted to a density of 200 seed per 4.6 m plots, in single-row plots, with three replicates at the Vegetable Research Station Kibler, AR. Plots were irrigated via overhead sprinkler irrigation. Three plants per accession per replication were marked for observation. At 4 WAP, tiller number and height (cm) were measured weekly until anthesis (8 WAP) of the Echinochloa. The three plants and three replications were averaged prior to analysis. Regression models were fit to the data and analysis of covariance was used to obtain a final model that best represents each species. Rice showed a different growth and was analyzed separately. The three Echinochloa sp. followed a linear growth model for both tiller number and height increment. The three species were of different stature, with ECO being the tallest, but all species exhibited linear growth within the observation period and grew at the same rate (12.78 cm per week). All species also produced 3.48 tillers every week. The rice height measurements fit a 3-parameter nonlinear logistic model and averaged 1.64 cm increment per week. The rice tiller numbers followed a linear model and averaged 2.61 tillers a week. The three *Echinochloa* species grew approximately 8 times faster from 4 to 8 weeks than the experimental rice line did, but contemporary commercial varieties may grow as fast as the weed. This study highlights the importance of application timing and the effect a missed application will have on the efficacy of an herbicide treatment for *Echinochloa* management.

TOLERANCE OF POPCORN, SWEET CORN, AND FIELD CORN INBREDS TO PREEMERGENCE AND POSTEMERGENCE ACURON APPLICATIONS. B.D. Black*[1], M. Saini[2], R.D. Lins[3], T.L. Trower[4], G.D. Vail[5];[1]Syngenta, Searcy, AR, [2]Syngenta Crop Protection, LLC, Greensboro, NC, [3]Syngenta Crop Protection, LLC, Byron, MN,[4]Syngenta, Baraboo, WI, [5]Syngenta Crop Protection, Greensboro, NC (53)

ABSTRACT

Acuron is a new selective herbicide under development by Syngenta with anticipated registration allowing first sales in the 2015 growing season. Acuron contains four active ingredients with three modes of action and is formulated with liquid capsule suspension (ZC) technology. Acuron will have a wide window of application including pre-plant, pre-emergence and post-emergence (up to 12” corn) and will provide broad-spectrum residual control of annual grass and broadleaf weeds in field corn, silage corn, and seed corn. It will be registered for pre-emergence use only in sweet corn and yellow popcorn.

Multiple field trials were conducted across the corn growing regions of the US to determine crop safety of field corn inbreds, sweet corn, and popcorn to pre-emergence and post-emergence applications of Acuron at 2890 and 5780 g ai/ha and compare crop tolerance to Lumax EZ at 3340 g ai/ha and 6680 g ai/ha rates. Results from these studies showed field corn inbred, sweet corn hybrid, and popcorn tolerance to Acuron were equal to or better than Lumax EZ.

EVALUATION OF INSTIGATE, REALM Q, AND RESOLVE Q FOR WEED MANAGEMENT IN LOUISIANA CORN. J. McKibben*, D. Stephenson, R.L. Landry, B.C. Woolam; LSU AgCenter, Alexandria, LA (54)

ABSTRACT

Utilization of herbicides with multiple sites of action is needed for management of herbicide-resistant weeds in corn. Instigate is a pre-formulated mixture of rimsulfuron and mesotrione (1:10 ratio) labeled for use preemergence (PRE) in corn. Realm Q is a pre-formulated mixture of rimsulfuron and mesotrione (1:4.2 ratio) labeled for use postemergence (POST) in corn. Both Instigate and Realm Q contain two herbicidal sites of action. Resolve Q is a pre-formulated mixture of rimsulfuron and thifensulfuron (4.6:1 ratio) labeled for use postemergence in corn. Research was conducted at the LSU AgCenter Dean Lee Research and Extension Center near Alexandria, LA in 2012 and 2013 to evaluate weed control programs containing Instigate, Realm Q, and/or Resolve Q. The experimental design was a randomized complete block with four replications. Treatments included Instigate (rimsulfuron:mesotrione) at 18:175 g ai ha^{-1} alone PRE, Instigate plus Aatrex (atrazine) at 280 g ai ha^{-1} PRE, and Instigate plus Cinch ATZ (atrazine:*S*-metolachlor) at 650:505 g ai ha^{-1} PRE. Sequential POST treatments of Realm Q (rimsulfuron:mesotrione) at 21:88 g ai ha^{-1} or Resolve Q (rimsulfuron:thifensulfuron) at 16:4 g ai ha^{-1} plus atrazine at 420 g ha^{-1} and Roundup PowerMax (glyphosate) at 860 g ae ha^{-1} were applied following each PRE treatment containing Instigate. Lexar EZ (atrazine:*S*-metolachlor:mesotrione) at 1460:1460:190 g ai ha^{-1} PRE followed by Roundup PowerMax POST and Halex GT (glyphosate:*S*-metolachlor:mesotrione) at 1050:1050:105 g ae ha^{-1} plus atrazine at 420 g ha^{-1} POST were comparison treatments. All POST treatments were applied with 0.25% v/v non-ionic surfactant to 26 cm corn. Visual evaluations for control of barnyardgrass [*Echinochloa crus-galli* (L.) Beauv.], browntop millet [*Urochloa ramosa* (L.) Nguyen), glyphosate-susceptible Palmer amaranth (*Amaranthus palmeri* S. Wats.), and ivyleaf morningglory (*Ipomoea hederacea* Jacq.) were collected 28 d after the PRE and POST treatment (DAT). No corn injury was observed 28 DAT following the PRE or PRE followed by (fb) POST treatments. All PRE or PRE fb POST treatments controlled all weeds 99% 28 DAT. This data indicates that weed management programs in corn containing Instigate, Realm Q, and/or Resolve Q are viable options for Louisiana corn producers.

EVALUATION OF PREEMERGENCE RESIDUAL HERBICIDES FOR WEED MANAGEMENT IN LOUISIANA SOYBEAN. R.L. Landry*, D. Stephenson, B.C. Woolam; LSU AgCenter, Alexandria, LA (55)

ABSTRACT

Experiments were conducted at the LSU AgCenter Dean Lee Research and Extension Center near Alexandria, LA in 2012, 2013, and 2014. These experiments evaluated soybean (*Glycine max*) injury and weed management following applications of PRE residual herbicides. A randomized complete block with four replications was utilized in all experiments. Plot size was 9 m long with four, 0.97 m rows. Soil type was a Coushatta silt loam with pH = 8. Treatments include flumioxazin 72 g ai ha^{-1}, flumioxazin:chlorimuron 63:21 g ai ha^{-1}, chlorimuron:tribenuron 24:7 g ai ha^{-1}, chlorimuron:flumioxazin:thifensulfuron 22:72:7 g ai ha^{-1}, chlorimuron:flumioxazin:thifensulfuron 6:71:17 g ai ha^{-1}, metribuzin:chlorimuron 180:30 g ai ha^{-1}, *S*-metolachlor:fomesafen 1216:267 g ai ha^{-1}, *S*-metolachlor:metribuzin 1103:262 g ai ha^{-1}, sulfentrazone:metribuzin 117:264 g ai ha^{-1}, sulfentrazone:chlorimuron 471:54 g ai ha^{-1}, pyroxasulfone 149 g ai ha^{-1}, flumioxazin:pyroxasulfone 71:90 g ai ha^{-1}, and pyroxasulfone:fluthiacet-methyl 146:4 g ai ha^{-1}. Soybean injury and control of hophornbeam copperleaf (*Acalypha ostryifolia*), ivyleaf morningglory (*Ipomoea hederacea*), Palmer amaranth (*Amaranthus palmeri*), sicklepod (*Senna obtusifolia*), and smellmelon (*Cucumis melo*) were visually estimated 21 and 42 d after application (DAT). Following final evaluation, glyphosate was applied at 870 g ae ha^{-1} to all treatments and sequential applications were applied as needed. Soybean yield was calculated by harvesting the center two rows of each plot using conventional harvesting equipment. Yield was adjusted to 13% moisture before analysis.

Soybean injury was ≤ 23% for all treatments 21 DAT; however, injury was greater following treatments that contained chlorimuron at greater than 6 g ha^{-1}, which may be due to soil pH greater than 7.5 at the experiment location. However, soybean injury was ≤ 7% for all treatments 42 DAT. All residual PRE herbicides controlled hophornbeam copperleaf, ivyleaf morningglory, Palmer amaranth, sicklepod, and smellmelon at least 88% 21 DAT. Furthermore, ivyleaf morningglory, Palmer amaranth, sicklepod, and smellmelon were controlled at least 78% by all residual herbicides 42 DAT. Hophornbeam copperleaf was controlled at least 81% by all treatments except *S*-metolachlor:fomesafen (77%) and flumioxazin:pyroxasulfone (76%) 42 DAT. Soybean yields averaged 4185 kg ha^{-1} following all PRE residual herbicide treatments; however, only soybean treated with chlorimuron:flumioxazin:thifensulfuron, *S*-metolachlor:fomesafen, and pyroxasulfone:fluthiacet-methyl yielded greater than the non-residual treatment. Data suggests that multiple PRE residual herbicide options are available for Louisiana soybean producers; however, herbicide selection should be based on weed spectrum as weed control varied between different treatments and weeds. Furthermore, little to no difference in soybean yields among treatments indicated that early-season visual injury in these experiments did not influence soybean yield. These data indicate that if ALS- and/or glyphosate-resistant weeds are present, producers could benefit from using PRE residual herbicides.

EVALUATION OF HERBICIDES FOR CONTROL OF FRINGED REDMAIDS (*CALANDRINIA CILIATA*) IN WINTER WHEAT. D. Stephenson*[1], B.C. Woolam[1], R.L. Landry[1], A. Meszaros[2], G. Coburn[2]; [1]LSU AgCenter, Alexandria, LA, [2]Pest Management Enterprises, LLC, Cheneyville, LA (56)

ABSTRACT

Fringed redmaids (*Calandrinia ciliata*) is an annual species native to the western U.S. It has also been identified in Massachusetts and Mississippi. In 2013, fringed redmaids was documented in Louisiana when it emerged in a sugarcane production area in the fall of the year. Due to its observed emergence in the fall, infestation of winter annual crops such as winter wheat could be problematic. Therefore, research was conducted in the winter/spring of 2013/2014 at Pest Management Enterprises, LLC research farm in Cheneyville, LA to evaluate herbicides labeled for use in winter wheat for control of fringed redmaids. A randomized complete block experimental design with four replications was utilized. Herbicide treatments evaluated were chlorsulfuron:metsulfuron at 22:4 g ai ha^{-1} preemergence (PRE), saflufenacil at 50 g ai ha^{-1} PRE, metribuzin at 160 g ai ha^{-1} early-postemergence (EPOST), 2,4-D at 1120 g ae ha^{-1} mid-postemergence (MPOST), dicamba at 140 g ae ha^{-1} MPOST, mesosulfuron at 60 g ai ha^{-1}, pyroxsulam at 18 g ai ha^{-1}, and thifensulfuron:tribenuron at 21:11 g ai ha^{-1}. EPOST treatment was applied to 2 to 3 lf wheat and MPOST treatments were applied to 8 to 10 cm fringed redmaids. Wheat injury and fringed redmaids control was visually evaluated 14, 28, and 42 d after each application timing. Wheat yields were collected, but are not presented.

Chlorsulfuron:metsulfuron PRE controlled fringed redmaids 89 to 97% at all evaluation intervals. Saflufenacil PRE provided similar control to chlorsulfuron:metsulfuron PRE 14 DAT, but control decreased to 38 to 35% 28 and 42 DAT, respectively. Metribuzin EPOST controlled fringed redmaids 95 to 99% regardless of evaluation interval. Fringed redmaids control 14 DAT following 2,4-D and dicamba MPOST was 8 and 5%, respectively. However, 2,4-D MPOST controlled fringed redmaids 83% 42 DAT, which was similar to chlorsulfuron:metsulfuron PRE and metribuzin EPOST. Mesosulfuron and thifensulfuron:tribenuron MPOST controlled fringed redmaids similarly (61 to 69%) which was greater than pyroxsulam MPOST (28%) 14 DAT. All three provided equal control 28 DAT (70 to 86%). Thifensulfuron:tribenuron MPOST provided similar control (89%) to chlorsulfuron:metsulfuron PRE and metribuzin MPOST 42 DAT. Mesosulfuron and pyroxsulam MPOST controlled fringed redmaids 55 and 63%, respectively, 42 DAT. Chlorsulfuron:metsulfuron PRE and metribuzin EPOST are the only treatments to provide 89% or greater fringed redmaids control at all evaluation intervals; however 2,4-D and thifensulfuron:tribenuron MPOST provided similar fringed redmaids control 42 DAT.

Restrictive rotational crop requirements following application of chlorsulfuron:metsulfuron PRE and differential wheat variety tolerance to metribuzin may reduce the use of these herbicides for fringed redmaids control by winter wheat producers in Louisiana. To avoid these issues, Louisiana wheat producers should apply 2,4-D or thifensulfuron:tribenuron for fringed redmaids management with the understanding that excellent season-long control may not be achieved. Research of fringed redmaids management programs in winter wheat will continue.

IMPACT OF DEEP TILLAGE AND ZERO TOLERANCE ON PALMER AMARANTH POPULATION IN COTTON. M.D. Inman*[1], D.L. Jordan[2], A.C. York[2], K.M. Jennings[2], D.W. Monks[2]; [1]NCSU, Raleigh, NC, [2]North Carolina State University, Raleigh, NC (57)

ABSTRACT

Glyphosate-resistant Palmer amaranth has become one of the most problematic weeds in cotton production systems throughout Southeastern United States. Overreliance of glyphosate has shifted management practices to integrate alternative control methods such as deep tillage and a zero tolerance of weed seed production system. These practices can be costly to implement, however, can be effective in situations of heavy infestations of herbicide resistant weed species. Research was conducted from 2012-2014 to determine the influence of a single deep tillage operation and hand removal on Palmer amaranth populations. This experiment was also designed to determine the economic impact of a single deep tillage operation and a zero tolerance seed production strategy on Palmer amaranth populations in following years. Treatments consisted of moldboard plow vs. no moldboard plow both with and without hand removal of Palmer amaranth. Although not always statistically significant, moldboard plowing and hand removal reduced weed populations in subsequent years. However, differences in weed populations did not always translate into differences in yield and economic returns. Major differences in yield and economic return were not observed because effective herbicides were used during both years to control resistant and susceptible biotypes.

PREEMERGENCE WEED MANAGEMENT IN SOYBEANS. M.L. Flessner*[1], S. McElroy[2], J. Ducar[2], J. Gillilan[3];[1]Virginia Tech, Blacksburg, VA, [2]Auburn University, Auburn, AL, [3]Winfield Solutions LLC, Springfield, TN (58)

ABSTRACT

Herbicide resistant weeds have led to a resurgence in preemergent herbicide use. Research was conducted to investigate preemergence weed control efficacy and safety to soybeans in conventional tillage. Research was conducted at the Auburn University's Sand Mountain Research and Extension Center near Crossville, AL in a Hartsells sandy loam (pH 6.2). The soybean variety was Pioneer 95Y70 planted 2.5 cm in depth. Soybeans were planted and treatments applied shortly thereafter on June 2, 2014. Treatments included pendimethalin at 1.39 kg ai ha^{-1} (Framework 3.3EC, Winfield Solutions LLC, St. Paul, MN), flumioxazin at 0.07 kg ai ha^{-1} (Valor SX, Valent U.S.A Corp., Walnut Creek, CA), sulfentrazone at 0.14 kg ai ha^{-1} + cloransulam-methyl at 0.02 kg ai ha^{-1} (Sonic, Dow AgroSciences LLC, Indianapolis, IN), and pyroxasulfone at 0.12 kg ai ha^{-1} (Zidua, BASF Corp., Research Triangle Park, NC), with and without metribuzin (Glory, Makhteshim Agan of North America, Inc., Raleigh, NC) at 0.28 kg ai ha^{-1}. A nontreated check was also included. Treatments were applied at 93 L ha^{-1} using a 6-nozzle, CO_2 pressurized backpack sprayer to 3 by 6 m plots. A randomized complete block design with four replications was used. Visual weed control and crop injury data were collected 7, 15, and 28 days after treatments (DAT) using a percent scale where 0 corresponds to no control or injury and 100 corresponds to complete plant necrosis relative to the nontreated. By 7 DAT, 4.8 cm of rainfall occurred, and by 28 DAT, a total of 14.1 cm occurred. Data were subjected to ANOVA and means separated using Fisher's protected $LSD_{0.05}$.

Treatments including metribuzin controlled broadleaf signalgrass [*Urochloa platyphylla* (Munro ex C. Wright) R.D. Webster] > 90% 7 and 15 DAT and > 85% 28 DAT. Pyroxasulfone and sulfentrazone + cloransulam-methyl treatments both controlled broadleaf signalgrass 35 to 65% throughout the trial, while pendimethalin resulted in < 15% control. Flumioxazin resulted 75 to 85% broadleaf signalgrass control. Only treatments including metribuzin were in the top performing statistical grouping for broadleaf signalgrass control 15 and 28 DAT.

Treatments including metribuzin resulted in > 97% goosegrass [*Eleusine indica* (L.) Gaertn.] control 7 DAT. Pyroxasulfone, sulfentrazone + cloransulam-methyl, flumioxazin, and pendimethalin (all without metribuzin) resulted in 17, 95, 75, and 48% goosegrass control, respectively 7 DAT. Goosegrass was completely controlled by all treatments 15 and 28 DAT.

All treatments resulted in > 99% control of carpetweed (*Mollugo verticillata* L.) and smooth pigweed (*Amaranthus hybridus* L.) throughout the trial with the exception of flumioxazin alone, which resulted in 74% control of both weeds 15 and 28 DAT.

Overall these data indicate that all treatments were effective for broadleaf weed (carpetweed and smooth pigweed) control when applied with or without metribuzin; however, metribuzin was required for adequate grass weed (broadleaf signalgrass) control.

RESPONSE OF ENERGYCANE TO PREEMERGENCE AND POSTEMERGENCE HERBICIDES. D.C. Odero*, J.V. Fernandez, H.S. Sandhu, M. Singh; University of Florida, Belle Glade, FL (59)

ABSTRACT

Energycane (*Saccharum* spp.) has been proposed as a potential perennial bioenergy crop for lignocellulosic-derived fuel production in the United States. No herbicides are currently labeled for use in energycane, but herbicides used in sugarcane and other crops can potentially be used if there is acceptable crop tolerance. Container studies were conducted outside to evaluate the tolerance of energycane to 9 PRE and 19 POST herbicides. PRE application of atrazine, metribuzin, *S*-metolachlor, mesotrione, pendimethalin, and diuron at rates labeled for sugarcane did not injure or significantly reduce energycane aboveground and belowground biomass compared with the nontreated plants 28 and 56 d after treatment (DAT). Injury from flumioxazin (7%), hexazinone (29%), and clomazone (54%) was observed 28 DAT. Injury from flumioxazin was transient and was not observed 56 DAT. At 56 DAT, energycane injury increased to 71 and 98%, respectively for clomazone and hexazinone. Hexazinone and clomazone applied PRE reduced aboveground and belowground biomass compared with the nontreated plants. POST application of atrazine, ametryn, mesotrione, carfentrazone, 2,4-D amine, dicamba, halosulfuron, asulam, metribuzin, and trifloxysulfuron did not injure or significantly reduce energycane aboveground and belowground biomass compared with the nontreated plants 28 DAT at labeled use rate for sugarcane. Injury was observed when diuron (51%), hexazinone (100%), paraquat (66%), clomazone (51%), flumioxazin (21%), sethoxydim (100%), clethodim (99%), glyphosate (100), and glufosinate (84%) were applied POST and each of these treatments reduced both aboveground and belowground energycane biomass compared with the nontreated plants. These results show that several PRE and POST herbicides used for weed management in sugarcane may potentially be used in energycane for weed control if planted hectares increase in the future.

USE OF STREAMLINE AND VIEWPOINT IN CUT STUMP APPLICATIONS FOR CONTROL OF UNDESIRABLE HARDWOODS. A.W. Ezell*[1], J.L. Yeiser[2], A.B. Self[1]; [1]Mississippi State University, Starkville, MS, [2]Univ. of Arkansas- Monticello, Monticello, AR (107)

ABSTRACT

Treatments utilizing various percent concentrations of both 3-lb. and 2-lb. AI liquid formulations of MAT-28 in basal oil were applied to fresly cut surfaces of hardwoods and pines. Stump diameters ranged from the 1-inch size class to the 5-inch size class with the majority of all stumps in the 1-inch and 2-inch size classes. Treatments included 1.67, 3.33, 6.68 and 10% v/v of the 3-lb material and 10% v/v of the 2-lb. material in addition to a 25% v/v solution of Garlon 4. The 1.67% v/v solution had significantly less control than the other treatments, and while increasing the amount of MAT-28 increased control slightly, there were no significnt differences between the other 3-lb formulation treatments. The 3-lb material produced significantly better resuslts than the 2-lb material and the MAT-28 performed overall better than the Garlon 4 treatment.

MIXTURES OF GLYPHOSATE, IMAXZAPYR, AND AMINOPYRALID FOR SITE PREPARATION.
A.W. Ezell*[1], J.L. Yeiser[2], A.B. Self[1]; [1]Mississippi State University, Starkville, MS, [2]Univ. of Arkansas-Monticello, Monticello, AR (108)

ABSTRACT

Tank mixtures of glyphosate, imazapyr and aminopyralid were compared to a tank mix of glyphosate, imazapyr and triclopyr with a timing comparison of July vs. August application. Treatments were applied using a CO2- powered backpack sprayer to simulate aerial broadcast application. Results indicated that all treatments were highly effective in controlling the hardwoods present on the site. The addition of triclopyr or aminopyralid generated no significant additional benefit in this study due to species present on the study site and the level of other active ingredients in the mixtures. Glyphosate and imazapyr combintionswere very effective on controlling all principal species on the site.

CONTROLLING UNWANTED HARDWOODS WITH BASAL BARK APPLICATIONS OF MAT28 360SL. J.L. Yeiser*[1], A.W. Ezell[2], J.L. Yeiser[1]; [1]University of Arkansas at Monticello, Monticello, AR, [2]Mississippi State University, Starkville, MS (109)

ABSTRACT

MAT28 was tested for unwanted hardwood control in Drew County, AR and in Oktabbeha County, MS. Herbicides were applied near Florence, AR on September 21, 2013 to unwanted hardwoods growing in a loblolly pine pantation recently receiving its 2nd thinning. Hardwoods were mixed oak (southern red, cherrybark, water > white and post), winged elm, red maple, and hickory (black > mockernut). Hardwoods occupied the leave strip between down rows. Ten stems in each of the 1-inch, 2-inch, and 3-inch groundline diameter classes received a basal application of bark oil blue and herbicide to the the bottom 14-inch of the stem using a small hand-pump sprayer. Herbicide treatments were: (1) MAT28+oil 3%+97%, (2) MAT28+oil 7%+93%, (3) MAT28+oil 10%+90%, (4) MAT28+oil 13%+87%, (5) MAT28+oil 10%+90%, (6) MAT28+Garlon+oil 7%+5%+88%, (7) MAT28+Garlon+oil 7%+10%+83%, (8) MAT28+Stalker+oil 7%+1%+92%, (9) Garlon 25%+75%, and (10) untreated check. Treatments 1-4 and mixtures contained a 360SL MAT28 formulation while treatment 7 contained a 2.0SL MAT28 formulation. Treatments were visually evaluated on November 7, 2014 for percent control. For all species, as rate of MAT28 in treatments 1-4 increased, percent control increased. However, treatments 3 and 4 developed a mayonnaise consistency making uniform application difficult but with little impact on results. Control using the 2.0SL was better than the untreated check. Treatments containg the higher rate of Garlon and MAT28+oil (13%+87%) provided similar control that was below the best treatment, Garlon+oil (25%+75%). In Starr Memorial Forest, MS, treatments were applied on September 23, 2014 in a clearcut. Plots were 10-ft x 100-ft with sprouts within 5-ft of either side of a center line treated and then evaluated on August 14, 2014. Thirty-one species were assessed for control. For all species best control was achieved with treatments MAT28+oil (13%+87) and MAT28+Garlon.

FTTCLOUD: A TOOL TO MINIMIZE SPRAY DRIFT ON HERBICIDE RESISTANT CROPS. D. Saraswat*[1], B.C. Scott[2]; [1]University of Arkansas Coop Ext Service, Little Rock, AR, [2]University of Arkansas, Lonoke, AR (96)

ABSTRACT

The widespread use of herbicide tolerant-traits technology formed the basis for identifying such fields to help growers prevent drift and misapplication of herbicides. In response to this need, the University of Arkansas Cooperative Extension Service launched a statewide program named Flag the Technology in 2011. This program uses color-coded flags as a visual alert of the herbicide trait technology within a farm field. This program has been endorsed by Southern Weed Science Society of America and is attracting interest from across the USA, Canada, and Australia. However, flags have risk of misplacement or disappearance due to mischief or severe windstorms/thunderstorms, respectively. This presentation will discuss the design and development of a cloud-based, free application utilizing open-source technologies, called Flag the Technology Cloud (FTTCloud), for allowing agricultural stakeholders to color code their farm fields for indicating herbicide resistant technologies. The developed software utilizes modern web development practices, widely used design technologies, and basic geographic information system (GIS) based interactive interfaces for representing, color-coding, searching, and visualizing fields. This program has also been made compatible for a wider usability on different size devices-smartphones, tablets, desktops and laptops.

A SURVEY OF WEST TEXAS COTTON WEED MANAGEMENT SYSTEMS IN 2014. R.M. Merchant*[1], P. Dotray[2], W. Keeling[3], M. Manuchehri[1]; [1]Texas Tech University, Lubbock, TX, [2]TAMU Ag Experiment STation, Lubbock, TX, [3]Texas A&M Agrilife, Lubbock, TX (97)

ABSTRACT

Cotton (*Gossypium hirsutum*) is the major agronomic crop of West Texas with over 2 million ha planted in 2014. Glyphosate-resistant Palmer amaranth (*Amaranthus palmeri*) is a relatively new and significant threat to cotton production in the Southern High Plains. A survey of cotton producers was conducted in the spring of 2014 in order to better understand current weed management practices of the region. The survey was published online using the Qualtrics® survey system and announced by email using County Extension Agent and the Plains Cotton Growers list servers. Ninety-five completed surveys were recorded over the period of 8 weeks. Of the respondents, 59% were producers, 13% consultants, 18% dealer/distributor, and 19% from extension/education. Fifty-five percent of respondents reported an operation larger than 800 ha, 79% of whom also planted cotton. Of the acreage reported, 60% was under some form of irrigation. Roundup Ready Flex and Roundup Ready/BGII were the most commonly used transgenic traits. Sixty-five percent received trifluralin and 36% received pendimethalin preplant incorporated. The most commonly used at-plant herbicides were s-metolachlor and pendimethalin, 30% and 22% respectively. Residual herbicides tank-mixed with postemergence applications were reported, with the most widely used being s-metolachlor (50%) and acetochlor (26%). The most widely used residual herbicides postemergence-directed were diuron (39%), MSMA (24%), and prometryn (24%). Tillage was widely used, with at least 47% of the cotton acreage receiving deep-plowing, rod-weeding, or between-row cultivation. Seventy-two percent of respondents suspect glyphosate-resistant weeds on their operation while 80% suspect glyphosate-resistance has occurred on a neighboring farm. Ninety-one percent indicated that the presence or threat of glyphosate-resistance has affected their decisions regarding crop rotation, variety selection, and tillage practices. This survey has been used to guide field research regarding glyphosate-resistant Palmer amaranth in West Texas, and will be published annually to track changes in weed management practices for the area.

DEVELOPING AN EDUCATIONAL TOOL (PAM MODEL) FOR PROMOTING INTEGRATED MANAGEMENT OF PALMER AMARANTH. M.V. Bagavathiannan*[1], M. Lacoste[2], S.B. Powles[2], L.E. Steckel[3], M. Popp[4], J.K. Norsworthy[4]; [1]Texas A&M University, College Station, TX, [2]University of Western Australia, Perth, Australia, [3]University of Tennessee, Jackson, TN, [4]University of Arkansas, Fayetteville, AR (98)

ABSTRACT

Palmer amaranth (*Amaranthus palmeri*) is the most predominant herbicide-resistant weed threatening row-crop production in the southern US. Given the impact of seedbank size on species persistence and the risk of resistance evolution, a core focus on soil seedbank management is vital. This is particularly true for weeds such as Palmer amaranth that can produce tremendous amounts of seeds. Emphasis on minimizing seedbank size serves as a valuable proactive resistance management strategy, which is more economical in long-run compared to reactive management tactics that are deployed after the fact. However, demonstrating the biological and economic benefits of proactive, integrated management strategies remains a challenge. To this effect, a user-friendly software is being developed to educate the stakeholders of the benefits of adopting and the penalties of not adopting given resistance management strategies. This model is based on the ryegrass integrated management (RIM) model developed at the Australian Herbicide Resistance Initiative (AHRI) and implemented in Microsoft Excel® platform. The integration of Visual Basics Applications (VBA) interface provide a software-like appearance and experience. This tool allows the growers to select a range of crop production and weed management strategies (chemical and non-chemical options) and make parallel comparisons. This model will serve as an excellent decision-support tool for making rational weed management decisions based on long-term seedbank dynamics and economics.

SWSS ENDOWMENT ENRICHMENT SCHOLARSHIP PRESENTATION - GAINESVILLE FL. E.T. Parker*; Auburn University, Auburn, AL (99)

ABSTRACT

In 2014 I received the Southern Weed Science Society Endowment Enrichment Scholarship. The goal of this scholarship is to provide an opportunity for students to participate in a week-long educational experience with industry or academia. In August of 2014, I had the privilege of visiting the University of Florida in Gainesville. On this trip, I was able to work firsthand in applying herbicide treatments to raised pepper beds and tour several UF research stations and facilities. During my visit, I worked with Dr. Peter Dittmar, Dr. Jay Ferrell, and Dr. Nathan Boyd while learning about weed management across Florida and seeing the equipment used to produce the majority of the U.S. fresh-market vegetables. This experience really broadened my understanding of weed management and allowed me to see new ways of combating future weed control issues mechanically, chemically, and culturally. It was also amazing to branch outside of turfgrass and traditional row crops and see how weeds and insects affect vegetable crops. This was an amazing opportunity and I would like to thank everyone who helped put this program together and also those who fund this venture. I also encourage all students to apply for this amazing opportunity to learn about different aspects of weed management and expand their professional networks.

POLYGONS AND MORE NEW FEATURES FOR THE SOUTHEAST EARLY DETECTION NETWORK APP. R.D. Wallace*, C.T. Bargeron, J. Daniels, R. David; University of Georgia, Tifton, GA (100)

ABSTRACT

In 2005, the University of Georgia's Center for Invasive Species and Ecosystem Health (The Center) developed and launched EDDMapS, a web-based Early Detection and Distribution Mapping System, to accurately map distribution of invasive plants across the United States. More recently, smartphone technology has made it possible for citizen scientists and other casual reporters to submit observations of invasive species while away from their computer. The first app, IveGot1, was created in cooperation with the National Park Service, Florida Fish and Wildlife Commission and the University of Florida for reporting non-native plants and animals in Florida. As more programs have displayed interest in developing apps for identification and reporting in their region, more apps have been launched. The Southeast Early Detection Network is an app for identifying and reporting invasive plants, and a few insects and wildlife, in the southeastern US. The list of species has been tailored to common and emerging invasive species threats so that both casual and expert observers can effectively use the tool. The first version of the app was very streamlined for ease of use: identification information and images, current distribution maps, and a pared down reporting page for mapping point records in the field. New features for the app will include the ability to draw and map polygons and to map negative survey data. Polygons will be useful in showing the shape and scope of an infestation and negative data will document areas that have been evaluated for invasive species.

USING THE VIRGINIA WEED IDENTIFICATION LAB AS A MEANS TO TRACK WEED DEMOGRAPHICS AND DISTRIBUTION OVER TIME. K.A. Venner*[1], S. Askew[1], A.R. Post[2]; [1]Virginia Tech, Blacksburg, VA, [2]Oklahoma State University, Stillwater, OK (101)

ABSTRACT

The Virginia Weed Clinic is a free extension service provided by Virginia Tech through the department of Plant Pathology, Physiology & Weed Science. The Weed Clinic has been receiving and processing weed identifications and control recommendations for over 30 years. In a single year, the clinic can receive up to 400 weed samples from different commodities grown in Virginia including those submitted by private parties. Spatial and demographic data for the Weed Clinic has been collected every year including weed common and botanical name, commodity of origin, county, and date received. This information will be useful to horticultural and agronomy extension agents and to any commodity grower where an abundance of data has been collected for their crop.

Data from 2002-2012 has been analyzed to illustrate demographic and spatial data for weeds submitted to the Weed Clinic by both private growers and extension agents in the state of Virginia. Submissions represent 147 plant families, 428 genera and 729 unique species. The largest families represented, based on number of individual submissions, are Poaceae, Asteraceae, Fabaceae, Brassicaceae, Lamiaceae, Polygonaceae, and Caryophyllaceae. Of 428 genera, 399 contained 3 unique species submitted or less, 15 genera had 4 unique species submitted, 9 genera had 5 unique species, and 3 genera had 6 unique species. The genera *Veronica* and *Bromus* had the largest number of unique species containing 8 and 7, respectively.

Most samples are submitted between the months of May and September accounting for 35% of all submissions. Only 6 different commodities account for the majority of Weed Clinic samples, including: 28% from residential turfgrass, 21% from pasture, 10% aquatic, 7% each from fallow areas and ornamental beds, and 4% from gardens. Up to 7% of growers submit samples without specifying their crop. The remaining 16% come from various commercial crops and forested areas. The most commonly submitted weed to the Weed Clinic over the last 10 years is Japanese stiltgrass (*Microstegium vimineum*). This is a weed of growing concern in forest understories, roadsides, pastures, and other non-cropland as it creates a monoculture, crowding out native or desired vegetation. The "top ten" weeds identified by the Virginia Weed Clinic included: Japanese stiltgrass (*Microsegium vimineum)*, Japanese clover (*Kummerowia striata*), nimblewill (*Muhlenbergia schreberi*), tall fescue (*Lolium arundinaceum*), roughstalk bluegrass (*Poa trivialis*), bermudagrass (*Cynodon dactylon*), common chickweed (*Stellaria media*), sericea lespedeza *(Lespedeza cuneata*), yellow nutsedge (*Cyperus esculentus*), and smooth crabgrass (*Digitaria sanguinalis*). As turfgrass accounts for the largest percentage of submissions, many of the weeds listed in the "top ten" are problematic weeds in turfgrass.

FLAG THE TECHNOLOGY: A SIMPLE IDEA GETS COMPLICATED!. R. Scott*[1], D. Saraswat[2], T. Barber[3];[1]Universitiy of Arkansas, Lonoke, AR, [2]University of Arkansas Coop Ext Service, Little Rock, AR, [3]University of Arkansas, Lonoke, AR (102)

ABSTRACT

Flag the Technology was a program developed by the University of Arkansas in 2010 and first implemented in one county to test the feasibility of using a simple colored flag system to identify fields according to their herbicide tolerant technology. The initial program consisted of white flags for glyphosate tolerant crops, yellow for STS and Clearfield crops, red for conventional and green for Liberty Link. As new technology is being introduced this program must be adapted to fit all possible combinations of herbicide technology now or soon to be available to growers. For example: black will now represent Xtend or dicamba crops and a checkered flag will indicate tolerance to both glyphosate and dicamba and the color teal will be used for Enlist or 2,4-D tolerant crops. To date almost $250,000 worth of flags have been used in Arkansas alone to mark fields since 2011-12. This program is being adapted with a web based version and app under development.

EVALUATING THE TIME REQUIRED FOR DISSIPATION TO OCCUR FOR HALOSULFURON FROM LOW DENSITY POLYETHYLENE MULCH UNDER DRY CONDITIONS. X. Li*, T.L. Grey, S. Culpepper; University of Georgia, Tifton, GA (187)

ABSTRACT

Purple nutsedge (Cyperus rotundus L.) is one of the most troublesome weeds in vegetable production of the southeast US and halosulfuron effectively controls this weed. However, halosulfuron persistence on low density polyethylene (LDPE) mulch has not been adequately evaluated. Injuries and yield reductions of vegetable crops have been reported when halosulfuron was applied prior to transplanting over LDPE mulch. Therefore, a study was conducted to determine the impact of halosulfuron on the growth and yield of vegetable and fruit crops, and its persistence on LDPE mulch under field dry conditions. A field bioassay was conducted in Tifton GA in 2013 and 2014 using watermelon and squash, in which halosulfuron (SandeaÂ®) was applied at various timings prior to transplanting over the LDPE mulch. Results indicated that halosulfuron 1.5 and 3 oz/A applied 27 or 23 days prior to transplanting (DPT), and 1.5 oz/A @ 17 or 14 DPT did not significantly reduce squash yield and fruit number per plot in 2013 or 2014 trial. However, halosulfuron 1.5 oz/A @ 9 and 1 DPT in 2013 trial, and 1.5 oz/A @ 1 DPT in 2014 trial reduced squash yield and number. No treatment effect was significant on watermelon, however, 1.5 oz/A @ 1 DPT showed the tendency to reduce watermelon yield and fruit numbers per plot. Analytical results suggested that halosulfuron applied at 0.5 or 1 oz/A produced similar dissipation rate on LDPE mulch under dry conditions in field, and 21 days was needed for 90% halosulfuron dissipation on LDPE mulch. No detectable halosulfuron presented on LDPE mulch 35 days after treatment (DAT). Laboratory incubation was conducted on two thermal-gradient tables with sensors, to investigate halosulfuron degradation as affected by temperature in HPLC-grade water. Temperature used in this study varied from 10 to 42C. Halosulfuron showed little degradation within the first 48 hrs of incubation at temperature below 40C. Significant degradation occurred at 4 DAT when temperature exceeds 25C. At 7 DAT, halosulfuron degradation was 17, 32, 43 and 71%, respectively, at 30, 35, 38 and 42C. Then, 27, 45, 58 and 84% was degraded at the respective temperatures 10 DAT. In contrast, only 6 and 9% of halosulfuron was degraded at 20 and 25C at 10 DAT, with no significant degradation found at temperatures below 20C.

EVALUATION OF SEASON-LONG HERBICIDE PROGRAMS FOR SOUTHERN PEA IN ARKANSAS.

C.E. Rouse*[1], N.R. Burgos[1], L.E. Estorninos Jr.[1], D.R. Motes[2]; [1]University of Arkansas, Fayetteville, AR, [2]University of Arkansas, Kibler, AR (188)

ABSTRACT

Southernpea producers in Arkansas lack diverse and viable weed control programs for season-long management. Two studies were conducted in the summer of 2014 at the Arkansas Agricultural Research and Extension Center (AAREC), Fayetteville, AR, and at the Vegetable Research Center (VRS), Kibler, AR to evaluate various herbicides in different combinations for use in a season-long weed control program in southernpea. In total, 19 herbicide programs were evaluated which included fomesafen, halosulfuron (54 g ha^{-1}), imazethapyr (70 g ha^{-1}), S-metolachlor (1120 g ha^{-1}), sulfentrazone (210 g ha^{-1}), a premix of sulfentrazone + carfentrazone (160 g ha^{-1}), trifluralin (840 g ha^{-1}), bentazon (1120 g ha^{-1}), fluthiacet-methyl (6.7 g ha^{-1}), or sethoxydim (320 g ha^{-1}) applied in various combinations and timings; both a weedy and weed- free control were also included. Herbicides were applied preplant-1 week before planting (PPL), preplant incorporated (PPI), preemergence (PRE), or postemergence (3 to 4 trifoliate). The experiments were arranged in a randomized complete block design with 4 replications. 'Top Pink' southern pea were drill-seeded into beds spaced 91 cm apart and 6.1 m long. Each plot had 2 treated rows where data were collected and border rows on each side. Stand count (21 DAP), crop injury (%), weed count (1 sq m^{-1}), weed control by species (%), total weed control (%), and dry yield were evaluated throughout the season. Data were analyzed using an ANOVA; locations were analyzed separately. None of the herbicide treatments had an affect on the crop stop stand at either location. Low levels of injury were observed at AAREC (<25%), overall injury at the VRS location was higher early in the season (<55%), but greatly reduced (<20%) by the end of the season. The premix of sulfentrazone + carfentrazone (PPL or PRE) fb fluthiacet with other herbicides exhibited the greatest injury (13%-25%), mid-season, at both locations. None of the treatments reduced yield at the AAREC location; the crop at VRS was lost to sudden death at pod-filling stage. Weed pressure was low at the AAREC location while Palmer amaranth infestation was very high at the VRS location. At the VRS, trifluralin (PPI) was least effective, while treatments containing fomesafen, the premix of sulfentrazone + carfentrazone, and flumioxazin were most effective (>90%) 2 WAP and were consistent throughout the season. All programs evaluated were deemed safe on southernpea. This study indicated that the premix of sulfentrazone + carfentrazone applied preplant or preemergence provides excellent, broad spectrum, residual weed control and that a tailored POST treatment should be used to control the remaining species season-long.

HERBICIDAL ACTIVITY OF MUSTARD SEED MEALS (*SINAPIS ALBA* \'IDAGOLD\' AND *BRASSICA JUNCEA* \'PACIFIC GOLD\. P.A. Baumann*[1], X. Wang[2], M. Gu[2], G. Niu[3]; [1]Texas A&M University, College Station, TX, [2]Texas A&M AgriLife, College Station, TX, [3]Texas A&M AgriLife, El Paso, TX (189)

ABSTRACT

Mustard seed meals (MSM) are by-products resulting from crushing mustard seeds to provide biofuel. MSM have been applied to soil as bio-herbicides due to the release of active glucosinolates hydrolysis products. Three experiments were conducted to determine the herbicidal activity of two MSM (*Sinapis alba* 'IdaGold' and *Brassicajuncea* 'Pacific Gold').

In greenhouse containers (6-inch azalea pot), MSMs were applied on the surface or incorporated with germination mix at 0, 1.5, 3.0 or 4.5 g/pot in the top 2.5 cm layer. Thirty seeds of each weed per pot were sown 2 mm deep. All treatments were replicated 4 times in a three-factor (MSM type, rate, and application method) design. Petri dish experiments were conducted to determine the residual effects of MSM on weed seedling emergence. Large crabgrass (*Digitaria sanguinalis*) and Palmer amaranth (*Amaranthus palmeri*) were sowed in germination mix incorporated with MSM (*Sinapis alba* 'IdaGold' and *Brassica Juncea* 'Pacific Gold') at 0, 88, 176 or 265 g/m^2 in petri dishes. Petri dishes were sealed for 1, 3, 5 or 7 days after sowing. A three-factor (MSM type, rate, and sealing duration) design was employed with 5 replications.

In the greenhouse experiment, large crabgrass emergence 10 DAS (days after seeding) in the untreated pots was 66% of what was originally seeded. At 3.0 gm/pot, significant reductions were shown when comparing incorporated (44%) to surface applied (29%) "IdaGold" MSM. At 4.5 gm/pot, incorporated plots exhibited 38% emergence compared to 22% in the surface applied pots. Similar significant differences were shown with 'PacificGold' MSN. Although significant reductions in emergence occurred when comparing all incorporated treatments of both MSN to the untreated pots, no differences were shown between the two MSN within any treatment rate. Palmer amaranth emergence in the pots was only 24% where no MSN was applied. At all three application rates, 'IdaGold' MSM caused significantly greater seedling inhibition than 'PacificGold' MSN. No significant differences in Palmer amaranth emergence were seen when comparing incorporated and surface applied 'PacificGold' MSN. However, no emergence was observed at 3.0 and 4.5 gm/pot from either application of 'IdaGold' MSN, indicating a high level of emergence inhibition from this variety of MSN.

In the sealed petri dish experiment, where no MSN was applied, germination ranged from 51 to 65% of large crabgrass that was originally sowed. 'PacificGold' MSN reduced emergence significantly (16% emergence after one day of being sealed at 88 gm/m2). All other timings of seal removal at all rates resulted in essentially no large crabgrass emergence. 'IdaGold' MSN was significantly less inhibitory than 'PacificGold' MSN at all sealing durations at the low rate of 88 gm/m2. However, when the rate was increased to 176 and 265 gm/m2, few differences were seen between the two MSN. Palmer amaranth emergence was highly variable where no MSN was applied (25-55% of that sowed). However, when dishes were treated with 176 or 265 gm/m2 of either MSN, emergence was 3% or less. The 88 gm/m2 rate resulted in significantly greater inhibition from the 'IdaGold" MSN when sealing duration was 3 or 5 days.

LEVEL OF 2,4-D OR DICAMBA RESIDUE FOUND IN CUCURBIT FRUIT FROM A SIMULATED DRIFT SCENARIO. A.S. Culpepper*[1], J. Flowers[2], J. Smith[1], M. Curry[2], R. Beverly[2]; [1]University of Georgia, Tifton, GA,[2]Georgia Department of Agriculture, Tifton, GA (190)

ABSTRACT

Cotton technologies with tolerance to glyphosate, glufosinate, and 2,4-D or dicamba will offer growers more flexibility in developing cotton weed management systems. However, adoption of these technologies will also increase the potential for damage to non-target specialty crops grown nearby. Vegetable production in Georgia has a farm gate value of nearly $1 billion including 33 vegetables produced for fresh market; 32 of which are sensitive to 2,4-D and dicamba. Thus, it is paramount that these vegetables be free of any illegal pesticide residues to protect the consumer as well as the grower.

Cantaloupe and cucumber experiments were conducted during 2014; cantaloupe in the spring and cucumber in the fall at the Tifton Vegetable Park. Plots were 12 feet wide by 20 feet long with transplants planted into a 32-inch wide by 8-inch tall raised bed. Each bed was fumigated with 1,3-dichloropropene plus chloropicrin and metam sodium and followed immediately with a low density polyethylene mulch. Cucurbit production followed standard grower practices. Treatments were applied topically at 15 GPA with a backpack sprayer.

Cucurbits were treated with 2,4-D amine or Clarity (dicamba) at the 1/75X or 1/250X rate during three growth stages. The X rate for 2,4-D and Clarity was 1.0 and 0.5 lb ai/A, respectively. Herbicides were applied 54 (vegetative), 31 (bloom), and 18 (bloom/fruit) days before first harvest (DBH) of cantaloupe and 26 (vegetative), 16 (full bloom), and 7 (bloom/fruit) DBH of cucumber. A minimum of 0.7 inches of rain occurred between treatment and first harvest for both crops. Treatment separation of $P = 0.05$ was used except where noted differently.

Cantaloupe was harvested 17 times and cucumber was harvested 10 times for marketable fruit. During the first harvest, two fruit from each plot were bagged and delivered to The Georgia Department of Agriculture for residue analysis. Georgia Department of Agriculture procedures were identical to those followed when addressing drift complaints except fruit from each plot was checked for both 2,4-D and dicamba; thus, plots that were treated with dicamba were analyzed for both dicamba and 2,4-D and those treated with 2,4-D were analyzed for both 2,4-D and dicamba. Residue analysis noted no detection of 2,4-D from plots treated with dicamba and no detection of dicamba from plots treated with 2,4-D; additionally, neither 2,4-D nor dicamba were detected in any fruit from controls.

Cantaloupe were injured at most 25, 16, and 6% when 2,4-D (1/75X) was applied 54, 31, and 18 DBH, respectively; injury from the 1/250X rate ranged from 15% at 54 DBH down to 2% at 18 DBH. Clarity at the 1/75X rate injured cantaloupe at most 42, 20, and 2% when applied 54, 31, and 18 DBH, respectively; injury from the 1/250X rate ranged from 23% at 54 DBH down to 1% at 18 DBH. Fruit weights were reduced by 2,4-D but only at the 1/75X rate and only when applied 54 DBH (14% loss). Clarity at the 1/75X rate reduced weights 20% when applied 54 DBH; if using $P = 0.1$ then fruit weights were also reduced 10% by Clarity (1/75X) when applied 31 DBH. Lab analysis did not detect 2,4-D residue in any fruit. Dicamba residues of 0.005 ppm and 0.014 ppm were found in fruit treated with the 1/75X rate of Clarity when applied 31 and 18 DBH, respectively.

Cucumber were injured at most 11, 8, and 5% when 2,4-D (1/75X) was applied 26, 16, and 7 DBH, respectively; injury from the 1/250X rate was less than 4%. Clarity at the 1/75X rate injured cucumber at most 30, 19, and 16% when applied 26, 16, and 7 DBH, respectively; injury from the 1/250X rate was less than 5%. Fruit weights were reduced by 2,4-D but only at the 1/75X rate and only when applied 26 DBH (13% loss). Clarity at the 1/75X rate reduced fruit weight 17% when applied 26 DBH; if using $P = 0.1$ then fruit weights were also reduced by the same rate applied 16 DBH. Lab analysis did not detect 2,4-D residue in any fruit. Dicamba residues of 0.019 ppm and 0.007 ppm were found in fruit treated 7 DBH with the 1/75X and 1/250X rate, respectively.

Residue levels detected by The Georgia Department of Agriculture were extremely consistent within treatments. For example, dicamba levels detected in cantaloupe at the 1/75X rate 18 DBH by replication were as follows: 0.01, 0.02, 0.015, and 0.011. For cucumber, dicamba levels detected at the 1/250X rate 7 DBH by replication were as follows: 0.004, 0.01, 0.01, and 0.005.

RESPONSE OF SUMMER SQUASH AND CUCUMBER TO REFLEX, SANDEA, AND STRATEGY. S. Singh*[1], N.R. Burgos[1], V. Singh[1], S.E. Abugho[1], D.R. Motes[2], L.E. Estorninos Jr.[1]; [1]University of Arkansas, Fayetteville, AR, [2]University of Arkansas, Kibler, AR (191)

ABSTRACT

Cucurbits are grown in the United States for consumption as fresh and processed food. A challenge in cucurbit production is weed control due to their sensitivity to herbicides. Only a few herbicides are currently labeled for cucurbits. Field experiments were conducted at the Arkansas Agricultural Research and Extension Centre, Fayetteville and the Vegetable Research Station, Kibler, AR in the summer of 2014 to evaluate the tolerance of cucurbits to different rates and timings of fomesafen (0.25, 0.375, 0.5 lb ai A^{-1} PRE and 0.25 lb ai A^{-1}, POST-RM) and halosulfuron (0.048 lb ai A^{-1} PRE or POST-RM). These were applied, with or without *S*-metolachlor (1 lb ai A^{-1}), to summer squash and cucumber in three replications. A PPI and PRE application of Strategy (ethalfluralin + clomazone; 2 pt A^{-1}) was applied at planting to weed-free plots and all POST-RM plots. Injury was recorded 3 and 5 wk after PRE herbicide application (WA-PRE) and 1 and 2 wk after POST-RM application (WA-POST-RM). In Fayetteville, the injury on squash 3 WA-PRE ranged from 6%-59%; being highest with fomesafen at 0.50 lb ai A^{-1} (59%) which declined substantially 2 weeks later. High injury was observed with Strategy (PRE) fb fomesafen tankmixed with *S*-metolachlor (0.50 lb ai A^{-1} + 1 lb ai A^{-1}; POST-RM) up until harvest. Halosulfuron, *S*-metolachlor and Strategy by themselves caused little injury. Injury with halosulfuron PRE or POST-RM did not exceed 18%. *S*-metolachlor (PRE) caused 25% stunting initially, but decreased at 5 WA-PRE. Cucumber incurred high injury (91%) with fomesafen at 0.50 lb ai A^{-1}. In Kibler, the highest injury (80%) on summer squash 3 WAT was with Strategy (PPI) fb *S*-metolachlor + halosulfuron (PRE). Cucumber treated with fomesafen (PRE or POST-RM), regardless of rate, incurred high injury at all stages of evaluation. The yield of squash and cucumber treated with *S*-metolachlor + halosulfuron PRE was similar to that of the weed-free check that was sprayed with Strategy (PRE) and hand weeded at Fayetteville. In Kibler, squash treated with fomesafen at 0.375 lb ai A^{-1} PRE and cucumber treated with *S*-metolachlor (PRE) yielded higher than other treatments. In conclusion, summer squash is tolerant to *S*-metolachlor and up to 0.375 lb ai A^{-1} fomesafen. Cucumber is also tolerant to *S*-metolachlor, but sensitive to fomesafen even at the lowest rate tested, regardless of application timing.

SWEET POTATO RESPONSE TO SELECT HERBICIDES FOR WEED CONTROL IN ARKANSAS. C.E. Rouse*, L.E. Estorninos Jr., V. Singh, R.A. Salas, S. Singh, N.R. Burgos; University of Arkansas, Fayetteville, AR (192)

ABSTRACT

Sweetpotato is a relatively new crop being introduced as an option for Arkansas producers. To date, little research has been conducted to assess herbicides for sweetpotato in Arkansas production systems. A study was conducted in the summer of 2014 at the Vegetable Research Station, Kibler, AR, to evaluate commonly used sweetpotato herbicides and new herbicides for use in Arkansas. A total of 28 treatments were evaluated, including both a weedy and weed-free check. The herbicides were clomazone (628 g ha^{-1}), S-metolachlor (1121 g ha^{-1}), flumioxazin (90 & 108 g ha^{-1}), fomesafen (280, 392, & 560 g ha^{-1}), sulfentrazone (280 g ha^{-1}), linuron (561, 841, & 1121 g ha^{-1}), and pyroxasulfone (2243 g ha^{-1}) applied in various combinations and timings. Different application timings were evaluated for the different herbicides: pre-transplant (PreTP), 1 week post-transplant (WPOT), 2 weeks post-transplant, and 75 days before harvest (DBT). Data collected included stand count (plants ha^{-1}), crop injury (%), plants at harvest (plants ha^{-1}), number of roots per hectare, yield (mt), weed count 2 WAP (1 m^2), weed control by species (%), and total weed control (%). Data were analyzed with an ANOVA and significant means were separated using Fisher's Protected LSD (α=0.05). Using clomazone + S- metolachlor (1 WPOT) as the commercial standard treatment, none of the other treatments evaluated significantly reduced the sweet potato population. Crop injury was low and did not exceed 38% for any treatments at any time. However, treatments with linuron applied 2 WPOT and the S-metolachlor (1 WPOT) fb fomesafen (2 WPOT) treatments had consistently more visible injury later in the season, relative to other treatments. S-metolachlor (1 WPOT) had the highest yield overall at 30 mt; the addition of fomesafen (2 WPOT) to this timing of S-metolachlor had the lowest yield (4 mt), but none of the herbicide treatments were significantly different. Early-season control, 2 weeks after transplanting, of all weed species was acceptable for all herbicide treatments (>85%). At 3 weeks after transplanting control was reduced and the low flumioxazin rate (90 g ha^{-1}) had the lowest weed control (74%). All treatments with S-metolachlor applied no later than 1 WPOT had 100% weed control, primarily because of the high activity of S-metolachlor on pigweeds. Overall, most treatments were safe on sweetpotato with yields comparable to the weed-free plants. Higher weed control was observed with S-metolachlor applied 1 WPOT, but most of the other treatments still had >80% weed control. Fomesafen, sulfentrazone, and pyroxasulfone have potential for use in Arkansas production and should be further evaluated.

THE USE OF PIGS FOR NUTSEDGE CONTROL IN ANNUAL CROPPING SYSTEMS. G. MacDonald*; University of Florida, Gainesville, FL (193)

ABSTRACT

Yellow and purple nutsedges (*Cyperus esculentus and Cyperus rontundus*) are some of the most ubiquitous and troublesome weeds in annual cropping systems throughout Florida and the southeastern US. While chemical control options are available for many crops, including some horticultural crops, these weeds continue to cause major problems. At the University of Florida's Plant Science Research and Education Unit (PSREU) both of these species infest large research sites, and in recent years appear to be less responsive to chemical control. Pigs (*Sus domesticus*) have been known to rogue out and consume nutsedge tubers, and may have been indirectly utilized by some farmers that used overwintering fields for pig foraging. To determine if pigs would provide a means of nutsedge control, a study was initiated at the PSREU in the spring of 2014. Three conjoining fenced pens (24 x 24m) were constructed in a heavily infested area of nutsedge (predominantly purple after further determination), and 12 individual pigs were placed in each pen. Water and commercial feed were supplied to the animals per University of Florida Extension Service recommendations. Pigs were approximately 15-20 lbs at the start of the experiment. Pigs were allowed to forage in the pens for 2 weeks, and then rotated to the next pen for a total of 2 full cycles (12 weeks). The 12 individuals for each pen were kept together throughout the duration of the experiment. Prior to introducing the pigs, 81 soil core samples (7.6 cm diameter x 30.5 cm deep) were pulled from each pen using a grid sampling design. The soil was sifted and the number of nutsedge tubers was determined from each core sample. This procedure was repeated after removal of the pigs after 12 weeks, and samples were pulled from the exact location of the previous core. To test for possible herbicide resistance, tubers collected from the first core sampling were planted in 3L pots containing field soil and placed under greenhouse conditions. A reference population of purple nutsedge was purchased from a regional vendor for comparison. Plants were treated with rates of glyphosate, imazapyr and halosulfuron to determine I-50 values for each population. There were no statistical differences detected between populations for any of the herbicides evaluated, indicating a lack of resistance development. However, based on tuber numbers, the pigs caused a 48% reduction in nutsedge tuber density across the three pens. Despite the unpleasant taste of purple nutsedge tubers, these animals appear to have the capacity to reduce nutsedge in a relatively short period of time.

EQUIPMENT MODIFICATIONS FOR PERENNIAL NUTSEDGE CONTROL IN FALLOW ORGANIC TRANSITION. W.C. Johnson III*; USDA-ARS, Tifton, GA (194)

ABSTRACT

Many conventional growers are interested in diversifying into organic production by using long-term fallow sites and having these sites immediately certified as organic. However, perennial nutsedges frequently infest long-term fallow sites and are extremely difficult to control in organic crop transition and production systems. Herbicides suitable for use in certified organic production do not adequately control perennial nutsedges. Cultural and mechanical control are partially effective in controlling perennial nutsedges. It was theorized that tilling fallow sites using a peanut digger would displace perennial nutsedges and predispose weeds to desiccation. Preliminary research and on-farm experiences demonstrated the potential of fallow tillage with a peanut digger to control perennial nutsedges, but performance was inconsistent. Best performance was during hot and dry periods that facilitated desiccation. However, rainfall soon after tillage with the peanut digger substantially lessened control by allowing displaced nutsedges to reestablish. A means to collect nutsedge plants as they fall from the peanut digger would improve consistency. This concept was chosen by two teams of mechanical engineering students at Auburn University (Samuel Ginn College of Engineering) as a project to fulfill requirements for MECH 4240 - Comprehensive Design (a two semester class). Students from each team prepared competing design proposals Spring Semester 2014, with the better design chosen for construction by combined teams Summer Semester 2014. Students designed and constructed a trailer that attached to the back of a standard two-row peanut digger. The hitch stabilized lateral movement of the trailer, yet allowed vertical articulation during operation. The rear of the trailer was supported by swivel wheels that also added control when turning. Inward sloped sides of the trailer allowed displaced nutsedge plants to accumulate on a hydraulically-powered conveyor belt that was used to periodically move displaced weeds to the rear of the trailer. Displaced weeds collected in the trailer were discarded off-site by a hydraulically-powered lift gate on the trailer. In July 2014, the prototype was tested in a fallow site near Tifton, GA heavily infested with yellow nutsedge (<400 plant/m^2). The peanut digger and modified trailer removed and collected 99% of the yellow nutsedge plants in several test runs. Two modifications of the prototype are needed before use in replicated research trials: (1.) the hitch between the peanut digger and trailer needs to be modified to place the leading edge of the trailer further under the peanut digger to lessen chances for displaced weeds to fall back onto the soil surface, (2.) the conveyor belt in the trailer needs to be supported with two rollers to prevent sagging due to large volumes of displaced weeds. In conclusion, the modified trailer collects and disposes yellow nutsedge displaced by the peanut digger and offers markedly improved control options in fallow sites during organic transition and production.

NUTSEDGE MANAGEMENT IN PEPPER AND TOMATO WITH COMBINATIONS OF DIMETHYL DISULFIDE, CHLOROPICRIN, AND METAM POTASSIUM. N.S. Boyd*, G. Vallad; University of Florida, Wimauma, FL (195)

ABSTRACT

Effective fumigation systems are needed for weed management in horticultural crops in Florida. Experiments were conducted at the Gulf Coast Research Education Center in Balm, Florida, to evaluate dimethyl disulfide and metam potassium combinations in tomato. No fumigant, 131 kg ha^{-1} 1,3-dichloropropene (1,3-D) plus 200 kg ha^{-1} chloropicrin, 392 kg ha^{-1} of dimethyl disulfide (DMDS), or 340 kg ha^{-1} of DMDS plus 90 kg ha^{-1} of chloropicrin were applied with three shanks at 20 cm in a raised bed. Within each fumigation treatment no metam potassium, or metam potassium at 195 kg/ha was applied at 30 cm using a Yetter rig prior to the initial bed shape, at 10 cm at the top of the bed with six shanks, or at both depths. All beds were covered with TIF plastic immediately after fumigation. The experiment was set up as a factorial with four blocks and conducted in the fall and spring crop. In both seasons, there was a significant interaction between the fumigant applied at 20 cm and metam potassium placement. In the fall, metam potassium alone did not reduce nutsedge density compared to the untreated control. DMDS plus chloropicrin and 1,3-D plus chloropicrin significantly reduced nutsedge density with metam potassium giving no further reduction in density. DMDS combined with metam potassium at 10 or 10 and 30 cm provided the same level of control. Similar trends were observed in the spring but nutsedge densities were much lower and a significant reduction in nutsedge was observed in all fumigant treatments compared to the untreated control. When averaged across fumigants applied at 20 cm, metam potassium tended to reduce nutsedge density most effectively when applied at 10 cm. Metam potassium applications at all depths reduced broadleaf weed numbers emerging in the planting holes. Treatments had minimal impact on tomato yield though in the fall, fumigants that included chloropicrin, stunted the tomato plants and reduced flower number. The authors conclude that within a single season 1,3-D plus chloropicrin, DMDS plus chloropicrin, and DMDS plus metam potassium adequately controlled purple nutsedge in fields with moderate to low densities. Metam potassium on its own did not adequately control nutsedge but did reduce broadleaf weed numbers emerging in the planting holes.

NUTSEDGE CONTROL IN BELL PEPPER USING IN-CROP HERBICIDES AND FALLOW PROGRAMS. P.J. Dittmar*[1], N.S. Boyd[2]; [1]University of Florida, Gainesville, FL, [2]University of Florida, Wimauma, FL (196)

ABSTRACT

The fallow period between summer and fall Florida vegetable production provides an opportunity for broad spectrum herbicides and cultivation. Although, fallow period weed management decreases nutsedge populations; the population can grow during the crop season. The objective was decreasing nutsedge populations with postemergence herbicides during bell pepper included in a glyphosate and cultivation during the fallow period. Treatments were a factorial design with 8 fallow period weed management programs x 2 postemergence treatments. The main plots fallow period weed management including: cultivation alone, glyphosate alone, cultivation f.b. cultivation, cultivation f.b. glyphosate, glyphosate f.b. glyphosate, glyphosate f.b. cultivation, glyphosate f.b. cultivation f.b. glyphosate and a nontreated. This was the third year of the main plots being applied. The subplots were imazosulfuron POST and nontreated. The imazosulfuron was applied when pepper were 9 to 12 inches tall and the nutsedge was 12”. The imazosulfuron application did not control the nutsedge. No differences were measured between imazosulfuron POST and no POST. All the fallow programs had lower nutsedge populations than the nontreated. The best fallow program was glyphosate f.b. cultivation f.b. glyphosate, which was similar to the glyphosate f.b. glyphosate and cultivation f.b. glyphosate treatments. A fallow program include multiple applications of glyphosate and cultivation during the fallow period lowers nutsedge during the bell pepper season. The imazosulfuron POST application is dependent on the size of nutsedge at the time of application.

USE OF INTEGRATE TO IMPROVE LATERAL MOVEMENT OF DRIP-APPLIED ITC GENERATORS FOR TOMATO PRODUCTION. T.P. Jacoby*; University of Florida, Gainsville, FL (197)

ABSTRACT

Purple and yellow nutsedge (*Cyperus rotundus* and *Cyperus esculentus*) are two troublesome weeds in tomato production. Previous research demonstrated that high nutsedge populations can reduce tomato yield by 51% (Gilreath and Santos, 2004). Most tomato growers in Florida rely on 1,3-dichloroprope, chloropicrin or isothiocyanate (ITC) generators as methyl bromide alternatives, but these fumigants have shown to be less effective at controlling nutsedge populations. The majority of nutsedge tubers in plasticulture production originate from the under fumigated bed edges. This is mainly due to the inability of drip applied fumigants to extend laterally across beds in Florida's deep sandy soils. Moreover, as these fumigants break down into a weak gas they become less effective. Their efficacy can possibly be improved when combined with a soil surfactant.

A series of experiments were conducted at the Gulf Coast REC beginning Spring 2013 to compare ITC generators and determine the benefit of a soil surfactant to improve lateral movement of drip-applied fumigants for the control of nutsedge. Only the experiment from Spring 2014 will be discussed. The treatments consisted of 1) Metam potassium (Sectagon K-54®, 60 gal/Treated A), 2) Allyl isothiocyanate (AIT) (Dominus®, 40 gal/Treated A) 3) Dazitol® 12.5 gal/acre, 4) Metam potassium + Integrate® (1 gal/Treated A) 5) AIT + Integrate® 6) Dazitol®+ Integrate®, 7) Integrate® and 8) non-treated control. One drip tape with 1 ft between emitters (0.45 gal/100ft/min) and black VIF mulch was applied over all treatments using a speedroller. Beds were 28 in wide on top and 32 in at base. All treatments were applied to plastic covered raised beds through an Ag Sprayer pump at 2.2 gpm, with Integrate® being injected one day before all drip fumigant applications. This experiment was set up as a split-plot design with six replications where Integrate® was the whole plot factor and fumigant the sub-plot factor.

There was a significant difference of 2.5 (in) in the lateral movement of metam potassium across beds with the addition of Integrate®. AIT extended laterally across beds farther than Dazitol® but this effect was not due to Integrate®. The initial nutsedge population in each plot before fumigation was fairly uniform and high with an average of 20 shoots/m^2. The addition of the surfactant application prior to the three ITC generators did not increase purple nutsedge control at two or six weeks after treatment (WAT). Metam potassium and AIT treatments performed statistically better than the Dazitol® and the non-treated control treatments at 2 WAT. However, AIT was similar to Dazitol® and the non-treated control at 6 WAT. At 6 WAT, metam potassium alone had the lowest nutsedge population with 19 shoots/m^2. In general, Dazitol® was ineffective against nutsedge. There was no difference in tomato yield for any of the treatments but this may be due to the weather during the season which led to abnormally low fruit set for all plants.

ATTEMPTING TO USE HPPD-INHIBITING HERBICIDES FOR GOOSEGRASS CONTROL IN BERMUDAGRASS. J.R. Brewer*[1], M. Cox[2], S.S. Rana[3], S. Askew[1]; [1]Virginia Tech, Blacksburg, VA, [2]Helena, Memphis, TN, [3]Virginia Polytechnic Institute and State University, Blacksburg, VA (198)

ABSTRACT

Few postemergence herbicide options exist for goosegrass (*Eleusine indica*) control on bermudagrass turf. Recent restrictions on MSMA have rendered the long-standing combination of MSMA plus metribuzin ineffective as turf managers can't treat enough area or enough times to effectively address goosegrass infestations. Now the loss of diclofop has further limited postemergence control options in bermudagrass. Most turf managers are using multiple treatments of foramsulfuron and sulfentrazone but these herbicides are expensive and only effective on seedling goosegrass. Recent turfgrass registration of the HPPD-inhibiting herbicides mesotrione and topramezone has led to attempts to achieve selective goosegrass control in bermudagrass with these new herbicides. Topramezone, in particular, effectively controls large goosegrass plants at half the maximum use rate in cool-season turf. At rates as low as 7% of the maximum labeled rate, topramezone can control seedling goosegrass. Unfortunately, bermudagrass turf is typically injured by topramezone. At Virginia Tech, we have been evaluating potential topramezone programs for goosegrass control in bermudagrass since 2012. Two greenhouse trials were conducted in 2012 and 2013 to evaluate various rates of topramezone in combination with several rates of triclopyr for goosegrass control and bermudagrass response. In 2013 and 2014, topramezone at rate 5.5 g/ha^{-1} and rate 12.3 g/ha^{-1} was applied alone or in mixture with triclopyr at rate 140.2 g/ha^{-1} on 31 cultivars of bermudagrass maintained at a 3.2 cm mowing height. In 2014, two trials were conducted to evaluate goosegrass control and bermudagrass response to topramezone at 2.45 g/ha^{-1} and 4.9 g/ha^{-1} applied weekly with and without triclopyr at 86.5 g/ha^{-1}. An additional 3 trials were conducted at various locations in Virginia to evaluate programs of mesotrione at 175 g/ha^{-1} plus simazine at 280 g/ha^{-1} or 560.9 g/ha^{-1}alone or with metolachlor at 1398.8 g/ha^{-1} for goosegrass control and bermudagrass response compared to MSMA at 2243 g/ha^{-1} plus metribuzin at 371.6 g/ha^{-1}. These trials were initiated between June 18, 2014, and August 20, 2014, and placed on different golf course and research locations in the state of Virginia.

Greenhouse studies in 2012 and 2013 suggested that topramezone at 5.5 g/ha^{-1} and 12.3 g/ha^{-1} and triclopyr at 140.2 g/ha^{-1}represented the best balance between bermudagrass safety and goosegrass control. These rates were used in subsequent field trials in 2013 and 2014 to evaluate bermudagrass cultivar response and goosegrass control. At three trial sites, goosegrass cover ranged from 19 and 37 %. By 10 weeks after initial treatment (WAIT), topramezone at either rate alone or with triclopyr reduced goosegrass cover to between 0 and 7%. All bermudagrass cultivars were injured 30 to 70%. White symptoms from topramezone alone persisted for at least 2 weeks. Necrotic symptoms from triclopyr combinations ranged between 20 and 40% but persisted for as much as 5 weeks. Despite the initial greenhouse results, field studies suggest that lower rates of triclopyr may be more effective. The three trials evaluating programs of mesotrione were initiated on June 18, 2014 at Hermitage Country Club and Independence Golf and August 20, 2014 at the Turfgrass Research Center. At both golf course locations, injury ranged from 40 to 80% and sequential treatments were not applied at the superintendents request. The third trial was conducted on Tifway 419 bermudagrass and received both treatments. All mesotrione treatments injured Tifway bermudagrass over 90% at study conclusion. On August 20, 2014, additional studies were established in Blacksburg, VA to evaluate topramezone applied weekly four times at low use rates for effects on goosegrass and bermudagrass. At 7 WAIT, all treatments had controlled goosegrass 90% or greater but injured bermudagrass 85 to 99% at 3 WAIT. At 7 WAIT, only the treatments that included triclopyr had greater than 90% injury. The treatments of topramezone alone at 4.9 g/ha^{-1} and 2.45 g/ha^{-1} injured bermudagrass 41 and 16%, respectively at 7 WAIT. These studies suggest that HPPD-inhibiting herbicides may be more injurious to bermudagrass in Virginia than has been reported from states further south. In addition, low use rates of topramezone can effectively control goosegrass in bermudagrass but severe bermudagrass injury may persist for two weeks or more.

CONTROL OF SMUTGRASS (*SPOROBOLUS INDICUS*) WITH TRIBUTE TOTAL. J.H. Rowland*; Bayer, Austin, TX (199)

ABSTRACT

Smutgrass (*Sporobolus indicus*) is a very difficult to control weed in warm-season turfgrass. Current control options are limited to simazine and MSMA. Tribute Total (thiencarbazone-methyl, foramsulfuron, and halosulfuron-methyl) was tested over two years in TX for control of smutgrass. Complete control of smutgrass was obtained with spot applications (0.073 oz/gal) of Tribute Total applied two to three weeks apart.

EVALUATION OF SOLITAIRE AND CELSIUS FOR FRAGRANT KYLLINGA CONTROL IN BERMUDAGRASS. B. Konwick*, P. McCullough; University of Georgia, Griffin, GA (200)

ABSTRACT

Field experiments were conducted on ‘TifBlair’ centipedegrass at the University of Georgia Griffin Campus. The field was mowed weekly with a rotary mower at a 2 inch height with clippings returned. Irrigation was provided as needed to prevent turf wilting. Centipedegrass was at complete greenup, actively growing, and had no symptoms of stress from drought, disease, or other pests on the day of treatments. Experimental design was a randomized complete block with four replications of 3 x 10-ft plots. Treatments were applied on July 21, 2014 using a CO2 pressured sprayer calibrated to deliver 40 gallons per acre with a single 9504E flat-fan nozzle. At 4 and 7 days after application, all of the F7214-3 and Solitare treatments tested showed excellent control (>95%) of fragrant kyllinga. These treatments provided >89% control after 8 weeks. Dismiss showed similar results regarding control of fragrant kyllinga (>98%) throughout the study. Celsius was slower in controlling fragrant kyllinga. On day 4 and 7, ratings showed control at 10% and 18%, respectively. However, control then increased to levels similar to Dismiss, Solitare, and F7214-3 (control >94%) for the remainder of the study. Turfgrass injury was minimal during the study and never exceeded 11% for any treatment.

INDAZIFLAM SINGLE AND SEQUENTIAL APPLICATIONS FOR ANNUAL GRASS AND BROADLEAF CONTROL IN WARM-SEASON TURFGRASS. B.J. Brecke*, R.G. Leon; University of Florida, Jay, FL (201)

ABSTRACT

Indaziflam was evaluated for broadleaf and long-term annual grass control in warm-season turfgrass at the University of Florida West Florida Research and Education Center, Jay, FL from 2010 through 2014. Indaziflam applied once at 30 g a.i./ha provided 80% control of goosegrass (*Eleusine indica* (L.) Gaertn.) when evaluated 4 mo after treatment while indaziflam at 40 or 50 g/ha provided 90 to 95% control. When indaziflam was applied twice at 50 g/ha with a 12 mo interval between applications, goosegrass control was 85% when evaluated 24 mo after initial treatment. Prodiamine applied twice at 0.8 kg/ha or oxadiazon applied twice at 3.6 kg/ha at 12 mo intervals provided less than 60% goosegrass control 24 mo after initial treatment. A single early-season indaziflam application at 35 g/ha provided less than 60% doveweed (*Murdannia nudifolia* (L.) Brenn) control 90 days after treatment. When indaziflam was applied three times at 10 g/ha (total 30 g/ha) goosegrass control improved to 95% control 60 d after initial treatment and 80% at 133 days. A single indaziflam treatment at 30 g/ha provided 100% chamberbitter (*Phyllanthus urinaria* L.) control for 90 days after treatment. Control decreased to 80% by 123 days after treatment with no advantage of three applications at 10 g/ha over a single application at 30 g/ha.

LATE SEASON DALLISGRASS CONTROL IN COMMON BERMUDAGRASS. l. warren*[1], F. Yelverton[2]; [1]north carolina state university, raleigh, NC, [2]North Carolina State University, Raleigh, NC (202)

ABSTRACT

Dallisgrass (*paspalum dilatatum*) is one of the most common and troublesome turfgrass weeds in the southeastern United States (SWSS Weed Survey – Southern States 2012). Recent research has focused on GDD (Jan 1 through Jun 30 10C base) and CDD (Jul 1 through Dec 31 21C base)- based timings to determine if dallisgrass just breaking dormancy or just beginning cold acclimation processes prior to winter dormancy is most susceptible to herbicide applications. Research was initiated Sep 2013 at the early stage of CDD accumulation (16 CDD) to evaluate the efficacy of sequential applications for POST dallisgrass control in common bermudagrass (*cynodon dactylon*) turf.

The trial was established Sep 16, 2013 at 16 CDD on a driving range at The River Golf Club located near Louisburg, NC that was 90 to 95% infested with dallisgrass. The treatment list and rates included msma (Target® 6 Plus) at 2.24 kg ai ha^{-1}, trifloxysulfuron (Monument® 75WG) at 28 g ai ha^{-1}, foramsulfuron (Revolver® Herbicide) at 2 fl oz/M and a package mix of thiencarbazone + foramsulfuron + halosulfuron (Tribute™ Total) at 136 g ai ha^{-1}. All treatments received MSO at 0.5% v/v. Treatments applied on Sep 16, Sep 24 and Oct 22 included msma fb trifloxysulfuron fb trifloxysulfuron and also msma fb trifloxysulfuron + msma fb trifloxysulfuron. Treatments applied Sep 16, Sep 24 and Oct 2 included msma fb trifloxysulfuron fb msma and also msma fb foramsulfuron fb msma. Three treatments received two late-season applications and a final application on Jul 16, 2014. These included 1) msma treated Sep 16, Sep 24 and Jul 16; 2) trifloxysulfuron treated Sep 16, Oct 15 and Jul 16; 3) thiencarbazone + foramsulfuron + halosulfuron treated Sep 16, Oct 15 and Jul 16.

Trials were RCB designed with treatments replicated 4 times consisting of 1.52 x 2.44 m plots. Treatments were applied at 374 L/ha spray volume with 317 kPa at 4.8 km/h using a 4-nozzle, 25.3 cm spacing boom containing XR 8002VS nozzles. Data are presented using a 0-100 scale where visual weed control observations of 0 = no control and 100 = complete control and percent bermudagrass green cover of 0 = no live bermudagrass and 100 = complete plot coverage.

At 1 YAIT, late-season only treatments containing msma and trifloxysulfuron combinations provided 99 to 100% dallisgrass control. Common bermudagrass coverage also ranged from 80 to 84% due to the dallisgrass removal and also from a reduction in smooth crabgrass (*digitaria ischaemum*) pressure. The msma and foramsulfuron treatment controlled dallisgrass 98% but offered no smooth crabgrass control. Because of this, common bermudagrass coverage was only 24%.

At 1 YAIT, all multi-year treatments provided 99 to 100% dallisgrass control. Common bermudagrass coverage was 71% in msma-treated plots and 85 to 90% in plots treated with trifloxysulfuron and thiencarbazone + foramsulfuron + halosulfuron.

POSTEMERGENCE DOVEWEED CONTROL AND GLYPHOSATE UPTAKE. J.L. Atkinson*[1], L.B. McCarty[2], S. McElroy[3], F. Yelverton[4]; [1]SePRO Corporation, Whitakers, NC, [2]Clemson University, Clemson, SC, [3]Auburn University, Auburn, AL, [4]North Carolina State University, Raleigh, NC (203)

ABSTRACT

Doveweed (*Murdannia nudiflora* (L.) Brenan) is a problematic weed of golf course roughs, fairways and tees. Doveweed's light green color and course texture disrupts turfgrass quality by contrasting with the color and texture of desirable turfgrass. Identifying characteristics are linear-oblong to lanceolate leaves that are 3-7 cm long and 1-2 cm wide, a fringe of hairs along the lower leaf margins, small (≤1 cm) purple ephemeral flowers, and a fibrous root system. End-user reports of postemergence (POST) control are inconsistent and control is often short-lived. In addition, inconsistent control with non-selective herbicides such as glyphosate is common. Poor control of a closely related species, Benghal dayflower (*Commelina benghalensis* L.), with glyphosate has been attributed to poor uptake resulting from a hydrocarbon rich cuticle layer that prevents diffusion across the cuticle layer.

The goals of this research were: (1) evaluate selective POST doveweed control options in 'Tifway' hybrid bermudagrass (*Cynodon dactylon* [L.] Pers. × *C. transvaalensis* Burtt-Davy) turf; (2) quantify doveweed tolerance to glyphosate; and (3) quantify foliar absorption glyphosate following treatment with a radio-labeled glyphosate solution.

Evaluation of POST control options were conducted at Augusta Country Club in Augusta, GA on irrigated golf course rough comprised of 'Tifway' bermudagrass. Treatments included single applications of Blindside 6.5 oz/ac, Celsius 3.7 oz/ac, Speedzone 4 pt/ac, Tribute Total, 3.2 oz/ac and sequential applications of these treatments made on a 3 week interval. Applications were made using a CO_2 powered sprayer calibrated at 20 GPA. Three treatment replications were applied on 1.5 × 2 meter plots. Visual ratings were based on a 0-100% scale, 0% indicating no control and 100% indicating complete control. All applications received a non-ionic surfactant at 0.25% V/V. ANOVA was evaluated with alpha at 0.05.

All treatments controlled doveweed similarly (60 to 80%) 2 WAIT. Six WAIT single application Blindside treatments controlled doveweed 53%. Other single application treatments controlled doveweed <25%. Sequential applications of Celsius, Speedzone, or Tribute Total improved control 6 WAIT from <25% in single application treatments to >60%. Only sequential application of Speedzone and Tribute Total provided >75% control 6 WAIT in both years. After this point, no treatment consistently provided >50% control.

Tolerance of doveweed to glyphosate was evaluated by treating doveweed plants at the 5-8 leaf stage with deionized water or 0.09, 0.18, 0.36, 0.71, 1.42, 2.84, and 5.68 kg glyphosate ae ha^{-1}. Shoot biomass was measured 21 DAT. Experimental design was completely randomized with three replications and the experiment was repeated in time. Complete control was not achieved by any of the glyphosate rates evaluated. The highest rate reduced doveweed biomass 76%, confirming field observations of doveweed tolerance to glyphosate.

Absorption of ^{14}C-glyphosate was compared between doveweed with cuticle intact, doveweed with a disturbed cuticle, and smooth crabgrass (*Digitaria ischaemum* [Schreb.] Schreb. ex Muhl.). Plants in the 5-8 leaf stage were pre-treated with a 0.71 kg ae glyphosate ha^{-1} solution in 374 L ha^{-1} carrier volume. Prior to pre-treatment a leaf on each plant was covered with aluminum foil to prevent pre-treatment exposure. After pre-treatment a ^{14}C-glyphosate solution was prepared to simulate a 0.71 kg glyphosate ae ha^{-1} application rate in 374 L ha^{-1} of water with 0.20 KBq ml^{-1} of ^{14}C-glyphosate. Prior to ^{14}C-glyphosate application, the treatment leaf on doveweed plants designated for cuticle disruption were wiped with 100% acetone. A micropipette was then used to deliver five 2-µl droplets of ^{14}C-glyphosate solution to each designated treatment leaf. Three treated plants from each subset were randomly selected for harvest 24, 72, and 144 h after treatment. Radioactivity remaining on the leaf surface was then quantified. ^{14}C-glyphosate recovery in doveweed plants with an intact cuticle was 93.6%. In comparison, ^{14}C-glyphosate recovery from doveweed plants with a disrupted cuticle and crabgrass plants was 79.1 and 70.5%, respectively. This demonstrates a potential mechanism for doveweed tolerance to glyphosate.

Future research should continue to screen old and new chemistries for doveweed control efficacy and work to further understand doveweed tolerance to POST control options.

POSTEMERGENCE GOOSEGRASS CONTROL WITHOUT MSMA. P.O. Signoretti*, L.B. McCarty, A.G. Estes; Clemson University, Clemson, SC (204)

ABSTRACT

The purpose of this study was to determine the efficacy of Pylex (topramezone) and Tenacity (mesotrione) in combination with other herbicides for goosegrass control in bermudagrass (*Cynodon dactylon*) fairways. Goosegrass is a low growing, summer annual that is identified best by its white crown. Due to its compressed growth habit, goosegrass is capable of withstanding low mowing heights, which makes it very competitive in bermudagrass fairways. Bermudagrass is a warm-season perennial that grows laterally via stolons and rhizomes. Infestations of goosegrass on bermudagrass fairways disrupt turfgrass appearance, playability and uniformity. Currently, few post-emergent herbicides offer control of goosegrass in bermudagrass without causing significant damage to the bermudagrass.

A study with sixteen treatments was initiated on July 10, 2014 with rating dates on July 22, August 1, and August 26, which corresponds to 12, 22, and 47 days after initial treatment (D.A.I.A), respectively. Treatments included: Pylex 2.8 SC @ 1.5 oz/a, Pylex 2.8 SC @ 1.5 oz/a +: Princep 4 L (8oz/a), Velocity 17.6 WDG (6oz/a), Revolver 0.19SC (13oz/a), Dismiss 4 L @ 6oz/a, Xonerate 4 L @ 5oz/a, Revolver 0.19 SC @ 13oz/a + Dismiss 4 L @ 6oz/a, Sencor 75 WG @ 0.25 lb/a, Dismiss South 4 L @ 7.25 oz/a; Dismiss South 4 L @ 7.25 oz/a + Sencor 75 WG 0.25lb/a, Revolver 0.19 SC @ 26oz/a, Revolver 0.19 SC @ 13oz/a + Sencor 75 WG @ 0.25lb/a, Dismiss 4 L @ 12oz/a + Sencor 75 WG @ 0.25lb/a, Dismiss 4 L @ 6oz/a + Sencor 75 WG @ 0.25lb/a, Dismiss South 4 L @ 7.25oz/a + Sencor 75 WG @ 0.25lb/a. A follow up study was conducted with 10 treatments occurring on August 1, 2014, and August 26, with rating dates August 26, September 5, and September 17 which corresponds to 25, 35, and 47 D.A.I.T. Treatments included: Tenacity 2.8 SC @ 5oz/a, Pylex 2.8 SC @ 1oz/a, Tenacity 2.8 SC @ 5oz/a +: Princep 4 L (8oz/a), Tenacity, Turflon Ester & Spotlight; Pylex 2.8 SC @ 1oz/a +: Princep 4 L (8oz/a), Turflon Ester 4L @ 8oz/a & Spotlight @ 21 oz/a; and MSMA 6.6 L @ 2.2lbai/a + Sencor 75 WG @ 0.33lb/a. Treatments were applied once in the first study and twice in the second study. Studies were conducted at Clemson University on common bermudagrass fields infested with goosegrass. Applications were made using a CO_2 powered sprayer calibrated at 20 GPA. Four treatment replications were applied on 2x2 meter plots, using a randomized complete block design. Visual ratings evaluated percentage control of goosegrass and percentage of turf injury received by bermudagrass. Ratings were based on a 0-100% scale. 0% indicating no control or injury and 100% indicating complete control or plant death. ANOVA was evaluated with alpha at 0.05.

On September 17, 2014, five treatments provided > 95% goosegrass control: Pylex 2.8 SC @ 1oz/a, Pylex 2.8 SC @ 1oz/a + Princep 4 L (8oz/a), Pylex 2.8 SC @ 1oz/a + Turflon Ester 4L @ 8oz/a, Pylex 2.8 SC @ 1oz/a + Spotlight @ 21 oz/a, and Tenacity 2.8 SC @ 5oz/a + Princep 4 L (8oz/a). All treatments displayed > 75% turf damage ten days after the second application except: Tenacity 2.8 SC @ 5oz/a + Princep 4 L (8oz/a) and MSMA 6.6 L @ 2.2lbai/a + Sencor 75 WG @ 0.33lb/a and Tenacity 2.8 SC @ 5oz/a.

Repeat applications and screening of additional combinations and products will be continued in the future for timing and control of goosegrass in bermudagrass fairways.

POSTEMERGENCE TROPICAL SIGNALGRASS CONTROL. A.G. Estes*, L.B. McCarty; Clemson University, Clemson, SC (205)

ABSTRACT

With the loss of MSMA in the state of Florida Tropical Signalgrass (*Urochloa distachya*) is becoming an even hard to control weed issue. Therefore in the fall of 2013 several studies were initiated in South Florida to evaluate a fall timing using various herbicide and herbicide combinations for the control of Tropical Signalgrass.

Herbicides used in the first series of trials included Tribute Total, Xonerate, Dismiss South, Revolver, and Celsius. These herbicides were applied alone and in combination with one another. Treatments were initiated on October 23, 2013 with a sequential treatment applied two weeks after the initial. Specticle was applied to all plots on October 21, 2013 at 9 oz/A.

Best results from were seen with a single application of Xonerate at 10 and 14 oz/A,; sequential applications of Tribute Total at 3.2 oz/A, Xonerate at 7.25 oz/A, Celsuis at 3.7 oz/A, Revolver at 26 oz/A and Dismiss South at 7.25 oz/A,; combinations with sequential applications of Tribute Total + Xonerate, Tribute Total + Celsius, Tribute Total + Revolver, Dismiss South + Tribute Total, and Dismiss South + Xonerate. Future research will include evaluating fall versus spring applications of various herbicides and combinations of for improved long term Tropical Signalgrass control.

SPECTICLE AND TRIBUTE TOTAL PROGRAM APPROACH FOR DOVEWEED (*MURDANNIA NUDIFLORA*) CONTROL. S.M. Wells*[1], D. Myers[2], B. Spesard[2]; [1]Bayer CropScience, High Springs, FL, [2]Bayer CropScience, Raleigh, NC (206)

ABSTRACT

Doveweed is a summer annual that typically germinates later in the growing season than most weeds and has become problematic in golf turf and residential/commercial landscapes in the southeast. Preemergence herbicide control has shown inconsistent results depending on geography. Trials were conducted in 2013-2014 at various locations throughout the southeast in bermudagrass and St. Augustinegrass. The objectives were to: 1. evaluate efficacy of Specticle Flo alone and Specticle Flo followed by post applications of Tibute Total on doveweed efficacy, 2. evaluate early and late preemergence applications, 3. evaluate single and split applications. Treatments included single and split applications of Specticle Flo at 10-48 g ai/ha and a single application of Tribute Total at 135 g ai/ha after doveweed germination. Post application of Tribute Total was only applied to bermudagrass. Results from eight trials varied by location; however, applying a post Tribute Total application after doveweed germination overall produced excellent results through 40-50 days after application when regrowth was seen. Results also showed that applying Tribute Total in July rather than June was more efficacious. Split applications were more efficacious than single applications. Single 48 g ai/ha rates of Specticle applied at preemergence timing, in March in most trials did not provide residual control compared to split applications.

SPOT APPLICATIONS FOR DALLISGRASS (*PASPALUM DILATATUM*) CONTROL. G.K. Breeden*, J.T. Brosnan; University of Tennessee, Knoxville, TN (207)

ABSTRACT

Dallisgrass (*Paspalum dilitatum*) is a difficult-to-control perennial grassy weed of turf. Glyphosate can effectively control dallisgrass when applied as a spot treatment but these applications often result in undesirable turf injury for extended periods. We hypothesized that several POST herbicides could offer effective dallisgrass control and reduced turf injury compared to glyphosate when applied as spot treatments.

Two separate studies were conducted in 2014 on mature stands of common bermudagrass (*Cynodon dactylon*) infested with dallisgrass. Plots (1.5 by 1.5 m) in both studies were maintained as golf course rough and arranged in randomized complete block designs with three replications. Study 1 was conducted at the East Tennessee Research and Education Center (Knoxville, TN) and was initiated on 23 April 2014. Study 2 was conducted at Three Ridges Golf Course (Knoxville, TN) and was initiated on 31 July 2014..These timings were selected based on previously identified growing and cooling degree day benchmarks for optimal dallisgrass control in spring and fall, respectively. No supplemental irrigation or nutrients were applied to plots during these studies. Herbicide treatments in all trials were applied with a CO_2-pressurized boom sprayer calibrated to deliver 843 L ha^{-1} utilizing four, flat-fan, 8006 nozzles at 124 kPa, configured to provide a 1.5-m spray swath. Weed control and turf injury were visually evaluated in all trials utilizing a 0 (i.e., no weed control or turf injury) to 100 % (i.e., complete weed control or turf injury) scale at 5 and 8 weeks after initial treatment (WAIT).

Treatments in both studies included sequential applications of thiencarbazone (TCM) + foramsulfuron + halosulfuron (0.332 g ai L^{-1}), trifloxysulfuron (0.066 g ai L^{-1}), foramsulfuron (0.356 g ai L^{-1}), sulfosulfuron (0.25 g ai L^{-1}), flazasulfuron (0.125 g ai L^{-1}), fluazifop (1.4 g ai L^{-1}), quinclorac (2.03 g ai L^{-1}), quinclorac + sulfentrazone (4 g ai L^{-1}), mesotrione (0.667 g ai L^{-1}), topramezone (0.061 & 0.121 g ai L^{-1}), and MSMA (5.44 g ai L^{-1}) on a 3 week interval. Glyphosate (9.6 g ai L^{-1}) was applied as a single application for comparison. TCM + foramsulfuron + halosulfuron, quinclorac, and topramezone treatments included a methylated seed oil (MSO) surfactant at 0.5% v/v. All other treatments included a non-ionic (NIS) surfactant at 0.5% v/v except foramsulfuron, quinclorac + sulfentrazone, MSMA, and glyphosate.

In both studies, TCM + foramsulfuron + halosulfuron, foramsulfuron, fluazifop, and topramezone (0.121 g) controlled dallisgrass (≥ 70%) on all rating dates. Quinclorac, quinclorac + sulfentrazone, topramezone (0.061 g), MSMA and glyphosate also controlled dallisgrass (≥ 70%) in Study 2. All other treatments controlled dallisgrass ≤ 30% in both studies. Fluazifop, topramezone and glyphosate injured bermudagrass ≥ 50% on all rating dates. All other treatments injured bermudagrass ≤ 20%. Our findings indicate that spot applications of several POST herbicides can be utilized in dallisgrass management programs.

HOW DOES RUNOFF MOVEMENT OF INDAZIFLAM AND AMICARBAZONE COMPARE TO OTHER PREEMERGENCE HERBICIDES IN TURFGRASS? R.G. Leon*, B. Unruh, B.J. Brecke; University of Florida, Jay, FL (208)

ABSTRACT

Preemergence (PRE) herbicide placement is critical for weed control and turfgrass safety. Off target movement due to runoff could be a problem in turfgrass areas with irregular topography and where high soil moisture and irrigation and rainfall events reduce PRE herbicide adsorption to soil particles. Understanding runoff potential of PRE herbicides based on their chemical properties and how to minimize this risk with management practices are critical to maximize PRE herbicide activity and prevent off-target injury. We conducted field experiments to compare the runoff movement of amicarbazone and indaziflam, two new herbicides for turfgrass, to prodiamine, oxadiazon, dithiopyr, pronamide, and simazine in bermudagrass ('Tifway') fields with 13 to 15% slope. Herbicides were applied at full label rates when the soil was at field capacity. We also evaluated how irrigation after application affected the movement of the herbicides under normal conditions and a simulated storm event. Overseeded perennial ryegrass was used as indicator species, so we could track herbicide movement measuring perennial ryegrass mortality downhill from the treated area. Irrigating after application did not affect runoff movement. Herbicides moved slightly longer distances (approximately 10 to 25% longer) after the simulated storm event compared to the treatments with normal conditions, but there was no herbicide interaction with the storm event factor. PRE herbicides differed in their runoff movement. Prodiamine and oxadiazon moved small distances that were not significantly different than the nontreated control. Dithiopyr, pronamide, indaziflam, simazine, and amicarbazone exhibited similar runoff movement, which was 2 to 15 times higher than the movement observed for prodiamine and oxadiazon. However, maximum runoff recorded was less than 2 m.

UTILITY OF TOPRAMEZONE FOR POSTEMERGENCE GOOSEGRASS CONTROL IN BERMUDAGRASS. J.T. Brosnan*[1], G.K. Breeden[1], D.S. Farnsworth[1], J.J. Vargas[1], K.E. Kalmowitz[2]; [1]University of Tennessee, Knoxville, TN, [2]BASF Corporation, Research Triangle Park, NC (209)

ABSTRACT

Goosegrass [*Eleusine indica* (L.) Gaertn.] is a problematic weed of managed bermudagrass (*Cynodon* spp.) turf. Few herbicides are labeled for selective postemergence (POST) control of goosegrass in bermudagrass. Topramezone is a pyrazole herbicide with efficacy for POST goosegrass control in cool-season turfgrass. An inhibitor of p-hydroxyphenylpyruvate dioxygenase, applications of topramezone induce transient bleaching injury to bermudagrass foliage. We hypothesized that application rates of topramezone could be identified that would maximize goosegrass control while minimizing bermudagrass bleaching injury. Spot treatments at these rates could facilitate goosegrass control in bermudagrass turf.

Research was conducted in a golf course rough at Three Ridges Golf Course (Knoxville, TN). Turf was common bermudagrass [*Cynodon dactylon* (L.) Pers.] maintained at 3.8 cm. Rainfall was the only source of irrigation at this location and no supplemental nutrients were applied. Plots (1.5 x 2.5 m) were arranged in a randomized complete block design with three replications. Topramezone was applied singly at 5.9, 12.5, 18.4, 24.3, or 36.8 g ha^{-1} at three application timings: 5 June, 10 July, and 6 August 2014. Goosegrass plants averaged 2, 6, and 10+ tillers at these timings, respectively. All treatments were mixed in water and included a methylated seed oil surfactant at 1% v/v. Applications were made using a CO_2 pressurized boom sprayer calibrated to deliver 280 L ha^{-1} using four, flat-fan, 8002 nozzles at 124 kPa. Goosegrass control was evaluated on 0 (i.e., no control) to 100 (i.e., complete kill) percent scale relative to a non-treated check. Bermudagrass injury was assessed in a similar manner.

Applied in June, topramezone controlled goosegrass 75 to 97% for 49 days after initial treatment (DAIT). However, this declined to 17 to 27% by the end of the study suggesting that sequential applications may improve control. A similar response was observed in July with topramezone controlling goosegrass 88 to 95% by 83 DAIT but only 63 to 83% by the end of the study. August applications provided 95 to 100% control by 105 DAIT and 85 to 95% control by the end of the study. Few differences in goosegrass control were detected among topramezone rates in July or August. All rates of topramezone injured bermudagrass 14 days after application regardless of timing. Injury ranged from 18 to 53% with June treatments, 35 to 60% following treatment in July, and 27 to 70% with applications in August. At each timing the 5.9 g ha^{-1} topramezone rate resulted in less injury than rates $\geq$ 12.5 g ha^{-1}. By 35 days after application, bermudagrass injury declined to 0% for all rates of topramezone regardless of application timing.

Our findings indicate that topramezone is a highly efficacious option for POST goosegrass control in bermudagrass if transient bleaching injury can be tolerated for at least 35 days after treatment. Results would indicate that 5.9 g ha^{-1} is the optimal rate to maximize goosegrass control efficacy while minimizing bermudagrass injury. However, this rate may require a sequential application to provide commercially acceptable control for the duration of the summer season in Tennessee.

INDAZIFLAM ENHANCES BUCKHORN PLANTAIN CONTROL FROM POSTEMERGENCE HERBICIDES . P. McCullough*[1], C. Johnston[2], T.V. Reed[3], J. Yu[1]; [1]University of Georgia, Griffin, GA, [2]UGA, Griffin, GA, [3]University of Florida, Gainesville, FL (210)

ABSTRACT

Indaziflam is a cellulose synthesis inhibitor used for PRE control of annual weeds in turf and applications have shown to be injurious to established buckhorn plantain. The objectives of this research were to evaluate (1) effects of indaziflam application rate and placement on buckhorn plantain injury; (2) effects of tank-mixing indaziflam with POST herbicides for buckhorn plantain control; and (3) physiological effects of indaziflam on absorption and translocation of ^{14}C-2,4-D in buckhorn plantain. In greenhouse experiments, indaziflam reduced buckhorn plantain shoot mass 61 to 75% from the nontreated at 4 week after treatment (WAT) and hierarchical rank of application placements were: foliar + soil ≥ soil ≥ foliar. Differences in biomass reduction from application rates (27.5 and 55 g ai ha^{-1}) were not detected. In field experiments, indaziflam at 55 g ha^{-1}controlled buckhorn plantain 34% at 9 WAT but enhanced the speed of control from all herbicides tested in tank-mixtures. Exclusive applications of 2,4-D or 2,4-D + dicamba + MCPP provided poor control (<70%) of buckhorn plantain at 9 WAT, but tank-mixtures with indaziflam provided 81 and 98% control, respectively. Fluroxypyr and simazine alone controlled buckhorn plantain <38% but tank-mixtures with indaziflam enhanced control >2x from exclusive applications. Tank-mixing indaziflam with metsulfuron did not improve control from metsulfuron alone after 9 wk. Bermudagrass injury was not detected from any treatment. In laboratory experiments, ^{14}C-2,4-D absorption and translocation in buckhorn plantain was similar with or without indaziflam tank-mixtures at 72 and 168 h after treatment. Overall, indaziflam may improve buckhorn plantain control from POST herbicides by providing additive phytotoxicity in tank-mixtures in spring.

EFFECTS OF PREEMERGENCE TOPRAMEZONE APPLICATION UPON SPRIGGED BERMUDAGRASS ESTABLISHMENT. J.D. McCurdy*[1], W. Philley[2], C. Baldwin[3], B. Stewart[2]; [1]Mississippi State University, Starkville, MS, [2]Mississippi State University, Mississippi State University, MS, [3]Mississippi State University, Mississippi State, MS (232)

ABSTRACT

Preemergence herbicides may slow sprigged establishment of hybrid bermudagrass. However, delayed sprigging after preemergence application may still provide benefits of weed control and stale seed bed establishment without turfgrass injury. To that end, research was conducted at the R.R. Foil Plant Science Research Center near Starkville, MS on a Marietta fine sandy loam to evaluate the effects of bermudagrass establishment timing after preemergence herbicide application. The experiment was conducted as a randomized block design in a split-plot arrangement with four replications. Main-plot treatment was sprigging interval at 0, 7, 14, or 28 days after treatment (DAT). Sub-plot treatment was herbicide applied prior to sprigging. Herbicides compared were topramezone (49 g ai ha^{-1}; Pylex® 2.8 SC, BASF Corporation, Research Triangle Park, NC), prodiamine (0.84 kg ha^{-1}; Barricade® 4 FL, Syngenta Crop Protection, Greensboro, NC), or a non-treated check. Soil was tilled and prepared one week prior to herbicide application. Herbicides were applied on July 17, 2014 with a CO_2pressurized backpack sprayer in a water carrier volume of 280 L ha^{-1}.

Sprigging of Tifway 419 hybrid bermudagrass (*Cynodon transvaalensis* × *C. dactylon*) commenced three hours after herbicide application, 0 DAT. Plots (2 m^2) were sprigged with 19 L (approx. 1000 US bushels acre^{-1}) at all sprigging intervals. Beginning August 15, plots were mown at 3.8 cm. All plots received supplemental irrigation once or twice daily until September 15, withstanding days when natural rainfall occurred. Plots received 4 g N m^{-2} (18-0-6 polymer coated urea) on August 15 and October 1, 2014. Bentazon, 2,4-D, and dicamba were applied to control broadleaf and sedge weeds October 1, 2014. Bermudagrass cover and carpetweed (*Mollugo verticillata*) control were visually assessed relative to the non-treated control 53 and 83 Days after study initiation. On the final rating date, spectral reflectance at 670 nm (red) and 780 nm (near infrared) were recorded by a Holland Scientific Crop Circle ACS430 from a height 60 cm above canopy level. NDVI was calculated as a measure of overall canopy cover. Data were subject to analysis of variance. Means were separated within SAS procedure Glimmix by Fisher's protected LSD (alpha = 0.05).

When observed 53 days after study initiation, bermudagrass sprigged directly after topramezone application (0 DAT) was not reduced in cover relative to the non-treated; whereas, prodiamine treated plots were 25% less covered than non-treated and topramezone treated plots. Similarly, when sprigged 7 DAT, topramezone treated plots covered similarly to the non-treated, while prodiamine reduced bermudagrass cover 19%. Bermudagrass cover was similar across all treatments when sprigged 14 and 28 DAT. When observed 83 days after study initiation, topramezone nor prodiamine reduced bermudagrass cover of plots sprigged 0 or 7 DAT. Contrary to previously discussed observations, topramezone reduced bermudagrass cover (15%) relative to prodiamine (only 3%) when sprigged 14 and 28 DAT, possibly due to a combination of herbicide injury and weed pressure. NDVI data indicate that prodiamine treated plots had less canopy cover when sprigged 0, 7, and 14 DAT. However, this data may have been biased by the presence of weeds absent in prodiamine treated plots. Across sprigging dates, prodiamine controlled carpetweed 86% relative to the non-treated, while topramezone control was only 51%. Based upon NDVI measurements, canopy cover was equal across herbicide treatments when sprigged 28 DAT. Future research may evaluate topramezone for bermudagrass suppression during conversion from common bermudagrass to hybrid bermudagrass in golf course fairways and home-lawns.

CYTOCHROME P450-INHIBITORS AFFECT CREEPING BENTGRASS (*AGROSTIS STOLONIFERA*) TOLERANCE TO TOPRAMEZONE. M.T. Elmore*[1], J.T. Brosnan[2], G. Armel[3], D.A. Kopsell[2], J.J. Vargas[2], G.K. Breeden[2]; [1]Texas A&M University, Dallas, TN, [2]University of Tennessee, Knoxville, TN, [3]BASF Corporation, Research Triangle Park, NC (233)

ABSTRACT

Creeping bentgrass (*Agrostis stolonifera* L.*)* is moderately tolerant to the *p*-hydroxyphenylpyruvate dioxygenase-inhibiting herbicide topramezone. Corn tolerance to topramezone is attributed to rapid N-demethylation, but the mechanism of tolerance in creeping bentgrass is unknown. Experiments were conducted to determine if known cytochrome P450 monooxygenase inhibitors 1-aminobenzotriazole (ABT) and malathion influence creeping bentgrass tolerance to topramezone.

Treatments consisted of the cytochrome P450-inhibitors ABT and malathion alone or in combination with the safener cloquintocet-mexyl. These treatments were applied alone or on combination with topramezone. Single 'Penncross' creeping bentgrass plants were established from seed in cone-tainers in a glasshouse. After six months, roots were washed to remove media and plants were placed in hydroponic culture. After 10 d ABT, malathion, or cloquintocet-mexyl were dissolved in DMSO and added to the hydroponic solutions in appropriate amounts to achieve a 70 µM concentration. Since basipetal transport of malathion and cloquintocet-mexyl can occur through shoot tissue, these treatments were also applied to the foliage at 1000 and 23 g ha^{-1}, respectively, 22 h after they were added to hydroponic solution. Topramezone (8 g ha^{-1}) was applied to the foliage 24 h after ABT, malathion, and cloquintocet-mexyl were added to hydroponic solution. All foliar treatments were applied with NIS (0.25% v/v) and 215 L ha^{-1} of water carrier through a flat-fan nozzle in a spray chamber.

This experiment was repeated in time. Interactions by experimental run were not detected; therefore, data were combined across runs for statistical analysis. Chlorophyll fluorescence yield (F_v/F_m) was evaluated 2 DAT. Visible creeping bentgrass injury and non-root biomass were evaluated 10 DAT.

Visible creeping bentgrass injury increased from 22% when topramezone was applied alone to 79 and 41% when applied with malathion and ABT, respectively. Cloquintocet reduced topramezone injury to 1%. Cloquintocet also mitigated creeping bentgrass injury from ABT and malathion. Visible responses were supported by chlorophyll fluorescence yield and creeping bentgrass biomass responses. Responses to ABT and malathion suggest that creeping bentgrass tolerance to topramezone is influenced by cytochrome P450-catalyzed metabolism. Future research should determine primary and secondary metabolites of topramezone in weeds and creeping bentgrass to better understand tolerance mechanisms.

INVESTIGATIONS INTO THE MECHANISM OF GLYPHOSATE RESISTANCE IN A GOLF COURSE POPULATION OF ANNUAL BLUEGRASS. R.B. Cross*[1], L.B. McCarty[1], S. McElroy[2], P. McCullough[3], N. Tharayil[1], B. Powell[1]; [1]Clemson University, Clemson, SC, [2]Auburn University, Auburn, AL, [3]University of Georgia, Griffin, GA (234)

ABSTRACT

Glyphosate is used in the transition zone to control annual bluegrass in fully dormant warm-season grasses. A suspected resistant (R) biotype of annual bluegrass was identified on a golf course in South Carolina after at least 10 consecutive years of glyphosate application. Greenhouse bioassays revealed the R biotype was 4.4-fold resistant to glyphosate compared to a standard susceptible (S) biotype. Further studies were conducted to determine the mechanism conferring glyphosate resistance in the R biotype. Leaf discs of both biotypes accumulated shikimate in response to increasing glyphosate concentration, but accumulation was higher in the R biotype at glyphosate concentrations >31.25 µM. At the whole plant level, similar levels of shikimate accumulation were observed between biotypes at 6 and 24 hours after treatment (HAT) with glyphosate, but greater shikimate accumulation occurred in the S biotype at 72, 120, and 168 HAT. Shikimate levels decreased in the R biotype after 72 HAT. There were no differences in ^{14}C-glyphosate uptake between biotypes. However, more ^{14}C-glyphosate translocated out of the treated leaf in the R biotype and into root tissues over time compared to the S biotype. Partial sequencing of the EPSP synthase gene revealed a point mutation which resulted in an Ala substitution at Pro_{106}. These results represent the first documentation of a Pro_{106} to Ala substitution as the mechanism of glyphosate resistance in annual bluegrass and the first report of glyphosate-resistant annual bluegrass in South Carolina.

HERBICIDE SAFENERS INFLUENCE CREEPING BENTGRASS, ROUGHSTALK BLUEGRASS, AND PERENNIAL RYEGRASS TOLERANCE TO PINOXADEN. M.T. Elmore*[1], J.T. Brosnan[2], G. Armel[3], T.C. Mueller[2], J.J. Vargas[2], G.K. Breeden[2]; [1]Texas A&M University, Dallas, TN, [2]University of Tennessee, Knoxville, TN, [3]BASF Corporation, Research Triangle Park, NC (235)

ABSTRACT

The herbicide pinoxaden is a phenylpyrazoline inhibitor of acetyl-CoA carboxylase registered in the UK for ryegrass (*Lolium* spp.) control in fine-leaf fescue (*Festuca* spp.) turfgrass. Commercial formulations of pinoxaden include the safener cloquintocet mexyl, however we are not aware of any turfgrass research investigating the contribution of cloquintocet-mexyl to turfgrass safety and weed control. Preliminary research suggested creeping bentgrass (*Agrostis stolonifera*) was moderately tolerant to pinoxaden. The objective of this research was to determine how herbicide safeners cloquintocet-mexyl, fenchlorazole-ethyl and mefenpyr-diethyl affect pinoxaden injury to creeping bentgrass and efficacy against perennial ryegrass (*Lolium perenne*) and roughstalk bluegrass (*Poa trivialis*).

Research was conducted in a glasshouse at The University of Tennessee in Knoxville in 2014. ‘Penncross’ creeping bentgrass, roughstalk bluegrass, and perennial ryegrass were seeded to separate 10-cm diameter pots filled with peat-based media. After grass emergence, pots were hand-thinned to contain five plants each and allowed to mature for 6 months prior to treatment at a 2.5 cm height. Previous experiments determined that creeping bentgrass injury from pinoxaden decreased as rates of cloquintocet-mexyl, fenchlorazole-ethyl, and mefenpyr-diethyl increased up to 450 g ha^{-1}. Based on previous responses, safeners were applied at 68 and 450 g ha^{-1} to evaluate their effects on pinoxaden (90 g ha^{-1}) injury to creeping bentgrass and efficacy against perennial ryegrass and roughstalk bluegrass. Treatments were applied with NIS (0.25% v/v) and 215 L ha^{-1} of water carrier through a flat-fan nozzle in a spray chamber. The experiment was repeated in time. Visible injury or control was evaluated at 2 and 4 WAT. Clipping yield was also collected at 2 and 4 WAT.

Safeners reduced creeping bentgrass injury from 25% to ≤ 5%. Mefenpyr-diethyl and cloquintocet-mexyl reduced creeping bentgrass injury more than fenchlorazole-ethyl. All safeners reduced roughstalk bluegrass control; control was reduced more at 450 g ha^{-1} than 68 g ha^{-1}. Pinoxaden controlled perennial ryegrass > 80% at 4 WAT and safeners did not reduce control. Field experiments should evaluate pinoxaden (90 g ha^{-1}) in combination with cloquintocet-mexyl or mefenpyr-diethyl at 68 g ha^{-1} to evaluate creeping bentgrass safety as well as perennial ryegrass and roughstalk bluegrass control in different climates and seasons.

PRE- AND POST-EMERGENCE ANNUAL BLUE-EYED GRASS (*SISYRINCHIUM ROSULATUM*) CONTROL IN BERMUDAGRASS. M.L. Flessner*[1], S. McElroy[2]; [1]Virginia Tech, Blacksburg, VA, [2]Auburn University, Auburn, AL (236)

ABSTRACT

Annual blue-eyed grass is a member of the iridaeceae family and functions as a winter annual weed in bermudagrass. It can also persist as a perennial. Little information is available for herbicidal control, whether preemergence (PRE) or postemergence (POST) applied. The objectives of this research were to evaluate PRE and POST herbicides for blue-eyed grass control.

Field and greenhouse experiments were conducted from 2013 to 2015. Studies included PRE and POST experiments in both field and greenhouse settings, respectively. All studies were conducted in Auburn, AL with the exception of 2013 POST field study, which was located in Montgomery, AL. POST greenhouse study treatments were applied in March and included foramsulfuron (Revolver; Bayer Environmental Science, Research Triangle Park, NC) at 29 g ai ha^{-1}, thiencarbazone + iodosulfuron + dicamba (Celsius; Bayer Environmental Science) at 233 g ai ha^{-1}, thiencarbazone + foramsulfuron + halosulfuron (Tribute Total; Bayer Environmental Science) at 136 g ai ha^{-1}, metsulfuron + rimsulfuron (Negate; Quali-Pro; Pasadena, TX) at 35 g ai ha^{-1}, 2,4-D + MCPP + dicamba (Trimec Classic; PBI Gordon Corp., Kansas City, MO) at 1110 g ai ha^{-1}, sulfentrazone + imazethapyr (Dismiss South; FMC Corp., Philadelphia, PA) at 504 g ai ha^{-1}, imazaquin (Image, BASF Crop., Research Triangle Park, NC) at 560 g ai ha^{-1}, quinclorac (Drive XLR8; BASF Crop.) at 840 g ai ha^{-1}, and trifloxysulfuron (Monument; Syngenta Crop Protection, LLC, Greensboro, NC) at 28 g ai ha^{-1}. POST field studies included the same treatments as the greenhouse study with the addition of rimsulfuron (TranXit; Dupont, Wilmington, DE) at 35 g ai ha^{-1}, and 2,4-D + MCPP + dicamba + carfentrazone (Speedzone; PBI Gordon Corp.) at 1230 g ai ha^{-1}. PRE field experiment treatments were applied in early September and included indaziflam (Specticle Flo; Bayer Environmental Science) at 54 g ai ha^{-1}, oxadiazon (Ronstar; Bayer Environmental Science) at 3360 g ai ha^{-1}, pendimethalin (Pendulum AquaCap; BASF Corp.) at 1850 g ai ha^{-1}, prodiamine (Barricade; Syngenta Crop.) at 1120 g ai ha^{-1}, and dithiopyr (Dimension; Dow AgroSciences LLC, Indianapolis, IN) at 426 g ai ha^{-1} followed by dithopyr 12 weeks later at 426 g ai ha^{-1}. PRE greenhouse experiments included the same treatments as PRE field experiments with the exception of dithiopyr only applied once at 560 g ai ha^{-1} and the addition of propyzamide (Kerb; Dow AgroSciences LLC) at 1120 g ai ha^{-1}, isoxaben (Gallery; Dow AgroSciences LLC) at 1490 g ai ha^{-1}, and *S*-metolachlor (Pennant Magnum; Syngenta Crop Protection LLC) at 2780 g ai ha^{-1}. All experiments included a nontreated check, utilized a randomized complete block design with a minimum of three replications, and were applied at 280 L ha^{-1}. Annual blue-eyed grass control was visually evaluated relative to the nontreated check on a 0 (no control) to 100 (complete plant necrosis) scale. Visible control was assessed 3, 6, and 9 weeks after treatment (WAT) in POST field studies, 2, 4, and 6 WAT in POST greenhouse studies, and monthly from December to May in PRE field studies. Annual blue-eyed grass plant counts per pot and above ground dry biomass were assessed 10 WAT in PRE greenhouse studies. Data were subjected to ANOVA and effects were considered significant when $P < 0.05$ followed by means separation using Fisher's protected LSD ($P < 0.05$).

All POST treatments resulted in ≥ 93% control 6 WAT. Speedzone resulted in the fastest control, 98% 2 WAT. In greenhouse POST experiments, all treatments except foramsulfuron and imazaquin resulted in ≥ 90% control 4 WAT. Overall, these data indicate that annual blue-eyed grass is susceptible to a many common turfgrass herbicides applied for winter annual weed control. All field PRE treatments resulted in 0% control from December to May, likely indicating that this was a perennial population. All PRE greenhouse treatments significantly reduced population and above ground biomass relative to the nontreated. Oxadiazon, pendimethalin, prodiamine, dithiopyr, and *S*-metolachlor all resulted in complete control in both experimental runs. These data indicate that PRE herbicides evaluated do result in annual blue-eyed grass control, but the weed must be establishing from seed.

TOPRAMEZONE FOR BERMUDAGRASS ENCROACHMENT INTO BENTGRASS. C.A. Segars*[1], J.Q. Moss[1], A.R. Post[1], K.E. Kalmowitz[2]; [1]Oklahoma State University, Stillwater, OK, [2]BASF Corporation, Research Triangle Park, NC (237)

ABSTRACT

Pylex™ is a broad-spectrum, postemergent herbicide containing the active ingredient topramezone which is an HPPD-inhibiting herbicide. Pylex™ is labeled for the control of bermudagrass (*Cynodon dactylon* (L.) Pers.) and goosegrass (*Eleusine indica* (L.) Gaertn.) in cool season turfgrass. Bermudagrass is often used on the collar of creeping bentgrass (*Agrostis stolonifera* L.) putting greens where there is potential for stolon encroachment onto the putting green. Few herbicides are labeled to manage bermudagrass stolon encroachment into creeping bentgrass greens. The objective of this research was to investigate rate and timing of topramezone application programs to safely remove bermudagrass stolons encroaching onto bentgrass greens.

Two studies were initiated in Stillwater OK, one at Lakeside Golf Course and a second at the Oklahoma State University Turfgrass Research Facility. Studies were initiated as randomized complete block designs with 10 treatments and four replications. The product was evaluated from 0.0175, 0.035, 0.070 and 0.105 L/ha applied sequentially spaced three weeks apart either initiating in mid to late-July and again in mid-August. All topramezone applications included 1% v/v MSO. The study at the Turfgrass Research Facility was only initiated in August while the Lakeside study had initiating applications for both programs. Siduron at 48.8 kg ha^{-1} was used as the industry standard comparison. Visual evaluations of % bermudagrass control, % bermudagrass whitening, and % creeping bentgrass injury were taken 7, 14, 21, and 28 DAT for each application date. At the conclusion of the studies bermudagrass encroachment onto the green was measured. Data were managed in ARM and subject to ANOVA. Means were separated using Fishers protected LSD where α=0.05.

Topramezone did not significantly reduce bermudagrass encroachment regardless of initial application timing and siduron was no more effective than topramezone. The highest rate of topramezone (0.105 L/ha) caused unacceptable bentgrass injury after the first application at 29%. The 0.070 L/ha rate caused 21% injury and the 0.035 L/ha rate caused 11% injury. Management programs initiated in August caused more severe injury compared to July initiated programs. By two weeks after treatment August initiated programs were injured as much as 49%. This is likely due to increased daytime temperatures experienced in September compared to August in Stillwater, causing increased heat stress on bentgrass. Creeping bentgrass recovered quickly except in isolated areas of the green where turf was heat and water stressed. At 30 days after the first application and 8 days after the last application bermudagrass control was the greatest at 0.105 L/ha rate in both the July and August initiated programs with up to 29% and 34% control respectively. The 0.070 L/ha rate had 24% and 21% control while the 0.035 L/ha had 10% and 6% in the July and August initiated programs, respectively. At completion of the study there were numerical differences in length of bermudagrass encroachment into the putting green between nontreated and topramezone plots; however, none were significant. Based on the studies we performed this season, this application regimen should not be a recommended product placement for Pylex™ in the region.

PLANT GROWTH REGULATOR EFFICACY ON BERMUDAGRASS. L.B. McCarty, A.W. Gore*; Clemson University, Clemson, SC (238)

ABSTRACT

The purpose of this study was to evaluate the efficacy of various herbicides and plant growth regulators for control of vertical growth and seedhead development in bermudagrass rough areas. Bermudagrass is a commonly used warm-season turfgrass for both golf courses and athletic fields. The use of plant growth regulators is a common practice on all areas of golf courses to reduce the required amount of mowing and to limit the presence of the unsightly seedhead of finger-like spikes. Some herbicides have shown potential in limiting bermudagrass growth without total plant death. However, the repeated application of regulators and herbicides presents potential financial and phytotoxic problems.

A study with 7 treatments was initiated on May 26, 2014 with a second application 8 weeks later on July 21st. Data was collected weekly. Treatments included: Plateau (Imazapic) + Trinexapac-ethyl (referred to as TE) at 4 fl oz/A + 22 fl oz/A, RoundUp Pro Max (glyphosate) at 4 fl oz/A, Stronghold (Mefluide + Imazethapyr + Imazapyr) at 38 fl oz/A, TE at 22 fl oz/A, Anuew (Prohexadione calcium) at 27.5 oz/A, Plateau at 4 fl oz/A, and Plateau at 8 fl oz/A. Study was conducted at Clemson University on bermudagrass maintained at a level consistent with that of golf course rough. Applications were made with a CO_2powered backpack sprayer calibrated at 40 GPA. Four replications were applied on 1.5 x 2.5 meter plots, using a randomized complete block design. Ratings included: visual rating of phytotoxicity based on a 1-9 scale (1 indicating total plant death and 9 indicating no damage), a grid count system for seedhead density to establish a 0-100% presence, and an average height. ANOVA was evaluated with alpha at 0.05.

At 56 DAIT, Plateau + TE provided the best suppression of seedhead development with a density of 8.5%. Anuew and Plateau at 4 fl oz/A has density levels of 48.38% and 40.73%, respectively. All other treatments were greater than 50%. TE and Plateau at 4 fl oz/A provided the best levels of phytotoxicity levels with both at 9. Stronghold, Anuew, and Plateau at 8 fl oz/A provided damage levels of 8.0, 7.5, and 7.3, respectively, with all other treatments providing levels less than 7. Plateau + TE provided the greatest limited vertical growth with an average height of 4.42 inches at 56 DAIT. Anuew, Plateau at 4 fl oz/A, and Plateau at 8 oz fl oz/A provided average heights of 6.36 inches, 6.01 inches, and 6.49 inches, respectively. All other treatments were greater than 7 inches. At the conclusion of the second trial (112 DAIT) Plateau + TE, Stronghold, TE and Anuew provided best phytotoxicity ratings with Plateau + TE, Stronghold, and TE providing ratings of 9 and Anuew providing 8.8. A. All other treatments were less than 7. Plateau + TE provided greatest suppression of seedhead with a density of 10.15% as well as the most reduced vertical growth with an average height of 4.41 inches.

SMOOTH CRABGRASS (*DIGITARIA ISCHAEMUM*) AND GOOSEGRASS (*ELEUSINE INDICA*) CONTROL IN CREEPING BENTGRASS WITH METAMIFOP. M.L. Flessner*[1], S. McElroy[2], E.T. Parker[2]; [1]Virginia Tech, Blacksburg, VA, [2]Auburn University, Auburn, AL (239)

ABSTRACT

Smooth crabgrass and goosegrass are problematic weeds in creeping bentgrass putting greens. Few herbicidal control options exist for control of these weeds. Previous research indicates that metamifop has significant herbicidal activity on smooth crabgrass and goosegrass with safety to creeping bentgrass. Research was conducted to refine application rates and sequential application rates that optimize control and injury.

Research was conducted at the Auburn University's Turfgrass Research and Education Center in Auburn, AL (32.34°N, 85.29°W) in 'Crenshaw' creeping bentgrass. Three studies were conducted. Smooth crabgrass control and creeping bentgrass injury were evaluated separately at two mowing heights—a putting green height of 0.32 cm and a rough height of 3.8 cm. Goosegrass control was also evaluated in a separate trial at putting green height. All studies were conducted as randomized complete block with a minimum of three replications per treatment and all studies were repeated-in-time. Treatments evaluated for smooth crabgrass control were the same for both mowing heights and were metamifop (SAH-001; Summit Agro International Ltd.:Tokyo, Japan) applied once at 200, 400, and 800 g ai ha^{-1}, metamifop applied twice, sequentially on three week intervals at 200 followed by (fb) 200 and 400 fb 400 g ai ha^{-1}, metamifop applied thrice, sequentially on three week intervals at 200 fb 200 fb 200 and 100 fb 100 fb 100 g ai ha^{-1} and fenoxaprop (Acclaim Extra®; Bayer Environmental Science, Research Triangle Park, NC) applied thrice, sequentially on three week intervals at 17 g ai ha^{-1}. Treatments evaluated for goosegrass control were metamifop applied once at 200, 300, and 400 g ai ha^{-1}, metamifop applied twice, sequentially on three week intervals at 200 fb 200 and 300 fb 300 g ai ha^{-1}, fenoxaprop applied once at 100 g ai ha^{-1}, and fenoxaprop applied twice, sequentially on three week intervals at 100 fb 100 g ai ha^{-1}. All treatments were applied at 280 L ha^{-1} with a handheld four nozzle boom (TeeJet TJ8002VS nozzles on 25 cm spacing; Spraying Systems Company, Wheaton, IL) to 1.5 m by 1.5 m plots. Crabgrass and goosegrass control were visually evaluated relative to the nontreated check on a 0 (no control) to 100 (complete plant necrosis) scale. Creeping bentgrass injury was visually evaluated using a similar 0 to 100 scale, with a score of 20 representing the maximum commercially acceptable injury. Data were collected weekly to 56 days after initial treatment (DAIT). Data analyses were performed using SAS PROC GLM (SAS® Institute v. 9.1, Cary, NC). Data were subjected to ANOVA and effects were considered significant when $P < 0.05$. Subsequently, data were also subjected to means separation using Fisher's protected LSD ($P < 0.05$).

Year by treatment interactions were significant for all data except smooth crabgrass control at putting green height. Despite differences between years, the best metamifop treatments resulted in similar or superior goosegrass and smooth crabgrass control compared to fenoxaprop treatments in all cases. Metamifop treatments that included sequential applications resulted in ≥ 84% smooth crabgrass control at the rough height at the final rating 56 DAIT across all rates evaluated. All metamifop treatments resulted in ≥ 94% smooth crabgrass at putting green height at the final rating 56 DAIT. The best goosegrass control treatment was metamifop at 300 fb 300 g ai ha^{-1}, which resulted in > 98% control 56 DAIT in both years. Metamifop treatments that totaled 800 g ai ha^{-1} resulted in commercially unacceptable injury levels (> 20%) to creeping bentgrass at both mowing heights. Overall, metamifop has excellent potential as a commercial product for postemergent crabgrass and goosegrass control in creeping bentgrass.

POSTEMERGENCE PERENNIAL KYLLINGA CONTROL IN CREEPING BENTGRASS GOLF FAIRWAYS. L.B. McCarty*, R.B. Cross, A.G. Estes; Clemson University, Clemson, SC (240)

ABSTRACT

Perennial (aka green kyllinga, shortleaf spike sedge) kyllinga (*Kyllinga brevifolia* Rottb.) is a problematic mat-forming perennial weed in Cyperaceae. It commonly invades turfgrass stands where moisture is in excess. As with many perennial weeds, an extensive network of rhizomes increases difficulty of control of this plant.

Recently, perennial kyllinga has become a major weed in creeping bentgrass fairways, even where moisture issues are not present. Previous research has focused mainly on kyllinga control in warm-season turfgrasses with sulfonylurea herbicides and mixtures containing sulfentrazone. Limited product registration exists for cool-season turfgrasses; therefore, the objective of this research was to evaluate postemergence herbicide programs for perennial kyllinga control and creeping bentgrass fairway turf tolerance.

Treatments were applied to kyllinga-infested 'Penncross' creeping bentgrass fairways in Sky Valley, GA using a CO_2-pressurized backpack sprayer calibrated to deliver 20 GPA through 8003 flat-fan nozzles. The experimental design was a randomized complete block with four replicated 2 x 3-m plots. Percent visual kyllinga control and bentgrass injury ratings were recorded at several rating dates.

Treatments included MSMA 6.6L at 0.75 lb ai/a, halosulfuron (Sedgehammer 75 WP) at 1.3 oz/a, bentazon (Basagran T&O 4L) at 3 pt/a, imazosulfuron (Celero 75WDG) at 11 oz/a, carfentrazone (Quicksilver T&O 1.9L) at 6 oz/a, carfentrazone + 2,4-D + MCPP + dicamba (SpeedZone Southern 0.81L) at 5 pt/a, sulfentrazone (Dismiss 4L) at 10 oz/a, sulfentrazone + carfentrazone at 8 + 6 oz/a, sulfentrazone + halosulfuron at 6 + 1.3 oz/a, bispyribac-sodium (Velocity 17.6 WDG) at 6 oz/a, amicarbazone (Xonerate 4L) at 3 oz/a, and prodiamine + sulfentrazone (Echelon 4L) at 12 oz/a. Treatments were applied once or twice with an initial application on August 13, 2014 and a sequential on September 3, 2014.

Creeping bentgrass injury was not observed for any treatment at any rating date following applications. At 14 days after treatment (DAT), single applications of sulfentrazone, sulfentrazone + carfentrazone, and sulfentrazone + halosulfuron provided >85% kyllinga control. Single applications of all other treatments provided <75% control at this time. At 49 DAT, a single application of imazosulfuron provided 100% kyllinga control, with sulfentrazone + halosulfuron and halosulfuron alone providing 93 and 88% control, respectively. Single applications of all other treatments provided <40% control 49 DAT.

At 14 days after sequential treatment (DAST), two applications of imazosulfuron, halosulfuron, sulfentrazone, and sulfentrazone + halosulfuron provided 100% kyllinga control. Sulfentrazone + carfentrazone and sulfentrazone + prodiamine provided 92 and 77% control, respectively. At 28 DAST, previously mentioned treatments provided >87% kyllinga control. Two applications of all other treatments provided <60% kyllinga at this time.

In conclusion, long-term control (49 DAT) with single applications should include imazosulfuron or halosulfuron. Single applications of other herbicides tested will not adequately control perennial kyllinga. Two applications of sulfentrazone or sulfentrazone in combination with carfentrazone or imazosulfuron or halosulfuron provided >90% control. Future research will repeat trials at various locations under differing environmental and cultural conditions and evaluate additional combinations with sulfentrazone as alternate modes of action to sulfonylureas.

DEVELOPMENT OF A TURF AND LANDSCAPE WEED GARDEN TO ENHANCE CLIENTELE IDENTIFICATION SKILLS. A.J. Patton*; Purdue University, W. Lafayette, IN (241)

ABSTRACT

For extension educators, educational programming should include delivery methods that help our clients gain not only knowledge, but experience through exploration. As such, enhancement of delivery to increase educational effectiveness should be a priority. Among turfgrass extension specialists, the use of workshops and seminars to inform and educate clientele is common; however, hands-on demonstrations have also been observed to enhance learning and direct shifts in the thoughts and practices of attending clientele. In recent years, Extension agents and specialists across the country have developed gardens to educate clientele about multiple issues. When combined with traditional education programming, visits to hands-on demonstration sites increase learning and influence management decisions. The proper identification of weeds and their life cycle is essential to developing effective weed management strategies. To help facilitate improved turf weed identification skills, a weed garden was constructed at the W.H. Daniel Turfgrass Research and Diagnostic Center in West Lafayette, IN. The primary objective of this weed garden was to provide basic weed identification education for turf and landscape clientele. Secondary objectives, through educational programing, were to gather data on weeds that are difficult to control in managed turf and to justify the need for additional weed identification education. The garden was planted with over 100 weed species based on surveys on problematic weeds. The weed garden proved useful for introducing additional hands-on learning activities into traditional lecture-based seminars. Through seminar and field day attendee feedback, data were gathered on weeds commonly misidentified. The data reflected the need to continue focusing education efforts on weed identification and to increase training on weeds commonly misidentified. Through continued use of the weed garden, extension specialists can enhance clientele identification skills and aid in developing effective weed management strategies.

VEGETATIVE ESTABLISHMENT OF FOUR WARM-SEASON GRASSES FOLLOWING TOPRAMEZONE APPLICATIONS. C. Johnston*[1], P. McCullough[2]; [1]UGA, Griffin, GA, [2]University of Georgia, Griffin, GA (242)

ABSTRACT

A field experiment was conducted at the University of Georgia in Griffin, GA from June to October 2013. A mature tall fescue field was sprayed with glyphosate to kill existing vegetation in June. The field was scalped with a rotary mower, sliced in two directions, and debris was removed with blowers. Soil at the site was a Cecil sandy clay loam with a 6.0 pH and 2% organic matter.

Experimental design was a split-plot with four replications. Whole plots were ten herbicide treatments, and subplots were four turfgrass species. Whole plot size measured 5 x 20', and the four subplots measured 5 x 5' individually. The ten treatments included Pylex (topramezone) at 2 fl oz/acre plus MSO at 1% v/v applied one week before planting plugs, the day of planting, 1 week after planting, 2 weeks after planting, or four weeks after planting. For comparison, Tenacity (mesotrione) at 8 fl oz/acre plus NIS at 0.25% v/v was applied on the day of planting, 1 week after planting, 2 weeks after planting, or four weeks after planting. A nontreated plot was included in each replication.

On July 2, 2013, two plugs were planted per subplot including 'TifGrand' bermudagrass, 'Sea Isle 1' seashore paspalum, 'TifBlair' centipedegrass, and 'Palmetto' St. Augustinegrass. Plugs were collected from mature fields on the Griffin Campus, with aforementioned soil, and measured 3 x 3" area by 4" depth. Bermudagrass and seashore paspalum fields had been maintained as fairways with reel-mowers, while centipedegrass and St. Augustinegrass were maintained as lawns with a rotary mower. Treatments were applied with a CO_2 pressured sprayer calibrated to deliver 25 gallons per acre. The field was irrigated to prevent turfgrass moisture stress, and mowed weekly with a rotary mower at 2" height with clippings returned.

Overall tolerance levels from high to low of turfgrass species to Pylex was centipedegrass > St. Augustinegrass = seashore paspalum > bermudagrass. Tolerance of turfgrasses from high to low for Tenacity was centipedegrass > bermudagrass > St. Augustinegrass = seashore paspalum. Despite injury of grasses to Pylex, lateral growth was generally improved due to weed control from the nontreated. Smooth crabgrass control from Pylex was similar or better than Tenacity treatments, and Pylex was more effective at later timings on tillered crabgrass. However, Tenacity was more effective for controlling swinecress than Pylex.

WINTER APPLICATION OF ETHEPHON, TRINEXAPAC-ETHYL, AND FOSETYL-AL FOR ANNUAL BLUEGRASS SEEDHEAD SUPPRESSION. S.S. Rana*[1], S. Askew[2]; [1]Virginia Polytechnic Institute and State University, Blacksburg, VA, [2]Virginia Tech, Blacksburg, VA (243)

ABSTRACT

Annual bluegrass (*Poa annua* L.) seedheads in spring disrupts both the aesthetics and playability of creeping bentgrass (*Agrostis stolonifera* L.) putting greens. Plant growth regulators (PGR) are frequently used to suppress annual bluegrass seedheads on creeping bentgrass greens. The use of PGRs for annual bluegrass seedhead suppression has generated erratic results for turf phytotoxicity. Ethephon (Proxy) may discolor annual bluegrass; however, tank-mixing ethephon with trinexapac-ethyl (Primo Maxx) can reduce or mask turf injury. Recently, use of fosetyl-Al (Chipco Signature; FA) has increased on creeping bentgrass greens to promote plant health, manage stress, and increase turf quality under all environmental conditions. Application timing for PGRs can greatly influence efficacy for annual bluegrass seedhead suppression. A field trial was conducted at the Virginia Tech Golf Course in Blacksburg, VA to evaluate efficacy of ethephon plus trinexapac ethyl (E+T) with or without FA applied at different times for annual bluegrass seedhead suppression on a creeping bentgrass and annual bluegrass putting green. The trial was arranged as a randomized complete block design with 11 treatments replicated four times. The treatments included E+T with or without FA applied in October, November, December, or February each fb two spring applications in April, and E+T with or without FA applied twice only in April. The treatments also included a non-treated check for comparison. Half of each plot was aerated in spring to evaluate influence of aeration on turf response and seedhead suppression. Data were analyzed in SAS 9.2 and treatment means for each response variable were separated using Fisher's Protected LSD at the 5% level of significance. At one month after treatment (MAT), E+T injured creeping bentgrass more than commercially acceptable levels (<30%). E+T applied in October and November injured creeping bentgrass 69 and 70%, respectively. Adding FA to E+T masked the injury from E+T alone and improved turf normalized difference vegetation index (NDVI) compared to E+T alone applied in October, November, and December, 1 MAT. Creeping bentgrass started to recover from October applications and injury was below commercially acceptable levels 2 MAT. However, creeping bentgrass injury from November applications of E+T persisted for 4 months. At 1 week after core cultivation in spring (April 21, 2014), there were no significant effects of aeration on creeping bentgrass response; however, aeration increased annual bluegrass control in all E+T with FA applications, except February application, and E+T applied in October. In April, plots that received FA with E+T exhibited apparent "crown rising" and associated scalping of creeping bentgrass, significantly increasing creeping bentgrass injury on April 28 compared to plots that did not receive FA. During peak annual bluegrass bloom (May 9, 2014), all treatments suppressed annual bluegrass seedheads at least 57%. E+T suppressed annual bluegrass seedheads 100% when applied with FA at all application timings. October fb spring and spring only applications of E+T suppressed annual bluegrass seedheads 83 and 57%, respectively, and lower than other treatments.

AMINOCYCLOPYRACHLOR COMBINATIONS FOR WOODY PLANT CONTROL IN PASTURES. D.E. Sanders*; LSU AgCenter, Clinton, LA (164)

ABSTRACT

Interest in pasture woody plant control in Louisiana and other Gulf Coast states has increased in the past several years for several reasons. Long term neglect of woody plant encroachment from wood lines and pasture margins due to low cattle prices has been replaced with renewed interest in reclaiming pasture margins due to increased cattle prices. In addition, throughout south Louisiana downed trees in pastures due to four hurricanes in eight years has resulted in an increase in woody plant infestations increasing throughout pastures. Invasive species such as Chinese tallow (*Sapium sebiferum*) and Chinese privet (*Ligustrum sinense*) continue to increase. Since 2008, sixteen replicated trials using amincyclopyrachlor alone or in combination with registered pasture herbicides have been conducted targeting nine woody species commonly occurring in pastures in south Louisiana. Seven bermudagrass (*Cynodon dactylon)* tolerance trials were conducted with six harvested for yield analysis. Three Pensacola bahiagrass (*Paspalum notatum*) tolerance trials were conducted with two harvested for yield analysis. Trials were conducted at the Bob R. Jones-Idlewild Research Station at Clinton, LA or the Reproductive Biology Center at St. Gabriel, LA.

Three trials targeting Chinese Tallow (*Sapium sebiferum)* were conducted using MAT 28 (aminocyclopyrachlor) at rates from 0.94-2.0 oz ai/a in combination with Escort at .60 oz ai/a, Telar at .75 oz ai/a, triclopyr at 0.5 lb ai/a, 2,4-D at 1.0 lb ai/a or imazapyr at 1.0 lb ai/a. MAT 28 treatments were compared to either triclopyr at 1.0 lb ai/a, Milestone at 1.73 oz ai/a + Escort at 0.31 oz ai/a or Grazon P+D at .95 lb ai/a. All MAT 28 combinations provided 100% control of Chinese tallow one year after application. One trial targeting Chinese privet (*Ligustrum sinense*) and two trials targeting yaupon (*Ilex vomitoria*) were conducted using MAT 28 at rates from 2-10 oz ai/a in combination with Escort at 2-4 oz ai/a, Triclopyr at 2.0 lb ai/a or imazapyr at 1.0 lb ai/a. All MAT 28 combinations provided 95% or better control of Chinese privet and 99% or better control of Yaupon one year after treatment Standard treatments of Escort at 2-3 oz provided 80% control and Triclopyr at 2 lb ai/a provided 60% control one year after treatment. Three trials targeting dewberry (*Rubus sp.*) were conducted using MAT 28 at rates from 0.94-2.0 oz ai/a in combination with either Escort at 0.60 oz ai/a, Telar at 0.75 oz ai/a or triclopyr at 1.0 lb ai/a. MAT 28 plus triclopyr provided 99% or better control one year after treatment. MAT 28 plus either Escort or Telar provided 80% control one year after treatment. The standard treatment of Grazon P+D at 1.0 lb ai/a provided less than 50% control one year after treatment. Additional target species: box elder (*Acer negundo*), water oak (*Quercus nigra*), sugarberry (*Celtis laevigata*) and wax myrtle (*Myrica cerifera)* were evaluated over the past eight years. Most MAT 28 combinations provided greater than 90% control of box elder and water oak one year after application. MAT 28 combinations provided 50% or less control of sugarberry and wax myrtle one year after application.

Between 2009 and 2012 seven bermudagrass tolerance trials were conducted to evaluate phytoxicity and yield effects from MAT 28 alone or in combination with Escort, Telar, 2,4-D or triclopyr. MAT 28 rates ranged from 0.667 to 2.0 oz ai/a alone or in combination with one of the following: Telar from 0.56 to 0.75 oz ai/a, Escort from 0.10-0.30 oz ai/a, 2,4-D from 5.3-10.6 oz ai/a or triclopyr at 2.0-3.0 oz ai/a. All MAT 28 treatments at 1.0 oz ai/a or greater alone or in combination showed transient yellowing for 7-10 days with the exception of combinations containing 2,4-D which showed little or no discoloration. Yield results from these trials showed no significant differences between treatments and weed free checks. Three phtotoxicity trials with Pensacola bahia grass were conducted using the same above rates. No discoloration or yield reduction was noted except with MAT combinations containing Escort at any rate. MAT 28 plus Escort reduced Pensacola bahiagrass yields greater than 50%.

Further work in determining effects of MAT 28 combinations on pasture shade trees needs to be conducted. In all but the wax myrtle trial one or more of the combination treatments controlled the target species as well or better than the standard. The residual control provide by MAT 28 would be advantageous in pastures.

CHINESE TALLOWTREE CONTROL IN PASTURES. S.F. Enloe*; Auburn University, Auburn, AL (165)

ABSTRACT

Chinese tallowtree is an invasive tree found throughout the southeastern United States. Its negative impacts can be seen in numerous natural and managed ecosystems including bottomland hardwood forests, pastures, pine plantations, and along lakes, ponds, streams, and rivers. Despite its troublesome presence for many decades, relatively few effective control strategies are available. Root sprouting following management efforts is a major impediment to successful control. Studies were conducted in Alabama and Louisiana at three locations to test several herbicides for cut stump, basal bark, and foliar individual plant treatment methods. Herbicide treatments included triclopyr amine and ester formulations, imazamox, aminopyralid, aminocyclopyrachlor, and fluroxypyr. Data were collected just before leaf senescence one and two growing seasons after treatment, and included Chinese tallowtree foliar cover, number of stump or root collar sprouts and number of sprouts originating from lateral roots within a one meter radius of each tree. For the cut stump and basal bark studies, most herbicide treatments prevented sprouting from the stump or root collar region better than from lateral roots. Aminopyralid reduced total sprouting better than all other treatments in the cut stump study. The high rates of aminocyclopyrachlor and fluroxypyr resulted in the highest mortality in the basal bark study. Aminocyclopyrachlor reduced total sprouting better than all other herbicides in the foliar treatment study. Triclopyr amine and ester formulations, which are commercial standards, did not consistently control Chinese tallowtree across these IPT studies. These studies provide some promising treatments to increase the number of effective tools that can be used to manage Chinese tallowtree. Additional research is needed to address the prolific nature of lateral root sprouting following any of these treatment methods.

BUSH-TYPE BLACKBERRY CONTROL AFTER 2 ANNUALLY APPLIED TREATMENT PROGRAMS UTILIZING HERBICIDE MIXTURES VERSUS MECHANICAL MOWING. W.N. Kline*[1], P.L. Burch[2], E.G. Lowe[3];[1]Retired, Dow AgroSciences, BALL GROUND, GA, [2]Dow AgroSciences, Christiansburg, VA, [3]University of Georgia, Arnoldsville, GA (166)

ABSTRACT

The objective of this field research was to evaluate currently labeled herbicides and herbicide mixtures for long term blackberry control and compare to mechanical mowing for pasture renovation. This experiment was initiated in Oct 2012 in an abandoned fescue pasture near Crawford, GA. All plots were sprayed 2 years in a row – "sequential applications" in Oct 2012 and again in Oct 2013. Sprayed plots are 24 ft X 50 ft with 16 ft untreated buffers between plots arranged in a randomized complete block design with 3 replications per treatment.

Treatments were: Chaparral® 3.3 Oz/A; Chaparral 2 Oz + PastureGard® HL 1 Pt/A; GrazonNext® HL 2 Pt + Remedy® Ultra 2 Pt/A; GrazonNext HL 2 Pt + PastureGard HL 1 Pt/A; PastureGard HL 2 Pt/A; ACP 1.11 Oz + Metsulfuron 0.17 Oz (Ai/Ac); ACP 2.22 Oz + Metsulfuron 0.34 Oz (Ai/Ac); Metsulfuron 0.34 Oz (Ai/A); and Mechanical Mowing. (note: ACP = Aminocyclopyraclor)

Total sprayed volume was 30 GPA applied with ATV boom sprayer. All treatments included non-ionic surfactant (0.25% v/v). Mechanical mowing was completed at the same time as spray treatments with a "bush hog" mower attached to a farm tractor. All plots were visually rated for % blackberry control and fescue cover in fall 2013 (365 DAT) and fall 2014 (705 DAT).

Results: Blackberry briars take a long time to "take over" a pasture. Getting rid of them takes several years – a multi-year herbicide program is necessary. After 2 annual "sequential applications" to a blackberry infested fescue pasture, results suggest that treatments containing metsulfuron are less efficacious for blackberry control than non-metsulfuron treatments. Our observations suggest that sequential applications of metsulfuron containing herbicides (2 years in a row) cause significant fescue injury. This injury results in bare ground areas that promote re-invasion by blackberry, weedy grasses and other broadleaf weeds. In general the lack of fescue canopy provides opportunity for weeds (including blackberry) to re-establish. Herbicides and herbicide mixtures that did not contain metsulfuron improved the fescue canopy following each of the sequential applications. This outcome is different from the results that were presented in 2014 (Kline et al SWSS 2014). The best treatments at the end of 2 years (705 DAT) were GrazonNext HL 2 Pt + Remedy Ultra 2 Pt/A providing 94% blackberry control followed by GrazonNext HL 2 Pt + PastureGard HL 1 Pt/A with 91% control followed by PastureGard HL 2 Pt/A with 80% control. Chaparral treatments provided marginal control, ranging from 70 to 75% control. All other treatments were less than 70% control and should be considered not commercially acceptable. The net result is the combination of blackberry control provided by non-metsulfuron herbicides, plus the thick fescue canopy that develops following these treatments, results in excellent pasture renovation and near complete blackberry eradication.

Based upon these results, recommendations are for sequential annual spray treatments (at least 2 years) using one of the following: 1) GrazonNext HL 2 pts/acre + Remedy Ultra 2 pts/acre; 2) GrazonNext HL 2 pts/acre + PastureGard HL 1 pt/acre

Chaparral (or other metsulfuron containing herbicide mixture) as a first year treatment on thick canopy blackberry stands, then switch to non-metsulfuron mixtures such as GrazonNext HL + Remedy Ultra or GrazonNext HL + PastureGard HL as the second year treatment.

Also, PastureGard HL was evaluated in this trial at 2 pts/acre; 3 pts/acre has been shown to be efficacious on blackberry in operational programs. Sequential annual applications of Pasturegard HL at 3 pts/acre need to be evaluated in field experiments and compared to the recommended rates above.

Mowing blackberry is a waste of time and money.

MANAGEMENT OF PAWPAW IN BAHIAGRASS PASTURES. B.A. Sellers*[1], J.A. Ferrell[2]; [1]University of Florida, 33865, FL, [2]University of Florida, Gainesville, FL (167)

ABSTRACT

Pawpaw (*Asimina* spp.) is in the custard family, and ten species are known to occur in Florida. While these species are native, edible, and serve as a host of the zebra swallowtail butterfly, they can become problematic in grazing systems. Experiments were conducted in 2011 through 2014 in pastures naturally infested with pawpaw. Experiment one treatments included broadcast applications of triclopyr ester at 1.12 kg/ha, triclopyr + fluroxypyr at 0.84 + 0.28 kg/ha, aminocyclopyrachlor (ACP) + chlorsulfuron at 0.111 + 0.044 kg/ha, and ACP + chlorsulfuron at 0.222 + 0.088 kg/ha; sequential applications of these herbicides were also applied six months following the first application as separate treatments. This experiment was conducted two times beginning in May, 2011 (sequential application in December) and repeated in December, 2011 (with sequential application in May 2012). A second experiment was conducted that included the following treatments: ACP alone at 0.035, 0.070, and 0.140 kg/ha, ACP + chlorsulfuron at 0.069 + 0.027 and 0.138 + 0.054 kg/ha, ACP + 2,4-D amine at 0.070 + 0.533 and 0.140 + 1.066 kg/ha, ACP + triclopyr-ester at 0.070 + 0.140 and 0.140 + 0.280 kg/ha, and ACP + metsulfuron at 0.046 + 0.007, 0.078 + 0.012, and 0.168 + 0.026 kg/ha. Experiment two was conducted in December 2011 and repeated in May, 2013, using single, rather than sequential, applications. The number of pawpaw stems were counted in each plot prior to herbicide application and at six and twelve months after treatment (MAT). To account for differences among stem densities within each plot, stem counts at application were used as a covariate in the data analysis. There was a timing by treatment interaction for the first experiment at 6 MAT. All treatments following the May application resulted in at least 68% less pawpaw stems compared to the untreated, but no differences among treatments were detected. Following the December application, however, a single application of triclopyr at 1.12 or triclopyr + fluroxypyr resulted in at least 84% fewer pawpaw stems at 6 MAT; sequential applications of these herbicides at a six month interval did not improve control with these herbicides at 6 months after the sequential application. At 12 MAT only the main effects of treatment and timing were significant. A May application of herbicide treatment resulted in approximately 50% fewer pawpaw stems as compared to the December application. Except for a single application of triclopyr + fluroxypyr and the low rate of ACP + chlorsulfuron, all treatments resulted in at least 42% less pawpaw stems than the untreated control. The highest level of stem reduction was observed following a single (70%) or sequential (81%) application of the high rate of ACP + chlorsulfuron. In the second experiment, only treatment was significant at 6 MAT and ACP at 0.140 kg/ha plus either 2,4-D amine, triclopyr, or metsulfuron resulted in at least 68% fewer pawpaw stems compared to the untreated control. At 12 MAT there was a timing by treatment interaction and pawpaw stem density averaged across all treatments was approximately 75% less when treatments were applied in May versus December. Pawpaw stem density following the December application of all treatments ranged from 40 to 153 stems per plot, which was at least 31% lower than the untreated control; ACP at 0.140 kg/ha alone and ACP plus either 2,4-D amine or triclopyr resulted in at least 60% fewer pawpaw stems. No pawpaw stems were recorded in plots following the May applications of ACP at 0.140 plus 2,4-D amine, triclopyr, chlorsulfuron, or metsulfuron. Pawpaw stem density was 76% lower when treated with ACP at 0.070 and 0.140 kg/ha. All other treatments had similar stem densities as the untreated control. These data suggest that ACP may be a good alternative to pawpaw management in pastures, but timing of application may be critical as control was typically higher following a spring versus late fall application.

POSTEMERGENCE CONCEPTS FOR SOUTHERN SANDBUR (*CENCHRUS ECHINATUS*)Â CONTROL IN IMPROVED BERMUDAGRASS PASTURE. E. Jenkins*, J.Q. Moss, A.R. Post; Oklahoma State University, Stillwater, OK (168)

ABSTRACT

Several sandbur species affect forage production in the Southern Great Plains (SGP) including southern sandbur (*Cenchrus echinatus* L.), field sandbur (*Cenchrus spinifex* Cav.), and longspine sandbur (*Cenchrus longispinis* (Hack.) Fernald). Taken together they are detrimental to forage production, decreasing the quality and value of improved bermudagrass (*Cynodon dactylon* (L.) Pers.) pasture and hay. Livestock may be harmed when stocked on infested sites or fed infested hay. Injured animals require veterinary care and increase the cost of production. In-season management is necessary but few practices have proven effective.

Improved management strategies for sandburs in the SGP will increase the quality and value of bermudagrass pasture and hay produced in this region. It will also decrease veterinary costs to livestock producers and ultimately increase farm revenues for livestock and hay enterprises. Currently only four products are labeled for sandbur control in improved bermudagrass systems. They are pendimethalin, imazapic, nicosulfuron, and low-rate glyphosate. Pendimethalin is a preemergence product and the other three are postemergence. All of the post products are known to cause severe reductions in forage quantity and quality in the season of application. The objective of this research was to evaluate management practices including several pre-, split pre- and postemergent herbicides compared to industry standards to improve herbicide options for bermudagrass hay and pasture operations. The study was initiated on a producer site in Hennessey, OK as a split plot design with 9 treatments and four replications. The main plot was herbicide treatment and the subplots were 100% bermudagrass and 100% sandbur. Treatments included pendimethalin at 5.6 L ha-1 and 11.8 L ha-1, nicosulfuron at 0.105 kg ha-1, quinclorac at 1.12 kg ha-1, imazapic at 0.28 kg ha-1, aminopyralid at 0.28 kg ha-1, glyphosate at 0.77 kg ha-1, and pendimethalin PRE fb nicosulfuron POST at 5.6 L ha-1 fb 0.105 kg ha-1 and a nontreated control. Percent sandbur control, percent bermudagrass injury were evaluated visually 1, 2, 4, 6 , 8, 12, 15, and 16 WAT. Percent sandbur seedhead suppression was evaluated at 15 WAT and height and standing forage samples were taken for fresh and dry biomass. Data were managed in ARM 9.2 and subject to ANOVA. Means were separated using Fishers protected LSD at p=0.05.

Nicosulfuron, imazapic, and glyphosate significantly injured bermudagrass season-long at 25, 58, and 36% respectively even 16 weeks after the last treatment. Imazapic and glyphosate were also the only treatments to provide season-long control of sandbur at 93 and 84% respectively 16 WAT. Though nicosulfuron did not provide season long control, it did provide significant seedhead suppression, preventing sandbur from producing burs and leaving edible forage for livestock. New products investigated including quinclorac and aminopyralid did not effectively control sandbur or provide seedhead suppression. However, aminopyralid had a growth stimulating effect on bermudagrass and a significantly improved forage fresh weight compared to the nontreated. Additional products will need to be investigated to develop new tools for sandbur management in improved bermudagrass. This work suggests currently registered products are too detrimental to forage yields to be a feasible strategy unless a grower has significant ground to rotate livestock in a given season and leave land ungrazed or minimally grazed while managing for sandbur.

KNOTROOT FOXTAIL: WHAT WE KNOW, WHAT WE DON'T KNOW. G. Rhodes, Jr.*[1], T.D. Israel[2]; [1]University of Tennessee, Knoxville, TN, [2]University of Tennessee Knoxville, Knoxville, TN (169)

ABSTRACT

Although bermudagrass (Cynodon dactylon (L.) Pers.) currently comprises only 5 percent of Tennessee's grass forage base, interest in growing this warm season perennial grass for hay has increased in recent years. In particular, the strong demand for bermudagrass hay in small bales has prompted a number of growers, particularly in West Tennessee, to establish fields for hay production. To successfully compete in this high value market, producers must be in a position to produce virtually weed-free bermudagrass hay for their customers, many of whom are horse owners. Horse owners are willing to pay a premium for clean hay and they are becoming increasingly selective buyers. The registration of Pastora (nicosulfuron + metsulfuron) has greatly improved the ability of producers to effectively manage many grass and broadleaved weeds in bermudagrass hay fields. In particular, it has proven effective on troublesome annual grass weeds such as barnyardgrass (*Echinochloa crus-galli* (L.) Beauv.), fall panicum (*Panicum dichotomiflorum* Michx.), and annual foxtails (*Setaria* spp.). Foxtail control is particularly important in production of horse hay in that the seed head bristles can cause serious problems with mouth ulcers in horses. Horse owners are becoming increasingly aware of this problem and many refuse to purchase hay that contains foxtail seed heads.

Reports of Pastora failures on foxtail have increased in Tennessee over the past few years. Upon investigation of these reports, we learned that the majority of cases of insufficient foxtail control were in hay fields infested with knotroot foxtail (*Setaria parviflora* (Poir.) Kerguélen), a perennial species. Research was conducted in 2013 and 2014 to identify an effective herbicide option for management of knotroot foxtail in bermudagrass hay fields. While no effective control option was identified, the most effective option for suppression of knotroot foxtail (reduction or elimination of seed heads in harvested hay) was Pastora plus glyphosate (1.5 oz + 8 oz of a 3 lb ae/gal formulation) at first cutting followed by a second application of Pastora (1 oz/A), 2 to 3 weeks later. Fall applications of Pastora, glyphosate, Pastora + glyphosate, and other herbicides were found to be ineffective when evaluated the following year at green-up.

While on farm visits in 2013 and 2014 we observed that there appeared to be a relationship between management of N and K, and severity of knotroot foxtail infestations. Fields fertilized with recommended N and K rates and timings appeared to be less severely infested than those that were receiving less N and K. Accordingly, we conducted research in 2014 to investigate this apparent relationship and a possible interaction of fertility management and Pastora + glyphosate applications on knotroot foxtail biomass and seed head production. High N and K rates (100 lb/A N and K20) resulted in a lower knotroot foxtail seed head density at the second harvest as compared to low N and K rates (50 lb/A N and K20). No herbicde by fertility interaction was observed. As expected, the effect of herbicide was stronger than that of fertility.

PRE-EMERGENT WEED CONTROL WITH SPRING AND EARLY SUMMER PASTURE HERBICIDES.
W.N. Kline*[1], P.L. Burch[2], E.G. Lowe[3]; [1]Retired, Dow AgroSciences, BALL GROUND, GA, [2]Dow AgroSciences, Christiansburg, VA, [3]University of Georgia, Arnoldsville, GA (170)

ABSTRACT

There were 3 key objectives for this experiment. 1) Quantify the level and duration of pre-emergent weed control provided by pasture weed control herbicides. 2) Document herbicide response and length of control when sprayed at 2 timings (timing varied by location - early was April/May; late was June/July). 3) Identify key weed species controlled or suppressed by herbicide treatments during the growing season.

This project was initiated at 8 field trial locations across the Southeast (GA,FL,AL,KY) during the spring of 2014. Sprayed plots were 10 ft X 30 ft; with 5 ft untreated buffers between plots arranged in a randomized complete block design - 4 replications per treatment. Total sprayed volume was 20 GPA applied with CO2 “T” wand. All treatments included a non-ionic surfactant (0.25% v/v). Plots were visually rated for % weed control throughout the duration of the growing season.

Treatments included 2 rates of GrazonNext® HL at 1.2 & 1.5 pints/A, Chaparral® at 2.5 oz product/A, Grazon® P+D at 2 pints/A, 2,4-D (DMA 4) at 2.1 pints/A, and Weedmaster at 2 pints/A. Each of the 6 treatments was applied at 2 timings in each trial - total of 12 treatments. Timing varied by location: Early was April/May; Late was June/July

Conclusions: Results demonstrated large and significant differences between treatments applied at the early timing (April/May) on key target weeds in these trials. Early timings demonstrated excellent burn-down followed by pre-emerge control of horsenettle and spiny amaranth with both rates of GrazonNext HL & Chaparral through the end of the growing season. Grazon P+D provided moderate control and 2,4-D & Weedmaster gave poor control of these weeds. This was particularly true at later rating dates. Sicklepod pre-emerge control was excellent with GrazonNext HL (April application) providing ~ 85% pre-emerge sicklepod control at 27 DAT and ~50% pre-emerge sicklepod control out to 83 DAT on an abandoned ag field with no grass competition.

In general, across trials where these weeds were present, small differences between treatments were observed on common ragweed, Canada horseweed and annual marshelder.

Smaller and generally non-significant differences resulted from the late timing - June/July. Initial control ranged from ~60 to 95% control across all weeds evaluated. Percent weed control ranking from the late timing - June/July was: GrazonNext>Chaparral>GrazonP+D>Weedmaster>2,4-D. By end-of-season (Sept/Oct), there were small numerical differences between treatments due to the limited number of sites rated and natural senescence of weeds.

Recomendations: Based on results from these trials, GrazonNext HL and Chaparral herbicides provide superior initial (burn-down) and residual (pre-emerge) weed control of many problematic weeds in the Southeast. These products produce the best results when applied early in the growing season. Residual soil activity of the herbicide followed by early season pasture grass response after spraying herbicides, heavily influences the potential for season long weed control. This is especially true on healthy and dense coastal bermuda pastures at the time of spraying. If weeds are eliminated during the early part of the growing season, grass response can prevent weed germination for most of the rest of the growing season. Also, the importance of proper pasture management is critical. Weed control with herbicides is only part of successful forage production. Fertilization, cattle rotation and grass recovery after heavy grazing are as important as proper weed control. Over grazing can reduce or nullify weed control efforts, particularly with spring applied herbicides.

BUTTERCUPS IN TENNESSEE: A TALE OF TWO SPECIES. T.D. Israel*[1], G. Rhodes, Jr.[2]; [1]University of Tennessee Knoxville, Knoxville, TN, [2]University of Tennessee, Knoxville, TN (171)

ABSTRACT

Buttercups (*Ranunculus* spp.) are some the most common weeds found in the mid-South and over 20 species are found in Tennessee. Hairy buttercup (*R. sardous* Crantz) and bulbous buttercup (*R. bulbosus* L.) are of particular concern in pastures and hay fields. Both species mature in spring and reduce pasture and hay field quality and productivity. Hairy buttercup can be controlled with 2,4-D at 2 pt/A applied in late fall or late winter to early spring. Application prior to bloom stage is critical for managing buttercups because herbicides are more effective and it prevents plants from going to seed. In the past 5 years, several producers have experienced poor control of buttercup with 2,4-D, even while following recommended guidelines. Further investigation has revealed that these areas have become heavily infested with bulbous buttercup in addition to hairy buttercup.

Bulbous buttercup is a perennial that is strikingly similar to hairy buttercup. Virtually, the only difference is that bulbous buttercup has an enlarged corm or bulb-like base. Bulbous buttercup has spread in Tennessee and is thought to be more tolerant to 2,4-D. The purpose of our research is to determine control levels of hairy and bulbous buttercup using 2,4-D and some newer chemistry. Aminocyclopyrachlor (AMCP) is a new synthetic auxin herbicide and is anticipated to be registered for pasture use as premixtures: AMCP + 2,4-D (Kindra), AMCP + metsulfuron (Rejuvra), and AMCP + triclopyr (Invora).

Research was conducted in 2010, 2013, and 2014 on naturally occurring hairy and bulbous buttercup populations in eastern Tennessee. Experimental design was a randomized complete block with three replications. All treatments included non-ionic surfactant at 0.25%. Visual control ratings were evaluated monthly on a 0-99% scale. Spring-applied 2,4-D ester at 2 pt/A, Kindra at 16 oz/A, and Rejuvra at 1.5 oz/A controlled hairy buttercup ≥85%. Spring-applied GrazonNext HL at 1.6 pt/A, Rejuvra at 1.5 oz/A, and Kindra + Cimarron Plus at 24 + 0.2 oz/A controlled bulbous buttercup ≥87%. Fall-applied Rejuvra at 1.5 oz/A and Kindra + Cimarron Plus at 24 + 0.2 oz/A controlled bulbous buttercup ≥91%. Neither fall-applied nor spring-applied 2,4-D ester at 8 pt/A adequately controlled bulbous buttercup. The results indicate that while 2,4-D is still effective on hairy buttercup, other active ingredients should be utilized when managing bulbous buttercup.

EVALUATION OF CARFENTRAZONE FOR HAIRY BUTTERCUP CONTROL AND WHITE CLOVER TOLERANCE IN PASTURES. S.F. Enloe*; Auburn University, Auburn, AL (172)

ABSTRACT

Despite decades of research on broadleaf weed control in forage systems, there are still very few herbicide options that are safe on forage legumes. In the southeastern United States, winter annual weeds such as hairy buttercup are a significant problem for forage legumes including white and crimson clovers. To address this issue, two separate studies were conducted at pasture sites in Lamison and Russellville, Alabama from December 2013 to May 2014. The first was a dose response study using six rates of carfentrazone. The second study compared tank mixes of carfentrazone and imazethapyr or 2,4-D to each product alone. Treatments were applied in either December 2013 or March 2014 to mixed stands of hairy buttercup and either white clover or crimson clover. Visual evaluations of buttercup control and forage injury were collected during the spring of 2014. In the dose response study, carfentrazone was not effective for hairy buttercup control at any rate at either location. In the tank mix study at Lamison, carfentrazone increased buttercup control when applied with either 2,4-D or imazethapyr at 41 DAT compared to either product alone. However, this result was not found at later evaluation dates. Carfentrazone severely injured crimson clover at the Russellville site but was safened when tank mixed with imazethapyr. These results indicate that carfentrazone may be limited in its utility when controlling hairy buttercup in white or crimson clover forages. More research is needed to determine its fit for other forage legume/weed complexes.

PERILLA MINT CONTROL: AVOIDING TOXICITY TO GRAZING LIVESTOCK. D.P. Russell*, J. Byrd; Mississippi State University, Mississippi State, MS (173)

ABSTRACT

Perilla mint (*Perilla frutescens*) is an erect, herbaceous annual known to cause respiratory toxicity in livestock. Perilla mint may reach an average height of 2 feet and is predominately found in areas of partial shade, low-lying areas, and woodland edges. Elevated toxicity levels are believed to occur as the plant enters the reproductive stage during late summer. The goal of these studies was to evaluate efficacy of several preemergence and postemergence herbicide treatments in randomized complete block design experiments.

A field experiment to evaluate postemergence treatments was initiated in August 2014 in east-central Mississippi. Plants were at the late vegetative/early reproductive stage at the time of application. Per-acre herbicide treatments included Perspective (39.5% aminocyclopyrachlor + 15.8% chlorsulfuron) at 16 fl oz, Rejuvra (44.5% aminocyclopyrachlor + 6.67% metsulfuron) at 2.5 oz, Invora (7.3% aminocyclopyrachlor + 14.6% triclopyr) at 12 fl oz, Grazon P+D (10.2% picloram + 39.6% 2,4-D) at 1 and 2 pts, GrazonNext HL (8.24% aminopyralid + 41.26% 2,4-D) at 1.2 pts, Roundup Powermax (48.7% glyphosate) at 1.3 pts, Remedy Ultra (60.45% triclopyr) at 1 pt, Cimarron (60% metsulfuron) at 0.1 oz, Weedmaster (12.4% dicamba + 35.7% 2,4-D) at 1 and 2 pts, and 2,4-D Amine (47.3% 2,4-D) at 2 pts. Treatments were applied with a CO_2 backpack calibrated to deliver 14 GPA. An untreated control was included in the design.

Results from the postemergence field experiment indicated Roundup Powermax exhibited the quickest response with 100% perilla mint control 14 days after treatment (DAT). Complete control was achieved by every treatment except Remedy Ultra and Cimarron 42 DAT.

Inflorescences from perilla mint plants outside the postemergence field study were collected October 14, 2014 and later cleaned and stored for future testing. Prior to seed harvest, a preemergence greenhouse study was initiated using older seed with a germination percentage of 69% pure live seed. Preemergence herbicides were applied through a controlled environment spray chamber with a CO_2 pressurized sprayer that delivered 23 GPA one day after perilla mint seed was planted into commercial potting mix. Herbicides used on a per-acre basis included Perspective (39.5% aminocyclopyrachlor + 15.8% chlorsulfuron) at 16 fl oz, Grazon P+D (10.2% picloram + 39.6% 2,4-D) at 2 pts, GrazonNext HL (8.24% aminopyralid + 41.26% 2,4-D) at 1.2 pts, Weedmaster (12.4% dicamba + 35.7% 2,4-D) at 2 pts, Prowl H_2O (38.7% pendimethalin) at 4.2 qts, and Plateau (23.6% imazapic) at 6 fl oz. An untreated control was also included.

Evaluation of the preemergence greenhouse study indicated all treatments except Prowl H_20 provided acceptable control, and were not significantly different through 49 DAT. Perspective, Grazon P+D, and Weedmaster provided complete control, inhibiting germination of all seed. Evaluation of control through 49 DAT indicated Prowl H_20 provided visually less perilla mint control compared to all other treatments. However, there were no significant differences among preemergence treatments based on plant green weight.

BIOCHEMICAL BIOHERBICIDES: THE HOLY GRAIL OF BIOPESTICIDES. S.O. Duke*; USDA, ARS, Oxford, MS (103)

ABSTRACT

The volume of herbicides used in the U.S. greatly exceeds that of other pesticides. Evolution of resistance to currently use herbicides has increased the need for herbicides with new modes of action (MOAs), yet almost 30 years has passed since a genuinely new MOA was introduced. Herbicide resistance is increasing herbicide use and the need for new MOAs. Natural products offer potentially new herbicides MOAs. Additionally, there are no efficacious and economical weed management chemicals (biochemical bioherbicides) available for organic agriculture. The available products, such as organic acids, fats, and oils, have to be used in large amounts at great expense. As are result, weed management is generally the most costly pest problem in organic farming. Experts have said that a cost-effective biochemical bioherbicide is the “holy grail” of biopesticides. Current organic products do not act at enzymatic sites as synthetic herbicides do, but instead cause rapid plant tissue desiccation by direct effects no plant cuticles and membranes. Examples of natural compounds with new MOAs involving enzymatic sites will be discussed. New biochemical bioherbicides have the potential for greatly improving weed management in organic agriculture and providing new MOAs for conventional agriculture.

THE EFFECT OF NO-SEED RETURN POLICY ON PALMER AMARANTH (*AMARANTHUS PALMERI*) IN THE SOIL SEEDBANK. T.M. Webster*[1], T.L. Grey[2]; [1]USDA-ARS, Tifton, GA, [2]University of Georgia, Tifton, GA (104)

ABSTRACT

Palmer amaranth has become a significant weed problem throughout the Southern U.S., in part, due to the ability of the populations to develop resistance to various herbicide mechanisms of action. One potential means of reducing the impact of Palmer amaranth in cropping systems is to minimize the population of these seeds in the soil seedbank. Previous studies have documented that Palmer amaranth seed viability ranged from 9 to 22% after 36 months of burial. Preliminary research indicated that fields with high Palmer amaranth seed densities near the soil surface could benefit from a single deep turning with a moldboard plow to invert the soil and bury the surface seed to depths from which they cannot emerge; this will bring soil to the surface with minimal populations of Palmer amaranth, providing growers with a more manageable seedbank. The objective of this research was to determine the influence of a single deep tillage event and zero seed-return policy on Palmer amaranth soil seedbank densities. Field studies were initiated in the autumn of 2011 and 2012 at the USDA-ARS Jones Research Farm, near Chula, GA. The soil seedbank was sampled prior to study initiation and then each subsequent autumn. Treatments were a factorial with two levels of tillage (single deep tillage and not disturbed) and two levels of weed control (zero seed return and no weed control). A high-residue rye cover crop was planted each autumn, rolled in the spring, and cotton planted using a strip-tillage/planting unit that formed an 18 cm disturbance and left 73 cm of rolled rye undisturbed. The pretreatment soil seedbank averaged approximately 11,000 seeds/m^2. Zero-seed-return treatments had <6,900 seeds/m^2 after the first year, while the no weed control treatments increased to >19,000 seeds/m^2. Prior to treatments, 48% of Palmer amaranth in the soil seedbank was in the top 5 cm. After the first year, only 17% of the total Palmer amaranth seedbank was in the top 5 cm for the zero-seed-return and deep tillage treatment; surface seed were redistributed throughout the profile by tillage. The zero-seed-return without deep tillage treatment had 42% of the seed remaining in the top 5 cm, representing the annual rate of attrition. In the no weed control treatments, Palmer amaranth seedling populations were 4.4 to 6.8-fold higher in the cotton row where the strip tillage occurred, relative to the undisturbed row middles that were covered in the rolled rye mulch. In conclusion, tillage will effectively bury Palmer amaranth seeds, and used in conjunction with zero-seed-return, reduce the soil seedbank in the top 5 cm by 80% after one year. However, the soil seedbank is saturated with Palmer amaranth seed, allowing little differences in established seedling populations based on tillage treatments. In addition, based on estimates of seed return by Palmer amaranth and soil seedbank sampling, the fate of over 80% of Palmer amaranth seeds produced is unknown. Future research should focus on determining what processes regulate seed return and persistence in the soil seedbank.

SUPPRESSION OF WINTER CANOLA GERMINATION FROM ALLELOPATHIC EFFECTS OF WINTER WHEAT STUBBLE. J. Belvin*, A.R. Post; Oklahoma State University, Stillwater, OK (105)

ABSTRACT

Winter canola (*Brassica napus* L.) is becoming an important crop in Oklahoma in rotation with winter wheat (*Triticum aestivum*L.) as a tool to clean up weedy fields. However, establishing this crop in no-till systems is challenging and winter survival is much lower than in conventionally tilled systems following wheat. It is known that wheat can be allelopathic to itself and here we hypothesize that certain wheat varieties exert an allelopathic effect on winter canola survival in no-till systems where crop stubble is not removed.

Wheat straw samples were collected from 2 locations of Oklahoma State University's 2014 wheat variety trials, Chickasha, OK and Lahoma, OK. Experiments were set as a complete 2 x 42 factorial with factor one being canola variety and factor two being wheat variety. Straw was chopped to a 5 cm or smaller length as if it had been harvested with a straw chopper in place and a "tea" was made from the straw simulating a 35 bushel wheat crop and 2.5 cm of rainfall between wheat harvest and subsequent fall canola planting. The wheat straw was "brewed" for 48 hours and then vacuum-filtered. Three mLs of tea were added to each Petri dish containing 10 canola seeds. Canola was watered as needed with distilled water after initial treatment and images were taken at 3, 5, and 7 days after treatment (DAT). At 7 DAT fresh weight was taken for each plot, samples were dried at 60°C, and dry weights were taken again for each sample. Digital images were cropped and color-inverted in Adobe Photoshop 9. Sigma Scan Pro 5 was set to evaluate images for blue identified as plant biomass in the color-inverted images. Data were subject to ANOVA and means separated by fishers protected LSD (p=0.05).

Of 42 varieties tested across two locations one third significantly decreased fresh weight 7 DAT. Wheat straws sampled from Chickasha, OK had greater allelopathic affects than wheat straws sampled from Lahoma, OK. 'Endurance', 'Pete', 'Armour', 'OK Rising', 'WB-Grainfield', and 'Doublestop CL+' sampled from both locations affected canola germination and biomass accumulation for both conventional and Roundup-Ready (RR) varieties as much as 50%. 'Deliver', 'OK Bullet', 'CJ', 'WB-Redhook', 'LCS Mint', and 'Centerfield' sampled from Chickasha, OK significantly reduced biomass accumulation for both canola varieties; however, samples of the same varieties from Lahoma, OK did not reduce canola germination and biomass. 'Doans' was the only wheat straw to significantly reduce canola biomass accumulation collected from Lahoma, while Chickasha samples of the same variety had no effect.

It is important to further investigate the capacity for wheat straw from particular varieties to impact canola germination and biomass accumulation in the fall, as this is vital to establishment and winter survival. Remaining wheat straw samples from this experiment which had an effect on canola germination will used to investigate effects in the field in Fall 2015.

RESISTANCE PROFILES OF *ECHINOCHLOA COLONA* IN ARKANSAS. N.R. Burgos*[1], C.E. Rouse[1], T. Tseng[2], S.E. Abugho[1], T. Hussain[1], R.A. Salas[1], V. Singh[1], S. Singh[1]; [1]University of Arkansas, Fayetteville, AR, [2]Purdue University, Lafayette, IN (106)

ABSTRACT

Echinochloa colona (junglerice) is the most predominant species of *Echinochloa* in Arkansas and in the southern US. It is most similar to *E. crus-galli* (barnyardgrass); thus, both are commonly known as barnyardgrass. This grass weed complex is the number one problem in rice production in the southern US. The 'barnyardgrass' collective has evolved resistance to major herbicides used in rice including propanil, quinclorac, clomazone, and ALS inhibitors. We conducted a survey to determine the resistance profile of junglerice various herbicides, across multiple years. This data presents the results from 2013. For each herbicide, a total of 60 plants per accession were tested across two runs of bioassays in the greenhouse. Junglerice infested 76% of the fields sampled and was the only *Echinochloa* species in 30% of the fields. Barnyardgrass was found as the sole species in 15% of the fields surveyed. Seventy percent of the junglerice samples tested were resistant to propanil and 20% were resistant to propanil and quinclorac. One of 20 was resistant to quinclorac alone. Two of 20 samples were resistant to imazethapyr and 1 of 20 was resistant to propanil, quinclorac, and imazethapyr. Complex resistance patterns are evolving in *Echinochloa*, requiring increased diversification in management practices to stem the accelerated evolution of resistance.

EFFECTS OF RATES AND TIMINGS OF SAFLUFENACIL HERBICIDE APPLICATIONS ON YIELDS OF SIX SOYBEAN VARIETIES. J.T. Ducar*[1], C.H. Burmester[2], T.N. Sandlin[3], G.S. Stapleton[4]; [1]Auburn University, Crossville, AL,[2]Auburn University, Belle Mina, AL, [3]Alabama Cooperative Extension System, Belle Mina, AL, [4]BASF, Dyersburg, TN (211)

ABSTRACT

All soybean varieties are tolerant to saflufenacil (Sharpen) applied at 1 oz/acre. However, soil types will determine proper application timing for this rate. It has been observed in field trials that many soybean varieties exhibit an enhanced degree of tolerance to Sharpen. In a trial conducted in 2013 at Tennessee Valley Research and Extension Center (TVREC), twenty-two varieties were evaluated for tolerance. From these results, six varieties were selected for the 2014 tests to be conducted at TVREC and the Sand Mountain Research and Extension Center (SMREC) evaluating tolerance at the 1 and 2 oz/acre rates. The six varieties evaluated included two tolerant varieties: Asgrow 5633 and Cropland 5371; two moderate varieties: Cropland 5482 and Progeny 5610; and two sensitive varieties: Asgrow 5831 and Progeny 5711. Sharpen at 1 and 2 oz/acre was applied at 21, 14, and 0 days before planting (dbp). The soils at TVREC are a silt loam and the soils at SMREC are a fine sandy loam. A minimal response was seen at the 1 oz/acre rate at either location at 14 or 21 dbp at any evaluation. At TVREC, the Progeny 5610 and Asgrow 5831 were sensitive at 0 dpb application 17 DAT (days after treatment) evaluation at the 1 oz/acre rate. At the 2 oz/acre rate, a response was seen with both of these varieties at 21, 14, and 0 dbp at 17 DAT evaluations. However, at 30 DAT, the varieties were no different at the 1 oz/acre rate. At the 2 oz/acre rate, a response was still evident with these varieties as well as with Progeny 5711 at the 0 dbp application. Yields at TVREC were not different by timing. Progeny 5610 yielded the highest regardless of the timing and the Asgrow 5633 produced the lowest yields. At SMREC, at the 14 DAT evaluation, only the 0 dbp timing had a response with Progeny 5610, Progeny 5711, and Asgrow 5831 showing sensitivity at 1 and 2 oz/acre rates. A minimal response was observed at 21 and 14 dbp at the 71 DAT evaluation, however, at 0 dbp, Progeny 5610 and Progeny 5711 had injury of greater than 25% at 71 DAT. Yields at SMREC were different by timing. Cropland 5482 yielded the highest regardless of rate. No differences within varieties were noted between rates and timings at either location. Further research needs to be conducted to evaluate potential additional uses with tolerant varieties with increased rates and soil types.

EVALUATION OF SAFLUFENACIL TANK-MIXES WITH OTHER PPO HERBICIDES TO REDUCE PREPLANT APPLICATION TIMING IN SOYBEAN. G.S. Stapleton*[1], J. Ducar[2], M. Oostlander[3]; [1]BASF, Dyersburg, TN, [2]Auburn University, Auburn, AL, [3]BASF, RTP, NC (212)

ABSTRACT

Saflufenacil with the trade name Sharpen® herbicide was labeled for use in a wide range of crops including soybeans for the 2010 use season. Verdict® herbicide (saflufenacil + dimethenamid-P) was introduced the next year for use in soybean and corn. Since then these labels have been expanded in soybeans to include increased use rates in medium to fine textured soils depending on the preplant interval. In 2013 eight trials were conducted to evaluate the potential for reducing the 30 day planting restriction interval for tank-mixing Sharpen with other Group 14 (PPO) containing herbicides including sulfentrazone, flumioxazin and fomesafen. Minimal soybean crop response was observed across all varieties evaluated when applied 14 days prior to planting. It was determined that the preplant interval could be reduced to 14 days when Sharpen at 0.022 lb ai/A (1 oz/A) is tank mixed or sequentially applied with other PPO herbicides on reduced-till or no-till soybean systems on medium to fine textured soils. In 2014 studies were conducted in Kentucky (Murray State University) and Alabama (Sand Mountain Research and Extension Center, Auburn University) to evaluate Verdict to reduce the planting interval for tank mixing with PPO herbicides to 14 days prior to planting. Less than 6% injury was observed 28 to 35 days after planting (14 days preplant). At the Murray State University location when applied preemergence (PRE) these PPO combinations injured soybeans 69 to 98% four to five weeks after planting whereas, virtually no soybean injury was observed at Sand Mountain Research and Extension Center. Significant yield reductions occurred at both locations when PPO tank-mixes with Sharpen were applied PRE. However, soybean yields were similar compared to the untreated weed-free check at both locations within soybean varieties when Verdict was applied with other PPO herbicides 14 days prior to planting. From this research it was recommended that Verdict could be tank mixed or sequentially applied with other PPO herbicides on reduced-till or no-till soybean systems on medium to fine textured soils.

NEW FIERCE XLT HERBICIDE FOR SOYBEAN. F. Carey*[1], J. Cranmer[2], C. Meador[3], J. Pawlak[4]; [1]Valent USA, Olive Branch, MS, [2]Valent USA, Morrisville, NC, [3]Valent USA, Weatherford, TX, [4]Valent USA, East Lansing, MI (213)

ABSTRACT

Fierce XLT Herbicide is a new product developed by Valent USA and recently labeled for use in soybean. Fierce XLT is a premix of flumioxazin (sold as Valor Herbicide by Valent USA), pyroxasulfone (a new herbicide developed by Kumiai Ihara of Japan) and chlorimuron (sold as Classic Herbicide by DuPont Crop Protection). Fierce XLT brings many advantages over other available soybean herbicide options including longer residual, resistance management and a broad weed control spectrum.

In university testing across the mid-south and mid-west, Fierce XLT has routinely provided 2 to 3 weeks greater residual control of *Amaranthus* species, such as common waterhemp and Palmer amaranth, compared to other soybean herbicides including Authority XL, Prefix and Valor. Fierce XLT contains multiple modes of action. There is a PPO inhibitor (flumioxazin), a very long chain fatty acid synthesis inhibitor (pyroxasulfone) and an ALS inhibitor (chlorimuron). These three distinct modes of action found in Fierce XLT make it difficult for weeds to develop resistance to Fierce XLT as compared to herbicides with just one or two modes of action. The multiple modes of action are also complimentary to each other which results in a very wide weed control spectrum including broadleaf weeds such as Palmer amaranth, common waterhemp, morningglory species, hemp sesbania, prickly sida, common ragweed and horseweed. Annual grasses such as barnyardgrass, large crabgrass, goosegrass, broadleaf signalgrass and Italian ryegrass are also controlled.

The presence of chlorimuron in Fierce XLT limits its use to soybean only. As with any herbicide containing chlorimuron, crop rotation intervals are important, especially when soil pH is greater 7.0.

DUPONT AFFORIA HERBICIDE: NEW BURNDOWN OPTION FOR THE SOUTH. M.T. Edwards*[1], H.A. Flanigan[2], R.M. Edmund[3], J. Smith[4], R.W. Williams[5]; [1]E. I. DuPont, Pierre Part, LA, [2]DuPont, Greenwood, IN, [3]DuPont Crop Protection, Little Rock, AR, [4]DuPont Crop Protection, Madison, MS, [5]DuPont Crop Protection, Raleigh, NC (214)

ABSTRACT

Soybean growers are adopting more comprehensive pre-plant burndown, pre-emergent and post-emergent weed control strategies in soybeans to combat resistance and protect crop quality. In 2014, DuPont Crop Protection introduced DuPont™Afforia™ herbicide, a product for use as a pre-plant burndown herbicide with medium residual.

DuPont™ Afforia™ contains two modes of action providing both contact and residual activity. DuPont™ Afforia™ is a dispersible granule formulation premix of tribenuron, thifensulfuron, and flumioxazin. Post-harvest or preplant applications burndown existing weeds and provide residual control of many broadleaf species and suppression of some key grass weeds.

Testing in the 2014 season focused on preplant applications in the spring where Afforia™ was combined with glyphosate and 2,4-D at labeled rates. At the time of soybean planting burndown control was achieved on winter annual weeds, such as Italian Ryegrass, Annual bluegrass, Carolina Geranium, Henbit, Carpetweed, Cutleaf Eveningprimrose, Buttercup, Wild Radish, Sibara, Common chickweed, Mare's tail and Common sowthistle. Early season residual control of summer annual weeds, such as Redroot Pigweed, Giant Ragweed, Sicklepod, Spotted Spurge, Entireleaf and Pitted Morningglory, Hemp Sesbania, Hophornbeam Copperleaf, Palmer Amaranth, Giant foxtail, Broadleaf Signalgrass, Barnyardgrass, Goosegrass, Browntop Millet and Red Sprangletop was excellent - (follow-up post-emergence applications of other herbicides will be required for season long weed control for all these species). The addition of DuPont™ Afforia™ to the soybean market provides a new option for growers to use one product with multiple modes of action to burn down winter annual weeds and provide residual control of summer annual weeds.

ï»¿ï»¿ï»¿ï»¿ï»¿THE EFFECT OF FALL SEEDED CEREAL COVER CROPS FOR USE IN SOYBEANS (*GLYCINE MAX)* FOR CONTROL OF AMARANTHUS SPP. IN MISSISSIPPI. R.J. Edwards*[1], D. Reynolds[2]; [1]Mississippi State University, Starkville, MS, [2]Mississippi State University, Starkeville, AR (215)

ABSTRACT

Cover crops are intentionally planted to replacing unmanageable weed populations with manageable, low value crops that can be easily killed. Use of cereal cover crops to shade aggressive amaranthus weeds was examined to develop a useful model for Mississippi. Field trials were conducted to examine cover crop preparation methods and to determine which combination of cover crops (*Secale cereal, Triticum aestivum* and *Avena sativa*) and residual herbicides (S-metolachlor + metribuzin, S-metolachlor + fomesafen, pendimethalin, flumioxazin, sulfentrazone + metribuzin and pyroxasulfone + flumioxazin) would maximize *Glycine max* production. We also examined the cost associated with implementing a cover crop (equipment, preparation and implementation) in comparison to a predominately glyphosate mediated weed management program to review costs.

Results showed that cereal cover variety and herbicide selection did not matter as all cover and herbicides controlled amaranthus species (*Amaranthus palmeri*, *A. rudis* and *A. spinosus*) greater than 85%. Other weeds controlled by cover crops in our studies included *Echinochloa crus-galli* (76.9 to 91.4%), *Ipomoea lacunosa* (93.3 to 100%) and *Euphorbia maculate* (88.8 to 100%). All cover and herbicides did not significantly impact soybean development or yields, except early in the growing season. In all three cover types, cutting the cover crops 10 cm above the soil and leaving the residue significantly reduced weed numbers (0.33 to 2.3 plants per plot). Cover crop preparation techniques showed that weed numbers are potentially higher under a rolled cover of wheat and rye (11.3 and 13 plants) compared to other preparations. However, high production and implementation costs (\$579 to \$707 ha^{-1}) may prevent the widespread establishment of cover cropping techniques in Mississippi.

MANAGING COVER CROPS FOR IN-SEASON WEED CONTROL IN DICAMBA-TOLERANT SOYBEAN. M.S. Wiggins*[1], G.B. Montgomery[1], T.D. White[2], R.F. Montgomery[3], L.E. Steckel[1]; [1]University of Tennessee, Jackson, TN,[2]Monsanto Company, St. Louis, MO, [3]Monsanto Company, Union City, TN (216)

ABSTRACT

Weed control has become an increasingly problematic issue for producers in Tennessee since the early 2000s, when glyphosate-resistant (GR) weeds were first discovered. Although new herbicide technology, such as dicamba-tolerant crops, is on the horizon, producers have begun to re-examine older weed suppression tactics such as tillage, row spacing, and cover crops. Dicamba-tolerant crops show great promise for allowing producers to implement alternative herbicide modes of action for controlling difficult weeds such as GR *Amaranthus spp.*; however, previous research and experience has shown that implementing these new technologies along with other best management practices will achieve greater weed control and reduce selection pressure for herbicide resistance weed biotypes. The focus of this research was to examine how dicamba-tolerant soybeans could be implemented into a cover cropping system to improve weed control.

A study to investigate cover crop management for in-season weed control in dicamba-tolerant soybeans was conducted in 2013-2014 at the West Tennessee Research and Education Center in Milan, TN. Hairy vetch was seeded on October 30, 2013 at a population of 22 kg ha^{-1}. Treatments were in a split-plot arrangement within a randomized complete block design with four replications. The whole plot was cover crop termination timing and consisted of 21, 14, and 0 d before planting (DBP) and 7 and 14 d after planting (DAP). Termination was achieved by applying a premix of a glyphosate + dicamba (1124 g ae + 562 g ae ha^{-1}, respectively). The sub plot was the sequential herbicide and was applied when smooth pigweed reached a height of 7-10 cm. Sequential herbicide treatments were either a premix of glyphosate + dicamba (1124 g ae + 562 g ae ha^{-1}, respectively) or a premix of fomesafen + glyphosate (275 g ai + 1108 g ae ha^{-1}, respectively). Data was collected on cover crop biomass at each termination timing, visual burndown ratings, visual weed control ratings, soybean plant population, and soybean yield. All data were subjected to an analysis of variance with appropriate mean separation techniques and $\alpha = 0.05$.

There was variance in cover crop control 7 DA application; however, control was $\geq$ 97% 14, 21, and 28 DAA for all burndown timings. Cover crop biomass for 14 DBP, 0 DBP, 7 DAP, and 14 DAP treatments was greater than that of the 21 DBP treatment. Termination timing did not significantly affect soybean population or yield. However, the number of days from planting to requirement of a sequential herbicide increased with each termination timing from 1 d at the 21 DBP treatment to 46 d at the 7 DAP planting treatment, with the 14 DAP treatment never requiring a sequential herbicide application. Significant differences among sequential herbicides for weed control were not detected. This is likely due to smooth pigweed's high susceptibility to glyphosate.

Termination timing of cover crop did not have a significant impact on visual cover crop control, soybean plant population, or soybean yield. However, as cover crop termination was delayed, cover crop biomass increased and the number of days until the need for a sequential herbicide increased. Results indicate that delaying cover crop termination can increase cover crop biomass and improve weed control, and also that dicamba-tolerant crops can effectively be combined with cover cropping systems for efficacious weed control.

SOYBEAN INJURY CRITERIA ASSOCIATED WITH DICAMBA. M.R. Foster*, J.L. Griffin, M.J. Bauerle; LSU AgCenter, Baton Rouge, LA (217)

ABSTRACT

Availability of soybean with dicamba-resistance will provide an alternative weed management option, but risk of dicamba off-target movement to sensitive crops is of concern. The soybean cultivars ‘Pioneer 94Y80’ (indeterminate; MG 4.8) and ‘Terral REV 51R53’ (indeterminate; MG 5.1) at V3/V4 were treated with dicamba (Clarity diglycolamine salt) at rates of 0.6, 1.1, 2.2, 4.4, 8.8, 17.5, 35, 70, 140, and 280 g ae/ha corresponding to 1/1034 to ½ of use rate of 560 g/ha. Nonionic surfactant at 0.25% v/v was added to all treatments and a nontreated was included for comparison. The overall thrust of the research was to identify and quantify specific injury criteria associated with dicamba exposure and to evaluate this method of injury assessment along with plant height reduction and an overall total injury rating as predictors of soybean yield loss.

Specific injury criteria included leaf cupping, crinkling, soil contact, petiole drooping, and petiole base swelling; terminal chlorosis, necrosis, and epinasty; and stem epinasty, swelling, and cracking. Each were rated using a scale of 0 to 5 with 0= no injury; 1= slight; 2= slight to moderate (producer concern); 3= moderate; 4= moderate to severe; and 5= severe. Ratings were initiated 7 d after treatment (DAT) and continued every 15 days until 60 DAT. At each rating, plant height measurements and an overall visual assessment of plant injury using a scale of 0 to 100% with 0= none and 100%= plants dead were made.

Dicamba rates were separated into three groups based on soybean yield response. Soybean yield was not reduced for the lower dicamba rates of 0.6, 1.1, and 2.2 g/ha, but was reduced an average of 10 to 27% for the intermediate rates (4.4, 8.8, and 17.5 g/ha) and 55 to 100% for the high rates (35, 70, 140, and 280 g/ha). The separation into groups also simplified the comparison of individual injury criteria/injury level, plant height reduction, and overall injury to predict yield loss. Injury/height reduction that varies minimally between the lower and intermediate dicamba rates or where extreme variability exists between years would diminish its value as a predictor of soybean yield loss.

For the individual injury criteria ratings, excessive variability between years was observed for leaf petiole droop, terminal chlorosis, terminal epinasty, and stem cracking. Injury criteria showing potential to differentiate among the low and intermediate dicamba rates included leaf petiole base swelling (average ratings of 1.0 to 2.0 for low rates and 2.5 to 3.5 for intermediate rates), terminal necrosis (average ratings of 0 to 1.0 for low rates and 1.0 to 3.5 for intermediate rates), and stem base swelling (average ratings of 0.5 to 1.0 for low rates and 1.5 to 3.5 for intermediate rates). Although plant height at 15 DAT for the low dicamba rates was reduced 16 to 29% and overall injury was 42 to 56%, soybean yield was not reduced. Because of the differences observed among the dicamba rates in respect to height reduction and overall injury and because of the consistency observed between years, these variables may also have utility in predicting soybean yield loss. The concern that overall injury ratings are subjective and can vary among individuals could affect its utility as a predictor.

Research will be continued in 2015 to further evaluate injury criteria/injury level, plant height reduction, and overall injury to differentiate among dicamba rates in respect to yield loss. Such information could be important in making decisions in regard to replanting, crop inputs, crop insurance, and liability issues.

EVALUATION OF WEED CONTROL PROGRAMS UTILIZING HPPD-TOLERANT SOYBEANS. J.C. Holloway*[1], D.E. Bruns[2], M. Saini[3], B.R. Miller[4], D.J. Porter[3]; [1]Syngenta, Jackson, TN, [2]Syngenta Crop Protection, LLC, Marysville, OH,[3]Syngenta Crop Protection, LLC, Greensboro, NC, [4]Syngenta Crop Protection, LLC, Minneapolis, MN (218)

ABSTRACT

Field trials were conducted from 2012 to 2014 to evaluate mesotrione-based weed control programs in HPPD-tolerant soybeans stacked with glyphosate tolerance. These multiple mode-of-action herbicide tolerant soybeans enable the use of mesotrione and isoxaflutole pre-emergence in addition to glyphosate post-emergence.

Several mesotrione-based herbicide programs provided control of key weed species, including glyphosate resistant populations. The most successful and consistent weed control was achieved with two-pass programs that included pre-emergence residual herbicides and multiple, overlapping modes of action. These programs were designed to align with HRAC principles of weed resistance management. The use of these chemically diverse and novel programs will offer effective, safe and sustainable weed management options for soybean growers.

WEED CONTROL PROGRAMS INÂ ENLIST^{TM} SOYBEAN IN THE MIDSOUTH. M.R. Miller*[1], J.K. Norsworthy[1], M.T. Bararpour[1], G.D. Thompson[2]; [1]University of Arkansas, Fayetteville, AR, [2]Dow AgroSciences, Omaha, AR (219)

ABSTRACT

As glyphosate-resistant Palmer amaranth (*Amaranthus palmeri*) continues to spread across major production regions in the U.S., new technologies are needed in order to achieve effective control of this and other difficult-to-manage weeds in soybean. The introduction of Enlist^{TM} soybean technology and the Enlist Duo^{TM} herbicide (2,4-D choline + glyphosate DMA) provides growers with an alternative tool capable of controlling these weeds, most importantly glyphosate-resistant Palmer amaranth. Field experiments were conducted in 2012 and 2013 to evaluate herbicide programs utilizing Enlist Duo in Enlist soybean in the Midsouth. In both years, experiments were conducted at the University of Arkansas Research and Extension Center in Fayetteville, AR. Treatments were comprised of a systems approach utilizing preemergence (PRE) followed by postemergence (POST) herbicide applications compared to a total POST herbicide program. PRE treatments consisted of Valor (flumioxazin), Sonic (cloransulam-methyl + sulfentrazone), Valor (flumioxazin) + Classic (chlorimuron-ethyl), or Prefix (*S*-metolachlor + fomesafen). POST treatments consisted of Enlist Duo applied alone or in combination with Liberty (glufosinate) compared against current standards used in glyphosate-resistant soybean. The first application was made PRE whereas the second and third applications were applied early POST (EPOST) and mid POST (MPOST) respectively. Visual estimates of crop injury and weed control were taken 2 to 3 weeks after each application timing. Reproductive Palmer amaranth densities were determined prior to harvest. All programs provided > 95% control of large crabgrass, and no program exhibited > 5% crop injury. In both years, early-season Palmer amaranth control following the EPOST application was the highest in programs that received a PRE herbicide. Furthermore, Palmer amaranth control was 85% or higher 2 to 3 weeks after the final application timing with all herbicide programs that utilized a PRE treatment followed by Enlist Duo applied MPOST. Herbicide programs that relied solely on EPOST and MPOST applications of Enlist Duo resulted in the highest density of Palmer amaranth/m^2 prior to harvest compared to programs that utilized a PRE residual herbicide followed by a MPOST application of Enlist Duo. All herbicide programs had significantly higher yield compared to the non-treated whereas no differences in yield were observed among individual herbicide programs. Results for these studies indicate that the utilization of the Enlist Duo herbicide in Enlist soybean provides a valuable technological tool capable of controlling difficult-to-manage weeds such as glyphosate-resistant Palmer amaranth and large crabgrass. However, in order to achieve the best stewardship of this technology and prevent the evolution of resistance to Enlist Duo and other herbicides, growers should continue to apply PRE residual herbicides prior to and in combination with Enlist Duo.

TOLERANCE OF SOYBEAN TO FLURIDONE ALONE AND IN COMBINATION WITH PPO-INHIBITING HERBICIDES. M.S. McCown*[1], T. Barber[2], J.K. Norsworthy[1], J.C. Moore[1], M.T. Bararpour[1]; [1]University of Arkansas, Fayetteville, AR, [2]University of Arkansas, Lonoke, AR (220)

ABSTRACT

As a result of herbicide-resistant weeds increasing in agronomic operations, weed control programs in most Arkansas soybean fields today consist of several herbicide applications. New herbicide mechanisms with longer residual activity are needed to control weeds and reduce the risk of resistance evolving to the currently used herbicides. Fluridone is a herbicide that was tested but not developed in cotton in the early 1970’s. It has since become the most widely used aquatic herbicide in the world today. Fluridone was first used in 2012 in Arkansas under a Section 18 for the control of glyphosate-resistant Palmer amaranth in cotton. In 2014 a study was conducted to investigate the efficacy as well as crop tolerance of fluridone as a weed control option in soybean. Fluridone was evaluated at six rates (0, 0.05, 0.1, 0.15, 0.2, and 0.4 lb ai/A) in combination with three rates of Valor (0, 1, and 2 oz product/A). All treatments were applied immediately after planting soybean on a silt loam soil at the Pine Tree Research Station in Colt and on a clay loam soil at the Northeast Research and Extension Center in Keiser. Crop injury and weed control were visually evaluated at 2, 3, and 4 weeks after planting. Liberty was applied over the entire test as needed for the remainder of the year to control weeds that escaped preemergence treatments. Fluridone was more injurious to soybean on silt loam than on clay soil. On the silt loam soil where more than 50% injury was observed, the addition of Valor had a slight safening effect on fluridone, as evident by less injury to soybean. On the clay soil where less injury was observed, soybean yields were reflective of a safening effect similar to that observed on the silt loam. Overall, weed control was similar to that of crop injury in that greater control was observed on the silt loam than on the clay soil. Weeds on the silt loam soil included ivyleaf morningglory, broadleaf signalgrass, and hemp sesbania, and on the clay soil, barnyardgrass and horse purslane were present. Fluridone in combination with Valor exemplified an effective option for weed control and would provide two mechanisms of action, aiding resistance management. Future studies will continue to evaluate the best fit for fluridone and Valor in Midsouth soybean systems.

HERBICIDE PROGRAMS FOR JOHNSONGRASS CONTROL IN THE ABSENCE OF GLYPHOSATE AND ACCASE-INHIBITING HERBICIDES. R.R. Hale*[1], J.K. Norsworthy[1], D. Stephenson[2], M.T. Bararpour[1], C.J. Meyer[1]; [1]University of Arkansas, Fayetteville, AR, [2]LSU, Baton Rouge, LA (221)

ABSTRACT

Johnsongrass (*Sorghum halepense*) is a problematic weed in Arkansas and Louisiana cotton production. Since 2007, johnsongrass has evolved resistance to glyphosate in multiple locations throughout Arkansas and Louisiana. With resistance increasing, postemergence weed control options become more difficult for cotton producers. Hence, field studies were conducted in 2012, 2013, and 2014 at the University of Arkansas Research and Extension Center in Fayetteville, AR, and the Louisiana State University Agricultural Center Dean Lee Research and Extension Center in Alexandria, LA to evaluate johnsongrass control programs containing preemergence or early postemergence (EPOST) applications of pyrithiobac (Staple®), EPOST and mid-season postemergence applications of glufosinate (Liberty®), and MPOST applications of trifloxysulfuron (Envoke®) in cotton. Experiments at both locations were set up as a randomized complete block design in a programs approach utilizing pre-plant (DPP), PRE, EPOST, MPOST, and layby application timings. All EPOST treatments were applied to 2- to 4-leaf cotton and all MPOST treatments were applied to 6- to 8-leaf cotton. PRE-applied Cotoran or Cotoran + Staple and MPOST and LAYBY tank-mixtures containing multiple modes of action (MOA) significantly increased control for johnsongrass. The use of a preemergence herbicide with johnsongrass activity is needed to aid control. The highest level of control across location and years were a PRE application of Staple + Cotoran followed by an EPOST application of Liberty followed by a MPOST application of Liberty + Envoke followed by a layby application of Direx + MSMA.

WEED MANAGEMENT IN NORTH CAROLINA CORN PRODUCTION SYSTEMS WITH BICYCLOPYRONE. W.J. Everman*[1], V.J. Mascarenhas[2]; [1]North Carolina State University, Raleigh, NC, [2]Syngenta, Nashville, NC (222)

ABSTRACT

ACURON: PREEMERGENCE WEED CONTROL AND CORN SAFETY. M. Saini*[1], T.H. Beckett[1], S.E. Cully[2], R.D. Lins[3], G.D. Vail[4]; [1]Syngenta Crop Protection, LLC, Greensboro, NC, [2]Syngenta Crop Protection, LLC, Marion, IL, [3]Syngenta Crop Protection, LLC, Byron, MN, [4]Syngenta Crop Protection, Greensboro, NC (223)

ABSTRACT

Acuron™ is a multiple mode-of-action herbicide premix that provides preemergence and postemergence grass and broadleaf weed control in field corn (as well as seed corn, sweet corn and yellow popcorn). In addition to mesotrione, s-metolachlor, and atrazine, Acuron™ also contains bicyclopyrone, a new HPPD (4-hydroxyphenyl-pyruvate dioxygenase) inhibitor. Acuron™ applied preemergence is effective on difficult-to-control weeds, including common lambsquarters (*Chenopodium album*), common ragweed (*Ambrosia artemisiifolia*), giant foxtail (*Setaria faberi*), giant ragweed (*Ambrosia trifida*), Palmer amaranth (*Amaranthus palmeri*) and waterhemp (*Amaranthus rudis*) with improved residual control and consistency compared to commercial standards. Additionally, preemergence applications of Acuron™ are safe to corn. Pending regulatory approvals, first commercial applications are anticipated in the 2015 growing season.

EFFECT OF PREVIOUS ATRAZINE USE ON ENHANCED ATRAZINE DEGRADATION IN SOUTHERN US SOILS. T.C. Mueller*[1], R. Scott[2], D. Stephenson[3], D. Miller[4], E.P. Prostko[5], J. Grichar[6], J. Krutz[7], L.E. Steckel[8], P. Dotray[9];[1]University of Tennessee, Knoxville, TN, [2]Universitiy of Arkansas, Lonoke, AR, [3]LSU, Baton Rouge, LA, [4]LSU, St. Joe, LA,[5]University of Georgia, Tifton, GA, [6]TAMU, College Station, TX, [7]MSU, Stoneville, MS, [8]University of Tennessee, Jackson, TN, [9]TAMU Ag Experiment STation, Lubbock, TX (224)

ABSTRACT

The literature suggests that atrazine dissipation in surface soils can be more rapid once microbes adapt to the presence of the triazines. This research surveys soils from across the southern US region to determine how widespread this enhancement is at this time. A sub-sample of each soil was dried and shipped to MidWest Labs in Omaha, Nebraska. Each sample was assessed for various soil parameters including nutrient levels, OM, and texture.

Each soil was examined using the following procedure. Take a portion of each soil sample and place into a 500 mL Styrofoam cup in which 5 holes have been placed in the bottom of the cup. Add water to each sample to saturate the soil. Allow to drain for 24 hours. Place ~ 5.0 grams of each soil into a 20 mL glass vial for later atrazine fortification. This will establish each soil at a moist, near field-capacity status.

Each vial was then fortified with an aqueous atrazine solution that is incubated at a constant temperature for a time course is -1, 0, 3, 7, 14, 21, 28 and 42, with duplicate samples of each. The -1 DAT sample is to quantify any residual atrazine or metabolite. Each vial will be stored in a freezer at the appropriate DAT, and all samples within an experiment analyzed at the same time by adding methanol, shaking, filtration, and analysis on LC-MS. My lab analysis will determine parent and the 3 major metabolites simultaneously, with adequate recoveries. Given that all soils will be loaded with identical amounts, any recovery issues should be readily apparent.

Since we are only looking at fields with 0 or 5+ years of atrazine use, we are seeing if enhanced atrazine degradation is a widespread, region-wide phenomenon, and not determining how many years of exposure are needed for the enhancement. Another factor not considered is the atrazine use rate, which varies depending on the region of the country. Enhanced atrazine degradation was observed in several southern states, and follow up studies are planned to more closely examine this phenomenon.

HERBICIDE EFFECTS ON FIELD CORN YIELD INÂ A HIGH INPUT ENVIRONMENT. E.P. Prostko*[1], W. Carter[2];[1]University of Georgia, Tifton, GA, [2]The University of Georgia, Tifton, GA (225)

ABSTRACT

Over the past several years, many Georgia field corn growers have tried to maximize inputs with the goal of economicallyproducing yields in excess of 250+ Bu/A. In this type of production system, most plant stresses (moisture, nutrients, insects, and diseases) are adequately managed. Consequently, growers have questioned the impact of potential herbicide stresses on corn grown in such an environment. Generally, high yield production has not been the focus of most weed science research. Therefore, research was conducted in 2014 to evaluate the influence of herbicides on corn yield produced in an high input environment. Two, small plot, replicated field trials were conducted at the Randy Dowdy Farm in Brooks County, GA. All production practices typically implemented by this high yield grower were used. Pioneer 1685 was planted on March 22 in a twin-row pattern (48"- 15' spacing). In Test 1, herbicides were applied 21 DAP to corn in the V3-V4 stage of growth. Treatments included the following: Roundup Weather Max (32 oz/A) + Prowl H_20 (32 oz/A); Roundup WeatherMax (32 oz/A); Liberty (29 oz/A); Steadfast Q (1.5 oz/A) + COC (1% v/v); Capreno (3 oz/A) + COC (1% v/v); Laudis (3.0 oz/A) + COC (1% v/v); Halex GT (64 oz/A) + NIS (0.25% v/v); and Roundup WeatherMax (32 oz/A) + Sandea (0.67 oz/A). All treatments also included Atrazine (48 oz/A). In Test 2, Roundup WeatherMax (32 oz/A) + Atrazine (48 oz/A) + AMS Xtra (2.5% v/v) were applied at various stages of growth including V2-V3, V4, V6-V7, and V7-V8. Treatments were arranged in a randomized complete block design with 3 replications. Herbicides were applied using a CO_2 -powered backpack sprayer calibrated to deliver 15 GPA using 11002AIXR nozzles. The entire plot area was hand-weeded to minimize potential weed control differences. Yield data was collected by hand-harvesting a 3' X 10' section of row and converted to Bu/A @ 15.5% moisture. All data were subjected to ANOVA. In Test 1, field corn yield, ear number, and ear weight were not reduced by any herbicide treatment applied 21 DAP ($P > 0.10$). In Test 2, Roundup W-Max + Atrazine + AMS, applied at different stages of field corn growth, had no effect on yield, ear number, and ear weight ($P > 0.10$). These results suggest that the common herbicides used in Georgia field corn, applied at the recommended time and rate, do not negatively impact yields in a high input environment.

DICAMBA DRIFT AS AFFECTED BY BEST MANAGEMENT PRACTICES. L.Z. Shull*[1], D. Reynolds[2], J. Guice[3], W.E. Thomas[4]; [1]Mississippi State University, Mississpppi State, MS, [2]Mississippi State University, Starkeville, AR, [3]BASF Corporation, Winnsboro, LA, [4]BASF Corporation, Research Triangle Park, NC (244)

ABSTRACT

WEED MANAGEMENT SYSTEMS IN DICAMBA TOLERANT COTTON. C.H. Sanders*, D. Joseph, M.W. Marshall; Clemson University, Blackville, SC (245)

ABSTRACT

Palmer amaranth is the major troublesome herbicide-resistant weed in row-crop production in the southern United States due to past reliance on a single postemergence herbicide, glyphosate, for weed management. Currently, new dicamba-tolerant crop technologies and dicamba containing herbicide premixtures are being commercialized to control these resistant weeds. The main benefit of these new crop technologies will confer full tolerance to dicamba, glyphosate, and glufosinate herbicides. Field experiments were conducted at the Edisto Research and Education Center in 2012 and 2013 near Blackville, SC to determine the efficiency of at-plant and over-the-top dicamba herbicide programs on weed management in dicamba-tolerant cotton. Experimental design was a randomized complete block design with individual plot sizes of 3.8 by 12 m. Treatments were replicated 4 times in all experiments. Herbicides were applied in water using a CO2 pressurized backpack sprayer calibrated to deliver 240 L/ha with a pressure of 234 kPa. Each site was naturally infested with pitted morningglory and mixed population of glyphosate-resistant and sensitive Palmer amaranth. Data collected included percent visual weed control and crop injury on a scale of 0 to 100 with 0 being no control or injury and 100 indicating complete weed control or crop death. Cotton yields were harvested from the middle 2 rows of each plot. Data were subjected to ANOVA and means were separated using Fisher's Protected LSD at the $p = 0.05$ level. In the postemergence (POST) timing study, POST dicamba treatments provided over 90% control control of Palmer amaranth and pitted morningglory. The early POST timing provided more consistent Palmer amaranth control than the late POST timing. Overall, cotton yields were higher in the early POST trial due to the shorter duration of early season weed competition. In the dicamba systems trials, all treatments provided greater than 90% Palmer amaranth control. The dicamba, glyphosate, and glufosinate containing treatments provided excellent control. Programs that included an at-plant soil residual herbicide followed by a timely POST application had the highest seed cotton yields because of reduced weed competition. In summary, dicamba-based herbicide programs provided good to excellent control of Palmer amaranth and pitted morningglory. Weed size will still a limiting factor with regard to the success of POST dicamba and glufosinate applications on glyphosate-resistant Palmer amaranth.

COTTON INJURY AND YIELD EFFECTS FROM TANK CONTAMINATION LEVELS OF 2,4-D. M.E. Matocha*[1], P.A. Baumann[2], M.R. Manuchehri[3], P.A. Dotray[4], G.D. Morgan[1], J.A. McGinty[5], M.E. Metting[6]; [1]Texas A&M AgriLife Extension, College Station, TX, [2]Texas A&M University, College Station, TX, [3]Texas Tech University, Lubbock, TX,[4]Texas Tech University, Texas A&M AgriLife Research and Extension Service, Lubbock, TX, [5]Texas A&M AgriLife Extension Service, Corpus Christi, TX, [6]Dr. Paul Baumann, College Station, TX (246)

ABSTRACT

Glyphosate resistant Palmer amaranth and common waterhemp have become a serious problem for many growers. Therefore, new technologies such as Dow's 2,4-D tolerant cotton will provide a new tool for combating glyphosate resistant broadleaf weeds. With the development of 2,4-D tolerant cotton and other crops, producers will now be faced with additional challenges such as tank contamination with 2,4-D. Due to cotton's extreme sensitivity to 2,4-D, growers will have to be extra cautious when switching between 2,4-D tolerant crops and non-tolerant crops. Field studies were conducted in 2013 and 2014 to evaluate cotton injury and yield effects from tank contamination levels of 2,4-D. The studies were conducted at College Station and at Lubbock, Texas. Two rates were employed (0.00178 and 0.0357 lb/ai) to simulate spray tank contamination. Each rate was applied at six different growth timings to cotton: 4 leaf, 9 leaf, First Bloom, First + 2 wks, First Bloom + 4 wks, and First Bloom + 6 wks. Visual ratings taken included a combined rating of phytotoxicity (epinasty + leaf strapping), plant stunting (College Station location), and plant heights at the Lubbock site. Lint yield was also collected at both locations and years.

In 2013, both locations observed high levels of cotton injury at 28 DAT from the 4 leaf timing with the high rate (0.0357 lb ai/A) of 2,4-D. In contrast, the College Station site had less injury (<15%) with the high rate at the 9 leaf timing, whereas at Lubbock, greater than 50% injury occurred with the same treatment. The injury observed at both sites was substantially less with additional treatment timings as cotton plants began to mature. Lint yields at both locations reflected the injury observed at the 4 leaf, 9 leaf, and first bloom timings where each resulted in substantially and significantly less yield.

In 2014, both rates at the 4 leaf timing resulted in the greatest injury in 2014 at both sites, 28 DAT. In addition, the College Station site showed substantially more injury at the 9 leaf timing for both rates evaluated. Likewise, College Station had substantially more injury (20, 23.8% respectively) at the first bloom timing (both rates) compared to minimal injury at Lubbock (0, 3.8%, respectively). Furthermore, lint yields were significantly reduced where injury was greater than 11% (28 DAT) at College Station. Yields were significantly reduced at the high rate for all treatment timings (College Station), and only at the high rate for the 4 and 9 leaf timings at Lubbock.

THE EFFECT OF AUXIN HERBICIDES APPLICATION TIMING ON COTTON GROWTH AND YIELD.
J. Buol*[1], A.N. Eytcheson[2], D. Reynolds[3]; [1]Mississippi State University, Mississippi State, MS, [2]Mississippi State University, Starkville, MS, [3]Mississippi State University, Starkeville, AR (247)

ABSTRACT

New herbicide tolerant crops technologies may provide many benefits for producers such as alternative control options, resistance management with the incorporation of alternative modes of action, and an increase in yields. However, their introduction may also increase concern for issues such as herbicide drift, volatilization, and tank contamination. Research has been conducted with application of low concentrations of various auxin herbicides to a variety of crop species to assess their effect on growth and yield. Previous research has suggested that differences may exist in the level of injury in relation to the growth stage at which the auxin herbicide was applied.

An experiment was conducted to assess the effect of application timing on the injury potential of dicamba and 2,4-D to cotton growth and yield. The dimethylamine salt of 2,4-D and the diglycolamine salt of dicamba was applied at a rate of 1 fl oz/ A from one to fourteen weeks after emergence (WAE). Crop growth stage and height were recorded at each application along with environmental data. The experiment was conducted at two locations (Starkville & Brooksville, MS) in a randomized complete block design with four replications. Plots were 4 rows (12.66 ft) wide by 40ft long. Treatments were applied to the center two rows of each plot. Data collection included visual injury 7, 14, 21 and 28 DAT, cotton plant height, nodes above cracked boll (NACB) and cotton yield.

Cotton injury 28 DAT was greatest when dicamba was applied 4 to 7 WAE. Cotton height was significantly reduced when dicamba was applied 3, 5 and 7 WAE, compared to the untreated check. Significant yield reductions occurred when dicamba was applied between 5 and 9 WAE, correlating to the onset of 1st square and 1st bloom growth stages. Cotton injury 28 DAT was greatest when 2,4-D was applied 1 to 7 WAE. All 2,4-D applications significantly increased plant height compared to the untreated check. 2,4-D applied 1 to 7 WAE caused the greatest yield reductions compared to the untreated check, correlating to the onset of 1st square growth stage.

Overall, cotton yields were decreased with both herbicides when applied early and mid-season, compared to late season applications. Dicamba applied 5 to 9 WAE reduced cotton yield 24 to 43% and 2,4-D applied 4 to 7 WAE reduced yield 25 to 45%. Our data suggests that cotton growth stage is a significant factor in relation to yield reduction in response to applications of low dose concentrations of 2,4-D and dicamba.

ENLIST WEED CONTROL SYSTEMS IN ARKANSAS COTTON. R.C. Doherty*[1], T. Barber[2], L.M. Collie[2], A.W. Ross[2]; [1]University of Arkansas, Monticello, AR, [2]University of Arkansas, Lonoke, AR (248)

ABSTRACT

First confirmed in 2006, glyphosate-resistant Palmer amaranth (*Amaranthus palmeri*) remains a major concern for cotton (*Gossypium hirsutum*) growers in Arkansas. Herbicide systems that contain multiple modes of action and are applied timely are essential in controlling this evasive weed. The Enlist-Duo technology provides an opportunity and the flexibility to use multiple modes of action over-the-top of cotton for control of many weeds including Palmer amaranth. In 2013 and 2014 a trial was established at Rohwer, AR in a Hebert silt loam soil. The trial was arranged in a randomized complete block design with four replications. Treatments were applied at three timings preemergence, 2-4” weeds and 14-21 days after the 2-4” weed application. Herbicides used included Enlist-Duo, 2,4-D choline, Cotoran, Roundup WeatherMax, Liberty, Dual Magnum, and Warrant. These herbicides were applied alone and in combination to create a complete weed control system. All treatments were applied using a compressed air sprayer calibrated to deliver 12 GPA. Means were separated using fishers protected LSD. Weed control was recorded on a 0-100 scale with 0 being no control and 100 being complete control. In 2013 seven days after application B (DAB) Cotoran followed by Round-up and Cotoran followed by Liberty provided 75 and 76% control of Palmer amaranth. Cotoran alone provided 25% control of Palmer amaranth. All other treatments provided 99% control. Cotoran followed by Liberty and Cotoran alone provided 89 and 33% control of Southwestern cup grass (*Eriochloa gracilis*), while all other treatments provided 97% or greater control. In 2013 seven DAC all treatments provided 95% or greater control of Palmer amaranth and 91% or greater control of Southwestern cupgrass except Cotoran alone, which provided no control. In 2014 nine DAB Cotoran followed by Enlist-Duo and Cotoran followed by Liberty plus 2,4-D choline plus Dual Magnum provided 83 and 92% control of Palmer amaranth respectively, while both provided 94% control of barnyardgrass (*Echinochloa crus-galli) . All other treatments provided less than 78% control of either weed species. In 2014 twelve DAC* Cotoran followed by Liberty plus 2,4-D choline plus Dual Magnum followed by Enlist-Duo and Cotoran followed by Liberty plus 2,4-D choline followed by Enlist-Duo provided 95 and 91% control of Palmer amaranth respectively. Cotoran followed by Liberty plus 2,4-D choline plus Dual Magnum followed by Enlist-Duo and Cotoran followed by Enlist-Duo followed by Enlist-Duo both provided 98% control of barnyardgrass. In 2014 the addition of residual herbicides at the 2-4” weed application timing improved overall weed control. In both 2013 and 2014 systems that contained multiple modes of action in the 2-4” weed application provided better weed control.

EFFICACY OF RESIDUAL AND NONRESIDUAL HERBICIDE PROGRAMS IN COMBINATION WITH COVER CROP IN COTTON. M.G. Palhano*[1], J.K. Norsworthy[2], Z.D. Lancaster[2], C.J. Meyer[2], J.K. Green[2], S.M. Martin[2];[1]University of Arkansas, fayetteville, AR, [2]University of Arkansas, Fayetteville, AR (249)

ABSTRACT

Palmer amaranth is recognized as the most troublesome weed of cotton fields in Arkansas. Great amount of effort has been spent to study the proper way to manage this pest, since tremendously sum of money has been lost due to this weed. Cover crops have been reported as a form to Palmer amaranth emergence suppression caused by allelochemical and physical residue barrier. Federal conservation payments are accessible for farmers that want to embrace cover crops as a means to reduce tillage and increase weed suppression. A field study was initiated in the fall of 2013 at the Arkansas Agricultural Research and Extension Center in Fayetteville to evaluate the value of various cover crops in suppressing weed emergence and protecting cotton yield. This experiment was a split plot design with 14 cover crops serving as a main plot and the residual and nonresidual herbicide programs as a sub-plot. The non-residual herbicide program was designed to assess weed emergence in each cover crop throughout the growing season. Biomass of each cover crop was collected at cotton planting. Palmer amaranth density and visual estimates of weed control were evaluated 2, 4, 6, and 8 weeks after cotton planting. Seedcotton yield was also determined. Rye and wheat had the highest biomass production whereas the amount of biomass present in spring did not differ among the remaining cover crops. All cover crops initially diminished Palmer amaranth emergence. However, rye had the greatest suppression, with 90% less emergence than in no cover crop plots. Brassica and legume cover crops had only a minor impact on Palmer amaranth emergence. For these cover crops, physical suppression of the Palmer amaranth and other weeds from the cereal residues is most likely the greatest contributor to reducing weed emergence in this experiment. Unfortunately, similar to weed suppression, as biomass production increased there was greater difficulty in establishing a stand of cotton. It is possible that this was a result of the moist conditions that occurred at the time of planting and proper equipment and conditions during planting should alleviate this problem.

RESCUE TREATMENTS FOR PALMER AMARANTH CONTROL. D. Denton*[1], D.M. Dodds[1], D. Reynolds[2], A. Mills[3], J. Copeland[1], C.A. Samples[4]; [1]Mississippi State University, Mississippi State, MS, [2]Mississippi State University, Starkeville, AR, [3]Monsanto, Collierville, TN, [4]Mississippi State University, Starkville, MS (250)

ABSTRACT

An experiment was conducted in 2014 at Hood Farms in Dundee, MS to determine the effect of multiple herbicide applications and programs on GR-Palmer amaranth control. The experiment was initiated in grower's field with heavy natural infestations of glyphosate-resistant Palmer amaranth. Applications were initiated when Palmer amaranth plants were 20 to 25 cm in height as well as 40 to 50 cm in height beginning at each pre-determined timing, either one, two, or three herbicide applications were made. For treatments receiving two applications, the second application was made two weeks after the initial application regardless when treatments were initiated. For treatments receiving three applications, the third application was made two weeks after the second application regardless when treatments were initiated. Applications were made with a CO_2 powered backpack sprayer at a pressure of 317 kPa and an application volume of 140 L/ha. Treatments utilized in this experiment included: glyphosate + dicamba at 0.8 kg ae/ha and 0.6 kg ai/ha; glufosinate + dicamba at 0.6 kg ai/ha each; glyphosate + 2, 4-D at 0.8 kg ae/ha and 1.1 kg ae/ha; glufosinate + 2, 4-D at 0.6 kg ai/ha and 1.1 kg ae/ha. All herbicide treatments were applied using Turbo Teejet Induction 110015 tips. Visual estimates of weed control, the number of Palmer amaranth plants per square meter, count reduction of Palmer amaranth plants per square meter, height of Palmer amaranth plants per square meter, and height reduction of Palmer amaranth plants per square meter were collected at two and four weeks after each herbicide application. Experiments were conducted using a factorial arrangements of treatments in a randomized complete block design with four replications. Visual estimates of weed control, number of plants per square meter, count reduction, plant height, and plant height reduction were subjected to analysis of variance and means were separated using Fisher's Protected LSD at $p = 0.05$.

Two weeks after final applications, two and three applications provided greater than 95% visual control when initial application was 20 and 25 cm in height, regardless of herbicide program. When initial applications were made to Palmer amaranth 40 and 50 cm tall, glufosinate + dicamba and glufosinate + 2, 4-D provided 99% height reduction two weeks after the third application. Two weeks after the second application, glyphosate + dicamba, glyphosate + 2, 4-D, glufosinate + dicamba, and glufosinate + 2, 4-D provided 60, 86, 79 and 85% height reduction, respectively, when initial applications were made to 40 to 50 cm Palmer amaranth. Treatments containing glufosinate provided significantly greater height reduction (≥60%) compared to treatments containing glyphosate two weeks after initial application on 40 to 50 cm Palmer amaranth. Visual estimates of control indicated two and three applications provided significantly greater control (90 and 94%) compared to a single application at two weeks after final application when the initial application was made to 40 and 50 cm Palmer amaranth. Four weeks after final applications, two and three applications provided significantly greater reduction in the total number of plants per square meter (≥87%) compared to one application when the initial application was made to 20 and 25 cm Palmer amaranth. A similar trend for count reduction was observed at four weeks after final applications when initial applications were made to 40 and 50 cm Palmer amaranth. Visual estimates of weed control were significantly greater for two and three applications (96 and 98%) compared to one application four weeks after final applications when plans were 40 to 50 cm tall at the time of initial application.

No significant differences with respect to application timing or herbicide were observed for percent height reduction when treatments were initiated to 20 to 25 cm Palmer amaranth. Multiple applications of any of the herbicide combinations tested will be needed in a rescue application scenario.

AT HARVEST SURVEY OF WEEDS AND LEVELS OF HERBICIDE RESISTANCE IN GEORGIA. W. Vencill*[1], T.L. Grey[2], B. Blanchett[2], B.H. Blanchett[2]; [1]University of Georgia, Athens, GA, [2]University of Georgia, Tifton, GA (251)

ABSTRACT

The widespread use of herbicides such as glyphosate has resulted in the development of herbicide-resistant weeds. GR Palmer amaranth is the most significant species of concern in cotton production; more than 2 million ha of agricultural land in the Midsouth and SE US are estimated to be infested. However, with the imminent introduction of other herbicide-resistant crops such as auxinic-resistant cotton and soybean, weed scientists need to better be able to predict herbicide-resistant weeds. To preserve other herbicide mechanisms of action, we need to know more about the potential for other cases of glyphosate as well as other herbicide resistance and multiple-resistant weed populations. The immediate goal of this project is to 1) conduct a survey in 20 fields geographically dispersed in Georgia and collect mature weed seeds from as many species as possible and determine sensitivity to seven herbicide mechanisms of action (EPSP (WSSA Group 9), GS (WSSA Group 10), PSII (WSSA Group 5), PPO (WSSA Group 14), ALS (WSSA Group 2), HPPD (WSSA Group 27), and Auxinic (WSSA Group 4)) and if any multiple herbicide resistance is present and 2) determine a risk of major agronomic weeds in Georgia to further herbicide resistance development. In Fall 2013, 28 fields were sampled in southwest, central, southeast, and northeast Georgia.

As expected, Palmer amaranth was the dominant weed (86% sampled fields had Palmer amaranth present) found in fields during the sampling process. This data agrees with recent Southern Weed Science Society surveys that show Palmer amaranth to be the most common as well as troublesome weed in Georgia annual crops. In addition, glyphosate-resistant Palmer amaranth was the most predominate herbicide resistance type found in this survey with 69% of the Palmer amaranth populations sampled exhibiting glyphosate resistance. No other weeds examined were found to glyphosate resistant.

Atrazine resistance was found in two weed species. A population of Palmer amaranth was found to be atrazine resistant (ED_{50} = 3.57 lb ai/A atrazine). Laboratory tests indicated the population has metabolic resistance (enhanced glutathione transferase) rather than target-site resistance. This is the first case of atrazine-resistant Palmer amaranth outside a dairy operation in Georgia. A sicklepod population from Taylor Co. was found to be atrazine-resistant (ED_{50} = 3.0 lb ai/A) and also appears to have metabolic atrazine resistance. This is the first case of reported herbicide resistance in sicklepod.

No resistance was found to Group 2, 4, 10, and 14 herbicides in any of the weeds collected. This will be helpful information as Group 10 (glufosinate) herbicides are widely being used in the state and the introduction of auxinic-resistant crops will increase the selection pressure in Group 4 herbicides.

IDENTIFICATION OF PEANUT BREEDING LINES WITH HIGH AND LOW TOLERANCE TO POSTEMERGENCE HERBICIDES. R.G. Leon*[1], B.L. Tillman[2]; [1]University of Florida, Jay, FL, [2]University of Florida, Marianna, FL (252)

ABSTRACT

Postemergence (POST) herbicide tolerance is a critical component for grower adoption of new peanut varieties. However, POST herbicide tolerance is generally evaluated when the new variety is in the last phases of the breeding program or close to commercial release. This approach has the inconvenience that lines with desirable characteristics such as disease tolerance or oil content might be discarded during the selection process because of low yields caused by high susceptibility to the herbicides used in the breeding program. Also, a variety could be kept in the breeding program until release, but it might be susceptible to herbicides that were not used during the selection phases. These problems can be avoided if the herbicide tolerance of the breeding lines is known since the early stages of selection or even before crosses are made. In this way, specific evaluation and selection strategies that take into consideration herbicide tolerance can be implemented enabling the development of peanut varieties that have a more robust tolerance to key herbicides. We randomly selected 35 breeding lines from the Peanut Mini-Core Collection and evaluated their tolerance to 11 POST herbicides under greenhouse conditions. 'Florida-07' and 'Georgia-06G' were included in the experiment as commercial standards for comparisons. Plants were treated at the 3 to 5-leaf stage and injury and dry-weight reduction were evaluated at 14 and 40 days after treatment (DAT), respectively. Variation among peanut lines in herbicide tolerance was similar across herbicides and tended to show a normal distribution. The commercial cultivars frequently were among the most tolerant lines. Dose-response experiments showed that differences between the most susceptible and most tolerant breeding lines for the rate required to reduce dry weight 50% (GR_{50}) commonly ranged from 0.4 to 2-fold, but in a few cases reached up to 13-fold depending on the herbicide. The most tolerant lines were consistently tolerant to herbicides with different mechanisms of action suggesting that non-target site mechanisms are more likely to be responsible for the tolerance than target site mutations. These results suggest that significant differences in POST herbicide tolerance exist among breeding lines, and that these differences could be used to increase POST herbicide tolerance of new peanut varieties. Also, this information can be used when designing new crosses to reduce the risk of generating varieties with low POST herbicide tolerance.

DELAYED-PRE APPLICATIONS OF ZIDUA FOR ITALIAN RYEGRASS (*LOLIUM PERENNE* SSP. *MULTIFLORUM*) CONTROL IN WINTER WHEAT. K. McCauley*[1], A.R. Post[1], A. Hixson[2]; [1]Oklahoma State University, Stillwater, OK, [2]BASF, Lubbock, TX (253)

ABSTRACT

Zidua® received its federal registration for use in wheat in January 2014 and was sold in this market for the first time in fall 2014. Zidua® contains the active ingredient pyroxasulfone which belongs to the isoxazoline herbicide family. Pyroxasulfone has a broad spectrum of weed control that includes many grasses and broadleaves; however, its major market will be for Italian ryegrass control. Continuous winter wheat systems in the Southern Great Plains and complete reliance on ALS-herbicide chemistries have increased the incidence of ALS-resistant Italian ryegrass biotypes in the region. New tools to manage resistant populations are needed and Zidua® will be a valuable resource for resistant weed management in this region. Zidua® will also effectively manage ACCase- and glyphosate-resistant populations. Field experiments were conducted at the Cimarron Valley Research Station in Perkins, OK in 2013 and 2014 to evaluate Zidua's crop safety and weed control efficacy compared to other preemergence herbicide programs in winter wheat. Sites were selected to include known ALS-resistant populations of Italian ryegrass. Experiments were initiated as randomized complete block designs with three replications and four application timings. Application timing included preemergence, delayed preemergence which was applied at 80% of wheat emergence, spike ryegrass, and 4-leaf to 2-tiller ryegrass. A nontreated check was also included. For rates structure and application timing of each program please refer to Table 1. Applications were made with a tractor driven CO_2 propelled sprayer at 168 L/ha. Percent Italian ryegrass control and percent wheat injury were visually evaluated 7, 14, 21, and 28 days after treatment (DAT).

Table 1. Rate and application timing arrangement for pyroxasulfone evaluation on winter whea safety and efficacy against Italian ryegrass.

Treatment Program	Rate	Timing
pyroxasulfone (pyrox)	89.3g ai ha^{-1}	Applied alone at each timing
pyrox + pyrox + pinoxaden	39.9 + 89.3 + 60 g ai ha^{-1}	Pre + 4lf rye + 4lf rye
pyrox + pyrox + pinoxaden	89.3 + 89.3 + 60 g ai ha^{-1}	Delayed Pre + 4lf rye + 4lf rye
pyrox + pinoxaden	89.3 + 60 g ai ha^{-1}	Pre + 4lf rye
pyrox + pinoxaden	89.3 + 60 g ai ha^{-1}	Spike rye
pyrox + pinoxaden	89.3 + 60 g ai ha^{-1}	4lf rye
pyrox + metribuzin	89.3 + 158 g ai ha^{-1}	Spike rye
pyrox + pinoxaden + metribuzin	89.3 + 60 + 158 g ai ha^{-1}	Spike rye
pyrox + metribuzin + pinoxaden	89.3 + 158 + 60 g ai ha^{-1}	Spike + spike + 4lf rye
metribuzin	158 g ai ha^{-1}	Spike rye
pinoxaden	60 g ai ha^{-1}	Spike rye
pinoxaden	60 g ai ha^{-1}	4lf rye
pinoxaden + metribuzin	60 + 158 g ai ha^{-1}	Spike rye
Flufenacet/metribuzin + pinoxaden	286 + 60 g ai ha^{-1}	Pre + 4lf rye

ai/ai indicated a premix product
+ indicates a followed by or a tank-mixed application depending on the listed application timing

All programs which contained pyroxasulfone preemergence and all programs which contained a follow up application of pyroxasulfone up to spike rye controlled Italian ryegrass 85% or better by 4 weeks after the last treatment. All industry standard comparisons including Flufenacet/metribuzin + pinoxaden, metribuzin alone, and pinoxaden + metribuzin also controlled Italian ryegrass at least 78%. The delayed preemergence timing of pyroxasulfone alone was not as effective as expected in this study due to inadequate activation following application. But subsequent spike rye timings were as or more effective than industry standards. Visual injury was not noted at any application timing but a few treatments visibly reduced wheat stands. Treatments which included pyroxasulfone + metribuzin + pinoxaden caused wheat stand reductions of 25-30% and flufenacet/metribuzin + pinoxaden cause stand reductions as high as 60% at 4 weeks after the final treatment. Delayed preemergence and early post-emergence timings are the labeled use pattern for Zidua® in winter wheat for Italian ryegrass control and it is recommended in tank-mixtures with other modes of action and broader spectrum post-emergence products to improve weed control on other species.

EVALUATION OF PYROXASULFONE MIXTURES APPLIED DELAYED PREEMERGENCE AND EARLY POSTEMERGENCE FOR WEED CONTROL IN WHEAT. A. Hixson*[1], G. Armel[2], D. Westberg[2], A. Rhodes[3], G.S. Stapleton[4], S. Newell[5], S. Tan[6]; [1]BASF, Lubbock, TX, [2]BASF Corporation, Research Triangle Park, NC, [3]BASF Corporation, Brandon, MS, [4]BASF, Dyersburg, TN, [5]BASF Corporation, Statesboro, GA, [6]BASF Corporation, Raleigh, NC (254)

ABSTRACT

Studies were conducted in the states of DE, MD, VA, NC, GA, KS, MS, and TX to evaluate pyroxasulfone applied preemergence (PRE), delayed PRE (80% of germinated seedlings with shoots ½ inch in length), and postemergence (POST) (targeting 1 to 2-leaf ryegrass) alone and in mixtures for control of Italian ryegrass and other weed species. Pyroxasulfone (applied as Zidua® herbicide) was applied PRE and delayed PRE at rates between 0.5 to 1.25 oz/acre and was applied POST at rates between 1.0 to 1.5 oz/acre. POST mixtures of pyroxasulfone were evaluated alone and with pinoxaden (applied as Axial®herbicide) at 16.4 fl oz/acre and/or metribuzin (75% DF products) at 2 oz/acre. In general, PRE applications of pyroxasulfone caused more injury than delayed PRE applications, however, control of Italian ryegrass and jagged chickweed were slightly higher with PRE applications as compared to delayed PRE applications although both weeds were controlled 88% or greater regardless of these before emergence application timings. POST pyroxasulfone applied alone controlled Italian ryegrass, downy brome, and common chess 75% to 83%. In addition, pyroxasulfone POST did not control cereal rye and only provided 59% suppression of wild radish. The mixture of metribuzin plus pyroxasulfone applied POST increased wild radish and Italian ryegrass control to 99% and 86%, respectively. The most effective POST treatment was the three way mixture of pyroxasulfone plus metribuzin plus pinoxaden which provided 97 to 98% control of Italian ryegrass, common chess, and wild radish. The best pyroxasulfone treatments including the reduced rate PRE (0.5 to 0.67 oz/acre) fb a sequential POST (1.0 to 1.5 oz/acre) and the POST mixtures of pyroxasulfone with pinoxaden and/or metribuzin provided between 2 to 3 times greater yield when compared to the untreated check.

OPTIMUM TIMING FOR ITALIAN RYEGRASS (*LOLIUM MULTIFLORUM*) CONTROL IN WINTER WHEAT WITH ANTHEM FLEX. A.R. Post*[1], G. Stratman[2], T. Quade[3]; [1]Oklahoma State University, Stillwater, OK, [2]FMC, Stromsburg, NE, [3]FMC, Edgerton, MO (255)

ABSTRACT

WHEAT YIELDS AS AFFECTED BY LEADOFF CONCENTRATION IN SPRAYERS. G.R. Oakley*[1], G.T. Cundiff[1], D. Reynolds[2]; [1]Mississippi State University, Starkville, MS, [2]Mississippi State University, Starkeville, AR (256)

ABSTRACT

APPLICATION TIMING OF POWERFLEX HL TANK-MIXTURES FOR CHEAT (*BROMUS SECALINUS*) CONTROL IN WINTER WHEAT. M. Terry*[1], A.R. Post[1], R. Rupp[2]; [1]Oklahoma State University, Stillwater, OK, [2]DuPont, Stillwater, OK (257)

ABSTRACT

PREPARE FOR RESCUEGRASS (*BROMUS CATHARTICUS*) CONTROL IN WINTER WHEAT. H. Bell*[1], A.R. Post[1], G. Strickland[1], C. Effertz[2]; [1]Oklahoma State University, Stillwater, OK, [2]Arysta LifeScience, Fargo, ND (258)

ABSTRACT

Pre-Pare is a preemergence herbicide for wheat containing the active ingredient flucarbazone which is an ALS-inhibiting herbicide. Pre-Pare is labeled to be applied as a tank-mix with preplant burndown herbicides such as glyphosate to provide broad spectrum weed control as well as a lasting residual for grasses. It is labeled to control various grasses species including foxtails (*Setaria* spp.), wild oat (*Avena fatua* L.), bromes (*Bromus* spp.), and many broadleaf weeds. It has recently been marketed in winter wheat for the Southern Great Plains. Oklahoma is an important winter wheat growing state with over 2 million hectares planted in 2014 for both grain-only and dual purpose production. A growing problem with wheat production in this region is the control of brome grasses, particularly, rescuegrass (*Bromus catharticus* Vahl) . Bromes have a similar life cycle to winter wheat; however, they continue to grow when winter wheat becomes dormant. Therefore, producers must effectively control bromes early in the growing season in order to have a more profitable crop. Pre-Pare could be an important new tool for this market particularly because it has no grazing restriction.

Field experiments were conducted in Altus & Lane, OK during the 2013-14 growing season to determine the efficacy of multiple Pre-Pare (flucarbazone) tank-mixes with glyphosate applied at preplant timing. Experiments were arranged in a randomized complete block design with four replications. Treatments included a nontreated, glyphosate at 0.45 kg ae ha^{-1}, glyphosate at 0.45 kg ae ha^{-1} + flucarbazone at 0.015 kg ai ha^{-1}, glyphosate at 0.45 kg ae ha^{-1} + ARY-0566-001 at 0.029 kg ai ha^{-1}, glyphosate at 0.45 kg ae ha^{-1} + flufenacet/metribuzin at 0.476 kg ai ha^{-1}, glyphosate at 0.45 kg ae ha^{-1} + flucarbazone at 0.015 kg ai ha^{-1} + ARY-0566-001 at 0.015 kg ai ha^{-1}, glyphosate at 0.45 kg ae ha^{-1} + flucarbazone at 0.015 kg ai ha^{-1} + ARY-0922-001 at 0.016 kg ai ha^{-1}, glyphosate at 0.45 kg ae ha^{-1} + flucarbazone at 0.015 kg ai ha^{-1}+ ARY-0922-001 at 0.011 kg ai ha^{-1}, glyphosate at 0.45 kg ae ha^{-1} + flucarbazone at 0.015 kg ai ha^{-1} + ARY-0922-001 at 0.008 kg ai ha^{-1}, glyphosate at 0.45 kg ae ha^{-1} + flucarbazone at 0.015 kg ai ha^{-1}+ flufenacet/metribuzin at 0.238 kg ai ha^{-1}, glyphosate at 0.45 kg ae ha^{-1} + flucarbazone at 0.015 kg ai ha^{-1} + flufenacet/metribuzin at 0.476 kg ai ha^{-1}. All treatments also contained ammonium sulfate at 1.12 kg ai ha^{-1}. Percent rescuegrass control and % crop injury was evaluated at 4, 8 & 16 weeks after treatment (WAT).

All tank-mixtures containing flucarbazone controlled rescuegrass significantly better than a glyphosate application alone at 4, 8 and 16 WAT in Altus, OK. Control remained above 80% for each of these treatments for the duration of the trial. In Lane, OK tank-mixtures containing flucarbazone also outperformed other treatments controlling rescuegrass 90% or greater at 8 WAT. Only Powerflex + Pre-Pare significantly preserved yield above the nontreated in Lane, OK. Pre-Pare when used in tank-mixes with burndown partners offers a significant improvement for rescuegrass and wild oat control in Oklahoma and Pre-Pare in combination with Powerflex effectively controls this difficult weed spectrum.

THE ROLE OF NOZZLE DESIGN IN MAXIMIZING SPRAY DRIFT REDUCTION AND HERBICIDE EFFICACY. J.A. McGinty*[1], P.A. Baumann[2], G.D. Morgan[3], W.C. Hoffmann[4], B. Fritz[4]; [1]Texas A&M AgriLife Extension Service, Corpus Christi, TX, [2]Texas AgriLife Extension, College Station, TX, [3]Texas A&M AgriLife Extension, College Station, TX,[4]USDA-ARS, College Station, TX (259)

ABSTRACT

With the popularity of existing herbicide-tolerant crop traits and the potential commercialization of synthetic auxin-tolerant crops in the near future, there is an increased need for understanding the influence of spray nozzle design on physical spray drift reduction. Utilizing a low-speed wind tunnel with a laser diffraction sensor, an experiment was conducted to investigate the effect of different spray nozzle designs on spray droplet size spectra. Spray nozzles included the TeeJet XR 11002, DG 11002, AIXR 11002, AI 11002, and TTI 11002. Significantly larger droplets were observed in sprays produced by nozzles utilizing a pre-orifice design or a combination of pre-orifice and air-inclusion design, compared to those without these features. When operated at 30 psi, median droplet diameters produced by the TTI nozzle were 344% larger than droplet diameters produced by the XR nozzle. In addition, when operated at 60 psi, sprays produced by the XR nozzle resulted in a nearly 50-fold increase in the production of very fine spray droplets (≤100 µm diameter) when compared to the TTI nozzle. An accompanying field study was conducted in Corpus Christi, TX to examine the effect of these spray nozzle designs on the efficacy of both paraquat and glyphosate herbicides. At 3 DAT, Palmer amaranth (*Amaranthus palmeri* S. Watson) control was observed to be significantly lower in plots where paraquat was applied through TTI nozzles, however this difference was not observed beyond 3 DAT. With applications of glyphosate, no significant differences in weed control were observed among the nozzles tested. All treated plots exhibited in excess of 93% control of Palmer amaranth.

CROP PHASE CHANGES WEED SEED BANK COMPOSITION AND DENSITY IN A SOD-BASED CROP ROTATION. R.G. Leon*[1], D.L. Wright[2], J.J. Marois[2]; [1]University of Florida, Jay, FL, [2]University of Florida, Quincy, FL (260)

ABSTRACT

Diversification of crop rotations is desirable to maintain crop productivity and a critical component for effective weed management especially for herbicide resistance weeds. However, crop diversity in the rotation has been limited in many cases to two crop species. It has been proposed that adding a third crop, especially a perennial grass crop, would increase crop rotation benefits. Concerns about changes in weed populations that might make crop management more challenging as a result of the introduction of a third crop could limit growers adoption. We compared the weed seed banks of a sod-based rotation (bahiagrass-bahiagrass-peanut-cotton) and a conventional peanut-cotton rotation (peanut-cotton-cotton) and evaluated the importance of crop phase in weed seed bank dynamics in a long-term experiment initiated in 1999 in Florida. Extractable (ESB) and germinable (GSB) seed banks were evaluated at the end of each crop phase in 2012 and 2013, and total weed seed or seedling number, diversity, richness, and evenness were determined. In both ESB and GSB tests, weed diversity, richness, and total weed density were higher in the sod-based compared to conventional rotation. Furthermore, crop phases differed in weed seed bank structure. Most of the differences between rotations in weed seed bank structure were due to the first year of bahiagrass (B1) in which weed diversity increased. The high values for the different parameters observed in B1 in the sod-based rotation were transient, and in the second year of bahiagrass (B2) weed numbers and diversity decreased and reached levels equivalent to those in the conventional peanut-cotton rotation. The B1 phase increased the germinable fraction of the seed bank, but not the total number of weed seeds as determined by ESB. The increases in diversity and richness in bahiagrass phases were mainly due to grass weed species. The results of the present study demonstrated that including bahiagrass as a third crop in a peanut-cotton rotation could increase weed communities, mainly by favoring richness and diversity, but the structure and characteristics of the rotation would avoid additional complications in weed management in the peanut and cotton phases.

LIGHT INTERCEPTION IN SOYBEAN AFFECTS GRAIN YIELD AND WEED SUPPRESSION. J.C. Moore*[1], T. Butts[2], J.K. Norsworthy[1], G.R. Kruger[3], B.G. Young[4], L.E. Steckel[5], M.M. Loux[6], K.W. Bradley[7], W.G. Johnson[4], V.M. Davis[2]; [1]University of Arkansas, Fayetteville, AR, [2]University of Wisconsin, Madison, WI, [3]University of Nebraska-Lincoln, North Platte, NE, [4]Purdue University, West Lafayette, IN, [5]University of Tennessee, Jackson, TN, [6]Ohio State Unversity, Columbus, OH, [7]University of Missouri, Columbia, MO (261)

ABSTRACT

Digital imagery analysis provides a unique option to determine soybean light interception (LI) throughout the growing season. Subsequently, LI is used to calculate cumulative intercepted photosynthetically active radiation (CIPAR) which has been shown to affect soybean yield. This research evaluates whether early-season soybean CIPAR also has an effect on the amount of pigweeds (*Amaranthus spp.*) present at the postemergence (POST) herbicide application timing. A field study was conducted in cooperative effort with seven universities across eight locations in 2013 representing eight site-years. Locations were combined relative to their optimum adaptation zone for soybean maturity groups. The North region was comprised of Nebraska, Ohio, and Wisconsin, and the South region was comprised of Arkansas, Southern Illinois, and Tennessee. Two row widths (≤38 and ≥76 cm), three seeding rates (173,000, 322,000, and 470,000 seeds ha^{-1}), and two herbicide strategies (preemergence plus postemergence (PRE + POST) vs. POST-only) were arranged in a randomized complete block split-plot design with row width as the main plot factor and a 3x2 factorial of seeding rate and herbicide strategies as the subplots. Across all locations, PRE applications were made within two days of planting, POST-only applications were made approximately 14 days after the V1 (DAV1) soybean growth stage, and POST following PRE applications were made 28 to 35 DAV1. Pigweed density was measured prior to the POST herbicide applications and soybean harvest. Digital images of each plot were taken weekly from V1 to August 1 and analyzed using SigmaScan Pro 5® software to provide weekly LI percentages. Quadratic models were fit for each plot to estimate daily LI percentages from V1 to 50 DAV1 for each location, and subsequently used with daily average solar radiation estimates to calculate CIPAR. CIPAR was then summed for 29 DAV1 (early-season CIPAR) for analysis with pigweed densities at the POST herbicide application and summed for 50 DAV1 (total CIPAR) for analysis with soybean yield. Early-season CIPAR was inversely correlated with pigweed density at the POST herbicide application in the North ($R^2=0.3363$) and South ($R^2=0.1272$) regions. A one MJ m^{-2} increase in early-season CIPAR led to a decrease of one pigweed m^{-2} in both regions. A PRE + POST herbicide strategy increased early-season CIPAR in the North ($P=0.0300$) and South ($P=0.0236$) regions by 23.55 and 16.46 MJ m^{-2}, respectively. Similarly, this herbicide strategy significantly increased total CIPAR in the North ($P=0.0212$) and South ($P=0.0166$) regions by 29.79 and 18.35 MJ m^{-2}, respectively. An increase in seeding rate of 148,000 seeds ha^{-1} was required to achieve an equivalent increase in CIPAR. Furthermore, a PRE + POST herbicide strategy increased yields in both the North ($P=0.0400$) and South ($P=0.0329$) regions by 458 and 377 kg ha^{-1}, respectively. Soybean yield was positively correlated with total CIPAR for both the North ($R^2=0.2010$) and South ($R^2=0.2200$) regions. In conclusion, through digital imagery analysis we determined a PRE + POST herbicide strategy increases early-season and total CIPAR in both North and South regions of the Midwest. The increase in CIPAR aids in both weed suppression and soybean yield. To support these conclusions, data from 2014 will be analyzed to provide 16 total site-years.

WEED MANAGEMENT IN INZEN Z HERBICIDE-TOLERANT GRAIN SORGHUM. T.A. Baughman*[1], P.A. Baumann[2], P.A. Dotray[3], J. Keeling[4], R. Peterson[1], M.E. Matocha[5], T. Morris[4]; [1]Oklahoma State University, Ardmore, OK,[2]Texas A&M University, College Station, TX, [3]Texas Tech University, Texas A&M AgriLife Research and Extension Service, Lubbock, TX, [4]Texas A&M AgriLife Research, Lubbock, TX, [5]Texas A&M AgriLife Extension, College Station, TX (262)

ABSTRACT

Weed management especially the control of troublesome grassy weeds in grain sorghum has always been a challenge. The development of the Inzen Z herbicide tolerance sorghum trait provides an opportunity to improve overall weed management programs in grain sorghum. This trait provides tolerance to nicosulfuron herbicide. Weed control studies were conducted during the 2013 and 2014 growing seasons to evaluate this new technology. Trials were conducted at the Wes Watkins Agricultural Research and Extension Center near Lane, OK; the Caddo Research Station near Ft. Cobb, OK; the Texas A&M Research and Extension Centers near College Station, Halfway and Lubbock, TX; and the Stiles Farm near Thrall, TX. Trials were over-seeded with grassy weeds in 2013. These included barnyard grass (*Echinochloa crusgalli*), broadleaf signalgrass (*Urochloa platyphylla*), large crabgrass (*Digitaria sanguinalis*), red sprangletop (*Leptochloa panicea*), and Texas millet (*Urochloa texana*) depending on location. Trials were planted to conventional grain sorghum or corn to evaluate nicosulfuron herbicide programs on the control of these grassy weeds. Trials were conducted in naturally infested fields in 2014 at Ft Cobb and College Station. All trials were planted to grain sorghum containing the Inzen Z herbicide tolerance trait. Typical small plot techniques were used at all locations. Weed control was visually estimated at all locations. Barnyardgrass (ECHCG) control in 2013 at Lane was at least 75% early season with the liquid formulation of nicosulfuron applied 0.5 and 0.75 oz ai/A + 2 qt/A liquid nitrogen both with and without crop oil concentrate. Control late season was at least 70% with these same treatment combinations. ECHCG control at Lubbock was at least 90% with the liquid nicosulfuron combinations and when the dry formulation of nicosulfuron was combined with rimsulfuron. ECHCG control of at least 85% was maintained late season with the 0.75 oz ai/A application rate of liquid nicosulfuron. Control of ECHCG was less when pyrasulfotole + bromoxynil + atrazine was applied with nicosulfuron at both locations. Broadleaf signalgrass (BRAPP) control at Lane was less than 70% with all treatments early season except with the liquid formulation of nicosulfuron applied at 0.75 oz ai/A with 2 qt of liquid nitrogen. BRAPP control was less than 60% with all treatments late season. Early season control of BRAPP was at least 85% at Halfway with all treatments except the liquid nicosulfuron treatments applied alone. BRAPP control was still over 95% with nicosulfuron + rimsulfuron treatments mid-season. BRAPP control was reduced when pyrasulfotole + bromoxynil + atrazine was added to the nicosulfuron + rimsulfuron treatments but increased when they were combined with the liquid nicosulfuron treatments. Large crabgrass (DIGSA) control at Lane was at least 80% early season and at least 90% at Lubbock with the liquid formulation of nicosulfuron combinations. DIGSA control of at least 70 and 80% was maintained with these same treatments. The addition of pyrasulfotole + bromoxynil + atrazine again reduced control at both locations. Texas millet (PANTE) control was less than 50% at Lane. The population was sporadic at this location. PANTE control at College Station was greater than 85% early season with liquid nicosulfuron at 0.75 oz ai/A + liquid nitrogen alone or in combination with pyrasulfotole + bromoxynil + atrazine. Mid-season PANTE control was greater than 80% with these same treatments. PANTE control at Halfway was at least 98% with dry formulation of nicosulfuron applied alone or in combination with rimsulfuron. These same treatments controlled PANTE at least 95% mid-season. Red sprangletop (LEFFI) control was greater than 90% when liquid nicosulfuron + liquid nitrogen was applied at 0.5 or 0.75 oz ai/A in combination with pyrasulfotole + bromoxynil + atrazine or applied alone at the 0.75 oz ai/A rate. LEFFI control was less than 70% by mid-season. In all 2014 trials, only the liquid formulation of nicosulfuron was evaluated. In addition all POST treatments were applied with crop oil concentrate + ammonium sulfate. The only treatment in which grain sorghum injury was greater than 10% at Ft Cobb in 2014 was metolachlor + atrazine PRE followed by nicosulfuron pyrasulfotole + bromoxynil + atrazine applied POST2 at the V3-V4 growth stage. Initial grain sorghum injury was at least 40% with all nicosulfuron combinations applied POST1 at College Station. All POST2 nicosulfuron combinations injured grain sorghum over 10%. Early season grain sorghum injury at Halfway was 12-20% with all POST1 nicosulfuron combinations. POST2 nicosulfuron combinations injured grain sorghum less than 10%. No injury was observed at Lubbock in 2014. No late season grain sorghum injury was observed at Ft. Cobb, College Station, or Lubbock. Grain sorghum injury was still observed at the end of the season at Halfway but was 5% or less.

AN UPDATE ON HPPD-RESISTANCE IN AMAPA AND AMATA POPULATIONS. R. Jain*[1], V. Shivrain[1], C. Dunne[1], G.D. Vail[2]; [1]Syngenta Crop Protection, Vero Beach, FL, [2]Syngenta Crop Protection, Greensboro, NC (263)

ABSTRACT

HPPD-inhibitor herbicides have been very effective as pre-emergence and post-emergence for weed management in corn. Resistance to postemergence applied HPPD-inhibitors has recently been documented in waterhemp (*Amaranthus tuberculatus*or AMATA) and Palmer amaranth (*Amaranthus palmeri* or AMAPA). Greenhouse studies were conducted to determine the levels of HPPD resistance in these AMATA and AMAPA biotypes. In addition, response of AMATA and AMAPA accessions obtained from various states in the mid-west and mid-south, respectively, to mesotrione applied post-emergence at 3- and 6-inch height of plants was also investigated in the greenhouse.

Significant differences in control were observed between these accessions treated at the same rate of mesotrione. Also, the control for all accessions in all treatments decreased significantly when the applications were made to 6 inch versus 3 inch plants. The variability in control of various accessions at the same rate of herbicide indicates that there are inherent differences in the sensitivity of AMATA and AMAPA populations to HPPD herbicides with respect to both origin and height at the time of treatment. These data clearly suggest that mesotrione is most effective and consistent in controlling sensitive AMATA and AMAPA populations when applied to smaller (up to 3 inch) plants.

PERFORMANCE OF A NEW CLETHODIM FORMULATION. J.A. Gillilan*[1], J. Gednalske[2], G. Dahl[2], L. Henneman[2]; [1]Winfield Solutions, Springfield, TN, [2]Winfield Solutions, River Falls, WI (264)

ABSTRACT

Winfield has launched a new 3 lb/gal formulation of clethodim under the name Section® Three. The product offers users convenience with a higher concentration, and is labeled for same crop and tank mix compatibilities as Section®. Target weeds include volunteer corn and sorghum, and annual and perennial grasses. The use rate range is 2.67-10.67 fl oz/A, 66% the rate of Section. Section® Three requires a COC or HSOC adjuvant such as Superb® HC or Destiny® HC. The product was tested in 2013 and 2014 at many locations across the U.S., on volunteer corn, volunteer sorghum, shattercane, crabgrass and foxtail (POST). Data were subjected to repeated measures ANOVA and means were separated according to Fisher's Protected LSD ($P < 0.1$). Performance was at least equal to Section applied at the same a.i./A rate. The use of COC adjuvants with both Section® products generally improved weed control. Testing of tank-mix combinations with other commonly used herbicides, fungicides, insecticides and micronutrients indicated that there was no antagonistic effect on weed control.

WEED CONTROL OPTIONS FOR SESAME IN THE MIDSOUTH. L.M. Collie*[1], T. Barber[1], R.C. Doherty[2], A.W. Ross[1]; [1]University of Arkansas, Lonoke, AR, [2]University of Arkansas, Monticello, AR (265)

ABSTRACT

Sesame acres have been increasing the last couple of years throughout the Midsouth. This has created a need for labeled herbicide options for weed control in this crop. The purpose of this study was to determine sensitivity of sesame to common residual (PRE) and Post herbicides that are currently used to manage weeds including glyphosate-resistant Palmer amaranth (*Ameranthus palmeri*). Residual and contact herbicides were applied at planting (PRE), POST and PRE+POST timings. These trials were conducted in Rohwer, AR on a Herbert silt loam. Sesame was planted at 8 lbs/A with a grain drill on 14in rows. All herbicides were applied with a tractor mounted small plot sprayer at 12 GPA. Crop injury, Palmer amaranth (Amaranthus palmeri) and barnyardgrass (*Echinochloa crus-galli*) control were recorded throughout the trails. Yield was not recorded in these trials. All herbicides applied alone PRE showed significant crop injury and sesame stand was affected. When applied alone, Prefix at rates of 0.66 lb ai/A and 0.99 lb ai/A provided significant sesame injury at 50% and 60%. Cotoran, Direx, Dual II Magnum, and Zidua were the least injurious to sesame when applied PRE. Out of the POST only herbicides evaluated, Direx at 1 lb ai/A provided the highest rate of injury when applied at POST timings of 7, 14, and 21 DAE. When applied 7 DAE, Direx at 1 lb ai/A supplied 88% injury, but when applied 21 DAE injury was reduced to 40%. The highest injury ratings throughout the trials were present when the herbicides were applied both PRE+ POST. Dual II Magnum at 0.955 lb ai/A applied PRE followed by Direx at 1 lb ai/A provided 40% injury, mostly stunting and stand reduction after 21 DAB. Prefix at 0.99 lb ai/A followed by Direx at 1 lb ai/A produced the highest injury at 98%. The best weed control was observed with the combination of a PRE and POST herbicide. Dual II Magnum at 1.14 lb ai/A, applied PRE followed by Direx at 1 lb ai/A resulted in 95% Palmer amaranth control and 97% barnyardgrass control.

SENSITIVITY AND RECOVERY OF SOYBEAN FROM DRIFT RATES OF SELECTED COMBINATIONS OF Â DICAMBA, 2,4-D, GLYPHOSATE, AND GLUFOSINATE. M.T. Bararpour*, J.K. Norsworthy, C.J. Meyer, M. Palhano, M.R. Miller; University of Arkansas, Fayetteville, AR (266)

ABSTRACT

Glyphosate utility for broad-spectrum weed control has decreased in recent years as a result of herbicide resistance. Hence, new traits are being brought to the market. In the coming years, row crops will be available with resistance to dicamba, 2,4-D, glufosinate, and glyphosate, not all in the same package. A field study was conducted at the Agricultural Experiment Station, Fayetteville, Arkansas, in 2014 to evaluate the sensitivity and recovery of soybean under weed-free conditions to simulated drift rates of dicamba (Clarity), 2,4-D (Weedar), glyphosate (Roundup), and glufosinate (Liberty) alone and in various two-way combinations. The experiment was designed as a two (soybean growth stage) by 16 (herbicide treatments) factorial in a randomized complete block design. Dicamba, 2,4-D, glyphosate, and glufosinate were applied at 1/16X and 1/256X (simulated drift rates). A nontreated check was included. The 1X rate of dicamba, 2,4-D, glyphosate, and glufosinate was 0.5, 1.0, 0.77, and 0.41 lb ae or ai/A, respectively. Dicamba caused the greatest soybean injury (stunting and malformation of leaves and petioles). Soybean injury was 15 and 46%, 18 and 56%, and 19 and 61% (averaged over soybean growth stage) from dicamba, dicamba + glyphosate, and dicamba + glufosinate applications at 1/256X and 1/16X by the end of growing season, respectively. In comparison with dicamba, 2,4-D, 2,4-D + glyphosate, and 2,4-D + glufosinate caused 2 and 7%, 3 and 4%, and 0 and 4% (averaged over soybean growth stage) soybean injury at 1/256X and 1/16X, respectively. Glyphosate and glufosinate alone caused only 1 to 4% soybean injury. Soybean injury increased as simulated drift rate increased. Dicamba and dicamba combinations caused the greatest soybean yield reduction. The lowest simulated drift rate (1/256X) of dicamba + glyphosate and dicamba + glufosinate had yield reductions of 41 and 19%, respectively, which was greater than the 12% yield loss from dicamba alone. Similarly for the highest simulated drift rate (1/16X), soybean yield loss of 77 and 73% occurred from the combination of dicamba + glyphosate and dicamba + glufosinate whereas 52% yield loss occurred following the dicamba alone application. This research indicates that tank-mixing glyphosate or glufosinate with dicamba significantly increases the risk of injury and yield loss for soybean not having resistance to either herbicide.

DOES A CRUISERMAXX® RICE SEED TREATMENT SAFEN CLEARFIELD® RICE AGAINST ALS-INHIBITING HERBICIDES? S.M. Martin*[1], J.K. Norsworthy[1], R. Scott[2], G. Lorenz[3], J. Hardke[4], M.T. Bararpour[1];[1]University of Arkansas, Fayetteville, AR, [2]Universitiy of Arkansas, Lonoke, AR, [3]University of Arkansas, Lonoke, AR,[4]University of Arkansas, Stuttgart, AR (267)

ABSTRACT

Increased use of insecticide seed treatments in rice have brought up many questions about the potential benefits of these products. In 2014, a field experiment was conducted at the Rice Research and Extension Center in Stuttgart, Arkansas and at the University of Arkansas Pine Bluff Farm in Lonoke, Arkansas to evaluate whether an insecticide seed treatment could possibly lessen injury from acetolactate synthase (ALS)-inhibiting herbicides in Clearfield® rice. Two varieties were tested (CLXL 745 and CL152) with and without an insecticide seed treatment (CruiserMaxx® Rice). Four different herbicide combinations were evaluated (a non-treated check, two applications of Regiment®, two applications of Newpath®, and two applications of Newpath® plus Regiment®). The first herbicide application was early postemergence (1- to 2-leaf rice) and the second application was prior to establishing the permanent flood (preflood). Crop injury was assessed at preflood and two and four weeks after flooding. A reduction of rice water weevil larvae was seen with use of the CruiserMaxx® Rice seed treatment. CLXL745 that received two applications of Newpath® plus Regiment® had the most severe injury, with a mean injury rating of 60% at Stuttgart and 55% at Lonoke. Even with this severe level of injury, the rice plants recovered by the end of the growing season and yields within a variety were similar with and without a seed treatment across all herbicide treatments. At Stuttgart, rough rice yields averaged over seed treatments and herbicides were 134 bu/A for CL152 and 181 bu/A for CLXL745. Similarly at Lonoke, CL152 produced 177 bu/A compared to 218 bu/A for CLXL745. The use of CruiserMaxx Rice at Lonoke resulted in an 11 bu/A increase in rough rice yield, averaged over varieties and herbicides. These results show that repeated applications of ALS-inhibiting herbicides can cause severely injury Clearfield® rice, especially CLXL745, but rice is able to recover from this injury without an adverse effect on yield. The injury observed from the ALS-inhibiting herbicides was not significantly lessened by use of the insecticide seed treatment.

BENZOBICYCLON: A NEW HERBICIDE FOR RICE PRODUCTION. B.M. McKnight*[1], E.P. Webster[1], C. Sandoski[2], E.A. Bergeron[1], J.C. Fish[1]; [1]LSU AgCenter, Baton Rouge, LA, [2]Gowan Company, Memphis, TN (268)

ABSTRACT

Benzobicyclon is a carotenoid biosynthesis herbicide that has been marketed for use in Japan for several years. Benzobicyclon is a HPPD inhibitor and typical symptoms in susceptible weed species include bleached plant tissue followed by necrosis and plant death. Two separate field studies, a rate study and a timing of application study, were established at the Louisiana State University AgCenter Rice Research Station near Crowley, Louisiana to evaluate the activity of benzobicyclon on weed species that commonly occur in rice cropping systems. A greenhouse trial was conducted at the Louisiana State University campus in Baton Rouge, Louisiana to assess the activity of five rates of benzobicyclon, in combination with two flood depths, on yellow nutsedge growth (*Cyperus esculentus* L.).

Galvanized rings, 91-cm diameter by 31-cm deep, were randomly installed in by-plots for treatment containment in the application timing study. The design for this experiment was a randomized complete block design with four replications. Clearfield 'CL 151' rice was pre-germinated and hand broadcast at 60 kg ha^{-1} into the research area after a seeding flood was established. At 24 h after seeding, the seeding flood was drained from the field to allow rice to peg. Rice was allowed to peg for 5 days and a pinpoint flood was established on the field and remained for the duration of the study. Benzobicyclon was applied at seven different application timings: preplant on dry soil, 24 h after seeding flood establishment and seeding, 24 h following the draining of the seeding flood, on pegging rice 24 h prior to pinpoint flood establishment, three- to four-leaf rice, four- to five-leaf rice, and six-leaf to one-tiller rice. All applications were made with a CO_2-pressurized backpack sprayer calibrated to deliver 140 L ha^{-1}. Visual injury ratings were recorded 7, 21, 35, and 49 days after the last application timing.

Barnyardgrass (*Echinichloa crus-galli* L) control with benzobicyclon was > 90% in all treatment timings at 49 DAT. Activity of benzobicyclon on yellow nutsedge control was much slower compared with barnyardgrass; however, yellow nutsedge control was 95 to 98% across all application timings at 49 DAT. At 7 DAT, ducksalad [*Heteranthera limosa* (Sw.) Willd.] control was > 95% when treated with benzobicyclon on pegging, three- to four-leaf, and four- to five-leaf rice. By 49 DAT, ducksalad control was > 90% in all treatment timings.

In the rate study, galvanized rings were installed as previously described. This study was also a randomized complete block design with four replications. Flood practices were the same as the timing study and no rice was planted in the plot area to encourage rice growth. Applications were made when ducksalad had reached the spoon growth stage, or leaf expansion. Benzobicyclon was applied at ten different rates: 0, 31, 62, 123, 185, 246, 492, 738, 984, and 1230 g ai ha^{-1}. Applications were made with a CO_2-pressurized backpack sprayer calibrated to deliver 140 L ha^{-1}. Visual injury ratings were collected at 7, 21, and 35 DAT on ducksalad, barnyardgrass and yellow nutsedge.

At 21 DAT, barnyardgrass control was 48% with the 1230 g ai ha^{-1}. At 35 DAT, barnyardgrass control did not exceed 35% when treated with any rate of benzobicyclon. At 21 DAT, yellow nutsedge control was 60 and 65% with the 984 and 1230 g ai ha^{-1} rate, respectively. Yellow nutsedge control was less than 50% from any benzobicyclon rate at 35 DAT. Ducksalad control was much more consistent over the duration of the study and exceeded 90% from rates of 246 g ai ha^{-1} and higher, at 21 and 35 DAT.

In the greenhouse study, three- to six-leaf yellow nutsedge plants were transplanted into plastic containers designed to maintain a 5- and 10-cm flood depth. Plants were allowed to establish for seven days before a flood was introduced and treatments were applied with a CO_2-pressurized backpack sprayer calibrated to deliver 140 L ha^{-1}. Benzobicyclon was applied at six different rates: 0, 246, 492, 984, 1476 and 1968 g ai ha^{-1} in both a 5 and 10-cm flood. Visual control ratings were collected at 14, 21, and 28 DAT. After the final rating plants were harvested and leaf and tuber count, and plant height were recorded.

At 28 DAT, yellow nutsedge control in the 10-cm flood was 79 and 58% with the 1476 and 984 g ai ha^{-1} rates, respectively. Nontreated plants were taller than plants receiving any rate of benzobicyclon in both flood depths. Nontreated plants also had higher leaf and tuber counts than plants receiving any rate of benzobicyclon, regardless of flood depth.

Benzobicyclon exhibits activity on common rice weed species when a permanent flood is maintained following herbicide application. This research also suggests that control and activity increases with a deeper flood and that the flood must be maintained to optimize herbicide efficacy. Benzobicyclon, in combination with the proper cultural practices, has shown effective weed control in these studies and a fit within herbicide programs recommended for Louisiana rice production.

NEALLEY'S SPRANGLETOP (*LEPTOCHLOA NEALLEYI*) AN EMERGING WEED IN RICE. E.A. Bergeron*, E.P. Webster, B.M. McKnight, J.C. Fish; LSU AgCenter, Baton Rouge, LA (269)

ABSTRACT

A study was conducted at the LSU AgCenter Rice Research Station near Crowley, LA in 2014. This study evaluated rice yield reduction from Nealley's sprangletop densities. This study was a randomized complete block design with four replications. Clearfield 'CL 151' rice was drilled-seeded at 67 kg/ha on April 1, 2014. Quinclorac at 454 g ai/ha plus halosulfuron at 53 g ai/ha was applied delayed preemergence to control broadleaf and grass weeds. All herbicides were applied with a CO^2-pressurized backpack sprayer calibrated to deliver 140 L/ha. Nealley's sprangletop was planted in seed flats with 50- 2.5- by 2.5- cm cells. At three- to four-leaf stage, Nealley's sprangletop was transplanted into plots at 1, 3, 7, 13, or 26 plants/m^2.

At harvest, rice with no Nealley's sprangletop infestation or 1 plant/m^2 yielded 8910 and 8880, respectively. Increased infestations of 3, 7, 13, and 26 plants/m^2 resulted in yields of 8350 to 8100. There were no differences observed across infestations.

Nealley's sprangletop is a prolific seed producer with high seed viability at maturity. It is important to correctly identify this weed in order to select the appropriate weed management program. Fenoxaprop is the best option for controlling Nealley's sprangletop in rice production. Although not labeled in rice, Nealley's sprangletop treated with clethodim and quizalofop was controlled 91 to 98%.

PROVISIA™ RICE SYSTEM; WEED MANAGEMENT STRATEGIES FOR RICE. J. Guice*[1], C. Youmans[2], A. Rhodes[3], J. Schultz[4], S. Bowe[5], G. Armel[5], J. Harden[6]; [1]BASF Corporation, Winnsboro, LA, [2]BASF Corporation, Dyersburg, TN, [3]BASF Corporation, Brandon, MS, [4]BASF Corporation, North Little Rock, AR, [5]BASF Corporation, Research Triangle Park, NC, [6]BASF, Research Triangle Park, NC (270)

ABSTRACT

The Provisia™ Rice System, a new non-GM herbicide tolerant system under development by BASF which complements the Clearfield® Rice System, will provide growers with another effective tool for weed control and resistance management. This system will be a combination of Provisia™ rice treated with Provisia™ Herbicide. In field trials, Provisia rice has exhibited excellent tolerance to single and sequential herbicide applications of Provisia Herbicide. Provisia Herbicide will be a postemergence graminicide which controls Non-Provisia rice, including "weedy rice" [red rice, volunteer conventional rice types (Oryza sativa L.), hybrid rice types, and Clearfield rice] and other common annual and perennial grasses, including barnyardgrass(Echinochloa crus-galli L). Optimum control of red rice and other grass species was obtained with sequential applications. Provisia Herbicide, when tankmixed with other rice herbicides, provided control of broadleaf and grass weed species. Studies show that herbicides which cause necrosis to the grass leaf may reduce the efficacy of Provisia Herbicide. An example of a Provisia Rice System resulting in season long weed control typically includes a preemergence herbicide (example: clomazone or quinclorac); followed by an early postemergence application (1-3 leaf timing) of Provisia Herbicide + a broadleaf tankmix partner herbicide; followed by a mid postemergence application (1-2 tiller; just prior to flood) of Provisia Herbicide. Future research continues to focus on weed control systems to optimize the performance of the Provisia Rice System and mitigate the potential for the development of herbicide resistant weeds.

PROVISIA RICE: A FUTURE OPTION IN RICE. E.P. Webster*[1], S.D. Linscombe[2], E.A. Bergeron[1], B.M. McKnight[1], J.C. Fish[1]; [1]LSU AgCenter, Baton Rouge, LA, [2]LSU AgCenter, Crowley, LA (271)

ABSTRACT

Clearfield rice inbred lines became commercially available in 2002, and hybrid Clearfield rice became available 2 years later. With the development of Clearfield rice, producers could control red rice during the growing season for the first time. This also allowed producers to grow rice year after year with no rotation; however, this practice of continuous rice was not a part of the stewardship program developed by BASF. There are issues with out-crossing of Clearfield lines and/or hybrids with red rice that escape control measures. The hybrid rice also has dormant seed characteristics which can become a weed problem as an F2 the following year. These out-crosses and the F2 rice plants coupled with red rice form a complex that is referred to as weedy rice. A non-GMO herbicide resistant rice is currently under development by BASF, and this new technology is known as Provisia.

In 2014, Provisia rice was first evaluated for the potential use in the mid-south rice producing states to help manage weedy rice. Provisia is resistant to the herbicide quizalofop. Several studies were initiated to evaluate weed management with Provisia. In the first study, Provisia was applied in sequential applications without a broadleaf or sedge herbicide in the program. Potential herbicide combinations were evaluated for weed management and potential antagonism when Provisia was mixed with other rice herbicides. The LSU AgCenter rice variety development program is currently developing lines that will be acceptable in southern rice production, and tolerance trials were conducted on each potential line. This technology will hopefully provide another option to rice producers for control of red rice and other difficult to control grasses, and help extend the life of the Clearfield technology and this new Provisia technology.

Provisia only programs evaluated the control of red rice and hybrid Clearfield ‘CLXL 745’ rice and the tolerance of a Provisia inbred line. The initial application of Provisia was applied at 10.3 and 12.9 oz/A on rice in the two- to three-leaf stage or 12.9 oz/A on one- to two- tiller rice. A sequential application of Provisia at 15.5, 18.1 or 20.7 oz/A was applied to rice in the one- to two- tiller stage or panicle initiation growth stage. Studies were conducted at the LSU AgCenter’s Rice Research Station near Crowley, LA and the Northeast Research Station near St. Joseph, LA.

Control of red rice and CLXL 745 was 94 to 98%. Initial results indicate the hybrid may be slightly more difficult to control. In the mixture trial no antagonism was observed near Crowley; however, the trial near St. Joseph, Provisia was antagonized by RiceBeaux at 4 qt/A, Permit Plus at 0.75 oz/A, Grasp at 2.3 oz/A and several other herbicides evaluated. Injury was observed on the Provisia rice line used in the weed management studies and all of the experimental lines in the trial evaluating potential breeding lines. Injury symptoms were slight yellowing of rice plants at 7 to 10 days after treatment, and by 21 days after treatment little to no injury was observed.

In conclusion, Provisia rice will be a useful tool to rice producers in the mid-south. This technology has excellent activity on the weedy rice complex and many of the grasses infesting rice production. The limitation of this technology will be the ability to mix other herbicides with Provisia to broaden the weed control spectrum without antagonism occurring.

PREEMERGENCE AND POSTEMERGENCE HERBICIDE PROGRAMS IN DICAMBA TOLERANT SOYBEAN. D. Joseph*, C.H. Sanders, M.W. Marshall; Clemson University, Blackville, SC (110)

ABSTRACT

Palmer amaranth (*Amaranthus palmeri* S. Watson*)*, pitted morningglory [*Ipomoea lacunosa (L.*)] and large crabgrass [*Digitaria sanguinalis* (L.) Scop.] are common and troublesome weeds present in South Carolina soybean production fields. The recent evolution of herbicide resistant Palmer amaranth, control has become more difficult and expensive. In response, the Monsanto Company will be releasing Roundup® Xtend, a new crop technology which will introduce soybean with tolerance to dicamba and glyphosate. A new low volatility formulation of dicamba premixed with glyphosate will accompany the new crop technology. In 2012 and 2013 field experiments were conducted at Edisto Research and Education Center located near Blackville, SC to evaluate preemergence (PRE) and postemergence (POST) herbicide programs for weed control in dicamba tolerant soybean. Experimental design was a randomized complete block design with individual plot sizes of 3.8 by 12 m. Treatments were replicated 4 times in all experiments. Herbicides were applied in water using a CO2 pressurized backpack sprayer calibrated to deliver 240 L/ha with a pressure of 234 kPa. Each site was naturally infested with pitted morningglory, large crabgrass, and mixed population of glyphosate-resistant and sensitive Palmer amaranth. Data collected included percent visual weed control and crop injury on a scale of 0 to 100 with 0 being no control or injury and 100 indicating complete weed control or crop death. Data were subjected to ANOVA and means were separated using Fisher's Protected LSD at the p = 0.05 level. Dicamba PRE followed by glyphosate plus dicamba POST1 provided excellent control in all 3 weed species (>97%) at 2 weeks after first post emergence (2 WAP1). In general, dicamba alone PRE was not as effective as flumioxazin alone PRE when rated 2 weeks after second post emergence (2 WAP2). There were no significant differences in treatments containing three application timings than two. All treatments with at least one POST treatment effectively controlled all three weed species. Results showed flumioxazin PRE followed by glyphosate and dicamba POST1 and POST2 were the most effective treatment in Palmer amaranth and large crabgrass with 100% and 99% control respectively, 2 WAP2. Overall, dicamba plus glyphosate POST provided excellent control for all 3 weeds species.

MULTI-YEAR EVALUATION OF PREEMERGENCE HERBICIDES FOR ANNUAL BLUEGRASS (*POA ANNUA* L.) AND SMOOTH CRABGRASS (DIGITARIA ISCHAEMUM (SCHREB.) SHREB. EX MUHL) CONTROL. P.C. Aldahir*[1], S. McElroy[1], M.L. Flessner[2]; [1]Auburn University, Auburn, AL, [2]Virginia Tech, Blacksburg, VA (111)

ABSTRACT

In data presentation, tables or bar charts are normally utilized to present the mean of a given treatment accompanied by mean separation procedures such as Fisher's Protected LSD. In such a comparison, treatment separation is based on the mean. While statistically sound, end-users are only given partial information in such a scenario to base their herbicide choices. In turfgrass management, end-users are specifically interested in the consistency of products on a year after year basis, thus, the treatment variability that is also of interest. Box-and-whisker plots, also referred to as box plots, are ideal for visualizing and comparing variability of treatments when trials are conducted over multiple years or locations. Research was initiated to evaluate preemergence weed control in turfgrass for four consecutive years with the goal of identifying possible yearly variability in treatments.

A preemergence herbicide evaluation trial was initiated in Fall 2009 to evaluate annual bluegrass control and Spring 2010 to evaluate smooth crabgrass control. Each trial was repeated yearly in a different location until 2014, with trial initiation occurring in early March for preemergence smooth crabgrass (*Digitaria ischaemum* (Schreb.) Schreb. Ex Muhl.) control (four trials total) and mid-September for annual bluegrass (*Poa annua* L.) control (four trials total). Treatments included (in kg ai/ha): atrazine (1.12), prodiamine (1.12), prodiamine (0.76) plus sulfentrazone (0.36) dithiopyr (0.56), pendimethalin (2.2), pendimethalin (2.2) plus dimethenamid-p (1.68), simazine (1.12), oxadiazon (3.36), indaziflam (0.027), indaziflam (0.054), and dimethenamid-p (1.68). Data were rated for percent weed control on a 0 to 100% scale monthly, however we present data from the conclusion of experiments, which was early-April for annual bluegrass trials and late-August for smooth crabgrass control trials. Treatments were applied with a CO_2 pressurized backpack sprayer at 280 L ha^{-1}. No adjuvants were included with any treatment. Data subjected to analysis of variance using PROC GLIMMIX using SAS 9.2 (SAS Institute, Cary NC). Box and whisker plots were generated using PROC BOXPLOT.

First in evaluating annual bluegrass control, only prodiamine and indaziflam at 0.046 lower quartile range remained above 80% control. Quartile range of oxadiazon and indaziflam at 0.027 was 60 to 85% and 76 to 95%, respectively. For smooth crabgrass, only indaziflam (0.054) lower quartile exceeded 90%. Minimum lower quartiles for pendimethalin, pendimethalin plus dimethenamid-p, prodiamine plus sulfentrazone, dithyopyr, and prodiamine was 70% control or greater. Lower quartiles for atrazine, oxidiazon and indaziflam (0.027) failed to reach 60% control. Based on this results, prodiamine and indaziflam (0.054) can used to consistently and efficiently control annual bluegrass yearly. For smooth crabgrass, efficient and consistent control was only achieved with indaziflam (0.046), yet several herbicides resulted in moderate-to-high control.

EVALUATION OF HARVEST AID SYSTEMS IN MID-SOUTH SOYBEAN PRODUCTION. A.J. Brown*[1], B.W. Thomason[1], J. Irby[2]; [1]Mississippi State University, Mississippi State, MS, [2]Mississippi State University, Starkville, MS (112)

ABSTRACT

Indeterminate soybean varieties have become common for many mid-south soybean producers and along with that has come an increased use of harvest aids to desiccate plants at the end of the growing season. Whether due to delayed senescence under certain environmental conditions or the desire to deliver a crop sooner to achieve premium commodity prices, harvest aids provide an option to expedite the entry into a harvest season. Products such as paraquat, saflufenacil, carfentrazone and sodium chlorate can be applied to desiccate plant material. By label, harvest aid applications are to be made at 65% mature pods for the three herbicides or 7-10 days before harvest for sodium chlorate. Previous studies have shown that harvest aids do not cause significant yield reductions when applied at as high as 50% seed moisture. Conversely, if applied at 60% seed moisture a 15.4% yield reduction occurred. During the 2014 growing season, an experiment at the R.R. Foil Plant Science Research Center in Starkville, MS was conducted to evaluate paraquat, saflufenacil, and sodium chlorate applied at timings designated by the R6 and R6.5 growth stage and at 65% mature pods. Results show no significant yield reduction for any of the three application timings. However, although not statistically significant, an average of 3 bu/A reduction occurred under the R6 timing treatments. Observations recorded 7 DAA and beyond indicate no significant differences between harvest aid treatments. All treatment combinations required 14-15 DAA to facilitate harvest. Harvest was expedited 18 days under the R6 application, 11 Days at R6.5, and 4 days for the 65% mature pod application compared to the untreated check.

IMPACT OF DEPOSITION AIDS ON HERBICIDE PENETRATION INTO CROP CANOPIES. C.A. Samples*[1], D.M. Dodds[1], A.L. Catchot[1], G.R. Kruger[2], J. Copeland[1], D. Denton[1]; [1]Mississippi State University, Mississippi State, MS,[2]University of Nebraska-Lincoln, North Platte, NE (113)

ABSTRACT

Although glyphosate resistance has become more prevalent across much of the southern U.S., glyphosate is still commonly utilized to control non-resistant weed species. In 2010, almost 100 % of the cotton planted in the U.S. was treated at least once with glyphosate (NASS, 2014). However, due to glyphosate resistance, glufosinate tolerant crops are becoming more common. Glufosinate has been oberseved to increase control of glyphosate resistant Palmer amaranth from 9 to 19% when compared to glyphosate (Whitaker et al., 2011). Two POST applications of glufosinate has been shown to provide up to 96 percent control of Palmer amaranth 2 WAT. A single application of glufosinate applied at 0.6 kg ai/ha has been observed to provide 82 to 94 % control of Palmer amaranth 3 WAT (Ahmed et al. 2012). Several studies have been conducted evaluating drift retardant/deposition aid effects on drift (Guler et al., 2006, Hewitt, 2003, SDTF 1997, Wolf et al., 2002, 2003, 2005). Most of these studies were conducted with ground application systems or the use of a wind tunnel. Studies focused primarily on different polymer formulations. Very little to no information exists comparing tank mix combinations of insecticides with herbicides or deposition aids and the effect of these tank mixes on crop canopy penetration. With new technologies such as Enlist® or Xtend® on the horizon, data is needed regarding herbicide and insecticide tank mixed with deposition aids and the resultant effects on crop canopy penetration. Experiments were conducted in 2014 at the R.R. Foil Plant Science Research Center located in Starkville, MS. Deltapine 1321 B2RF was planted during early may for this experiment. All applications were made using a Bowman Mudmaster calibrated to deliver 140 L/ha at 3 mph. It was equipped with a 4 row multi-boom equipped with 110015 AIXR nozzles spaced 48 cm apart. Applications were made 46 cm above the crop canopy. Insecticides included Orthene 97 (SP) @ 0.84 kg ai/ha and Karate (EC) at a rate of 0.05kg ai/ha. Insecticides were applied alone or in combination with Liberty @ 0.6 kg ai/ha, Roundup Powermax @ 0.9 kg ae/ha, HM 9733 (guargum) applied @ 30 g per 38 L of water; HM 1428 (polymer) applied @ 0.5 % v/v; and HM 9679A (oil) applied @ 1.0% v/v. A red tracer dye was added to each treatment at a rate of 0.2% v/v. Metal stands 24" in height were utilized for this experiment. Card holders were spaced equidistantly from one another spiraling up the stand. Once the crop met the pre-determined height requirement, stands were placed in rows 2 and 3 with stand in row 2 being labeled as the front stand and the lower most position running parallel with the row. The stand in row 3 was labeled as the back stand and was placed with the lowest most positon located perpendicular to the row in an attempt to cover all penetration angles. Once stands were in place, 10 cm x 10 cm mylar cards were placed at the end of each card holder on the stand using clean latex gloves. Approximately 90 -120 seconds after application, cards were removed using another pair of clean latex gloves. Cards were then immediately placed in a dark container due to the dye's high level of photo degradability. Penetration of each treatment at each position was determined using a fluorimeter and reflectance analysis. Treatments were compared to applications receiving no herbicide or deposition aids in tank combinations. All data were analyzed using the PROC MIXED procedure in SAS 9.4 and means were separated using Fischer's Protected LSD. Stands were analyzed separately due to changes in penetration angles. When averaged across insecticides and position in the canopy for the back stand, treatments containing a polymer deposition aid provided 34 percent greater deposition than treatments not receiving a deposition aid. In addition, treatments with a polymer deposition aid had significantly greater penetration into the crop canopy than treatments containing the oil, Roundup Powermax, or Liberty with all three having a negative impact on total deposition in the canopy. However, when analyzing the front stand, treatments containing Roundup Powermax, regardless of insecticide or position had 65 percent greater deposition than treatments receiving no additive. These treatments had significantly greater deposition than all other herbicides and deposition aids used in testing. A three way interaction was present for insecticide, deposition aid/herbicide, and position in the canopy. However, this was only present for deposition at the lowermost position in the canopy. For the back stand, treatments containing Orthene + polymer deposition aid had significantly greater deposition than all other insecticide and deposition aid/herbicide combinations. On average, this treatment provided 296 percent greater deposition than Orthene with no additive. However, when analyzing the same interaction for the front stand treatments containing Orthene + Roundup Powermax had significantly greater deposition compared to all other treatments with deposition being 525 percent greater than that of treatments containing only Orthene. Data suggest that Roundup could be minimizing droplet size allowing for further canopy penetration at position 4 due to less surface area per droplet.

CAN LACTOFEN SERVE AS A PLANT GROWTH REGULATOR IN SOYBEAN?. J.P. Mangialardi*[1], B.H. Lawrence[1], C.B. Edwards[2], J.D. Peeples[1], J.A. Bond[1], T.W. Eubank[3], B.R. Golden[1]; [1]Mississippi State University, Stoneville, MS, [2]Monsanto Co., Scott, MS, [3]Dow AgroSciences, Greenville, MS (114)

ABSTRACT

Maximized and sustainable soybean (*Glycine max*) yields are the ultimate goal of producers. However, environmental conditions which expose soybean to weather extremes such as heat and drought sometimes limit a producer's ability to achieve this goal. The Early Soybean Production System (ESPS) consists of planting early-maturing, indeterminate soybean varieties in mid-April to mid-May to reduce late-season environmental stresses. Anecdotal evidence suggests that lactofen applied to soybean during vegetative growth stages improves yield by altering branching and height. Lactofen is a recommended herbicide for broadleaf weed control in specific situations in Mississippi soybean. Soybean injury with lactofen can be severe; however, it is unknown if this injury has a positive or negative effect on soybean growth and yield.

A field study was conducted in 2013 and 2014 at the Mississippi State University Delta Research and Extension Center in Stoneville, MS, to determine if lactofen influences soybean growth and yield when applied to early-maturing, indeterminate soybean across multiple planting dates. The experimental design was a split plot with four replications. The whole plots were soybean planting dates of April 15, May 1, May 15, and June 1. The subplots were herbicide treatments and consisted of a control that received no postemergence treatment, crop oil concentrate (COC) at 1% (v/v), and lactofen at 0.22 kg ai/ha plus COC at 1% (v/v). All treatments were applied at V2 soybean growth stage. Soybean necrosis and soybean biomass reduction were visually estimated 7, 14, 21, and 28 days after treatment (DAT). Photosynthetically active radiation under the soybean canopy and soybean height was determined 21 and 28 DAT. Soybean height, number of nodes, and yield were determined at maturity. All data were subjected to ANOVA and estimates of the least square means were used for mean separation with $\alpha = 0.05$. Pooled across planting dates, soybean necrosis from lactofen was 35% 7 DAT. However, necrosis 14 DAT with lactofen was no worse than in control plots or those treated with COC only. Pooled across planting dates, soybean height 28 DAT was 10% lower in plots treated with lactofen compared with control plots. Pooled across herbicide treatments, soybean heights were 23 and 47% greater with June 1 planting date compared with earlier plantings. The number of nodes at maturity was similar in plots treated with lactofen at all planting dates, but soybean plants in control plots produced more nodes with May 15 and June 1 plantings than April 15 or May 1.

A field study was conducted at two sites in 2014 to compare the soybean response to lactofen applied over a range of soybean growth stages. The experimental design was a randomized complete block with four replications. Lactofen at 0.22 kg/ha plus COC at 1% (v/v) was applied at weekly intervals beginning when soybean reached the V2 growth stage. Data collection and analysis were as previously described. Soybean necrosis with lactofen was 5 to 28% 7 DAT and 5 to 23% 14 DAT. At 7 DAT, soybean necrosis with lactofen applied at V3 and R1 was greater than those ≥ R2. The same trend was less apparent 14 DAT; however, necrosis was greater with V3 applications than those ≥ R3. Soybean height 14 days after last lactofen application, mature soybean height, number of nodes, and soybean yield were not affected by lactofen applied from V2 to R5.

Lactofen at V2 reduced soybean height early in the season; therefore, plant growth was altered by lactofen application. Differences in number of nodes at maturity resulted more from planting date than lactofen applications. Soybean yield was not influenced by lactofen at different planting dates or application timings. Early-season soybean growth can be altered with lactofen; however, it has little utility as a plant growth regulator to improve yields.

WEED MANAGEMENT SYSTEMS INCLUDING DICAMBA IN BOLLGARD II XTENDFLEX COTTON.
C.W. Cahoon*[1], A.C. York[1], S. Culpepper[2], D.L. Jordan[1], W.J. Everman[1], K.M. Jennings[1], L.R. Braswell[1]; [1]North Carolina State University, Raleigh, NC, [2]University of Georgia, Tifton, GA (115)

ABSTRACT

Glyphosate-resistant (GR) Palmer amaranth (AMAPA) remains troublesome throughout the southern United States. To aid in the control of this weed, Monsanto has developed cotton cultivars with tolerance to glufosinate, glyphosate, and dicamba. Dicamba offers wide spectrum broadleaf control and will be an additional postemergence (POST) over-the-top and preemergence (PRE) option for weed control in cotton. An experiment was conducted at North Carolina during 2013 and 2014 and Georgia during 2013 to evaluate AMAPA control in BollGard II® XtendFlex™ cotton with herbicide systems including dicamba. Soil at the field site was loamy sand with 0.46 to 1.9% organic matter and greater than 100 AMAPA/m^2. The experiment consisted of a factorial treatment arrangement of two base herbicide systems and seven timings of dicamba. All plots received acetochlor (1260 g ai/ha) immediately following planting (PRE). The two base herbicide systems were glyphosate potassium salt (1260 g ae/ha) and glufosinate-ammonium (654 g ai/ha). These herbicides were applied to 2- to 3-leaf cotton 18 to 23 days after planting (POST 1) and 18 to 22 days later to 8- to 10-leaf cotton (POST 2). Timing of dicamba applications included no dicamba, PRE, POST 1, POST 2, PRE and POST 1, PRE and POST 2, and POST 1 and POST 2. All plots, except the non-treated control, received a directed lay-by application of diuron (1120 g ai/ha) plus monosodium acid methanearsonate (2240 g ai/ha) plus nonionic surfactant (1% v/v) when cotton was 41 to 58 cm tall (Lay-by). Data for cotton injury, AMAPA control, and seed cotton yield were subjected to ANOVA using the PROC GLIMMIX procedure in SAS and means separated using Fisher's Protected LSD at p =0.05. Very little cotton injury was observed 7 days after POST 1 and 7 days after POST 2 (< 8%) following applications of glufosinate, glyphosate, and dicamba. Cotton injury was transitory and 14 days after POST 3 no injury was observed by any herbicide treatment. No cotton injury was observed following applications of PRE herbicides. Acetochlor alone PRE controlled AMAPA 59 to 83% prior to POST 1. At all locations, AMAPA control by acetochlor plus dicamba was greater than acetochlor alone (78 to 99%). Dicamba benefited both the glyphosate and glufosinate system. However, because of the significant amount of GR AMAPA at the location, the increase in control was more dramatic in the glyphosate system. Late in the season, glufosinate and glyphosate applied alone POST 1 and POST 2 controlled AMAPA 76 and 32%, respectively. Adding dicamba PRE or POST 1 in the glufosinate system did not improve AMAPA control compared to glufosinate alone. The addition of dicamba at POST 2 to glufosinate increased AMAPA control 15%. Likewise, two applications of dicamba in the glufosinate system improved AMAPA control 19 to 23%. In the glyphosate based system, dicamba added PRE, POST 1, or POST 2 increased AMAPA control 19, 47, and 50%, respectively. Dicamba applied PRE and either POST 1 or POST 2 also improve AMAPA control. However, in the glyphosate system, the greatest increase in control of AMAPA was observed following dicamba applied twice POST. When AMAPA were large (20 to 25 cm), dicamba applied POST improved AMAPA control by glufosinate and glyphosate alone 27 and 70%, respectively. Trends in seed cotton yield were similar to AMAPA control. Seed cotton yield was greater in plot that received acetochlor + dicamba compared to acetochlor alone. Also, in the glufosinate system, seed cotton yield was improved by the addition of dicamba at POST 2, PRE and POST 1, PRE and POST 2, and POST 1 and POST 2. In the glyphosate system, dicamba applied at any timing improved yield compared to plot receiving glyphosate only. However, dicamba applied twice POST increased yield 2130 kg/ha compared to glyphosate only. In general, including dicamba with glufosinate or glyphosate increased AMAPA control. However, increases in AMAPA control were much more noticeable when dicamba was added to glyphosate. Furthermore, glufosinate alone controlled AMAPA greater than glyphosate alone. This was to be expected with the high level of GR AMAPA. However, when dicamba was included with each of these herbicides, differences in weed control by glufosinate and glyphosate were only minor. Therefore, in cotton tolerant to glufosinate, glyphosate, and dicamba and where GR weeds are present, glyphosate plus dicamba may prove to be a useful weed control option. Furthermore, dicamba combined with glufosinate greatly increased AMAPA control when applied to AMAPA greater than 10 cm in height. Growers will find utility in adding dicamba to glufosinate when weeds are larger than desired for glufosinate alone to control. Additionally, tank mixes of dicamba plus glufosinate include two modes of action, reducing the chances of weed resistance developing to either herbicide.

EFFECT OF HERBICIDE ON DEVELOPMENT OF INTERNAL NECROSIS IN 'COVINGTON' SWEETPOTATO. S. Beam*, S. Chaudhari, N.T. Basinger, S. McGowen, K.M. Jennings, D.W. Monks; North Carolina State University, Raleigh, NC (116)

ABSTRACT

Field studies were conducted in 2014 at the Horticultural Crops Research Station near Clinton NC to determine the influence of herbicides on the development of internal necrosis (IN) in Covington sweetpotato. IN appears to be a postharvest disorder expressed as dark necrotic regions inside the sweetpotato storage root. Symptoms begin from the proximal end of the storage root and proceed through the root with no external symptoms. In study one herbicides were applied to the slip (sweetpotato plant) propagation bed after sweetpotato roots were planted and covered with soil but prior to slip emergence. Treatments for the propagation bed study included PRE flumioxazin (1.53, 3.06 oz ai/A), *S*-metolachlor (0.71, 1.43 lb ai/A), linuron (0.5, 1 lb ai/A), fomesafen (0.25, 0.5 lb ai/A), napropamide (1, 2 lb ai/A) and clomazone (0.375, 0.75 lb ai/A). Additional treatments included seperate POST treatments of paraquat (0.125, 0.25 lb ai/A) and ethephon (0.75, 1.125 lb ai/A) and nontreated checks (weedy, weed-free). Slips were cut from the beds just above the soil and then transplanted to a production field with no additional herbicide treatments applied except for clethodim POST for grass control in late season. Study two included herbicides applied to sweetpotato slips (nonrooted) transplanted in the production field. Treatments in the second study included PREPLANT flumioxazin (1.53, 3.06 oz/A), linuron (0.5, 1 lb/A), fomesafen (0.25, 0.5 lb/A), and paraquat (0.5, 1 lb/A). PRE herbicide treatments included *S*-metolachlor (0.71, 1.43 lb/A), clomazone (0.375, 0.75 lb/A), and napropamide (1, 2 lb/A) applied 4 d after transplanting. Additional treatments included of ethephon (0.75, 1.125 lb/A) applied 2 wk prior to harvest and nontreated checks (weedy and weed-free). Sweetpotato storage roots in both studies were harvested 108 ($\pm$ 5) d after planting using a tractor mounted chain digger. Internal necrosis evaluations were measured the day of harvest, 30, and 60 d after curing (cured at 85 F and 95% relative humidity for 7 d and stored at 58 F and 85% relative humidity). Although internal necrosis occurred in sweetpotato storage roots it does not appear that herbicides greatly affect the incidence of internal necrosis.

HPPD-TOLERANT SOYBEAN SYSTEMS FOR MANAGEMENT OF GLYPHOSATE-RESISTANT PALMER AMARANTH. B.W. Schrage*[1], M. Rosemond[2], J. Allen[3], M.W. Marshall[4], W.J. Everman[1]; [1]North Carolina State University, Raleigh, NC, [2]Bayer Crop Sciene, Research Triangle Park, NC, [3]Bayer Crop Science, Research Triangle Park, NC, [4]Clemson University, Blackville, SC (117)

ABSTRACT

The carbon efficiency of Palmer amaranth contributes to its rapid growth, prolific reproduction, and overall competitiveness in North Carolina soybean systems. With the growing presence of glyphosate-resistant biotypes; alternative weed management strategies such as HPPD-tolerant soybeans are being evaluated. An experiment was conducted in Clayton, NC and Blackville, SC in 2014 to assess the efficacy of isoxaflutole and yield in HPPD-tolerant soybeans. Several combinations of isoxaflutole (Balance Pro), flumioxazin (Valor SX), pyroxasulfone (Zidua), and flumioxazin and pyroxasulfone (Fierce) were applied PRE. Similar POST applications of glyphosate and fomesafen (Flexstar GT) followed at 4 WAP. Plots were rated for percent control of Palmer amaranth at 2, 4, and 7 WAP in South Carolina and 4 and 5 WAP in North Carolina. All plots were harvested upon reproductive maturity. All treatments exhibited greater than 95% control and without phytotoxic symptomology observed on the soybeans; there was no significant difference in yield among treatments in the study conducted in Blackville. In Clayton, treatments failed to display significant differences. This research might suggest the overall effectiveness of proactive weed management efforts to control glyphosate-resistant Palmer amaranth; albeit little difference was noticed among treatments.

CHANGE IN PALMER AMARANTH POPULATION IN COTTON FOLLOWING FOUR YEARS OF GLYPHOSATE AND DICAMBA. M.D. Inman*[1], D.L. Jordan[2], A.C. York[2], W.J. Everman[2], K.M. Jennings[2], D.W. Monks[2]; [1]NCSU, Raleigh, NC, [2]North Carolina State University, Raleigh, NC (118)

ABSTRACT

Herbicide resistance has changed weed management programs considerably over the past decade. Glyphosate-resistant Palmer amaranth has been one of the most burdensome and economically challenging weed species in cotton production throughout Southeastern United States. GR Palmer amaranth now drives weed management programs and the adoption of new strategies and tools to integrate with existing methods are needed.

Research was conducted from 2011-2014 to determine weed population dynamics and frequency of resistance of glyphosate-resistant Palmer amaranth with herbicide combinations consisting of glyphosate, dicamba, and residual herbicides in dicamba-tolerant cotton. Eight herbicide treatments were established in the experiment. Five treatments were maintained in the same plots over the duration of the experiment that consisted of glyphosate only postemergence with and without residual herbicides, glyphosate plus dicamba only postemergence with and without residual herbicides, and glyphosate plus dicamba plus acetochlor only postemergence. Remaining treatments alternated years with glyphosate only and glyphosate plus dicamba only postemergence; with and without residual herbicides. In spring of each year and winter of 2014, ten soil cores (approximately 4 L) were collected at random in each plot after planting and prior to any herbicide application. Soil cores were placed in greenhouse containers. After seedling emergence, weed diversity and density were recorded. An application of glyphosate at 946 g/ae ha was applied to all soil cores and based on surviving weed population frequency of resistance was determined for each treatment. Density of Palmer amaranth in the field was determined in August of each year after all herbicides were applied. Comparable trends were noted between field and greenhouse data. Treatments with glyphosate only postemergence had the highest population of Palmer amaranth regardless of residual herbicide use or not. The lowest populations were observed in treatments where dicamba was applied. Treatments with alternating postemergence herbicide programs, Palmer amaranth populations were central between glyphosate only and glyphosate plus dicamba postemergence treatments. By the end of the experiment frequency of glyphosate resistance was similar regardless of herbicide program.

IMPACT OF TILLAGE ON ITALIAN RYEGRASS (*LOLIUM MULTIFLORUM*) CONTROL IN WINTER WHEAT. Z.R. Taylor*, W.J. Everman; North Carolina State University, Raleigh, NC (119)

ABSTRACT

As the occurrence of herbicide resistant Italian Ryegrass (*Lolium multiflorum*) continues to spread, control options are continuing to decline. Cultural practices may become an option to help suppress ryegrass populations and increase control effectiveness when combine with a sound herbicide program. One practice that may have a significant impact on Italian Ryegrass population is tillage. To test this theory, wheat was grown in both tilled and in no-till conditions and received the following herbicide treatments; non-treated check, Zidua (pyroxasulfone) at 1.25, and 1.5 oz/a pre, Fierce (flumioxazin and pyroxasulfone) at 3 oz/a pre, Zidua at 1.25 oz/a and Sharpen (saflufenacil) at 2 fl oz/a pre, Prowl H2O (pendimethalin) at 2 pt/a at spike, Axiom (flufenacet and metribuzin) at 8 oz/a at spike, Axiom at 10 oz/a at spike, Zidua at 1.25 oz/a pre fb Osprey (mesosulfuron) at 4.75 oz/a and non-ionic surfactant at 1qt/100gal post, Zidua at 1.25 oz/a pre fb Powerflex (pyroxsulam) 3.5 oz/a post, Zidua at 1.25 oz/a pre fb Axial XL (pinoxaden) at 16.4 oz/a post, Osprey at 4.75 oz/a and Zidua at 1 oz/a and non-ionic surfactant at 1 qt/100gal post, Powerflex at 3.5 oz/a and Zidua at 1 oz/a post, Axial XL at 16.4 oz/a and Zidua at 1 oz/a post . In 2013, weed control and yield were both improved in the tilled system compared to the no-till system. Improved control in a tilled system was again seen in two locations in 2014, and yield was improved in one location, while in the other there were no yield differences seen between tillage systems.

WHAT IS THE *EPSPS* COPY NUMBER THRESHOLD FOR GLYPHOSATE-RESISTANT ITALIAN RYEGRASS? R.A. Salas*[1], N.R. Burgos[1], F.E. Dayan[2], B.C. Scott[3]; [1]University of Arkansas, Fayetteville, AR, [2]USDA-ARS Natural products Utilization Research Unit, University, MS, [3]University of Arkansas, Lonoke, AR (120)

ABSTRACT

Italian ryegrass is a troublesome weed in wheat production fields, which also carries over to corn, cotton, and soybean. Glyphosate-resistant Italian ryegrass in Arkansas was first detected in 2007. In 2014, 45 populations were confirmed resistant to glyphosate in eight counties across the state. This research is conducted to determine the level of resistance to glyphosate in 6 Italian ryegrass populations from Arkansas and to elucidate the resistance mechanism to glyphosate across multiple populations.The resistance level was determined by dose-response bioassay in the greenhouse. The absorption and mobility of glyphosate was evaluated using radiolabeled glyphosate. The herbicide target gene, *EPSPS*, was sequenced and gene amplification was determined by quantitative real-time PCR. The dose causing 50% growth reduction (GR_{50}) was 7 to 19 times higher for the resistant than the susceptible population. Uptake and translocation of ^{14}C-glyphosate was similar in resistant and susceptible plants. Target-site mutation associated with resistance to glyphosate was not detected. Resistant plants contained 11-fold to 151-fold more copies of the *EPSPS* gene than the susceptible plants, while the susceptible plants had only one copy of *EPSPS*. Plants surviving the recommended dose of glyphosate contained at least 11 copies. The *EPSPS* copy number was positively correlated to glyphosate resistance level (r=80). Therefore, resistance to glyphosate in these populations is due to multiplication of the *EPSPS* gene. Suppressing the mechanism of gene amplification may overcome resistance. The occurrence of *EPSPS* gene amplification was first reported in Palmer amaranth and now is also observed in Italian ryegrass, kochia, spiny amaranth, and tall waterhemp. Weeds are evolving ways to survive glyphosate application. Best management strategies should be implemented to curtail resistance evolution and to conserve the utility of glyphosate.

POSTEMERGENCE CONCEPTS FOR FIELD BINDWEED (*CONVOLVULUS ARVENSIS*) CONTROL. M. Terry*, A.R. Post; Oklahoma State University, Stillwater, OK (121)

ABSTRACT

EFFECT OF CLOPYRALID DOSE ON PLASTICULTURE GROWN STRAWBERRY IN FLORIDA. S.M. Sharpe*[1], P.J. Dittmar[1], N.S. Boyd[2], G.E. MacDonald[1], R.L. Darnell[1]; [1]University of Florida, Gainesville, FL, [2]University of Florida, Wimauma, FL (122)

ABSTRACT

Clopyralid is the only available herbicide for post emergence weed control in Florida strawberry production. Previous research has suggested that low rates of clopyralid may produce a hormesis effect. Furthermore, the range of tolerance for strawberry to clopyralid is not well understood. The objective of the study was to identify any hormesis effect by low doses of clopyralid and test the range of clopyralid tolerance for strawberry. A dose response study was established in Citra, Florida using a randomized complete block design. Strawberries were planted on November 12, 2013 and clopyralid applied on February 28, 2014 at rates of 0, 35, 70, 140, 280, 560, 1120 and 2240 g ae/ha. Growth measurements were taken weekly from March 7, 2014 thru April 19, 2014. Response variables include plant height, plant width, leaf number, flower number and damage rating. Harvest was taken biweekly between the 19th March and the 17th of April. A destructive plant harvest for dry biomass partitioned into above and below ground portions was taken at 47 days after treatment (DAT). Hormesis was tested with nonlinear regression using the Brian-Cousens log-logistic dose response model hormesis parameter's confidence interval. Analysis of variance and means separation were used to determine treatment effects. There was no significant hormesis effect on either fruit number or harvested fruit weight. Rates up to 280 g ae/ha caused no significant visual damage at 33 DAT. Rates above 280 g ae/ha caused significant decreases in plant height and width compared to the control at 33 DAT. Above ground biomass was significantly reduced at 1120 g ae/ha versus the control and the 35 g ae/ha treatment was significantly higher than treatments from 280 g ae/ha and higher. Leaf number was significant reduced by rates of 1120 g ae/ha and higher at 47 DAT. Rates of 560 g ae/ha and higher significantly reduced below ground biomass. Both berry number and harvested weight were significantly reduced at 1120 g ae/ha rates compared to the control though both weight and number were significantly higher at 35 g ae/ha than any other clopyralid treatment. Vegetatively, strawberries tolerated applications of clopyralid up to 560 g ae/ha above ground and up to 240 g ae/ha below ground without any significant damage. Reproductively, strawberries tolerated up to 560 g ae/ha without significant reductions in both berry number and harvested weight. Low doses of clopyralid produced no significant hormesis effect on strawberry yield.

RESIDUAL ACTIVITY OF QUIZALOFOP RELATIVE TO OTHER GRAMANICIDES. Z.D. Lancaster*, J.K. Norsworthy, M. Palhano, S.M. Martin, R.R. Hale, J.C. Moore; University of Arkansas, Fayetteville, AR (123)

ABSTRACT

With the evolution of weeds that have resistance to multiple herbicide modes of action, a new technology is needed to control many of these troublesome weeds. BASF is currently developing a new rice that will be resistant to quizalofop, an acetyl coenzyme A carboxylase (ACCase)-inhibiting herbicide. A field experiment was conducted in the summer of 2014 at the University of Arkansas Agricultural Research and Extension Center in Fayetteville, Arkansas to evaluate the residual activity of quizalofop relative to other graminicides for crop injury and grass weed control. The experiment was set up as a split-split plot design assigning overhead-irrigation activation as the whole plot factor, with plant-back date as the sub-plot, and herbicide treatments as the sub-subplot. This experiment was evaluated for four different crops (conventional rice, quizalofop-resistant rice, grain sorghum, and corn). Herbicide treatments were the anticipated labeled (120 g ai/ha) and 2X rates of quizalofop (Targa) and the currently labeled and 2X rates of fenoxaprop (Ricestar HT), cyhalofop (Clincher), fluazifop (Fusilade DX), clethodim (SelectMax), and sethoxydim (Poast). The irrigation event was applied with a traveling gun sprinkler system, and the plant-backs were made at 0, 7, and 14 days after treatment. On all crops, injury increased with herbicide activation over no activation. At 14 to 21 days after treatment, corn and grain sorghum both had the highest injury of 19% and 20%, respectively, from the high rate of sethoxydim with activation. Conventional rice and quizalofop-resistant rice had the highest injury of 13% and 4%, respectively, from fluazifop at the 2X rate. Herbicides effectively controlled emerged grasses at the time of application, but provided little residual grass control. The highest level of grass control occurred at 14 days after treatment, with control for all treatments declining at later assessments. Barnyardgrass (*Echinochloa crus-galli*) and broadleaf signalgrass (*Urochloa platyphylla*) were best controlled with the high rate of fluazifop at 98% and 96%, respectively. The results of this experiment suggest that caution will need to be taken for the plant-back period and immediate plant-back is not likely. Rainfall or irrigation appear to influence the activity of the evaluated graminicides and some crops exhibited greater tolerance, or less risk for injury, than others.

EFFECT OF FLOODING ON ATRAZINE DISSIPATION IN SOIL. A. Umphres-Lopez*[1], L.E. Steckel[2], D. Kincer[1], T.C. Mueller[1]; [1]University of Tennessee, Knoxville, TN, [2]University of Tennessee, Jackson, TN (124)

ABSTRACT

In Tennessee the majority of field crops are grown in the western region of the state. Because of soil type, annual rainfall, and low elevation, flooding occurs in the counties along the Mississippi River. Similarly in other states with regions prone to flooding, producers are faced with the question of should they replant and whether to replant corn (*Zea mays*) or soybean (*Glycine max*). Therefore the purpose of this research was to evaluate how flooding would affect atrazine dissipation in the soil and subsequent yield. This study was conducted at the University of Tennessee Plant Science Farm in Knoxville, TN. Plots were arranged in a factorial split-plot design with 2 tratment levels for 2012 and 2014. Because of above average rainfall in 2013, data was not collected. The first level of treatment consisted of flooded (F) and non-flooded plots (NF). The second level of treatment was atrazine with dosages of 0, 2.2, and 4.5 kg ai ha^{-1}. Soil samples, soybean injury at approximately 30 days after planting (DAP), and soybean yield data were collected. Soil samples were analyzed for atrazine concentration using a LC-MS according to laboratory standard operating procedures (SOPs). Data was analyzed using ARM (version 9.0) for mean separations that were tested with a protected LSD ($P < 0.05$). In 2012, data indicated that atrazine concentrations were higher at planting in NF plots compared to F plots. Yield was observed to be higher in NF plots, which would be expected since atrazine was readily available for possible plant activity and soybean injury. In 2014, although atrazine concentration was significantly higher in NF plots, there were no differences in yield among treatments.

BIOCHAR REDUCES PREEMERGENCE HERBICIDE AVAILABILITY AND WEED CONTROL WHEN USED AS A SOIL AMENDMENT. N. Soni*[1], R.G. Leon[1], J.E. Erickson[2], J.A. Ferrell[2], M. Silveira[3]; [1]University of Florida, Jay, FL,[2]University of Florida, Gainesville, FL, [3]University of Florida, Ona, FL (125)

ABSTRACT

Biochar reduces preemergence herbicide availability and weed control when used as a soil amendment. N. Soni*[1], R.G. Leon[1], J.E. Erickson[2], J.A. Ferrell[2], and Maria Silveira[3]. [1]University of Florida, Jay, FL 32565, [2]University of Florida, Gainesville, FL 32611, [3]University of Florida, Ona, FL 33865.

Biochar is a by-product of biofuel production and is currently used as a soil amendment to favor soil fertility and moisture and reduce leaching of nutrients. Despite its benefits to soil health and productivity, because biochar has high adsorption capacity its addition to the soil might affect preemergence herbicide activity. However, there is limited information available about the effect of biochar on weed control especially under field conditions. The present study evaluated how adding biochar to the soil modified atrazine and pendimethalin availability and their herbicidal activity under *in vitro* and field conditions. A sorption experiment showed that biochar reduced atrazine and pendimethalin concentration in the soil solution due to high levels of adsorption at all herbicide concentrations evaluated. Soil with biochar exhibited 16 and 4 times higher adsorption than soil alone. Under field conditions, atrazine and pendimethalin weed control in biochar treated plots was reduced in 75% and 60%, respectively compared to plots without biochar. Doubling the label rate did not compensate for the biochar negative effect on herbicide availability, and weed control was <50%. These results suggested that the use of biochar as a soil amendment in cropping system could decrease preemergence herbicide efficacy. Therefore, additional weed control practices such as the use of higher rates or more intensive use of postemergence herbicides and cultivation might be necessary to achieve adequate weed control levels.

CONFIRMING GLYPHOSATE RESISTANCE IN AN ANNUAL BLUEGRASS POPULATION COLLECTED FROM SPORTS TURF. S.S. Rana*[1], S. Askew[2], J.R. Brewer[2]; [1]Virginia Polytechnic Institute and State University, Blacksburg, VA,[2]Virginia Tech, Blacksburg, VA (126)

ABSTRACT

Glyphosate is the cheapest and most commonly used herbicide for annual bluegrass (*Poa annua* L.) control in dormant bermudagrass (*Cynodon dactylon* L.) turf. In 2013, field manager at the Frank Liske Park in Concord, NC reported an annual bluegrass population not controlled by glyphosate after six years of continuous applications. Plugs of suspected glyphosate-resistant annual bluegrass plants were collected from the Frank Liske Park and screened for glyphosate resistance. The annual bluegrass population was found resistant to glyphosate at 0.42 kg ai ha^{-1}, the labeled rate for annual bluegrass control in dormant bermudagrass turf. The annual bluegrass population with glyphosate resistance was grown in a greenhouse at the Glade Road Research Facility in Blacksburg, VA to produce seeds. Two greenhouse studies were conducted with an objective to compare locally-collected glyphosate-susceptible annual bluegrass to the suspected resistant population for response to glyphosate. Additional greenhouse studies were conducted to determine if resistance to glyphosate in suspected glyphosate-resistant annual bluegrass population confers resistance to other herbicides. All studies were arranged in a randomized complete block design with four replications. Data were collected for annual bluegrass visual injury and height reduction at weekly intervals, and reduction in annual bluegrass biomass at three and seven weeks after treatment (WAT). Replicate data were converted to percentage reductions compared to untreated plants and regressed against glyphosate rate using hyperbolic function via SAS 9.2. Estimated GR_{50} values were then calculated and subjected to analysis of variance to test for trial and biotype effects and interactions. Significant effects were separated using Fisher's Protected LSD test at the 5% level of significance. The suspected resistant population of annual bluegrass was found to be resistant based on significantly different GR_{50} values from height and biomass data at 3 and 7 WAT. Resistance factors ranged between 2 and 18 depending on measured response variable and trial. This study confirms the first report of glyphosate-resistant annual bluegrass developed on athletic field turf. Research is currently underway to determine the mechanism of resistance in this annual bluegrass population.

CONFIRMING RESISTANCE TO PRODIAMINE AND GLYPHOSATE IN A SINGLE ANNUAL BLUEGRASS BIOTYPE FROM TENNESSEE. S.M. Breeden*, J.T. Brosnan, T.C. Mueller, B.J. Horvath, S.A. Senseman; University of Tennessee, Knoxville, TN (127)

ABSTRACT

Annual bluegrass (POAAN) is a cool-season weed that commonly infests warm-season turfgrasses during winter dormancy. Cases of POAAN developing resistance to both PRE and POST herbicides in managed turfgrass systems have been reported throughout the southeastern United States; however, instances of POAAN developing multiple-resistance are limited. Poor POAAN control was reported in golf course roughs in Alcoa, TN following treatment with a tank mixture of prodiamine (1120 g ha^{-1}) and glyphosate (840 g ae ha^{-1}) during bermudagrass dormancy in 2013. POAAN had received this treatment for over ten consecutive years without chemical rotation. We hypothesized that this POAAN population had evolved multiple-resistance to both glyphosate and prodiamine and conducted research to determine the sensitivity of this POAAN biotype to applications of these herbicides.

Non-treated POAAN was harvested from field plots (1.5 x 10 m) at this location on 18 March 2014. A total of 100 plants were removed from three plots using a 1-m^2 grid. Each plant was distinguished by a number, then dissected into single tillers and transplanted into 164-cm^3 cone-tainers filled with a peat moss growing medium. Each tiller was given an alphabetical identifier associated with the number assigned during field harvesting. Plants were grown in a glasshouse with average low and high temperatures of 19 and 29 °C respectively. Tillers were irrigated thrice daily and maintained at a 4-cm height using scissors. In total, this process produced 890 tillers for experimentation.

To evaluate glyphosate sensitivity, 100 tillers were randomly selected from all plants harvested from the field and treated with glyphosate at 840 g ha^{-1} in an enclosed spray chamber (Generation III Research Sprayer, DeVries Manufacturing, Hollandale, MN) calibrated to deliver 281 L ha^{-1} on 29 April 2014. Visual control was assessed 21 days after treatment (DAT) on a 0 (no control) to 100% (complete kill) scale relative to a non-treated check. Plants controlled ≤ 30% were deemed glyphosate resistant (GR), while those controlled ≥ 70% were deemed susceptible. Moreover, 100 additional tillers from the GR group were analyzed for shikimic acid accumulation compared to a known susceptible POAAN population established from seed. These 100 tillers were treated with glyphosate at 420 g ha^{-1} on 13 May 2014 and destructively sampled 0, 1, 2, 3, and 6 DAT. This experiment was repeated on 20 May 2014. Each study was replicated four times and incorporated 5 sub-samples per biotype on each sampling date. Shikimic acid accumulation was quantified via high performance liquid chromatography with biotype responses compared using non-linear regression analyses.

Prodiamine sensitivity was evaluated in hydroponic culture using polyethylene containers filled with 10 L of full strength Hoagland nutrient solution connected to air stones to ensure oxygenation and agitation. Ten POAAN plants were washed free of growing media and cut to a uniform root length of 5 cm. Plants were inserted into pre-dilled holes in the lid of each container such that root tissues were submerged in the nutrient solution on 29 April 2014. In total, 100 tillers were randomly selected from all harvested plants. Immediately after insertion, prodiamine was added to the hydroponic solution at 0.04 mM, a concentration known to inhibit root growth of prodiamine-resistant POAAN from our field site by 50%. At 10 DAT, root length was measured with a ruler for all plants. Plants with root length > 5 cm were deemed prodiamine resistant while those with root length ≤ 5 cm were deemed susceptible.

In total, 96 of the 100 plants studied were deemed to be GR. These plants were controlled ≤ 30% 21 DAT and accumulated 50% less shikimic acid 6 DAT than a susceptible population. A total of 84 plants were deemed resistant to prodiamine, yielding 0.1 to 3 cm of root growth during the 10-day evaluation period. Across the entire 100 plant population, 81 plants were resistant to both herbicides while only a single plant was susceptible to both chemistries.

Future research is needed to confirm these resistance traits from seed and to determine if the ratios of resistant-to-susceptible plants observed in these greenhouse studies are present after treatment with glyphosate and prodiamine in the field.

UTILIZATION OF FLUMIOXAZIN PLUS PYROXASULFONE AND AGRONOMIC PRACTICES FOR PALMER AMARANTH (*AMARANTHUS PALMERI*) IN SOYBEAN (*GLYCINE MAX*). B.H. Lawrence*[1], J.P. Mangialardi[1], C.B. Edwards[2], J.D. Peeples[1], J.A. Bond[1], T.W. Eubank[3]; [1]Mississippi State University, Stoneville, MS, [2]Monsanto Co., Scott, MS, [3]Dow AgroSciences, Greenville, MS (128)

ABSTRACT

Glyphosate resistant Palmer amaranth is an economically troublesome weed too many southeastern U.S. growers. Palmer amaranth is notable mainly due to its competitiveness, prolific seed production, and herbicide resistance. Long-term management of Palmer amaranth requires a multi-faceted approach that includes rotating crops and herbicides, diversifying in-season herbicides, and closely monitoring fields for Palmer amaranth. Cultural practices such as altered row spacing combined with a PRE herbicide can aid in Palmer amaranth control. Flumioxazin plus pyroxasulfone is widely used in Mississippi as a PRE herbicide targeting Palmer amaranth. Additionally, most soybean in Mississippi are grown on wide rows, but interest in narrow row production to aid in Palmer amaranth management has increased recently. Therefore, research was conducted to determine the effectiveness of soybean row spacing as a tool for reducing the emergence of Palmer amaranth and to evaluate the effect of soybean row spacing on canopy light interception and soybean performance.

Two separate field studies were conducted at the Mississippi State University Delta Research and Extension Center in Stoneville, MS, in 2013 and 2014. Both studies were in a randomized complete block design with four replications. The first study, Palmer amaranth emergence study, evaluated three soybean row spacings (19, 38, and 76 cm) for their influence on emergence of Palmer amaranth throughout the growing season. The second study, soybean light interception study, compared the same three soybean row spacings for their effect on canopy light interception and soybean yield. Plots in the Palmer amaranth emergence study received no herbicide treatment and new emergence was recorded as plant/m^2 at 30, 60, and 90 days after planting (DAP). Plots in the soybean light interception study were treated immediately after planting with flumioxazin plus pyroxasulfone at 0.0681 and 0.922 kg ai/ha and photosynthetic active radiation (PAR) values were recorded below the soybean canopy at 30, 60, and 90 DAP. All data from both studies were subjected to ANOVA and estimates of the least square means were used for mean separation with $\alpha = 0.05$. Data from the Palmer amaranth emergence study were analyzed as a factorial of three soybean row spacings and three evaluation intervals. In the soybean light interception study, PAR data were analyzed similar to data in the Palmer amaranth emergence study; however, soybean yields were analyzed as the original randomized complete block.

Pooled over soybean row spacing, Palmer amaranth emergence was reduced 72% at 60 compared with the 30 DAP evaluation interval. However, Palmer amaranth emergence was similar between the 60 and 90 DAP evaluation intervals. By 90 DAP, emergence of Palmer amaranth was Ë, 1 plant/m^2 regardless of row spacing. Soybean achieved maximum observed light interception at 60 DAP at row spacings of 19 and 38 cm, but not until 90 DAP at the 76-cm spacing. Light interception from soybean in 19-cm rows was greater at 30 DAP than soybean in wider rows. By 60 DAP, soybean in 19- and 38-cm rows intercepted more light than in 76-cm rows. Soybean yields were increased 23 and 27% when row spacing decreased from 76 cm to 38 and 19 cm respectively.

Palmer amaranth emergence reached a minimum and soybean light interception reached a maximum at 60 DAP. Although soybean row spacing did not affect Palmer amaranth emergence, soybean light interception at 30 and 60 DAP and soybean yield were greater with 19- and 38- compared with 76-cm row spacings. Data indicated that a soybean row spacing of 38 cm should be utilized to optimize soybean light interception and yield while offering some suppression of Palmer amaranth emergence.

THE EFFECT OF GLUFOSINATE AND GRAMINICIDE TANK-MIX RATES ON BARNYARDGRASS CONTROL. A.N. Eytcheson*[1], D. Reynolds[2]; [1]Mississippi State University, Starkville, MS, [2]Mississippi State University, Starkeville, AR (129)

ABSTRACT

The rapid adoption of genetically modified (GM) crops resistant to non-selective herbicides, especially the glyphosate resistant cropping system has led to the development of glyphosate resistant weeds. As an alternative to the glyphosate based system, the LibertyLink® system utilizes the GM crop resistance to the herbicide glufosinate. Glufosinate is a non-selective, non-residual postemergence (POST) herbicide that has the ability to control weeds that are considered to be difficult to control with glyphosate as well as glyphosate resistant weeds. However, previous research has reported grass weed control with glufosinate may be inadequate and may require additional management inputs. Producers often chose to tank mix herbicides to broaden the spectrum of weed control, improve efficacy and reduce application cost by combining applications. However, combinations of graminicides with herbicides used to control broadleaves typically result in antagonism. Previous research has evaluated glufosinate-graminicide antagonism in annual grass species; however, very little literature is available regarding barnyardgrass antagonism. Therefore, field and greenhouse experiments were conducted to determine barnyardgrass control with an increasing rate titration of quizalofop-P and clethodim when tank-mixed with glufosinate

Both field and greenhouse experiments were arranged as a factorial arrangement of treatments in a randomized complete block design Factor level A consisted of quizalofop-P (0, 28, 56 or 84g ai/ha) and clethodim (0, 38, 76 or 114 g ai/ha). Quizalofop-P and clethodim rates represented 0, 0.5X. 1X, or 1.5X labeled rates. Factor B consisted of glufosinate applied at 0 or 564 g ai/h. A crop oil concentrate (1% v/v) was included in all graminicide applications. Field data collected included barnyardgrass control 7, 14, 21, 28 and 56 DAT, barnyardgrass biomass (g/m^2) collected at 56 DAT and soybean yield. Greenhouse data collected included barnyardgrass control 7, 14, 21 and 28 DAT, as well as barnyardgrass biomass (g/m^2) collected at 28 DAT.

There was not an interaction of field data due to year, therefore all data were analyzed across years. Quizalofop-P applied at 0.5X, 1X or 1.5X applied with or without glufosinate were not significantly different at 28 DAT, with control ranging from 87 to 94%. Clethodim applied at 1X alone controlled barnyardgrass better than when tank-mixed with glufosinate. However, by 56 DAT regrowth occurred from the crown with all treatments. Clethodim applied alone or tank-mixed with glufosinate significantly reduced barnyardgrass biomass compared to the untreated check. However, quizalofop-P 1.5X + glufosinate reduced barnyardgrass biomass by 54% compared to quizalofop-P 1.5X alone. Soybean yield increased by 54% when glufosinate was tank-mixed with either graminicide. Data from the Greenhouse experiments at the 28 DAT evaluate was similar to the field data. Barnyardgrass control did not differ between quizalofop-P applied alone or tank-mixed with glufosinate. However, barnyardgrass control was antagonized when clethodim at 0.5X was tank-mixed with glufosinate.

Glufosinate alone may not adequately control annual grasses, thus requiring additional management inputs. In times of less than adequate grass weed control, producers may consider tank-mixing glufosinate and clethodim. Our data suggests glufosinate alone had difficulty adequately controlling barnyardgrass; however, clethodim is more sensitive to tank-mixing with glufosinate compared to quizalofop-P. Significant regrowth from the crown after application will require additional management inputs. Further research needs to be conducted to further pinpoint rates which could lead to antagonism.

EVALUATION OF HERBICIDE EFFICACY AND APPLICATION TIMING FOR MISCANTHUS. D.N. Barksdale*, J. Byrd, M.L. Zaccaro, D.P. Russell; Mississippi State University, Mississippi State, MS (130)

ABSTRACT

Miscanthus species and hybrids have been a main focal point in the biofuels industry because of their capability to produce massive amounts of aboveground biomass. Limited research has been conducted on the control and eradication of these grasses. In 2013, field experiments were conducted on *Miscanthus* in Louisville, MS with two objectives in mind: (1) determine the efficacy of different herbicide treatments and (2) determine the effect of application timing. Experiments consisted of two application timings, summer and fall, and 21 herbicide treatments: glyphosate at 2, 4, 6.5 lb ae/A, 2% (v/v), imazapyr at 0.25, 0.5 lb ae/A, 1% (v/v), clethodim at 0.25 lb ai/A, 0.25% (v/v), fluaziflop at 0.38 lb ai/A, metsulfuron at 0.075 lb ai/A, 1 oz/100 gallons, imazapic at 0.18 lb ai/A, hexazinone at 0.5, 1 lb ai/A, MSMA at 3.3 lb ai/A , diuron at 2 lb ai/A, sulfosulfuron at 0.07 lb ai/A, sulfometuron at 0.09 lb ai/A, nicosulfuron + metsulfuron at 0.05 + 0.01 lb ai/A, and quinclorac at 0.75 lb ai/A. Statistical analysis of visual control data as well as aboveground biomass samples taken 12 months after treatment (MAT) revealed significant differences ($P < 0.05$) among treatments. According to statistical analysis on shoot mass, glyphosate applied at 4, 2, and 6 lb ae/A and 2% (v/v) in June achieved 100, 94, 85, 90% control, respectively. While some treatments applied in June provided partial *Miscanthus* visual control, shoot biomass weight measured 12 months after application revealed no significant differences among any other treatments compared to the untreated control. Metsulfuron applied at 1 oz/100 gallons achieved the greatest amount of control at 49% among September applications. For fall applications, glyphosate applied at 4 lb ae/A reduced*Miscanthus* shoot biomass 40%, compared to a 43% reduction by quinclorac at 0.75 lb ai/A or 0.07 lb ai/A sulfosulfuron. According to both visual and biomass data, *Miscanthus* control is highest when an application of glyphosate at 2 or more lb ae/A or as a 2% solution is applied in the summer time; whereas, fall applications were inadequate for long term control.

GRASS CONTROL IN SORGHUM AS IMPACTED BY CULTURAL PRACTICES AND WEED MANAGEMENT. T.E. Besancon*[1], A.M. Knight[1], Z.R. Taylor[1], L.J. Vincent[1], W.J. Everman[1], R. Weisz[2]; [1]North Carolina State University, Raleigh, NC, [2]North Carolina State University, RALEIGH, NC (131)

ABSTRACT

Weed control remains a major challenge for economically viable sorghum production in North Carolina due to sorghum's inability to efficiently compete with weeds during early growth stages. Moreover, herbicides capable of suppressing grasses are extremely limited due to sorghum sensitivity. In addition to Palmer amaranth (*Amaranthus palmeri*), grasses are extremely problematic in sorghum production. Previous studies have shown it was possible to improve weed control in sorghum by narrowing row spacing and increasing planting density. Field studies were conducted at the Central Crops Research Station (Clayton, NC) in 2013 and at the Upper Coastal Plain Research Station (Rocky Mount, NC) in 2014 to determine which association of row spacing, plant populations and herbicide program would increase crop competitiveness with grasses and eventually reduce the need for POST applications. The experiment was conducted as a factorial arrangement of 3 treatments in a randomized complete block design. Main factors consisted of different row spacings (19, 38, and 76 cm), planting density (40,000, 80,000, 120,000, and 160,000 plants per acre), and herbicide programs (non-treated, PRE application of S-metolachlor + atrazine, and PRE application of S-metolachlor + atrazine followed by POST application of acetochlor alone in 2013 or mixed with quinclorac in 2014). Weed control was visually estimated 4 weeks after PRE, 2 and 4 weeks after POST for Large crabgrass (*Digitaria sanguinalis*), Crowfootgrass (*Dactyloctenium aegyptium*), Broadleaf signalgrass (*Urochloa platyphylla*), and Yellow foxtail (*Setaria glauca*). Weed density and biomass were evaluated before harvest as well as grain yield at harvest. Data collected stressed the importance of an efficient post-emergence herbicide application to successfully control grass species and prevent sorghum yield loss.

In a situation of low weed infestation, grass biomass decreased significantly in the non-treated plots at every row spacing associated with plant density ranging from 120 to 160,000 plants per acre. Application of acetochlor as a POST herbicide didn't improve grass control and the highest yields were associated with the combination of narrow rows and high plant densities independently of the herbicide application timing.

Under heavy grass infestation, the POST application significantly improved grass control compared to a single PRE application. Higher planting density significantly improved Large crabgrass control at every row spacing and similar results were observed at a lesser extent for Broadleaf signalgrass and Yellow foxtail. Differences in weed biomass according to row spacing and planting density were only recorded for the PRE application. Significant lower cumulative grass biomass and density was recorded for the narrow row spacing (7.5 cm) associated with planting density ranging from 80 to 160,000 plants per acre. At wider row spacing (15 or 30 cm), significant decrease only occurred at the highest planting density (160,000 plants per acre). Grass infestation and bad sorghum growing conditions due to partial flooding of the field prevented the observation of any significant yield difference according to row spacing or plant population in the non-treated plots.

EVALUATION OF ROUNDUP READY FORAGE SOYBEANS FOR COGONGRASS CONTROL. M.L. Zaccaro*, J. Byrd, D.P. Russell, D.N. Barksdale; Mississippi State University, Mississippi State, MS (132)

ABSTRACT

The control of cogongrass (*Imperata cylindrica* (L.) Beauv.) has proven to be difficult as few herbicide provide adequate efficiency for an extended period. An approach using cover cropping systems is under investigation, because not only can it be used to improve soil fertility and compete with the weed, but the farmer produces a usable commodity which can help pay for control. The objective of this experiment was to evaluate cogongrass control using RR 'Big Fellow' forage soybeans (*Glycine max* (L.) Merr.) and multiple glyphosate applications. The experiment was conducted in south Mississippi in July, where six treatments were established in a complete randomized design with 4 repetitions: single herbicide application (1), double application (2), triple application (3), soybean cover and single application (4), soybean cover and double application (5) and soybean cover with triple application (6). After the cogongrass was mowed and the soil tilled, 75 lbs soybeans seed per acre was planted to the treatments 4, 5 and 6, with a no-till drill on 7/21/14. The initial herbicide application was made 8/13/14 with 1 lb ae per acre of Roundup PowerMax 4.5L with 0.25 % V/V of non-ionic surfactant. Second application of PowerMax at the same rate was applied 9/11/14 and the last application was 10/21/14. Roundup PowerMax was applied at 20 GPA using a 2-liter CO_2backpack sprayer with flat fan nozzles 8002VS and 20 PSI. Visual control ratings (%) were taken monthly. Cogongrass and soybean biomass were harvested from 10.8 sq. ft area on 10/21/14, separated, dried and weighted. Data were analyzed in PROC GLM in SAS v. 9.3, then means were separated by the LSD with α=0.05. On average, the treatments 2, 3, 4, 5 and 6 were better than treatment 1 with respect to cogongrass control and biomass dry weight. Cogongrass control was improved by treatments 6 and 5, although these weren't significantly different from each other and from 2 and 3. The treatments 2 and 3 also provided good visual control, not significantly different from each other and from 4, 5 and 6. The treatment 4 provided 60 % cogongrass control, while not significantly different from 2 and 3. With respect to cogongrass biomass, the treatments 2, 3, 4, 5 and 6 resulted in a significant decrease on average biomass dry weight compared to the treatment 1, however not significantly different from each other. Cogongrass control will be evaluated again after the 2015 spring transition. In conclusion, it's recommended to use RR forage soybeans as a cover crop and two applications of glyphosate during the growing season to economically maximize cogongrass control.

NITROUS OXIDE EMISSIONS IMPACTED BY WEED MANAGEMENT. A.M. Knight*, W.J. Everman, S.C. Reberg-Horton, S. Hu, D.L. Jordan, N. Creamer; North Carolina State University, Raleigh, NC (133)

ABSTRACT

Agriculture accounts for a large portion of land use worldwide. In the U.S. specifically, the World Bank indicated that agriculture accounts for roughly 45% of land use. Agriculture is estimated to contribute greatly to the output of one of the main greenhouse gases, nitrous oxide (N_2O), which is suspected of contributing to climate change, contributing an estimated 59 percent to emissions. These large percentages are suspected to partially be due to one-third of nitrogen applied to cropping systems being utilized by the system while the additional two-thirds are lost to the environment. With different agricultural practices contributing to these greenhouse gas emissions, finding how various production practices contribute to greenhouse gas emissions will help in the recommendation of best management practices to minimize gas emissions by agriculture in the southeastern U.S. Field studies were conducted in 2013 and 2014 at the Center for Environmental Farming Systems at the Cherry Research Farm in Goldsboro, NC. Long-term plots of conventional no-till, conventional-tillage, conventional crop-hay, organic tillage, organic minimal tillage, and organic crop-hay systems were used to measure the flux of the greenhouse gases CO_2, CH_4, and N_2O, 24 to 48 hours after ~1.25 cm or more of rainfall, following USDA-ARS GRACEnet Project Protocols. Incubation studies regarding the impact of herbicides on these emissions were conducted in fall of 2014. In these combined experiments it was investigated how weeds and weed control played a role in greenhouse gas emissions. Results indicated weed-free areas in conventional managment emit more nitrous oxide than weedy areas (0.5-10 mg N $m^{2-1}day^{-1}$ more) while weedy areas emit more nitrous oxide in organic systems (0.5-10 mg N $m^{2-1}day^{-1}$ more). In addition, tillage plays a significant role in gas emissions across cropping systems. Full tillage systems were emitting upwards of 12 mg N $m^{2-1}day^{-1}$ while no-till or minimum tillage systems were emitting roughly 3 mg N $m^{2-1}day^{-1}$ on the same dates.

EVALUATING THE EFFICACY AND FIT OF FACET L TO CONTROL GRASS WEEDS IN GRAIN SORGHUM (*SORGHUM BICOLOR*) IN NC. L.J. Vincent*, W.J. Everman, T.E. Besancon, Z.R. Taylor, A.M. Knight, A.M. Growe; North Carolina State University, Raleigh, NC (134)

ABSTRACT

Grain sorghum production in North Carolina has been greatly inhibited by the lack of postemergence annual grass weed control herbicide options. Selective grass weed control after the crop has emerged has not been possible until recently. However, quinclorac has a history in rice and turf weed management as a broad spectrum herbicide and has been labeled for postemergence sorghum weed management. The objective of the study was four fold: determine sorghum phytotoxicity with quinclorac, evaluate its efficacy as a tank mix partner with common sorghum herbicides, examine its spectrum of weed control, and any impacts it may have on yield.

The experiment was organized as a randomized complete block design with a factorial arrangement in four replications established at two locations Rocky Mount and Lewiston-Woodville, NC. The factorial was twofold; factor A being herbicide timing (PRE fb POST and POST) and factor B was POST herbicide treatment. The PRE herbicide application was s-metolachlor + atrazine at 3.7 L/ha. All POST herbicide applications included quinclorac at a rate of 1.6 L/ha as well as crop oil concentrate at a rate of 1% v/v. In addition to quinclorac and crop oil concentrate at the aforementioned rates; the following herbicides were added as different tank mixes; atrazine, pyrasulfotole + bromoxynil, pyrasulfotole + bromoxynil + atrazine, prosulfuron, prosulfuron + atrazine, 2, 4-D, dicamba, and a nontreated check. Data collected includes; crop tolerance and weed control ratings at 7, 14, and 28 days after treatment (DAT), yield, and weed biomass weights and counts (data not presented).

End of the year data collection revealed some expected as well as unexpected conclusions. At both locations where atrazine was included in the tank mix, crop stunting was observed particularly in treatments which received atrazine at PRE and POST timings. Weed control ratings demonstrated the necessity of a preemergence herbicide in sorghum production. Although there were no significant differences amongst PRE fb POST treatments themselves, drastic improvements in control of large crabgrass and broadleaf signalgrass were achieve with the addition of a PRE. Significant differences were noted amongst treatments which only received a POST application. Treatments including atrazine at the PRE fb POST timing again proved to be important as in some cases, weed control was significantly improved compared to the similar treatment without atrazine. In both locations, across annual grass species, treatments including pyrasulfotole + bromoxynil with and without atrazine in some cases significantly increased weed control. Finally, average yield at Rocky Mount was 0.8 MT/ha due to above average rainfall and high weed pressure. Lewiston-Woodville yielded on average 4.8 MT/ha. In both locations, the PRE fb POST treatments which included atrazine decreased yield, sometimes significantly.

PREEMERGENCE CONTROL OF SUMMER ANNUALS IN BERMUDAGRASS WITH FLUMIOXAZIN.
C.A. Segars*, J.Q. Moss, K. Koh; Oklahoma State University, Stillwater, OK (135)

ABSTRACT

Goosegrass (*Eleusine indica* (L.) Gaertn.) is problematic summer annual weed in both cool season and warm season turfgrass. Recently, flumioxazin was registered for use in dormant bermudagrass (*Cynodon dactylon* (L.) Pers). Flumioxazin inhibits protoporphyrinogen oxidase enzyme and it can be utilized for pre- and post-emergence weed control. Dormant turf application of flumioxazin has exhibited efficacy for post-emergence winter annual weed control and pre-emergence summer annual weed control. The objective of this study was to evaluate flumioxazin for its pre-emergent control of goosegrass in common bermudagrass. This study was conducted at Cimarron Trails Golf Course in Perkins, OK. Seven herbicide treatments, including flumioxazin, indaziflam, prodiamine, and oxadiazon, were applied to dormant common bermudagrass. All treatments included a non-ionic surfactant as 0.25 % V/V. Applications were applied using a CO_2 pressurized R&D Brand bicycle sprayer. The sprayer utilized a 1.5 m wide boom with three Spraying System TeeJet 8002 VS nozzles and 1.5 m x 3 m plots were assigned in a randomized complete block design with 4 replications. Treatment applied to this study did not delay bermudagrass green-up in spring 2013 and there was no significant herbicide injury observed in all plots. On the first rating date (26 weeks after initial treatment), all flumioxazin treatments showed significantly less goosegrasses on the plots. There was no significant difference between sequential flumioxazin treatments and indaziflam on all rating dates. Compared with prodiamine and oxadiazon, flumioxazin treatments maintained greater goosegrass control throughout this study.

INFLUENCE OF GROUND-COVER COMPETITION ON GROWTH, YIELD, AND BERRY QUALITY IN CABERNET FRANC GRAPE. N.T. Basinger*, K.M. Jennings, D.W. Monks, S.E. Spayd, W.E. Mitchem, S. Chaudhari; North Carolina State University, Raleigh, NC (136)

ABSTRACT

Viticulture in the Southeastern United States is limited by excessive vigor, high humidity and a challenging growing environment, all contributing to lower quality fruit. The objective of this study was to determine effects of 5 vegetation-free in-row strip widths (VFSW) on vine growth, berry quality, and yield of wine grapes. The study was conducted on Cabernet Franc cl. 312 on 101-14 MGT rootstock, in the Yadkin Valley region of North Carolina from 2011 to 2014. The vineyard floor was sown to 'Kentucky 31' fescue after grape harvest in 2010. In Spring 2011, vegetation-free in-row strip widths of 0, 0.3, 0.6, 1.2 and 2.4 m were established beneath the vines with paraquat and glufosinate and maintained throughout the growing season all four years. At the onset of fruit ripening (veraison), maintenance in half of each treatment ceased and the plot was allowed to grow up in native vegetation to determine the effect of late season weeds on vine growth, berry quality and yield. In 2011, 2013, and 2014 oBrix decreased with increasing VFSW. Titratable acidity increased with increasing VFSW in all four years. Winter pruning weight and lateral shoot number increased as VFSW increased in 2011 through 2014. Summer fresh pruning weight was greater for wider VFSW in 2012.Yield increased as VFSW increased all years except 2014.

CONFIRMATION AND LEVEL OF PALMER AMARANTH (*AMARANTHUS PALMERI*) GLYPHOSATE RESISTANCE IN AN OKLAHOMA POPULATION. K. Parmley[1], K. McCauley*[2], A.R. Post[2]; [1]Iowa State University, Ames, IA, [2]Oklahoma State University, Stillwater, OK (137)

ABSTRACT

Palmer amaranth (*Amaranthus palmeri* S. Watson) is a problematic weed species in summer row-cropping systems and has the capability to cause high economic losses. The introduction of Roundup Ready (RR) crops in the mid-1990’s improved Palmer amaranth control significantly; however, the continuous use of this system without herbicide or crop-trait rotation has led to the development of glyphosate-resistant (GR) Palmer amaranth populations. The first case of GR Palmer amaranth was confirmed in Georgia in 2005 and has since spread throughout the Southern and Midwestern regions of the United States. Increases in the spread of GR Palmer amaranth are decreasing the utility of RR systems. While GR weed populations have been well documented in nearby states such as Arkansas, Kansas, and Missouri, there is a lack of data for Oklahoma, though producers often report suspected GR weed populations. The objective of this study was to formally document suspected GR Palmer amaranth populations in Oklahoma and determine the level of glyphosate resistance.

The cross pollination of a GR Palmer amaranth plant can easily spread the resistance gene through a population. The genetic plasticity of Palmer amaranth as well as the selection pressure of applying glyphosate, has contributed to the rise in GR weed species. The mechanism most often reported for GR Palmer amaranth is overexpression of 5-enolpyruvyshikimate-3-phosphate synthase (EPSP) where shikimate is not accumulated in the leaf tissue. Altered enzyme has also been reported as a potential mechanism in this species.

In this study, two populations of suspected GR Palmer amaranth were screened for glyphosate resistance against a glyphosate susceptible (GS) reference population. One was collected from Hennessey, OK and the other from Payne County OK. Each population was evaluated using a glyphosate rate titration and the level of resistance was estimated using a shikimate leaf disk assay. The suspected resistant populations were obtained from producers in Oklahoma and had escaped at least one application of glyphosate. Seed were chemically scarified to break dormancy using H_2SO_4. Seed were planted in the greenhouse with a 16h day length at 29/25°C day/night temperatures. All plants were 5-10 cm in height at time of treatment. Treatments included glyphosate at 0.65, 1.25, 2.5, 5.0, 9.9, 19.9, and 39.9 kg ae ha^{-1} plus a nontreated check. Treatments were replicated ten times and each study was repeated in space. A DeVries Series II spray chamber was used apply treatments. Plant height, visual percent control, and images were taken weekly for four weeks after treatment. At the conclusion above ground biomass was harvested and fresh and dry weight was recorded.

The shikimate leaf disc assay was performed as follows: leaf disks were excised from the newest leaf of eight different plants for eight replications. Two to three leaf disks were immediately placed in a 10 mM ammonium sulfate solution plus 0.1 % Tween 80 and various glyphosate concentrations from 8 to 1000 uM. After the completion of the shikimate leaf disk assay, optical density was determined at 380 nm using a spectrophotometer.

Both the Hennessey (HEN) and the Payne county (BF) populations were resistant to glyphosate based on greenhouse trial data and differential accumulation of shikimate between GR and GS populations. This confirms glyphosate resistant Palmer amaranth populations for Kingfisher and Payne counties in Oklahoma. Additional herbicide and crop-trait rotation strategies are necessary to manage these populations in our state and the surrounding region.

SOIL MOISTURE AND LIGHT EFFECTS ON JUNGLERICE (*ECHINOCHLOA COLONA)* AND WEEDY RICE RESPONSE TO QUIZALOFOP P-ETHYL. C.E. Rouse*[1], N.R. Burgos[1], J. Harden[2]; [1]University of Arkansas, Fayetteville, AR, [2]BASF, Research Triangle Park, NC (138)

ABSTRACT

Herbicide efficacy is a critical component of effective weed control and herbicide resistance management in cropping systems. Factors that influence herbicide efficacy include the environmental conditions before, during, and after application. A greenhouse study was conducted in the fall of 2014 to evaluate the effects of soil moisture and light on the control of junglerice (*Echinochloa colona*) and weedy rice following quizalofop application. Three environmental conditions were evaluated: shade, dry down prior to application, and rainfall following application; a fourth factor- ecotype of weedy species was also included. Shade conditions were: shade for 2 days before application, shade for 2 days after application, and no shade. Within each shade condition the experiment was organized as a split-plot design where the main plot was a randomized complete block of rainfall following application, the blocking factor was dry down, and the split-plot level was ecotype. Three timings of dry down were evaluated- 10 days before, 5 days before, and saturated soil up to application. The rainfall timings were 1 hour after application, 5 days after application (DAA), and 10 DAA. A susceptible and graminicide-tolerant ecotype of junglerice and weedy rice were used. Seeds were planted in pots (1,618 cm^3) containing field soil, with three replicates and maintained at 5 plants per pot. Quizalofop (60 g ha^{-1}) was applied once to 2-leaf plants. Plants without herbicide stress were used as reference. Herbicide activity was evaluated visually three weeks after application and fresh biomass (g) was measured. For proper partitioning of variance, each shade treatment was analyzed separately; within the shade treatment data were analyzed using an ANOVA, with blocking factor (dry down) as random effect and all other factors fixed. Lower biomass was observed when rainfall was applied longer after application (10 DAA). Without shade, Echinochloa control was <85% with lesser activity (69%) on the tolerant ecotype. Shade for two days prior to herbicide application resulted in 88% or greater weed control, which could result in greater crop injury. The weedy rice ecotypes responded similarly to quizalofop regardless of environmental conditions. The impact of soil moisture was not clear and will be verified in follow-up experiments. The results of this study indicate that soil moisture levels have less impact on herbicide activity than low light levels prior to application; this has the potential to cause greater crop injury.

INFLUENCE OF HEAT INTENSITY AND DURATION ON WEED SEED VIABILITY. J.K. Green*[1], J.K. Norsworthy[1], M.T. Bararpour[1], M. Walsh[2], R. Scott[3]; [1]University of Arkansas, Fayetteville, AR, [2]University of Western Austraila, Crawley, Australia, [3]Universitiy of Arkansas, Lonoke, AR (139)

ABSTRACT

Herbicide-resistance is a major problem in global agriculture as a result of the immense selection pressure being placed on herbicides today. Alternative weed control tactics are needed to help preserve the efficacy of our current herbicides. Harvest Weed Seed Control measures similar to those currently used in Australian cropping systems are being evaluated for use in U.S. soybean production at the University of Arkansas. Complete kill of pitted morningglory, Palmer amaranth, barnyardgrass, and johnsongrass has been observed when using narrow-windrow burning in soybean. An experiment was conducted at the University of Arkansas Altheimer Laboratory in Fayetteville, Arkansas to determine the amount of heat needed to kill seeds of various weeds. Pitted morningglory and sicklepod seeds were evaluated since these are two weeds that are likely to be most resilient to heat. Additional species are also being evaluated including Palmer amaranth, johnsongrass, barnyardgrass, giant ragweed, hemp sesbania, prickly sida, velvetleaf, broadleaf signalgrass, giant foxtail, and common lambsquarters. Four replications of 100 seeds of both species were placed in ceramic crucibles and subjected to a high fire kiln for various temperatures (200, 400, 600 C) and times (20, 40, 60, 80 s). Seeds were then evaluated for viability using a 1% w/v tetrazolium chloride solution. Viability estimates were recorded and data were normalized relative the viability of the nontreated control. Data were subjected to regression analysis using JMP Pro 11.2. Heat index as defined by number of seconds of exposure times the temperature of the exposure was linearly related to seed viability. Sicklepod was more resilient to heat than pitted morningglory. All pitted morningglory seed were killed when 600 C was for 40 s or longer whereas the only treatment that completely killed sicklepod was 600 C for 80 s. The heat indices need to kill these two weeds were much less than the heat indices produced under field conditions when soybean chaff was narrow windrowed and burned. This experiment serves to validate our findings from narrow-windrow burning of soybean chaff, which is that complete kill of all weed seed should be achieved during the burn.

TARGET-SITE RESISTANCE TO PROPANIL IN *CYPERUS DIFFORMIS* L.: IMPLICATIONS FOR MANAGEMENT IN RICE FIELDS OF CALIFORNIA. R.M. Pedroso*[1], R. Alarcon-Reverte[1], A.J. Fischer[2]; [1]University of California at Davis, Davis, CA, [2]University of California at Davis - Professor, Davis, CA (140)

ABSTRACT

Cyperus difformis L.(smallflower umbrella sedge or variable flatsedge; CYPDI) is a troublesome annual weed (Cyperaceae) commonly found in rice fields worldwide. In CA, CYPDI management was complicated by the evolution of resistance to acetolactate-synthase (ALS)-inhibiting herbicides in 1993; ALS-resistant (R) CYPDI populations are now widespread throughout CA rice fields. In the wake of resistance to ALS inhibitors, the post emergent photosystem II (PSII)-inhibiting herbicide propanil (3,4-dichlopropionanilide) has been extensively used to control ALS-R CYPDI and other weeds of rice. Lack of proper control following propanil spraying was detected in 2012 suggesting resistance to this herbicide might have also evolved in rice fields. The objectives of this research were to confirm resistance to propanil, ascertain resistance levels, and establish the underlying mechanisms of resistance in CYPDI biotypes collected in rice fields of California. Our results indicate that a number of CYPDI populations collected in CA rice fields displayed a high level of resistance to propanil (R/S ratio equaled 14). When rice cv. M-206 and propanil-susceptible (S) and –R CYPDI were sprayed with propanil jointly with the insecticide carbaryl (a known propanil synergist that inhibits propanil degradation in plants), all plant species except propanil-R CYPDI experienced significant growth suppression, suggesting propanil metabolism is not the mechanism of resistance in the R biotypes used. Interestingly, propanil-R CYPDI biotypes are also cross-resistant to other PSII-inhibiting herbicides (diuron, atrazine, bromoxynil, and metribuzin), although resistance to atrazine is weak. These results suggested propanil resistance might involve the PSII-inhibitor binding site at the target protein D1 of PSII. Therefore, we sequenced the herbicide-binding region of the chloroplast *psbA* gene, which codes for propanil's target site (e.g. the D1 protein), where a valine to isoleucine substitution at amino acid residue 219 was identified. This mutation had already been identified in *Poa annua* biotypes resistant to diuron and metribuzin and is not associated with resistance to atrazine in agreement with our results. Therefore, unlike resistance in grasses and selectivity in rice - at which resistance is attributed to enhanced propanil degradation, resistance to propanil in CYPDI from CA is endowed by a single mutation at the D1 protein, which affects binding of propanil at its target-site. For control of propanil-R CYPDI (and given the widespread resistance to ALS inhibitors in CA rice fields), it is thus necessary to switch herbicide modes of action away from PSII and ALS inhibitors, and prevent spread of resistant populations by preventing seed contamination by performing proper cleaning of tillage and harvest machinery. Further research has also indicated that other herbicides used in rice are effective against propanil-R CYPDI, such as carfentrazone, benzobicyclon, and thiobencarb. Experiments aiming at elucidating the role of P450 monooxigenases and esterases are ongoing.

EFFECT OF NOZZLE SELECTION ON WEED EFFICACY AND DROPLET SIZE OF ENGENIA TANKMIX COMBINATIONS. C.J. Meyer*[1], J.K. Norsworthy[1], G.R. Kruger[2], J.K. Green[1], Z.D. Lancaster[1], J.C. Moore[1]; [1]University of Arkansas, Fayetteville, AR, [2]University of Nebraska-Lincoln, North Platte, NE (141)

ABSTRACT

In 2015, auxin-type herbicide-resistant crops will be available in the marketplace; therefore, nozzle selection will become a highly important variable in maintaining efficacy of herbicide solutions while minimizing off-target movement. A field experiment was conducted in 2013 and 2014 at the Northeast Research and Extension Center in Keiser, Arkansas to evaluate interactions between dicamba formulated as Engenia, glyphosate (Roundup PowerMAX), and glufosinate (Liberty) applied with three different nozzle types. To supplement the field data, droplet spectra for each nozzle and tank-mix combination were determined at the West Central Research and Extension Center in North Platte, Nebraska. This experiment was arranged as a randomized complete block design with a factorial arrangement of two factors: nozzle type and herbicide treatment. TeeJet 11004 TT, AIXR, and TTI nozzles, designated by the manufacturer as coarse, extremely coarse, and ultra coarse droplets, respectively, were used to apply the herbicide treatments. Applications were made with a tractor-mounted research sprayer at 276 kPa, 140 L ha^{-1}, and 13.4 km hr^{-1} to actively growing weeds. Herbicide treatments were labeled rates of Liberty, Roundup PowerMAX, Engenia, Liberty + Engenia, Roundup PowerMAX + Engenia, and Liberty + Roundup PowerMAX + Engenia. Percent weed control was evaluated four weeks after application for Palmer amaranth and barnyardgrass. For most treatment and nozzle combinations, Palmer amaranth control was greater than 95% in both years. In 2013, TT nozzles provided significantly greater control of barnyardgrass than with the TTI nozzle for Liberty alone, Roundup PowerMAX alone, Roundup PowerMAX + Engenia, and Liberty + Roundup PowerMAX + Engenia. In 2014, the interaction between herbicide and nozzle type was not significant; therefore, the TT nozzle provided three percentage points more control of barnyardgrass than the TT nozzle, averaged across all herbicide treatments except for Engenia alone (control of barnyardgrass by Engenia alone was 0%). When treatments were applied to 20- to 30-cm tall barnyardgrass in 2014, compared to 8- to 15-cm tall plants in 2013, an antagonistic effect was observed when Engenia was added to Roundup PowerMAX. The weed control data correlated with the droplet spectra analysis in that as volume median diameter (D_{v50}) increased from TT nozzles to the TTI nozzles, efficacy tended to decrease. Changing nozzle size or mixing herbicides in solution can have a dramatic effect on the droplet spectrum and volume median diameter. For example, Liberty alone tends to decrease D_{v50} relative to water alone, but when tank-mixed with Engenia or Roundup PowerMAX, a reduction in droplet size is not observed. These results suggest that nozzle selection will play a key role in maximizing efficacy of postemergence applications in dicamba-resistant crops. Additionally, evaluating droplet spectra of potential dicamba-containing tank-mixtures is critical for producing the desired droplet size to minimize off-target movement.

DRIFT APPLICATIONS OF DICAMBA AND 2,4-D AT MULTIPLE GROWTH STAGES IN COTTON.
H.C. Smith*, J.A. Ferrell; University of Florida, Gainesville, FL (142)

ABSTRACT

Field experiments were conducted in Citra, FL and Tifton, GA to evaluate simulated drift of dicamba and 2,4-D on cotton at three growth stages. Citra plots were planted with Deltapine 1050 on April 29th, 2014 and Tifton plots were planted with Phytogen 499 on May 8th, 2014. Applications were made at the 1st-leaf, 6th-leaf, and 1st square growth stages of cotton. Drift rates were applied at 0.25, 0.5, and 1 gallon per acre (GPA) using a controlled droplet applicator (CDA) sprayer with each droplet measuring approximately 125 microns. Drift rates were based off of the standard rate (0.5 lb ae/A) and carrier volume (15 GPA) for each herbicide and reduced proportionally to simulate a real-world drift situation. This means that if the intended drift rate was 1/15th the standard herbicide rate (0.033 lb/A) the carrier volume was also reduced by a factor of 15 (1 GPA). This allows the herbicide concentration of the drift to remain consistent with a normal herbicide application rate. The main effect and interactions for herbicide rate (i.e. the 0.25, 0.5, and 1 GPA application volumes) were not significant so data were averaged across rates. However, the main effect of application timing was significant. All drift applications significantly reduced yield compared to the untreated control (UTC), but cotton was more tolerant to dicamba than 2,4-D. Yield was significantly reduced in the 2,4-D applications (-42.9, -70.2, and -80.3%) at the 1st-leaf, 6th-leaf, and 1st-square growth stages, respectively, when compared to dicamba (-25.3, -23.0, and -37.3%). This was due to a reduction in overall boll formation as initiation of flowering was delayed to higher node positions in the plant. The first harvestable boll positions were delayed an average of 2.1 nodes by dicamba and 5.4 nodes by 2,4-D for applications made at the 1st-square stage. Application of 2,4-D resulted in the average number of harvestable bolls being significantly reduced at the 6th-leaf (-71.6% Citra and -64.7% Tifton) and 1st-square (-93.8% Citra and -81.3% Tifton) applications, where dicamba only significantly reduced bolls (-47.4%) at the 1st-square application in Tifton, GA. In conclusion, cotton was significantly more tolerant to dicamba drift than 2,4-D at all growth stages. Cotton sensitivity to both herbicides increased as plants progressed to the squaring growth stage. Yield reductions were the result of boll formation being delayed to higher nodes in the cotton plant.

INFLUENCE OF FERTILITY AND REGROWTH STAGE ON 'FLOTALTA' LIMPOGRASS [HERMARTHRIA ALTISSIMA] TOLERANCE TO HERBICIDE APPLICATIONS. C.A. Lastinger*[1], B.A. Sellers[2], J.A. Ferrell[3];[1]University of Florida, lakeland, FL, [2]University of Florida, 33865, FL, [3]University of Florida, Gainesville, FL (143)

ABSTRACT

Limpograss is a warm-season C4 perennial that is well adapted to the poorly drained soils of south Florida. There have been four cultivars released but the only one that remains in production is ‘Floralta’. Past research suggested that limpograss tolerance to 2,4-D amine is the result of the regrowth height at the time of herbicide application. Dicamba has been the industry standard for weed control in limpograss, but it is relatively expensive. It is important, therefore, to investigate the effects of other herbicides on limpograss tolerance. This project examined the effects of fertilizer timing and regrowth height on limpograss tolerance to herbicides. Experiments were conducted in July, 2013 and repeated in July, 2014 at the Range Cattle Research and Education Center near Ona, FL. A split-plot design with four replications was used for these two experiments with herbicide treatment representing the whole plot and either fertilizer timing or regrowth height representing the sub-plot. Whole plots were 3 by 12 m and the subplots were 3 by 3 m. Ten herbicide treatments were applied on the same day to whole plots: dicamba at 840 g/ha, 2,4-D amine at 2,130 g/ha, dicamba + 2,4-D amine at 430 + 1,250 g/ha, aminopyralid + 2,4-D at 86 + 699 g/ha, metsulfuron at 13 g/ha, fluroxypyr + triclopyr at 210 + 630 g/ha, aminopyralid + metsulfuron at 130 + 20 g/ha, hexazinone at 560 and 1,120 g/ha, and aminoclopyrachlor at 70 g/ha. Dicamba is considered the industry standard for weed control in limpograss and was used as the check. In the fertilizer timing experiment 56, 28, and 56 kg/ha of nitrogen, phosphorous, and potassium were applied to sub-plots two weeks before, the same day as, and two weeks after herbicide application. In the regrowth height experiment herbicides were applied on the same day to sub-plots with 15, 30, 60, and 90 cm of regrowth, which were obtained by clean-mowing each sub-plot at three week intervals. Limpograss tolerance was evaluated by visual injury at 30 days after treatment (DAT), with 0 equaling no injury and 100 being complete death, and by harvesting the center 1 by 2 m of each sub plot 90 DAT. Dry weight was recorded after seven days of drying in a forced-air dryer at 60 C. Data were analyzed using PROC MIXED and means separated using Fisher’s Protected LSD at P= 0.05 where appropriate. Herbicide treatment by fertilizer timing was not significant, and only the main effect of herbicide treatment was significant for both visual response and biomass data. Hexazinone resulted in at least 2-times greater visual injury than all other treatments 30 DAT and the high rate resulted in at least 51% less biomass compared to all other treatments 90 DAT. Injury from fluroxypyr + triclopyr and aminocyclopyrachlor was approximately 2-times greater than all other treatments except for hexazinone, but only aminocyclopyrachlor resulted in a significant reduction (32%) in biomass compared to dicamba (5,412 kg/ha). All other treatments were similar to dicamba with regards to biomass production. As in the fertilizer experiment, only the main effect of herbicide treatment was significant for the regrowth experiment. Injury following application of the high rate of hexazinone was at least 2.5-times greater than all other treatments 30 DAT. At 90 DAT, hexazinone at 560 and 1,120 kg/ha resulted in at least 38 and 81% less biomass, respectively, compared to all other treatments. Biomass of 2,4-D amine-treated plots was approximately 36% less than dicamba-treated plots (2,108 kg/ha). Limpograss biomass in all other treatments was similar to dicamba-treated plots. This research indicates that fertilizer application may have more of an influence on limpograss biomass following herbicide treatment than regrowth height. Additionally hexazinone causes significant injury to limpograss, which may be of concern to ranchers who need to control smutgrass.

EVALUATION OF ACURON AS A NEW HERBICIDE FOR WEED CONTROL IN CORN. G.B. Montgomery*[1], L.E. Steckel[1], J.C. Holloway[2]; [1]University of Tennessee, Jackson, TN, [2]Syngenta, Jackson, TN (144)

ABSTRACT

Acuron is a new corn herbicide from Syngenta that could be available to producers in the 2015 growing season. Acuron contains four active ingredients with three modes of action. The active ingredients are bicyclopyrone, mesotrione, S-metolachlor, and atrazine. Bicyclopyrone is a new active ingredient that will only be available as a premix component of Acuron. Bicyclopyrone is a 4-hydroxyphenyl pyruvate dioxygenase (HPPD)-inhibiting herbicide that can provide residual or postemergence weed control. The application window for Acuron will range from 28 d prior to planting until corn has reached 12 inches in height. It is anticipated that combination of herbicides in Acuron will provide consistent, broad spectrum weed control in corn. Research was conducted to compare Acuron to currently available herbicide premixes in corn.

A study to compare residual control from Acuron to other corn herbicides was conducted in 2014 at the West Tennessee Research and Education Center in Jackson, TN. In 2013, a study to evaluate weed control from Acuron in a program approach was conducted at the Research and Education Center in Milan, TN. At each location, treatments were arranged within a randomized complete block design with four replications in Jackson and three replications in Milan. Treatments in Jackson included Acuron (bicyclopyrone: 0.037, mesotrione: 0.150, S-metolachlor: 1.337, and atrazine: 0.625 lb ai/A), Acuron + atrazine (bicyclopyrone: 0.037, mesotrione: 0.150, S-metolachlor: 1.337, and atrazine: 0.625 + atrazine: 0.75 lb ai/A), Anthem ATZ (atrazine: 1.00, pyroxasulfone: 0.121, and fluthiacet-methyl: 0.004 lb ai/A), Corvus (thiencarbazone-methyl: 0.033 and isoxaflutol: 0.082 lb ai/A), SureStart (acetochlor: 0.938, clopyralid: 0.095, and flumetsulam: 0.030 lb ai/A), and Verdict (saflufenacil: 0.045 and dimenthenamid-P: 0.391 lb ai/A). Treatments at Milan were Acuron (bicyclopyrone: 0.019, mesotrione: 0.075, S-metolachlor: 0.669, and atrazine: 0.313 lb ai/A) fb Halex GT (glyphosate: 0.941, mesotrione: 0.094, and S-metolachlor: 0.941), Acuron (bicyclopyrone: 0.037, mesotrione: 0.150, S-metolachlor: 1.337, and atrazine: 0.625 lb ai/A) alone, and fb Touchdown (glyphosate: 1.00 lb ae/A) or Touchdown + Status (glyphosate: 1.00 lb ae/A + dicamba: 0.138 and diflufenzopyr: 0.053), Acuron + atrazine (bicyclopyrone: 0.037, mesotrione: 0.150, S-metolachlor: 1.337, and atrazine: 0.625 + atrazine: 0.75 lb ai/A), Corvus (thiencarbazone-methyl: 0.033 and isoxaflutol: 0.082 lb ai/A), Degree (acetochlor: 1.947 lb ai/A) fb Roundup Powermax (glyphosate: 0.773 lb ae/A), Lexar (atrazine: 1.305, mesotrione: 0.168, and S-metolachlor: 1.305 lb ai/A) and Verdict (saflufenacil: 0.045 and dimenthenamid-P: 0.391 lb ai/A) fb Roundup Powermax (glyphosate: 0.773 lb ae/A). PRE treatments were applied immediately after planting and follow-up treatments were made 42 d after planting. Crop injury and weed control were visually estimated at weekly intervals after the PRE application throughout the growing season. For brevity, control of all weed species present at each location, were combined and presented as overall weed control. Weed species present at Jackson included annual grasses, *Amaranthus palmeri*, and*Ipomoea lacunosa*, and weed species at Milan included annual grasses, *Amaranthus hybridus*, and *Abultion theophrasti*. All data were subjected to ANOVA and estimates of the least square means were used for mean separation with $\alpha = 0.05$.

No injury was observed from any treatment at either location (data not presented). In Jackson, weed control was similar for all treatments 42 and 56 DAT. However, 56 DAT all treatments provided < 80% weed control. A main effect of herbicide was detected 70 DAT. Verdict provided greater control than that of Anthem ATZ and SureStart. Control from Acuron, Acuron+atrazine and Verdict was similar and greater than that of SureSart. In Milan, there were no significant main effects 14 or 42 DA-A. There was a significant effect of herbicide 7 and 42 DA-B. At the 7 DA-B rating interval, Acuron fb Status + Touchdown provided the greatest control, but was similar to that of all treatments that included a follow-up application and greater than all PRE only treatments. 42 DA-B Acuron fb Halex GT provided the greatest control and was similar to that of Acuron fb Touchdown and Acuron fb Touchdown + Status. At this interval Acuron fb Halex GT provided greater control than all treatments that only received PRE herbicides.

Acuron, as a PRE, provided improved or similar overall weed control to that of currently labeled premix herbicides for corn. However, at each location overall weed control from any PRE only treatment was not sufficient for season long weed control. The study from Milan indicates that Acuron can be included into corn weed control programs to sufficiently provide season long weed control in combination with other herbcides.

EVALUATION OF POST HARVEST HERBICIDE APPLICATIONS FOR SEED PREVENTION OF GLYPHOSATE RESISTANT PALMER AMARANTH. W.D. Crow*[1], L.E. Steckel[1], R.M. Hayes[1], T.C. Mueller[2]; [1]University of Tennessee, Jackson, TN, [2]University of Tennessee, Knoxville, TN (145)

ABSTRACT

New control strategies are needed to optimize weed control and crop performance from the increasing prevalence of glyphosate resistant (GR) Palmer amaranth. A field study was conducted in 2012 and 2013 at the West Tennessee Research and Education Center in Jackson, TN and in 2013, there was an additional location at the East Tennessee Research and Education Center in Knoxville, TN. The objective of this research is to evaluate POST-harvest weed management programs for the prevention of seed production of glyphosate resistant (GR) Palmer amaranth, and to evaluate herbicide carryover into winter wheat. Herbicides consisted of paraquat alone or tank-mixed with a residual herbicide of metribuzin, *s*-metolachlor, pyroxasulfone, saflufenacil, flumioxazin, pyroxasulfone plus flumioxazin, or pyroxasulfone plus fluthiacet-methyl. Three applications were followed by a preemergence herbicide applied at wheat planting. Paraquat alone controlled 91% of Palmer amaranth 14 DAA; however there was no control of plant regrowth or new germination. Palmer amaranth control from all residual herbicide treatments was the same. All treatments prevented seed production of GR Palmer amaranth. Through implementation of such POST-harvest strategies, 1200 seed per m^2 or approximately 12 million seed ha^{-1} were prevented from replenishing the soil seedbank. Overall, the addition of a residual herbicide increased Palmer amaranth control only 4 to 7% over paraquat alone. Preemergence herbicides injured wheat in 2012 (<10%), but not in 2013. Wheat yield was not affected by any herbicide application.

EVALUATION OF SOIL TEXTURE AND PRE HERBICIDE ON COTTON GROWTH, DEVELOPMENT, AND YIELD. J. Copeland*[1], D.M. Dodds[1], A.L. Catchot[1], D. Reynolds[2], J. Gore[3], D. Wilson[4], C.A. Samples[1], D. Denton[1];[1]Mississippi State University, Mississippi State, MS, [2]Mississippi State University, Starkeville, AR, [3]Mississippi State University, Stoneville, MS, [4]Monsanto, St. Louis, MO (146)

ABSTRACT

Since 1997, cotton growers have depended heavily on glyphosate for weed control. Unfortunately, growers transitioned away from the use of soil- applied residual herbicides and glyphosate-resistant (GR) weed species have become a concerning matter for cotton growers. Due to the prolific growth habit of GR Palmer amaranth, it has become the most troublesome weed pest in cotton production. Therefore, the use of preemergence (PRE) herbicides has become a necessity for cotton producers across the Cotton Belt.

Early season cotton growth is naturally slow and can be disrupted by factors such as herbicide injury. Cotton injury can occur during emergence from PRE herbicides if environmental conditions are not favorable. More specifically, soil texture and PRE herbicide choice can have an effect on early cotton development and can potentially reduce yields. Previous research indicates that soil texture, environmental conditions, and PRE herbicide use can affect crop development. With the extensive use of PRE herbicides cotton weed management programs, it is critical to determine cotton response to commonly used PRE herbicides and how crop injury may be associated with different soil textures.

Two greenhouse studies were conducted to determine the impact of PRE herbicides and soil textures on early cotton growth and development. Trials were conducted at the R.R. Foil Plant Science Research Center in Starkville, Mississippi. Deltapine 0912 B2RF seed (treated with metalaxyl [0.014 mg ai/seed] + pyraclostrobin [0.04 mg ai/seed] + ipconazole[0.002 mg ai/seed] + fluxapyroxad [0.018 mg ai/seed] + thiamethoxam [0.375 mg ai/seed] + abamectin [0.15 mg ai/seed]) was planted in two distinct soil textures, both collected from on-farm locations in Mississippi. Cotton seed were planted in a Bosket very fine sandy loam soil (49.7% silt, 27.8% sand, 22.7% clay, and 1.9% organic matter) and a Griffith silty clay soil (56.2 % clay, 29.2 % silt, 14.6 % sand, and 3.7% organic matter). Individual pots were 16.5 cm in diameter and 2600 g od air-dried soil was placed in each pot.

PRE herbicides included fluometuron at 1.12 kg ai/ha, diuron at 1.12 kg ai/ha, fomesafen ai 0.28 kg ai/ha, S-metolachlor at 1.07 kg ai/ha, S-metolachlor at 1.07 kg ai/ha + fluometuron at 1.12 kg ai/ha, as well as an untreated check. Experiments were conducted using a factorial arrangement of treatments in a repeated measurements design, with the three factors being soil texture, PRE herbicide and time (weeks after planting). Treatments were replicated 10 times. All data were subjected to analysis of variance and means were separated using Fishers Protected LSD at $p = 0.05$.

At three weeks after planting (WAP), cotton grown in sandy loam soil had significantly more true leaves than cotton grown in silty clay soils. However at 5 WAP, cotton grown in silty clay soils had significantly more true leaves. At two, three, and four WAP, cotton grown in sandy loam soil was significantly taller than cotton grown in silty clay loam soil. Percent height reductions due to PRE herbicide were significant at one WAP for cotton grown in sandy loam soils when compared to the untreated. There were no differences in cotton growth due to PRE herbicide in subsequent weeks. Cotton grown in sandy loam soil had significantly more biomass than cotton grown in silty clay soil. A height reduction was only observed when s- metolachlor + fluometuron was applied when compared to untreated. Fomesafen had significantly less fresh weight biomass than cotton treated with diuron or fluometuron. However, no differences were observed in cotton fresh weight biomass due to application of fomesafen and the untreated check. Application of fomesafen and s-metolachlor + fluometuron resulted in dry weight biomass reduction compared to other treatments; however, dry weight biomass from this treatment was not different than untreated check. Weed control from preemergence herbicides is critical for early season cotton growth. These data highlight the importance of abiding by the label restrictions for herbicide use across various soil textures.

EVALUATION OF SEQUESTRATION OF DICAMBA IN SPRAYER HOSES. G.T. Cundiff*[1], D. Reynolds[2];[1]Mississippi State University, Starkville, MS, [2]Mississippi State University, Starkeville, AR (147)

ABSTRACT

The introduction of new herbicide tolerant crops may provide many benefits for producers such as alternative control options for resistant weed species, decreased costs, and different modes of action. Along with these benefits, the use of auxin containing herbicides may also increase concern for issues such as herbicide drift, volatilization, and tank contamination. The adjuvant and solvent system utilized in several commercial herbicides often result in the release of herbicides which have been sequestered within the spray system thus resulting in injury to sensitive crops. Roundup WeatherMax and PowerMax (glyphosate) are two such products that have been observed to have this effect.

Two studies were conducted to assess different formulations of dicamba persistence in sprayer hoses with different cleanout procedures. One study focused on determining if Clarity (diglycolamine salt of dicamba) persistence would differ among five various hose types, two cleanout procedures and applied to soybean used as a bio-indicator to assess cleanout efficiency in field. While the second study focused on a new dicamba formulation known as Engenia. This study focused on determining if Engenia persistence would differ among five various hose types, three cleanout procedures and applied to soybean used as a bio-indicator to assess cleanout efficiency in a greenhouse setting. Samples were collected and analyzed to determine Engenia persistence with respect to hose by cleanout treatments.

For the first study, five different types of agricultural spray hoses were evaluated. Each hose measured 3 m and had an inside diameter of 1.2 cm, which is enough carrying capacity to deliver sufficient volume to treat the two center rows of a four row plot with a length of 12 m. All spray lines were filled with dicamba at 0.56 kg ae/ha and left to incubate for 48 hours. The dicamba spray solution was then flushed out of the lines and cleaned with either water or ammonia and then left to incubate in their designated cleaning solution for 24 hours. After their final flush, all lines were left empty for 48 hours. The spray lines were then filled with Roundup WeatherMax (glyphosate) at 1.1 kg ae/ha and incubated for 48 hours to aid in the release of any sequestered auxin herbicides before spraying to a sensitive crop. The glyphosate solution was applied to Roundup Ready soybean at R2 with a two row spray boom using TeeJet XR 80015 spray tips delivering 140 liters per hectare. This study was conducted at two different sites (Starkville, MS and Brooksville, MS) in July and August of 2013. Weekly visual ratings were taken 7, 14, 21 and 28 days after treatment (DAT) with yield and percent yield reductions taken.

For the second study, five different types of agricultural spray hoses were evaluated. Each hose measured 3 m and had an inside diameter of 1.2 cm. All spray lines were filled with Engenia at 0.56 kg ae/ha and left to incubate for 48 hours. The dicamba spray solution was then flushed out of the lines and cleaned with either water, ammonia or no cleanout and then left to incubate in their designated cleaning solution for 24 hours. After their final flush, all lines were left empty for 48 hours. The spray lines were then filled with Roundup WeatherMax (glyphosate) at 1.1 kg ae/ha and incubated for 48 hours to aid in the release of any sequestered auxin herbicides before spraying to a sensitive crop. The glyphosate solution was applied to Roundup Ready soybean at the V3 growth stage in a spray chamber delivering 140 liters per hectare. A known rate titration of Engenia (0.56, 0.14, 0.00875, and 0.00219 kg ae/ha) was applied separately as comparison treatments. Samples were collected from each hose by cleanout treatment and the titration. These samples were run on an HPLC to determine residual concentration from each treatment. This study was conducted twice in a greenhouse setting (Starkville, MS) in October 2014. Visual ratings were taken 3, 5, 7 and 14 days after treatment (DAT) with dry matter taken at 21 DAT.

Initial results of the dicamba hose study showed significant differences with soybean injury based on hose type four weeks after treatment. There were no differences based on cleanout method, and no differences in yield or percent yield reduction based on hose, cleanout or hose x cleanout. Results of the Engenia trial show significant differences due to hose type by cleanout procedure 14 DAT with respect to injury. Dry matter showed significant differences based on hose type when compared to the untreated check. Analytical data showed significant differences based on hose type by cleanout procedure. Results indicate that the use of a polyethylene hose type shows significantly less injury and less retention of the dicamba analyte than other agricultural hoses.

CRITICAL WEED-FREE PERIOD IN PICKLING CUCUMBER. S. McGowen*, S. Chaudhari, N.T. Basinger, S. Beam, K.M. Jennings, D.W. Monks; North Carolina State University, Raleigh, NC (148)

ABSTRACT

Field studies were conducted at the Horticultural Crops Research Station in Clinton, North Carolina in 2014 to determine the critical weed-free period for Palmer amaranth (*Amaranthus palmeri*) in pickling cucumber. A naturally occurring population of Palmer amaranth was present at the study site. Palmer amaranth emergence at different time points throughout the season was simulated by allowing Palmer amaranth to establish at 0, 2, 3, 4, and 5 wk after crop seeding. Palmer amaranth control was simulated by allowing Palmer amaranth to emerge with crop and then removing Palmer amaranth at 0, 2, 3, 4 and 5 wk after crop seeding and preventing further establishment of Palmer amaranth after the removal date. Assuming an acceptable yield loss of 5%, the critical weed-free period for Palmer amaranth in pickling cucumber was 17 to 33 d after seeding.

RESPONSE OF GRAFTED EGGPLANT ON TOMATO ROOTSTOCK TO HERBICIDES. S. Chaudhari*[1], K.M. Jennings[1], D.W. Monks[1], F. Louws[2]; [1]North Carolina State University, Raleigh, NC, [2]NCSU, Raleigh, NC (149)

ABSTRACT

Interspecific grafting using rootstock and scion from different species is common practice in solanaceous crop production to address many abiotic and biotic stresses, including drought/waterlogging, insects, and diseases. Tomato rootstocks have been successfully used for eggplant production. However, the safety of tomato herbicides has not been tested on grafted eggplant which is combination of two plants, tomato rootstock and eggplant scion. Greenhouse and field studies were conducted in 2012 through 2014 to determine the response of grafted eggplant to napropamide, metribuzin, halosulfuron, trifluralin, *S*-metolachlor and fomesafen herbicides which are registered in tomato. The greenhouse study had treatments of metribuzin pre-transplant (PRE) or post-transplant (POST) at 0.14 and 0.28 kg ai/ha, *S*-metolachlor PRE at 0.4, and 0.8 kg ai/ha, and halosulfuron POST at 0.018, and 0.036 kg ai/ha. The field study was conducted at Mountain Research Station, Waynesville, NC and at Horticultural Crops Research Station, Clinton, NC. Herbicide treatments in the field study included PRE *S*-metolachlor (0.8 and 1.06 kg ai/ha), fomesafen (0.28 and 0.42 kg ai/ha), metribuzin (0.28 and 0.55 kg ai/ha), napropamide (1.12 and 2.24 kg ai/ha), halosulfuron (0.039 and 0.052 kg ai/ha), and trifluralin (0.56 and 0.84 kg ai/ha). The eggplant cultivar 'Santana' was used as scion and non-grafted control, while two hybrid tomatoes 'DP106' and 'Maxifort' were used as rootstocks for grafted plants. No differences were observed in grafted and non-grafted eggplant for herbicide injury in greenhouse and field studies. Injury from metribuzin POST at 0.14 and 0.28 kg/ha 4 WAT was 94 and 100% injury for grafted and non-grafted eggplant, respectively. In field studies, PRE napropamide, *S*-metolachlor, fomesafen and trifluralin appeared to be safe and did not cause any injury and yield reduction in grafted and non-grafted eggplant. However metribuzin caused severe injury and yield reduction in both grafted and non-grafted eggplant. Metribuzin at 0.55 kg/ha caused 60 and 81% plant stand loss in 2013 and 2014, respectively. Halosulfuron PRE caused 24% yield reduction in grafted and non-grafted eggplant compared to nontreated control during 2013 but was not injurious in 2014. PRE napropamide, *S*-metolachlor, fomesafen and trifluralin can be considered safe for weed control in grafted eggplant on tomato rootstock.

GLYPHOSATE RESISTANT PALMER AMARANTH IN GLYPHOSATE-TOLERANT SOYBEAN. A.M. Growe*, Z.R. Taylor, A.M. Knight, T.E. Besancon, L.J. Vincent, W.J. Everman; North Carolina State University, Raleigh, NC (150)

ABSTRACT

The over-exploitation of glyphosate tolerant technology has resulted in increased resistance of troublesome weed biotypes, such as Palmer amaranth (Amaranthus palmeri). As this resistance becomes more common in agricultural systems throughout the southern and mid-western United States, integrated herbicide systems should be practiced to suppress its impact on crop production. Field trials were conducted in Caswell Research station in Kinston, NC and Upper Coastal Plain near Rocky Mount, NC to evaluate the control of glyphosate resistant Palmer amaranth (Amaranthus palmeri) with overlapping residual herbicides. Herbicide systems applied PRE were pyroxasulfone, saflufenacil with and without metribuzin, a premix of saflufenacil and imazethapyr with pyroxasulfone, a premix of sulfentrazone and cloransulam alone, and a premix of sulfentrazone and metribuzin alone. These treatments were compared when a POST of Dimethenamid-P was added, with the exception of a sulfentrazone and cloransulam premix. Treatments with Dimethenamid-P as a POST generally were more effective in controlling Palmer amaranth than those without. Between both locations, the PRE only and PRE followed by POST treatments controlled 78 and 87 percent of Palmer amaranth respectively. Control of Palmer amaranth was variable between the two locations. All treatments achieved over 95 percent control at the Caswell station. PRE application of saflufenacil and imazethapyr premix with pyroxasulfone was most effective with 86 percent control of Palmer amaranth (Amaranthus Palmeri) at the Upper Coastal Plain location.

INFLUENCE OF WATER QUALITY AND CONDITIONING AGENTS ON GLYPHOSATE EFFICACY.
M.R. Manuchehri*[1], P.A. Dotray[2], J. Keeling[3], T. Morris[3]; [1]Texas Tech University, Lubbock, TX, [2]Texas Tech University, Texas A&M AgriLife Research and Extension Service, Lubbock, TX, [3]Texas A&M AgriLife Research, Lubbock, TX (151)

ABSTRACT

Water is the main carrier used in most herbicide applications. The quality of water may play an important role in herbicide efficacy, especially for weak acid herbicides such as imidazolinones, 2,4-D, and glyphosate. Growers in the Texas High Plains are considering the use of reverse osmosis (RO) water to offset potential antagonism of herbicides due to poor water quality. Defining the role of water quality on glyphosate efficacy is important due to its increased use over the past 15 years. The effects of water quality and water conditioning agents on glyphosate efficacy were assessed in eight field trials established near Lubbock, TX over three growing seasons. The objectives of these studies were to 1) determine if glyphosate efficacy is affected by water carrier source, 2) determine if there is a benefit in using RO water, and 3) determine if the addition of ammonium sulfate or other water conditioning agents will improve glyphosate control when water quality is poor. Test plants included volunteer winter wheat (*Triticum aestivum* L.) and Palmer amaranth (*Amaranthus palmeri* S. Wats.). All trials were organized in a randomized complete block design with four replications. Five water sources, ranging in cation concentrations of 519 to 1,046 ppm, were selected from 23 wells throughout the Texas High Plains in the fall of 2011. In 2012 and 2013, five water sources plus a RO water source were used as carriers for the following four herbicide treatments: glyphosate applied alone at 0.43 and 0.86 kg ae/ha, and glyphosate applied at 0.43 and 0.86 kg ae/ha plus dry ammonium sulfate (AMS) at 2.04 kg/100 L. Injury was recorded at 14, 21, and 28 days after treatment. In 2014, two of the five water sources were selected (202 PPM and 1,028 PPM) plus a RO water source as carriers for the following eight herbicide treatments: glyphosate applied alone at 0.86 or 1.27 kg ae/ha, glyphosate applied alone at 0.86 or 1.27 kg ae/ha plus AMS at 2.04 kg/100 L, Interactive® at 1 L/100 L, Quest® at 0.625 L/100L, Choice® at 0.5 L/100 L, Weather Gard™ at 0.5 L/100 L, Bronc® Max at 1L/100 L, or Bronc® Total at 1 L/100 L. In 2012 and 2013, water source did not affect glyphosate performance in any of the trials; however, an increase in glyphosate rate and addition of AMS improved efficacy in three out of six trials while a rate by AMS interaction was observed in the other three studies. Glyphosate applied at 0.86 kg ae/ha plus AMS was most effective at controlling volunteer wheat. Similar control was achieved for glyphosate applied alone at 0.86 kg ae/ha and glyphosate applied at 0.43 kg ae/ha plus AMS. Glyphosate applied alone at 0.43 kg ae/ha was the least effective treatment. Treatments were similar for control of Palmer amaranth with the exception of glyphosate applied alone at 0.43 kg ae/ha, which was the least effective treatment. In 2014, RO water increased control of volunteer wheat while AMS was the only water conditioner that improved efficacy compared to glyphosate applied alone. Greater Palmer amaranth control was observed using RO and the 202 PPM water source compared to the 1,028 PPM water source. The addition of a water conditioner did not improve glyphosate performance.

GRAIN SORGHUM AND SOYBEAN AS REPLACEMENT CROPS FOLLOWING A FAILED COTTON STAND. L.R. Braswell*, A.C. York, D.L. Jordan, C.W. Cahoon; North Carolina State University, Raleigh, NC (152)

ABSTRACT

Cotton growers have resumed use of preemergence herbicides in an effort to better control glyphosate-resistant weeds. This has complicated replanting decisions when cotton stands fail and it is too late to replant to cotton. Soybean and grain sorghum are the most likely replacement crops for a failed cotton stand in the southeastern United States. Soybean and grain sorghum response to most commonly used preemergence cotton herbicides is well understood. Less understood is the response of soybean and grain sorghum to fluometuron and diuron. Labels for fluometuron and diuron specify 9- and 12-month rotational restrictions, respectively, for both crops. Research conducted in the 1970's and 1980's on fine-textured soils in Arkansas and Tennessee indicated it was possible to replant to grain sorghum 6 weeks after fluometuron application to cotton whereas at least a 9-week waiting interval was needed for soybean. Grain sorghum was less sensitive to both herbicides than soybean. Similar research has not been conducted on coarse-textured, low organic matter soils typical of cotton production in the southeastern United States.

Experiments were conducted in North Carolina in 2013 and 2014 at four locations for grain sorghum and three locations for soybean on soils ranging in texture from sand to sandy loam and humic matter ranging from 0.3 to 0.9%. Treatments were a factorial arrangement of herbicides, planting delays after herbicide application, and tillage in a split-strip-strip design with four replications. Herbicides were none, fluometuron at 1120 g ai/ha, and diuron at 840 g ai/ha. Planting delays were 3, 6, and 9 weeks after fluometuron and diuron application. Tillage options included none or disking prior to planting the replacement crops. Data recorded included replacement crop injury at 3 and 6 weeks after planting, crop stand, and grain yield.

Little to no soybean injury was observed with the 6- or 9-week planting delays. Injury by fluometuron and diuron ranged from 6 to 33% and 1 to 15%, respectively, when soybean planting was delayed 3 weeks. Injury was generally greater when disking occurred before replanting. Fluometuron and diuron reduced soybean stand at 2 of 3 and 1 of 3 locations, respectively, regardless of tillage. Diuron did not reduce soybean yield regardless of planting delay or tillage. Fluometuron reduced soybean yield at 2 of 3 locations with the 3-week planting delay. However, because of a strong effect of planting delay on yield, soybean yield was still greater when planted 3 weeks after fluometuron compared with later plantings.

Little to no effect of herbicides was noted for sorghum injury or stand regardless of tillage or length of planting delays. Herbicides did not affect sorghum yield regardless of planting delay or tillage. The main effect of planting delay was significant, with a 24% reduction in sorghum yield due to the 9-week delay.

INTROGRESSION OF RESISTANCE-CONFERRING *ALS* MUTATIONS IN HERBICIDE-RESISTANT WEEDY RICE. V. Singh*, N.R. Burgos, S. Singh, S. Basu, D. Gealy, A. Pereira; University of Arkansas, Fayetteville, AR (153)

ABSTRACT

Weedy red rice (*Oryza sativa*) competes aggressively with rice, reducing yields and grain quality. Clearfield^{TM} rice, a nontransgenic, herbicide-resistant (HR) rice introduced in 2002 to control weedy rice, has resulted in some *ALS*-resistant weedy rice apparently due to gene flow. Studies were conducted to determine the occurrence and morphology of resistant weedy rice in fields with histories of Clearfield^{TM} rice and persistent infestations of *ALS*-resistant weedy rice, and to verify the resistance-conferring mutations in the *ALS* gene. Weedy rice collected from 11 counties in Arkansas, USA were tested for resistance in a field experiment consisting of 89 weedy rice accessions and 3 Clearfield^{TM} rice cultivars in Stuttgart, AR (2011). Sequential applications of imazethapyr were made at dosages of 0.5x and 1x (0.071 kg ai ha^{-1}), respectively. Injury and mortality were recorded 21 days after the second application. Two-to-five HR plants per accession per replication (727 plants) were selected to represent different plant phenotypes and characterized for 14 morphological traits. Allele-specific PCR-based genotyping was used to detect point mutations in the *ALS* gene, S_{653}N and G_{654}E in resistant plants. The *ALS* gene of 10 selected HR accessions was Sanger-sequenced and aligned (Bioedit®) with those of Clearfield^{TM} cultivars. The S_{653}N mutation, which is one of the mutations in Clearfield^{TM} rice that confer resistance to imidazolinone herbicides, was detected in all of the resistant red rice accessions. Outcrossing between weedy rice and Clearfield^{TM} rice will be verified using genome-wide micro-satellite markers.

PRE AND POSTEMERGENCE CONCEPTS FOR SOUTHERN SANDBUR (*CENCHRUS ECHINATUS*) IN BERMUDAGRASS. E. Jenkins*, J.Q. Moss, A. Post; Oklahoma State University, Stillwater, OK (154)

ABSTRACT

Several sandbur species affect residential and recreational turfgrass in the Southern Great Plains (SGP) including southern sandbur (*Cenchrus echinatus*), field sandbur (*Cenchrus spinifex*), and longspine sandbur (*Cenchrus longispinis*). Sandburs typically behave as summer annuals or weak perennials but the biology of sandbur is not well understood. Since the loss of MSMA, there are no effective postemergent herbicides which effectively control sandburs in bermudagrass (*Cynodon dactylon*(L.) Pers.) turf.

Two experiments were initiated at Perkins Park in Perkins, OK in 2014 to evaluate the safety and efficacy of several pre- and postemergent products to control sandbur. Experiments were set as randomized complete block designs with four replications. The preemergence study included 10 treatments and the postemergence study included 11 treatments. Preemergent treatments were pendimethalin at 4.34 L ha^{-1} as a single application and a split application spaced 3 weeks apart, indaziflam at 0.35 L ha^{-1},oxadiazon at 8.1 kg ha^{-1}, dithiopyr at 1.06 kg ha^{-1}, prodiamine at 2.1 L ha^{-1}, oryzalin at 4.2 L ha^{-1}, simazine at 2.8 L ha^{-1}, thiencarbazone-methyl + foramsulfuron + halosulfuron +0.25% v/v NIS at 0.224 L ha^{-1}, and a nontreated check. In the postemergence study treatments included quinclorac at 7.39 L ha^{-1}, metsulfuron-methyl at 0.070 L ha^{-1}, iodosulfuron-methyl + dicamba at 0.26 Kg ha^{-1}, foramsulfuron at 1.4 L ha^{-1}, trifloxysulfuron-sodium at 0.037 kg ha^{-1}, amicarbazone at 0.35 L ha^{-1}, topramezone at 0.070 L ha^{-1}, mesotrione at 0.28 L ha^{-1}, topramezone + triclopyr at 0.070 L ha^{-1} + 2.24 L ha^{-1}, mesotrione + triclopyr at 0.28 L ha^{-1} + 2.24 L ha^{-1}, and a nontreated check. Percent bermudagrass injury, percent sandbur control and # sandbur plants per plot were taken weekly for 8 weeks after treatment (WAT). Data were managed in ARM 9.2 and subject to ANOVA. Means were separated using Fisher's protected LSD at α=0.05.

The majority of treatments in the postemergence experiment caused greater than 30% and unacceptable injury to bermudagrass for up to 8 WAT and did not effectively control sandbur. In the preemergence study no treatment caused unacceptable injury at any evaluation timing. Pendimethalin in a single application, dithiopyr and simazine controlled sandbur at 63, 77, and 70% respectively 16 WAT. The split pendimethalin application did not improve the length of residual control or the level of sandbur control as expected. Data suggest a single application of pendimethalin, dithiopyr or simazine would be most effective at managing sandbur in residential or recreational bermudagrass turf where activating rainfall or irrigation can be expected. No effective postemergence treatment was identified to replace MSMA as a tool for sandbur control in bermudagrass turf. Additional work is needed to improve postemergence sandbur control options in this system.

EFFECTS OF SIMULATED 2,4-D AND DICAMBA DRIFT ON FIELD GROWN TOMATO PLANTS. M.E. Metting*[1], P.A. Baumann[1], J.G. Masabni[1], M.E. Matocha[2], J.A. McGinty[3]; [1]Texas A&M University, College Station, TX, [2]Texas A&M AgriLife Extension, College Station, TX, [3]Texas A&M AgriLife Extension Service, Corpus Christi, TX (155)

ABSTRACT

EFFECT OF PURPLE NUTSEDGE TUBER GROWTH STAGE ON EPTC AND FOMESAFEN EFFICACY. T.V. Reed*; University of Florida, Gainesville, FL (156)

ABSTRACT

Purple nutsedge (*Cyperus rotundus* L.) is a problematic weed in Florida small fruit and vegetable production. EPTC and fomesafen are potential preemergence herbicides for control of purple nutsedge in Florida plasticulture, but field application has shown control to be erratic. Greenhouse experiments were conducted in Gainesville, FL from May to August 2014 to investigate susceptibility of various purple nutsedge tuber growth stages to EPTC and fomesafen applications. Treatments included EPTC at 2.94 kg ai ha^{-1} and fomesafen at 0.42 kg ai ha^{-1} at 0, 3, 6, 9, 12, and 15 days after planting (DAP) tubers, plus a nontreated check. Purple nutsedge emergence, shoot height, leaf number, and dry shoot weight decreased with a reduction in time between application and planting. At 28 DAP, across all application timings, EPTC had lower values of 5.6 cm and 2.2 for average shoot height and leaf number, respectively, and greater reduction in dry shoot mass versus the nontreated, compared to fomesafen with values of 9.3 cm, 3.6, and, 51% for average shoot height, leaf number, and dry shoot mass compared to the nontreated control, respectively.

RESPONSE OF EDAMAME VARIETIES TO PRE AND POST HERBICIDES. S.E. Abugho*, N.R. Burgos, L.E. Estorninos Jr., V. Singh, R.A. Salas, C.E. Rouse; University of Arkansas, Fayetteville, AR (157)

ABSTRACT

Edamame consumption is projected to increase annually in the US due to its potential health benefits. The greatest challenge to edamame production is weed control. Few herbicides are labeled for growing edamame and the tolerance of new edamame varieties to herbicides is not known. Field studies were conducted at the Vegetable Research Station on Kibler, Arkansas and at the Arkansas Agricultural Research Station in the summer of 2013 and 2014 to determine the effect of preemergence (PRE) herbicides [sulfentrazone, 0.21 kg ai ha^{-1}; flumioxazin, 0.07 kg ai ha^{-1}; pyroxasulfone, 0.12 kg ai ha^{-1}; and metribuzin, 0.56 kg ai ha^{-1}] and postemergence (POST) application of fomesafen (0.26 kg ai ha^{-1}) on edamame varieties and advanced soybean lines. The experiment was conducted in a split-plot design (herbicides as whole plot and varieties as subplot) with four replications. A broadcast PRE application of *S*-metolachlor (1.12 kg ai ha^{-1}) was done to maintain the plots weed-free. Crop stand count, injury rating (21 DAP for PRE and 35 DAP rating for fomesafen) and yield were recorded. In 2013, crop stand in nontreated plots was higher in Fayetteville (18 plants m^{-1}) than in Kibler (14 plants m^{-1}). Metribuzin and sulfentrazone caused the highest injury (33-35%) on all varieties in Kibler; in Fayetteville, UA-4913, UA-5612 and UA-5213 C showed stunting at 21 DAP. Fomesafen caused 14% and 18% cosmetic injury, respectively, in Fayetteville and Kibler. In 2014, crop stand in the nontreated plots was higher in Kibler (15 plants m^{-1}) than in Fayetteville (12 plants ha^{-1}).Metribuzin caused the highest injury (77%) in Kibler while flumioxazin, metribuzin, and sulfentrazone caused the highest injury in Fayetteville (22-26%). Injury from fomesafen at both locations was minimal (7-8%). UA-5612 had the highest yield in 2013 (3.3 mt ha^{-1}) in Kibler as well as in 2014 (2.58-3.13 mt ha^{-1}) in both locations. This study demonstrates differential response of edamame varieties to soil-applied herbicides and that metribuzin could not be used on these varieties because of high risk of yield loss. Fomesafen, applied POST, is safe on all varieties tested.

INFLUENCE OF SIMULATED 2,4-D DRIFT ON REPRODUCTIVE DEVELOPMENT AND MATURITY OF COTTON. S.A. Byrd[1], A.S. Culpepper[1], D.M. Dodds[2], A. Jones[3], K.L. Edmisten[4], D.L. Wright[5], G.D. Morgan[6], P.A. Baumann[6], P.A. Dotray[7], M.R. Manuchehri[7], J.L. Snider[1], J.R. Whitaker[8], D.R. Chastain[1], and G.D. Collins[9]. [1]Department of Crop and Soil Science, University of Georgia, Tifton, GA 31793, [2]Department of Plant and Soil Science, Mississippi State University, Starkville, MS 39762, [3]Department of Plant Science, University of Missouri, Portageville, MO 63873,[4]Department of Crop Science, North Carolina State University, Raleigh, NC 27695, [5]Agronomy Department, University of Florida, Quincy, FL 32351, [6]Department of Soil and Crop Sciences, Texas A&M University, College Station, TX 77843,[7]Department of Plant and Soil Science, Texas Tech University, Lubbock, TX 79409, [8]Department of Crop and Soil Science, University of Georgia, Statesboro, GA 30460, [9]Department of Crop Science, North Carolina State University, Rocky Mount, NC 27801 (158)

ABSTRACT

Since its release in the 1940s, 2,4-D has been a broadly used agricultural herbicide. With the impending release of 2,4-D resistant cotton cultivars, an increase is expected in the use of this herbicide, as well as an increase in the interface between resistant and nonresistant cotton cultivars, likely raising the potential for drift injury on cotton. It has been reported that 2,4-D is very prone to drift, up to distances ofseveral kilometers, and cotton is regarded as one of the most sensitive crops to injury from 2,4-D. Injury to terminal growing points, reproductive structures, delays in maturity, and reduced yield have been observed from cotton exposed to drift of 2,4-D. The vegetative stage is regarded as the most sensitive in terms of yield loss from 2,4-D exposure. The objectives of this study were to determine the yield effects of 2,4-D as well as the impacts on fruiting and maturity characteristics on cotton. The study took place in two locations in Georgia in 2013, and in Georgia, Mississippi and Missouri in 2014. The study consisted of single applications of two simulated drift rates of 2,4-D, 0.002 kg a.i. ha^{-1}(low rate) and 0.04 kg a.i. ha^{-1}(high rate) at the four leaf (4 leaf), nine leaf (9 leaf), first bloom (FB), two weeks after FB (FB + 2 wks.), four weeks after first bloom (FB + 4 wks.), and six weeks after FB (FB + 6 wks.) growth stages. A non-treated control (NTC) treatment receiving no 2,4-D applications was also included. The cultivar PhytoGen 499 was utilized at all study locations. Reproductive and maturity data was collected in both years at the Georiga sites, and at Mississippi and Missouri in 2014. When significant, yield loss at all locations typically resulted from the high rate of simulated 2,4-D drift, though the low rate also resulted in yield loss in three of the five locations. Applications made at growth stages nearer to bloom, specifically at the 9 leaf, FB, and FB + 2 wks. stages led to the most severe instances of yield loss. Across all locations, plant maturity characteristics corresponded with treatments which resulted in yield loss more so than total boll measurements taken at 0.3 meter increments of the plant. In 17 out of the 27 treatments that resulted in significant yield loss, either the percent of open bolls, or the total number of bolls measured on the whole plant were significantly reduced compared to the NTC values. The yield results of this study provide evidence that later growth stages of cotton, around and after first bloom are sensitive to 2,4-D in terms of yield loss, and that maturity and reproductive development could provide some explanation for the mechanism behind the yield loss. The authors would like to acknowledge the Georgia Cotton Commission for their support and funding of cotton agronomic research at the University of Georgia.

INFLUENCE OF HERBICIDE AND APPLICATION TIMING ON HAIRY INDIGO CONTROL IN PEANUT. B.C. Colvin*, J.A. Ferrell; University of Florida, Gainesville, FL (159)

ABSTRACT

Hairy Indigo (*Indigofera hirsuta*) is an aggressive annual that can grow to be several feet in height. It is a problem weed in peanut and can be difficult to manage since it is challenging to manage a legume weed in a legume crop. Growers in Florida have had trouble in recent years achieving adequate control of this weed. To this end, the objective of this project was to evaluate different herbicide treatments for the control of hairy indigo in peanut and to investigate the impact of different application timings on control. Plots were established in a factorial arrangement in a randomized compete block design in 2014. The five herbicide treatments consisted of imazapic (0.07gal/ha), imazapic + 2,4-DB (0.07gal/ha+0.31gal/ha), lactofen + 2,4-DB (0.23gal/ha + 0.31gal/ha), imazapic + lactofen + 2,4-DB (0.07gal/ha + 0.23gal/ha + 0.31gal/ha), and bentazon + acifluorfen + 2,4-DB (0.62gal/ha + 0.31gal/ha). All herbicide treatments were applied with crop oil concentrate at 1% v/v. Herbicides were applied at three different timings based on the height of the hairy indigo: 2.5-5cm, 5-10cm, or 10-15cm. When applied to hairy indigo at 2.5-5cm in height, all herbicide combinations provided greater than 85% control at 2 weeks after treatment (WAT). By 4 WAT, all treatments provided greater than 87% control, except imazapic alone (77%). The lactofen containing treatments performed exceedingly well with 97-99% control at 4 WAT. When hairy indigo reached 5-10 cm, control with imazapic and imazapic plus 2,4-DB decreased to approximately 50% at 2 and 4 WAT. Lactofen containing treatments provided between 82 and 87% control, with no differences detected between these treatments. Acifluorfen + bentazon + 2,4-DB was less effective, providing 85% control at 2 WAT and decreasing to 70% by 4 WAT. Control of plants between 10-15cm was similar to those treated at 5-10 cm. Control of 10-15 cm hairy indigo with imazapic or imazapic + 2,4-DB was unacceptable, ranging between 52 and 28% at 4 WAT. The lactofen treatments continued to provide 84 to 90% control, while acifluorfen + bentazon + 2,4-DB was less effective at 70% control. These data demonstrate that if the herbicide is applied when the weed is 2.5-5 cm in height, there are many effective options. However, if application is delayed to after 5 cm, including lactofen will likely be necessary to achieve acceptable control.

OFF-TYPE GRASSES IN ULTRA-DWARF BERMUDAGRASS PUTTING GREENS: A NEW WEED MANAGEMENT PROBLEM? E.H. Reasor*[1], J.T. Brosnan[2], B. Schwartz[3], R.N. Trigiano[2], G. Henry[4], J.C. Sorochan[2];[1]University of Tennessee-Knoxville, Knoxville, TN, [2]University of Tennessee, Knoxville, TN, [3]University of Georgia, Tifton, GA, [4]University of Georgia, Athens, GA (160)

ABSTRACT

Ultra-dwarf bermudagrass (*Cynodon dactylon* (L.) Pers. x *Cynodon transvaalensis* Burtt Davy) putting green use is rapidly increasing in the southeastern United States. Many golf course superintendents managing these surfaces have noticed off-type grasses in their ultradwarf bermudagrass greens. Anecdotal observations suggest that these off-types vary in texture, color, growth rate, and susceptibility to plant growth regulators compared to commercial ultradwarf cultivars such as 'TifEagle', 'MiniVerde', and 'Champion'.

Research was initiated in 2013 with an objective of morphologically and cytogenetically characterizing bermudagrass selections from ultradwarf putting greens. Fifty-two different selections (off-types and desirable cultivars) were collected from golf course putting greens in the southeastern United States. Off-type selections were identified by visual differences in texture and color compared to the desirable cultivar. Selections were cultured from single stolon transplants in a greenhouse at the University of Tennessee (Knoxville, TN) for two months prior to morphological characterization. Plants received 25 kg N ha^{-1} wk^{-1}, 1 cm^{-1} day^{-1}, and 30°C average temperature. Morphology was characterized by measuring internode length, stolon diameter, leaf length, leaf width, and leaf length-to-width ratio.

Morphological variability was evident across the 52 selections. Internode length ranged from 16 to 39 mm, stolon diameter ranged from 0.6 to 0.9 mm, leaf length ranged from 6 to 34 mm, leaf width ranged from 1.7 to 2.4 mm, and leaf length:width ranged from 3:1 to 15:1. Considering the number of response variables and range of recorded measurements, a cluster analysis using a K-means algorithm was performed using SAS Enterprise Guide 6.1. A maximum of three clusters were defined by cubic clustering criterion and frequency of observations. Cluster means for all variables were significantly different ($p < 0.0001$). Selections for future research will be made using a Mantel-Haenszel Chi-Square test for cluster association.

Ploidy levels of all 52 selections were determined using flow cytometry comparing a tetraploid bermudagrass and two triploid bermudagrasses (TifEagle and Tifway). All 52 selections were determined to be triploid and had higher DNA frequency than Tifway. This response suggests that all selections were within the Tifgreen-derived cultivar family. Moreover, selections collected in this study are not tetrapoloid or Tifway contaminants from collars, fairways or roughs.

Future research will evaluate how the selections identified in this initial research compare to authentic cultivars such as Tifgreen, Tifdwarf, TifEagle, MiniVerde, and Champion when subjected to varying plant growth regulator, nitrogen, and cold temperature regimes. Genotype-by-sequencing techniques will also be used to develop a DNA fingerprint of authentic cultivars to help identify the presence of off-type grasses in the field.

INFLUENCE OF TILLAGE METHODS ON MANAGEMENT OF *AMARANTHUS* SPECIES IN SOYBEAN. A.G. Scott*[1], M.A. McClure[1], L.E. Steckel[1], V.M. Davis[2], W.G. Johnson[3], M.M. Loux[4], J.K. Norsworthy[5], J. Farmer[5], K.W. Bradley[6]; [1]University of Tennessee, Jackson, TN, [2]University of Wisconsin, Madison, WI, [3]Purdue University, West Lafayette, IN, [4]Ohio State Unversity, Columbus, OH, [5]University of Arkansas, Fayetteville, AR,[6]University of Missouri, Columbia, MO (161)

ABSTRACT

Glyphosate resistant (GR) weeds have brought a sense of urgency to weed scientists to find alternative means to control herbicide resistant weeds. GR *Amaranthus* is considered one of the top 3 most troublesome weeds in the Southern United States. Since producers have a history of terminating weeds mechanically through tillage this prompted weed scientists to explore different tillage systems to try and manage GR *Amaranthus* in *Glycine max.*

Research was conducted in 2014 in Jackson, TN, Fayetteville, AR, Lafayette, IN, Arlington, WI, South Charleston, OH, Belleville, IL, Moberly, MO, and Columbia, MO. Treatments were arranged within a split plot design with 4 replications at each location. Whole plots were set as tillage types and sub plots were set as herbicide treatments. Whole plot treatments included deep tillage with a moldboard plow in the fall followed by a field cultivator in the spring, conventional tillage with a chisel plow in the fall followed by a field cultivator in the spring, minimum tillage in the spring with a turbo-till, and a no-till plot. Each tillage treatment also received two herbicide treatments: 1) Residual Program of flumioxazin preemergence at 0.087 kg ai/ha^{-1} followed by a post application of glufosinate at 0.59 kg ai/ha^{-1} and s-metolachlor at 1.42 kg ai/ha^{-1}. 2) Post applications of glufosinate 0.59 kg ai/ha^{-1} throughout the season. *Glycine max* planting dates and varieties were reflective of those typically utilized by producers at each location. *Glycine max* varieties were glufosinate tolerant. Six soil cores per treatment were taken up to a depth of 25 cm. Soil cores were cut in to 6 sections based on depths of 0-1, 1-5, 5-10, 10-15, 15-20, 20-25 cm, then pulverized and spread over potting soil and grown in a green house. Emerged weeds were counted and identified to species every two weeks and then removed by hand for a span of 3 months. Weeds species in field plots were counted and identified in two m^2 quadrants per treatment every two weeks following planting, until soybeans reached R6. Weeds were hand removed from quadrants then the entire plot received an application of glufosinate at 0.59 kg ai/ha^{-1}, applied at 140 L/ha^{-1}.

Tillage decreased *Amaranthus* emergence when a tillage method was utilized verse the no-till treatments in the Tennessee location. There was a similar trend that showed in the other locations that had significant *Amaranthus* populations. The deep tillage treatment showed the greatest variety of seed being distributed throughout the soil profile, with the largest portion of the seed being buried in the 5-15 cm range. As could be expected, besides the no-till treatment, the minimum tillage treatment showed the least variation of seed distribution through the soil profile, with most of the seed being buried in the 0-5 cm range.

Mechanical suppression of herbicide resistant weeds through tillage could be a viable option for some producers in the future. However, due to issues with soil erosion, especially in Tennessee, deep tillage is not a sustainable solution. Other options to control GR weeds in the future will still be needed to maintain control of row crops in agricultural fields.

EXPLORING INHIBITION OF TYROSINE AMINOTRANSFERASE AS A PUTATIVE MODE OF ACTION OF METHIOZOLIN. K.A. Venner*[1], S.D. Askew[1], S. J. Koo[2]; [1]Virginia Tech, Blacksburg, VA, [2]Moghu Research Center, Daejeon, South Korea (162)

ABSTRACT

Methiozolin is a new herbicide under evaluation in the US for the selective removal of annual bluegrass in creeping bentgrass putting greens. This herbicide is a member of the isoxazoline class of chemistry, but the primary mode of action is currently disputed. Experiments performed in Korea have suggested that methiozolin may act as a cell wall biosynthesis inhibitor but the data were inconclusive as to whether the inhibition was a primary or secondary effect. Research performed at Virginia Tech in 2014 found that incorporation of 13C-glucose was inhibited by methiozolin, and lends some support to this statement. In Germany, Dr. Klaus Grossmann's lab concluded that methiozolin acts as a putative inhibitor of tyrosine aminotransferase, thus grouping this herbicide with other inhibitors of plant carotenoids, like cinmethylin, a product used in rice for the selective control of grassy weeds. Tyrosine aminotransferase is an important enzyme in the conversion of L-tyrosine to 4-hydroxyphenylpyruvate (4-HPP). In support of the TAT-inhibitor conclusion, Grossman et al. reported increased levels of tyrosine and L-DOPA and an apparent safening of *Lemna paucicostata* when 4-HPP was added to methiozolin-containing solution. An *Arabodopsis* TAT isoenzyme, TAT7, was also inhibited by methiozolin but the required rate was over 1000 times typical field rates of methiozolin. Commercial products containing methiozolin are used to target two primary weeds, *Poa annua* and *P. trivialis*, yet neither of these weeds have been used in previous attempts to determine the mode of action. The objective of this research is to determine whether or not tyrosine aminotransferase inhibition is a primary mode of action for methiozolin in annual bluegrass and several desirable turfgrass species.

Laboratory experiments were conducted in an attempt to duplicate the reported safening of *L. paucicostata* to methiozolin by addition of 4-HPP. Our goal was to test several turfgrass species and annual bluegrass along with duckweed, *L. paucicostata*. Seeds of annual bluegrass (*Poa annua*), creeping bentgrass (*Agrostis stolonifera*), Kentucky bluegrass (*Poa pratensis*), and perennial ryegrass (*Lolium perenne*) were cultured aseptically in 0.25x Hoaglands solution in order to germinate seed for use in the study. *L. paucicostata* was cultured in 1.0x Schenk and Hildebrant media. All plants were transferred to 0.25x Hoaglands solution containing the following treatments: methiozolin at 0.2 uM, methiozolin at 0.2 uM + 10uM 4-HPP, no methiozolin, and no methiozolin + 10 uM 4-HPP. All treatments contained 1.0% DMSO as a solvent for methiozolin. Digital images were taken regularly in order to ascertain whether or not 4-HPP had an effect on plant response to methiozolin via comparison between green pixel counts throughout the duration of the study. In previous studies, 4-HPP has not altered methiozolin activity on: annual bluegrass, creeping bentgrass, Kentucky bluegrass, perennial ryegrass, and *Lemna minor*. In one of four studies, 4-HPP improved *L. paucicostata* growth in the presence of methiozolin. These effects were visible as regrowth six days after addition to media containing methiozolin plus 4-HPP. In two additional studies, addition of 4-HPP to methiozolin-containing solution did not affect the incorporation of 13C-glucose into plant cell wall sugars versus methiozolin alone. Our preliminary conclusion to date is that the three turfgrasses and annual bluegrass respond similarly to methiozolin and 4-HPP does not influence response of these species to methiozolin under conditions similar to previous studies.

INFLUENCE OF DRIFT-REDUCTION NOZZLE TECHNOLOGY ON EFFICACY OF CONTACT AND SYSTEMIC TANK-MIXED HERBICIDES. S.A. Butler*, L.E. Steckel; University of Tennessee, Jackson, TN (163)

ABSTRACT

Weed management has become a challenge in soybean and cotton production because of the steady increase in number of glyphosate-resistant (GR) weed species. In the Mid-south, GR Palmer amaranth (*Amaranthus palmeri*) is one of the most problematic weeds to control. Palmer amaranth is highly competitive to soybeans and cotton due to its quick adaptability, lengthy germination window, aggressive competition, and ability to produce large quantities of seed. As of 2014, GR Palmer amaranth has spread to 21 states in the U.S. In order to consistently control weeds and slow the development of further herbicide resistance, diverse herbicide chemistries should be applied. Future soybean and cotton crops tolerant to synthetic auxins, such as dicamba and 2,4-D, and inhibitors of 4-hydroxyphenylpyruvate dioxygenase (HPPD), such as mesotrione, give growers another post emergence (POST) option to control problematic GR Palmer amaranth (*Amaranthus palmeri*). With multiple non-selective herbicides being used POST in crops, the need for drift management will increase. Also, synthetic auxins possess high rates of drift potential and volatility. Drift-reducing nozzle technology should be utilized in order to manage weeds POST in crops with crop-tolerant herbicides. Application stewardship practices will be required with future herbicide tolerant crops, including the use of spray nozzles that produce reduced quantities of driftable fines (<140 micron volume median diameter). Nozzles designed for minimizing drift manipulate spray mixtures to be applied in coarse droplets (>400 micron volume median diameter). Coarse droplets typically reduce coverage thus decreasing efficacy of contact herbicides, such as glufosinate. Contact herbicides work most effectively through nozzles producing fine to medium droplets (between 150 and 400 micron volume median diameter). Dual orifice nozzles historically increase coverage. Alternate spray application methods should be considered to improve efficacy of contact and systemic herbicides tank-mixed.

A field experiment was conducted at the West Tennessee Research and Education Center in Jackson, Tennessee in 2013 and 2014 to evaluate efficacy of contact and systemic herbicides tank-mixed through drift-reduction spray nozzles in single and dual orifices and in angled, vertical, and combination of angled and vertical fan arrangements. This study was performed in corn (*Zea mays*) comparing efficacy of glufosinate, glufosinate plus mesotrione, glufosinate plus 2,4-D, and glufosinate plus dicamba on Palmer amaranth. Each herbicide treatment was applied through 5 spray nozzles including: Teejet AIXR11002 (single orifice, vertical), Teejet TTI11002 (single orifice, angled), Teejet AITTJ60-11002VP (dual orifice, angled), simulated Wilger Combo-Rate with Greenleaf Airmix11002 (dual orifice, vertical), and Greenleaf TADF02 (dual orifice, combination of angle and vertical). Applications were made POST on 15 to 21 cm Palmer amaranth. Assessments were made of Palmer amaranth visual control 7, 14, and 21 days after application (DAA). Fresh weight biomass samples were collected 14 DAA and corn was harvested for yield at maturity and adjusted to 15.5% moisture. Atomization analysis of droplet size was evaluated using Helos KR laser diffraction at the West Central Research and Extension Center in North Platte, Nebraska. Droplet size had greatest effect on visual control ratings across spray nozzle parameters, significantly increasing control up to 6% when decreasing droplet size from 649 microns to 292 microns. Fans arranged vertically or in combination of vertical and angled significantly increased control up to 3.5% in comparison to angled fan arrangements. Dual orifice nozzles showed up to 3% higher control of Palmer amaranth at 14 DAA than a single orifice nozzle, however, no significant differences were found between the number of orifices based on visual control ratings at 21 DAA. Tank-mixing a systemic herbicide with glufosinate significantly increased Palmer amaranth control up to 12%. Palmer amaranth fresh weight biomass was significantly reduced 128 g m^{-2} when tank-mixing a systemic herbicide. Thus, the ability to apply alternate herbicide chemistries tank-mixed with glufosinate has the potential to improve Palmer amaranth control in future herbicide-tolerant soybean and cotton crops and promote protection of herbicide chemistries from resistance. Also, when applying contact herbicides tank-mixed with systemic herbicides in future tolerant crops, using an approved spray nozzle that creates the finest droplets will provide the greatest control of Palmer amaranth

ENDANGERED SPECIES OF THE SOUTHEAST. A.O. Clark*; Syngenta Crop Protection, LLC, Greensboro, NC (226)

ABSTRACT

The Endangered Species Act of 1973 was passed to ensure that Federal Agencies conserve and recover listed species and the ecosystems upon which they depend. Because any Federal action must evaluate the impact of its action on listed species, it is important to understand the location of the listed species. There are currently almost 1500 threatened or endangered (T&E) species across the United States, and 371 of these are located in the Southeast. Of the 371 species, 147 are plant species. This presentation highlights a few of the T&E species in the Southeast and their habitats.

ASSESSING PROXIMITY OF PESTICIDE USE AND ENDANGERED SPECIES HABITATS IN THE SOUTHEASTERN U.S. D.D. Campbell*; Syngenta Crop Protection, LLC, Greensboro, NC (227)

ABSTRACT

GRAMOXONE SL 2.0 LABEL UPDATE. M.U. Dixon*; Syngenta Crop Protection, Greensboro, NC (228)

ABSTRACT

HERBICIDE REGISTRATION REVIEW AND ITS IMPACT ON HERBICIDE USE. C.S. Moore*; Syngenta Crop Protection, LLC, Greensboro, NC (229)

ABSTRACT

REGULATORY REQUIREMENTS FOR REGISTERING A HERBICIDE IN THE U.S. J.W. Wells*; Syngenta, Greensboro, NC (230)

ABSTRACT

PALMER AMARANTH MANAGEMENT WITH ENGENIA IN BOLLGARD II XTENDFLEX COTTON.
A.C. York*[1], C.W. Cahoon[1], G.W. Oliver[2]; [1]North Carolina State University, Raleigh, NC, [2]BASF, Holly Springs, NC (174)

ABSTRACT

An experiment was conducted on a loamy sand soil in 2013 and 2014 to evaluate Palmer amaranth (AMAPA) control in Bollgard II XtendFlex cotton with systems utilizing Engenia (BAPMA salt of dicamba; pending EPA approval) herbicide. Treatments included a factorial arrangement of two base systems and seven Engenia options. Base systems in 2013 included Prowl H2O (pendimethalin, 924 g ai/ha) applied PRE, either Roundup PowerMax (glyphosate, 1120 g ae/ha) plus Dual Magnum (*S*-metolachlor, 1090 g ai/ha) or Liberty (glufosinate-ammonium, 594 g ai/ha) plus Dual Magnum at first POST, and Roundup PowerMax plus Dual Magnum at second POST. These are referred to as the Roundup system and the Liberty/Roundup system. Base systems were the same in 2014 except that Outlook (dimethenamid-*P*, 630 g ai/ha) replaced Dual Magnum in the first POST and Warrant (acetochlor, 1260 g ai/ha) replaced Dual Magnum in the second POST. Engenia (560 g ae/ha) options included none, PRE, first POST, second POST, first and second POST, PRE and first POST, and PRE and second POST. The first POST was applied to 1- to 2-leaf cotton and 6- to 8-cm weeds. The second POST was applied to 5- to 7-leaf cotton. AMAPA at the second POST ranged from 5 to 18 cm, depending upon previous treatments. Data were averaged over years. An additional treatment was Roundup first and second POST with no residual herbicide PRE or POST. This treatment indicated 40 to 50% of the AMAPA was glyphosate-resistant.

No cotton injury was observed with Engenia PRE or POST. Dual Magnum, Outlook, and Warrant caused minor (5% or less), transient foliar necrosis.

Residual activity from Engenia applied PRE was observed. At 14 days after PRE application and prior to POST application, AMAPA was controlled 31 and 75% by Prowl and Prowl plus Engenia PRE, respectively. Following POST application, a base herbicide system by Engenia interaction was noted for AMAPA control. In the absence of Engenia, greater control was noted throughout the season with the Liberty/Roundup system compared to the Roundup system. For example, at 14 days after second POST, AMAPA was controlled 89% by the Liberty/Roundup system without Engenia compared with 40% by the Roundup system.

Engenia was of greater benefit in the Roundup system than in the Liberty/Roundup system. In the Roundup system, at 14 days after second POST, AMAPA was controlled 40, 61, 96, and 86% with no Engenia, Engenia PRE, Engenia first POST, and Engenia second POST, respectively. Engenia applied PRE and POST was no more effective than Engenia POST only. In the Liberty/Roundup system, AMAPA was controlled 89% in the absence of Engenia. Control was not improved when Engenia was included PRE, first POST, or PRE plus first POST. AMAPA was controlled 100% when Engenia was included with the second POST.

Although residual control from Engenia applied PRE was observed, POST application was more effective than PRE application. With a single POST application, Engenia was more effective in the first POST application in the Roundup system and more effective in the second POST application in the Liberty/Roundup system. When Engenia was included with both POST applications, complete AMAPA control was noted in both systems.

CROP RESPONSE OF BOLLGARD II XTENDFLEX COTTON TO APPLICATIONS OF DICAMBA AND DICAMBA PREMIX FORMULATIONS. J.T. Fowler*; Monsanto Company, Wentzville, MO (175)

ABSTRACT

Bollgard II® XtendFlex™ cotton is expected to be introduced in 2015, pending deregulation by USDA of the trait. Testing of the trait in 2012 revealed that a potential crop response in the form of necrosis can result from applications of dicamba + glyphosate, either tankmixed or applied as a premix. To evaluate the potential for response and the factors that contribute to it, three separate studies were conducted in 2013 and 2014 across the US cotton belt. In 2013, a study to examine the influence of nozzle droplet size, herbicide, and application volume was conducted at 3 locations. Teejet AIXR 11002, Green Leaf Air Mix AM110-02, and Teejet TTI 11002 nozzles with very coarse, extremely coarse, and ultra coarse droplet sizes, respectively, were used to apply either 0.5 lbs ae/A dicamba or 0.5 lbs ae/A dicamba + 1.0 lbs ae/A glyphosate at 10, 15, and 20 gallons per acre application volumes. Also, in 2013, a study to determine the effect of application rate and timing was established at 11 locations. In this study, increasing rates of dicamba + glyphosate at a 1:2 ratio (0.5, 1.0, 1.5, 2.0, 3.0, and 4.0 lbs ae/A dicamba plus 1.0, 2.0, 3.0, 4.0, 6.0, 8.0 lbs ae/A glyphosate) were applied sequentially to 4-, 8-, and 12-node cotton. In 2014, an additional study evaluating the influence of nozzle droplet size, herbicide, and application volume was conducted at 10 locations. Treatments consisted of Teejet AIXR 11002 and Teejet TTI 11002 nozzles with very coarse and ultra coarse droplet sizes, respectively, used to apply either 0.5 lbs ae/A dicamba or 0.5 lbs ae/A dicamba + 1.0 lbs ae/A glyphosate at 5, 10, 15, and 20 gallons per acre application volumes.

The premix of dicamba + glyphosate in both 2013 and 2014 caused a greater crop response than the dicamba alone treatments (11.2 and 7.3% necrosis in 2013 and 2014, respectively, compared to 5.2 and 3.9%). In both years, the effect of nozzle droplet size was significant, with the Teejet TTI 11002 causing greater necrosis than the treatments using nozzles with smaller droplet sizes. In 2013, application volume was not significant with similar crop response across 10, 15, and 20 gallons per acre. However, in 2014, the 5 gallons per acre application volume did significantly increase necrosis compared to 10 and 15 gallons per acre. Cumulatively, treatments across both years of the dicamba + glyphosate premix applied with Teejet TTI 11002 nozzles at the lowest application volumes caused significantly greater crop response than dicamba alone applied at greater volume with smaller droplet size nozzles. In the 2013 study to examine a rate and timing response, crop response in the form of necrosis increased significantly between rates but there was no effect due to application timing. Location did effect the level of response, but did not interact significantly with the rate treatment response. Applications of 0.5 lbs ae/A dicamba + 1.0 lbs ae/A glyphosate through 4.0 lbs ae/A dicamba + 8.0 lbs ae/A glyphosate caused a necrosis response of 4.6 to 40.7%, respectively, across application timings. Final plant height was significantly reduced by applications of 1.5 lbs ae/A dicamba + 3.0 lbs ae/A glyphosate and higher compared to the untreated check. The two highest rates also caused a delay in the node of first fruiting branch (6.7 and 6.6 for the 6X and 8X rates, respectively) compared to the untreated check (6.1). Total nodes trended higher with increasing rates, but only the 3.0 lbs ae/A dicamba + 6.0 lbs ae/A glyphosate differed significantly from the untreated check. Seed cotton yield was similar for the untreated check (3358 lbs/A) and the sequential treatments of 0.5 lbs ae/A dicamba + 1.0 lbs ae/A glyphosate (3398 lbs/A) and 1.0 lbs ae/A dicamba + 2.0 lbs ae/A glyphosate (3102 lbs/A). All other treatments reduced seed cotton yield significantly compared to the untreated check.

ANNUAL AND PERENNIAL WEED MANAGEMENT WITH ENGENIA™ HERBICIDE IN BOLLGARD II XTENDFLEX COTTON. W. Keeling*[1], J. Frihauf[2], S. Bowe[2], J.D. Reed[3]; [1]Texas A&M Agrilife, Lubbock, TX, [2]BASF Corporation, Research Triangle Park, NC, [3]BASF Corporation, Lubbock, TX (176)

ABSTRACT

Field trials were conducted in 2013 and 2014 at various locations across the Texas High Plains to evaluate Engenia™ herbicide in Bollgard II® XtendFlex™ cotton, which is genetically modified for tolerance to dicamba, glufosinate, and glyphosate. The use of glyphosate in Roundup Ready cotton has effectively controlled many annual weeds that were problems in cotton prior to commercialization of this technology. However, some weeds including Russian-thistle (*Salsola tragus*), Kochia (*Kochia scoparia*), horseweed (*Conyza canadensis*) and perennials such as Texas blueweed, woollyleaf bursage, and field bindweed (*Convolvulus arvensis*) are not always effectively controlled with glyphosate, especially under cool or dry conditions. Additionally, glyphosate-resistant Palmer amaranth (*Amaranthus palmeri*), first identified in this region in 2011, has significantly increased in subsequent years and presents a major challenge to cotton producers. The objective of these studies was to evaluate Engenia™ herbicide, a new dicamba formulation specifically developed by BASF Corporation, as part of an overall weed management system in cotton for the Texas High Plains. Small plot field trials were conducted in Lubbock, Hale and Gaines Counties in 2013 and 2014 to evaluate Palmer amaranth, Russian-thistle, and field bindweed control in a system with residual herbicides including Prowl® H2O and Outlook®. All treatments were applied at 20 GPA using TTI 11002 nozzles at 50 psi.

Russian-thistle control ranged from 40-50% with Prowl® H2O PRE followed by (fb) glyphosate POST. The addition of Engenia™ POST at 12.8 floz/A improved Russian-thistle control to 100%. Late-season palmer amaranth control with Prowl®H2O PRE or glyphosate POST alone was less than 50%, while Prowl® H2O PRE fb glyphosate POST controlled Palmer amaranth 80%. When Engenia™ was added to glyphosate POST, Palmer amaranth control increased to 98-100%. When Prowl®H2O was not applied, the addition of Outlook® to Engenia™ + glyphosate improved control compared to Engenia™ + glyphosate POST alone.

Prowl® H2O PRE fb glyphosate POST controlled field bindweed less than 30%. While control improved to 50% with Engenia™ PRE, Engenia™ + Roundup POST controlled this weed 90% or greater. Cotton yields were increased 50-75% where field bindweed was controlled by 90-95% with Engenia™ treatments compared to glyphosate only treatments.

The results of these studies showed excellent crop safety with Engenia™ applied PRE or POST in Bollgard II® XtendFlex™ cotton, with improved control of problem annual and perennial weeds. For resistance management, Engenia™ still needs to be combined with residual herbicides for maximum weed control.

APPLICATION STEWARDSHIP OF ENGENIA™ HERBICIDE IN DICAMBA TOLERANT CROPS.
D. Westberg*, C. Brommer, C. Feng, W.E. Thomas; BASF Corporation, Research Triangle Park, NC (177)

ABSTRACT

New weed control options are needed to manage herbicide resistant weeds that are limiting control tactics and cropping options in some areas. Dicamba tolerant soybean and cotton will enable the postemergence in crop use of dicamba to manage problematic weeds with an additional herbicide site-of-action. In addition, dicamba tolerant cropping systems will allow for dicamba application preemergence without a planting interval restriction. Engenia™ herbicide, currently not registered by the US EPA, is an advanced formulation based on BAPMA (N, N-Bis-(aminopropyl) methylamine) dicamba salt that minimizes secondary loss of dicamba. Combined with this formulation innovation, a comprehensive stewardship strategy will be implemented to focus on effective weed control, weed resistance management, and maximizing on-target application.

Engenia herbicide should be integrated as a component of a grower's weed control program along with other cultural, mechanical, and chemical control methods. A robust herbicide program uses sequential and/or tank mixtures of herbicides that have multiple effective sites of action on target weeds. Likewise, Engenia should complement current programs adding an additional effective site of action for broadleaf weed control. Over several years of testing, the most effective soybean weed control programs have utilized preemergence followed by postemergence applications of herbicides like Optill® PRO followed Engenia plus glyphosate.

Many parameters related to equipment setup and environmental conditions during application should be considered to maximize on-target deposition. Nozzle selection offers the opportunity to dramatically reduce the potential for spray drift. Research shows that venturi-type nozzle technology can significantly reduce drift potential. Other application parameters that should be considered include travel speed, boom height, application volume, use of a deposition aid, and proximity to sensitive crops. BASF has initiated the 'On Target Spray Academy' training program to educate applicators on best application practices. The combination of Engenia and dicamba tolerant crops plus stewardship will provide growers with an effective system to control increasingly difficult and herbicide-resistant broadleaf weeds.

USING ENGENIA™ HERBICIDE WITH MULTIPLE HERBICIDES WITH DIFFERENT MECHANISMS OF ACTION FOR SEASON LONG WEED CONTROL IN MULTI-HERBICIDE RESISTANT COTTON.

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ABSTRACT

Cotton with multiple herbicide resistance will be utilized as a means to help mitigate herbicide resistant weeds. One herbicide-triple-stack resistant cotton (Xtend from Monsanto) will be tolerant to glyphosate, glufosinate, and dicamba. Engenia from BASF will be a dicamba product that will be available to growers of these cotton cultivars, where dicamba is formulated with a drift control agent: N,N-bis-(amiopropyl)methylamine (BAMPA). Research was conducted in 2012, 2013, and 2014 in Plains GA to evaluate Xtend cotton tolerance and weed control to Engenia when applied PRE, EPOST, or POST emergence in combination with contact and residual herbicides. When PRE applied, there was no injury or stand reduction from Engenia and Engenia plus Prowl H_2O. Combinations of Engenia with Outlook, Warrant, or Dual Magnum EPOST applied resulted in injury in the form of chlorosis (10-20%), but this was transient and not visible 10 days later. Injury was confounded in 2014 when Engenia and Outlook were combined with Roundup or Liberty, primarily due to excessive thrip feeding. However, this injury was transient and cotton recovered with minor stand reduction. POST applications of Engenia with Roundup, Liberty, or residual herbicides did not significantly injure cotton. Palmer amaranth with multiple-resistance (glyphosate/ALS) was effectively controlled (>90%) each year by the combination of Engenia with other PRE, EPOST, and POST herbicide treatment. When Engenia was not included as part of the postemergence (EPOST or POST) treatment program, Palmer amaranth escapes were evident with control decreasing during the season which would have prevented cotton harvest. When no residual herbicides were used, EPOST or POST treatments did not provide season long Palmer amaranth control. Sicklepod, morningglory species (smallflower and pitted), and wild poinsettia were controlled (>95%) by the EPOST and POST sequential applications of Engenia in combination with other contact and residual herbicides. Engenia will be an effective tool for controlling weeds in cotton when used in combination with other herbicides.

WEED MANAGEMENT STEWARDSHIP OF ENGENIA™ HERBICIDE IN DICAMBA TOLERANT CROPS. C. Brommer*, J. Frihauf, S. Bowe; BASF Corporation, Research Triangle Park, NC (179)

ABSTRACT

New weed control options are needed to manage herbicide resistant weeds that are limiting control tactics and in some areas cropping options. Dicamba glufosinate tolerant (DGT) cotton and dicamba tolerant (DT) soybeans will enable the use of dicamba to manage these problematic weeds with an additional herbicide mechanism-of-action. In addition to being a new control tactic, DGT cotton and DT soybeans will allow for application of dicamba as a preplant burndown without a planting interval and postemergence over the top of the crop. Engenia™ herbicide is an advanced formulation (EPA approval pending) based on the BAPMA (N, N-Bis-(aminopropyl) methylamine) form of dicamba. In addition to formulation innovation, a comprehensive stewardship strategy will be implemented to focus on weed management and effective control, weed resistance management, and maximizing on-target application. Engenia herbicide should be used as a complimentary tool in a grower's weed control program where it is integrated into a comprehensive strategy that includes cultural, mechanical, and chemical control. A robust herbicide program uses sequential and/or tank mixtures of herbicides that have multiple effective sites of action on a single weed. Likewise, Engenia should complement current programs to add an additional effective site of action for broadleaf weed control. Over several years of testing, the most effective cotton weed control programs have utilized sequential POST applications of glufosinate and dicamba tank mixed with residual herbicides following application of PRE residual herbicides. BASF field trials in DT soybeans have also demonstrated that postemergence use of dicamba with glyphosate and other effective herbicides following a preemergence or preplant residual herbicide program often provides the most consistent and effective control.

UNDERSTANDING RISKS ASSOCIATED WITH INCREASED USE OF AUXIN HERBICIDES IN MIDSOUTH CROPS: WHAT ARE THE CONCERNS? J.K. Norsworthy*[1], T. Barber[2], R. Scott[3], J.A. Bond[4], L.E. Steckel[5], D. Reynolds[6]; [1]University of Arkansas, Fayetteville, AR, [2]University of Arkansas, Lonoke, AR, [3]Universitiy of Arkansas, Lonoke, AR, [4]Mississippi State University, Stoneville, MS, [5]University of Tennessee, Jackson, TN, [6]Mississippi State University, Starkeville, AR (180)

ABSTRACT

Residual herbicides are a major component of most resistance management programs; however, these herbicides are dependent upon rainfall or irrigation for activation. Furthermore, for Palmer amaranth alone, the occurrence of resistance to glyphosate and acetolactate synthase-inhibiting herbicides is common place on most farmers throughout the Midsouth. With no new mechanisms of herbicide action in the foreseeable future, there is tremendous need for new weed management technologies. Two new technologies will soon be available to growers to combat herbicide-resistant Palmer amaranth and other difficult-to-control weeds. Monsanto is developing the Roundup Xtend Crop System which will provide growers the option of making over-the-top applications of dicamba, glyphosate, and glufosinate in cotton and similar applications in soybean, except for the exclusion of glufosinate. Of most significance from Dow AgroSciences is the anticipated commercialization of the Enlist™ Weed Control System, which allow a proprietary formulation of glyphosate and 2,4-D choline (Enlist Duo™) to be applied over-the-top of soybean and cotton as well as the use of glufosinate in these crops. Unlike in the late 1990's when only one technology was available that widely swept Midsouth cotton and soybean production, growers will have several options for weed management. With a divergence in technologies and number of effective weed control options growing, the likelihood for crop injury from tank-contamination and off-target movement of these herbicides increases immensely. Dicamba and 2,4-D, both auxinic herbicides, are prone to causing damage to soybean and cotton, respectively. While recent improvements in dicamba volatility have been made with development of the Bis(3-amonopropyl)methylamine salt of dicamba through the formulated product Engenia™, availability and use of a more volatile diglycolamine formulation of dicamba in the Roundup Xtend Crop System is anticipated. In the Enlist Weed Control System, only the lower volatility formulation, 2,4-D choline (Enlist Duo), will be permitted. In 2014, research was conducted at the Northeast Research and Extension Center in Keiser, AR to understand the distance that Clarity (diglycolamine formulation of dicamba) would cause injury to soybean when applications were made using those being promoted as forthcoming recommendations for dicamba use in the Roundup Xtend Crop System. A single spray swath 28 ft in width was made using a Bowman Mudmaster traveling at 9.4 mph and equipped with 11003 AIXR nozzles calibrated to deliver 10 gal/A at 40 PSI. Applications were made at the R1 or R3 growth stage of soybean. A similar trial was conducted at Jackson, TN with the dicamba application made at the R1 stage of double-cropped soybean. Assessments for crop injury and height, pod malformation, and grain yield were made downwind as well as either perpendicular or upwind from the spray application. Wind speeds were recorded during each spray application. For the nine trials conducted, the greatest distance to which 5% soybean injury was observed was 420 ft downwind at a wind speed of 9.8 mph. Fields where drift occurred at the R1 stage generally had symptoms present for longer downwind distances than when drift occurred at the R3 growth stage. However, progeny originated from plants that were exposed to drift at the R3 growth stage exhibited greater dicamba-like systems soon after emergence than did progeny from seeds collected following the R1 drift events. In regards to upwind or perpendicular movement from the spray application, it is most likely that this damage to soybean was the result of both volatility and physical drift. Soybean injury (5%) from dicamba was observed up to 51 ft upwind at a 96 degree direction from the downwind drift plume in one trial. As the day for introduction of these technologies draws nearer, there is continued need to understand the risks associated with off-target movement of dicamba and 2,4-D, and steps must be taken to protect against these technologies being introduced in a manner that causes undue risk to non-traited cultivars or other sensitive crops.

ENLIST AHEAD APP: MANAGEMENT RESOURCES FOR THE ENLIST WEED CONTROL SYSTEM.
R. Lassiter*[1], A. Asbury[2], D.E. Hillger[3], R. Keller[4], J. Laffey[5], J. Siebert[6], J. Wiltrout[7]; [1]Dow AgroSciences, Raleigh, NC, [2]Dow AgroSciences, Dahinda, IL, [3]Dow AgroSciences, Noblesville, IN, [4]Dow AgroSciences, Rochester, MN, [5]Dow AgroSciences, Maryville, MO, [6]Dow AgroSciences, Greenville, MS, [7]Dow AgroSciences, Indianapolis, IN (181)

ABSTRACT

Dow AgroSciences has developed the Enlist™ Weed Control System, breakthrough weed control technology that advances herbicide and trait technology by building on the Roundup Ready® system. The Enlist system will help control herbicide-resistant and hard-to-control weed populations. Enlist traits give corn, soybeans and cotton tolerance to Enlist Duo™ herbicide in the same application window as Roundup® herbicide. Enlist Duo herbicide is a proprietary blend of glyphosate and a new 2,4-D choline. Just as important as the trait and herbicide, Enlist™ Ahead is a benefits-based management resource that helps growers get the best results from the Enlist system—today and in the future. Built on a three-pillar foundation, Enlist Ahead will offer farmers, applicators and retailers management recommendations and resources, education and training, and technology advancements. As part of the Enlist Ahead program, Dow AgroSciences has developed the Enlist Ahead App. The app, designed for use with the Enlist Weed Control System, is a precision agriculture tool for maximizing weed control performance, managing weed resistance and making responsible applications of Enlist Duo™ herbicide with Colex-D™ Technology. In addition to the label, it offers growers and applicators practical herbicide application information from a single source that they can take with them from field to field. An example of the specific features found within the Enlist Ahead app are an application planner, mode of action calculator and a nozzle selection tool. The app's herbicide application planner combines real-time, localized weather data, capabilities to map crop fields and trait technologies, and other important considerations for growers and applicators to review before making a responsible herbicide application. Dow AgroSciences has used the latest science and technology to address problem weeds, and Enlist will be a very effective solution.

DICAMBA EFFECTS ON SOYBEAN PLANTS AND THEIR PROGENY. T. Barber*[1], J.K. Norsworthy[2], J.A. Bond[3], L.E. Steckel[4], D. Reynolds[5]; [1]University of Arkansas, Lonoke, AR, [2]University of Arkansas, Fayetteville, AR, [3]Mississippi State University, Stoneville, MS, [4]University of Tennessee, Jackson, TN, [5]Mississippi State University, Starkeville, AR (182)

ABSTRACT

Dicamba-resistant cotton and soybean developed by Monsanto have recently been deregulated by the USDA and may be available to plant on a small scale in 2015. Dicamba herbicide will offer producers another mode of action to manage broadleaf weeds postemergence in these crops. Concerns with off-target movement and spray tank contamination of dicamba have resulted in an increase of field research devoted to potential effects on non-tolerant soybean and cotton. Soybean is especially sensitive to dicamba and previous research has demonstrated significant yield losses with dicamba at rates as low as 0.23 g ai/A when applied at sensitive (R1) stages of growth. The purpose of this research was to determine if low rate applications of dicamba to soybean in reproductive stages will have any effect on progeny produced by affected plants. A study was conducted with an indeterminate (maturity group IV) and determinate (maturity group V) soybean cultivar at Marianna, AR. Dicamba was applied at V3, V6, R1, R2, R3, R4, R5 and R6 growth stages at 3.5 g ai/A and 0.89 g ai/A at each stage of growth. Additional studies were conducted with multiple soybean varieties at Fayetteville, AR, Brooksville, MS, Starkville, MS and Stoneville, MS with equivalent rates, but only at V3, V6, R1 and R2 growth stages. Soybean plants were rated for injury and plant heights were recorded during the season as well as yield at harvest. During harvest, a 454 g sub-sample of progeny seed was taken from each plot. Seed from all studies were collected and 15 seed from each representative plot at each location was returned to the principal investigator at each location. Each plot of 15 seed was then planted in the greenhouse to determine if any effects from dicamba applications during the season were apparent in the progeny. Yield was decreased in both maturity group IV and V cultivars. The most sensitive timing for yield loss from low rates of dicamba was R1 and R2 for the group IV cultivar at either dicamba rate. Yield loss appeared to be more severe in the determinate (group V) soybean cultivar with significant yield loss occurring at each growth stage. Dicamba applications at R1 provided the greatest yield loss in both soybean cultivars at 20% and 44%, respectively. Progeny produced by injured plants during vegetative growth stages (V3) did not result in significant visual injury or have reduced vigor when planted in the greenhouse. However, progeny from plants treated at R1-R6 growth stages revealed significant injury or dicamba symptomology at 14 days after planting (DAP). Injury to progeny increased significantly, when dicamba applications were made at each additional reproductive stage, with R5 and R6 displaying the greatest symptomology. Once again progeny from the determinate (group 5) cultivar displayed the most injury, up to 50% when dicamba was applied at the R5 and R6 soybean growth stages. Seedling vigor was also greatly reduced when dicamba was applied to plants later in reproductive growth stages. Data from the multiple location and variety study revealed a similar trend. Plants treated with low rates of dicamba at R1 and R2 growth stages produced progeny that had reduced germination, vigor and increased injury or dicamba symptomology. These results indicate that yield loss can be significant, depending on growth stage with off-target applications of dicamba to non-tolerant soybean. However, if non-tolerant soybean plants are affected with dicamba later in the growing season at the R3 to R5 growth stages, yield loss probably will not occur, but seed produced or progeny will be affected and will display symptoms when planted the following season. The ending result will be a poor soybean stand that exhibits dicamba-like symptoms and significantly reduced seedling vigor. This research will continue and affected progeny seed will be planted in the spring to determine stand reduction and yield loss under field conditions.

ENLIST WEED CONTROL PROGRAMS IN ENLIST SOYBEAN. D.M. Simpson*[1], J.S. Richburg[2], L.L. Walton[3], G.D. Thompson[4], B.B. Haygood[5], J.M. Ellis[6], K.K. Rosenbaum[7], D.C. Ruen[8]; [1]Dow AgroSciences, Indianapolis, IN, [2]Dow AgroSciences, Headline, AL, [3]Dow AgroSciences, Tupelo, MS, [4]Dow AgroSciences, Omaha, AR, [5]Dow AgroSciences, Collierville, TN, [6]Dow AgroSciences, Smithville, MO, [7]Dow AgroSciences, Crete, NE, [8]Dow AgroSciences, Lanesboro, MN (183)

ABSTRACT

Studies were conducted in 2012 (22 trials), 2013 (22 trials) and 2014 (14 trials) in the U.S. to evaluate the weed control delivered by a systems approach composed of PRE followed by POST herbicide applications in Enlist E3 soybeans. PRE herbicide treatments consisted of cloransulam + sulfentrazone, flumioxazin + cloransulam, flumioxazin + chlorimuron ethyl or S-metolachlor + fomesafen herbicide products. Postemergence treatments of Enlist Duo (2,4-D choline + glyphosate DMA) at 1640 and 2185 g ae/ha, glufosinate at 542 g ae/ha, 2,4-D choline + glufosinate at 800 + 542 and 1065 + 542 g ae/ha, and glyphosate at 1120 g ae/ha were applied approximately 28 days after planting. PRE applications of cloransulam + sulfentrazone or flumioxazin + cloransulam followed by Enlist Duo at 1640 or 2185 g ae/ha or 2,4-D choline + glufosinate at 800 + 542 or 1065 + 542 g ae/ha provided greater than 95% control of glyphosate-resistant AMAPA (*Amaranthus palmeri S. Wats)*, AMATA (*Amaranthus rudis Sauer*), AMBEL (*Ambrosia artemisiifolia L.)*, and AMBTR (*Ambrosia trifida L.*) at 28 days after application. Due to continuous germination of Palmer amaranth through the growing season, studies were conducted in 2013 (5 trials) and 2014 (6 trials) in the U.S. to evaluate the weed control delivered by a systems approach composed of pre-emergence (PRE) followed by a single POST herbicide application or two sequential POST applications in Enlist E3 soybeans. PRE herbicide treatments consisted of flumioxazin + cloransulam (71.5 + 23.5 g ai/ha), or flumioxazin + chlorimuron ethyl (62.7 + 21.6 g ae/ha) herbicide products. The POST treatments were single applications made to less than 4 inch tall Palmer amaranth or sequential POST applications made to less than 4 inch Palmer amaranth followed by a second application 14 to 21 days later. Single POST herbicide treatments were Enlist Duo at 1640 or 2185 g ae/ha, glufosinate at 542 g ae/ha, 2,4-D choline + glufosinate at 1065 + 542 g ae/ha, Enlist Duo + metolachlor at 2185 + 1070 g ae/ha or Enlist Duo + fomesafen + metolachlor at 2185 + 266 + 1214 g ae/ha. Sequential applications of Enlist Duo followed by Enlist Duo at 1640 fb 1640 or 2185 fb 2185 g ae/ha or glufosinate at 542 g ae/ha followed by glufosinate at 542 g ae/ha, or Enlist Duo at 2185 g ae/ha or 2,4-D choline +glufosinate at 1065 + 542 g ae/ha were applied approximately 18 days after POST application. At 14 to 21 days after sequential applications, Enlist Duo at 1640 and 2185 g ae/ha provided 92% control with sequential applications of Enlist Duo at 2185 g ae/ha provided 99% control. Addition of metolachlor or metolachlor + fomesafen to Enlist Duo at 2185 g ae/ha did not significantly improve control compared to Enlist Duo alone. Sequential applications of glufosinate followed by (fb) glufosinate, glufosinate fb Enlist Duo, Enlist Duo fb glufosinate or 2,4-D+glufosinate fb 2,4-D+glufosinate provided >97% control of AMAPA compared to 89% with a single application of glufosinate. With germination of ERICA (*Conyza canadensis L.)* extending into May and June, effective control options of glyphosate-resistant ERICA is needed prior to planting and in crop. A total of 19 studies were conducted between 2013 and 2014 to evaluate the ERICA control delivered by a systems approach composed of burndown followed by post-emergence (POST) herbicide applications in Enlist E3™ soybeans. Burndown applications consisted of glyphosate at 1120 g ae/ha, Enlist Duo™ at 1640 or 2185 g ae/ha, glufosinate at 542 g ae/ha, 2,4-D choline + glufosinate at 1065 + 542 g ae/ha and glyphosate + dicamba at 1120 + 560 g ae/ha applied with and without cloransulam + sulfentrazone at 25 + 195 g ae/ha. POST herbicide treatments consisting of Enlist Duo at 1640 and 2185 g ae/ha, glufosinate at 542 g ae/ha, 2,4-D choline + glufosinate at 1065 + 542 g ae/ha, glyphosate at 1120 g ae/ha or glyphosate + dicamba at 1120 + 560 g ae/ha were applied to V3 soybeans. At 4 weeks after the POST application, sequential applications of Enlist Duo, 2,4-D + glufosinate or glyphosate + dicamba provided >95% control of glyphosate resistant ERICA. Addition of cloransulam + sulfentrazone improved glyphosate-resistant ERICA control to >98% for all post treatments except glyphosate alone. Controlling glyphosate-resistant weeds requires an integrated systems approach which will vary based on weed biology, particularly germination intervals. Glyphosate resistant AMBEL, AMBTR and AMATA can be effectively controlled with PRE herbicide followed by Enlist Duo. Glyphosate resistant AMAPA will likely require a PRE herbicide followed by single POST application of Enlist Duo plus metolachlor or metolachlor + fomesafen or two sequential POST applications of Enlist Duo. Glyphosate-resistant ERICA will require a systems approach of Enlist Duo + cloransulam + sulfentrazone applied as a burndown application followed by a V3 application of Enlist Duo. Enlist Duo used as a component in a weed management program provides a sustainable solution to control herbicide-resistant and herbicide –susceptible weeds.

APPLICATION BEST MANAGEMENT PRACTICES FOR BALANCING DRIFT MITIGATION AND WEED CONTROL WITH THE ENLIST WEED CONTROL SYSTEM. J. Siebert*[1], A. Asbury[2], P. Havens[3], D.E. Hillger[4], R. Keller[5], J. Laffey[6], R. Lassiter[7], J. Schleier[3]; [1]Dow AgroSciences, Greenville, MS, [2]Dow AgroSciences, Dahinda, IL, [3]Dow AgroSciences, Indianapolis, IN, [4]Dow AgroSciences, Noblesville, IN, [5]Dow AgroSciences, Rochester, MN, [6]Dow AgroSciences, Maryville, MO, [7]Dow AgroSciences, Raleigh, NC (184)

ABSTRACT

Dow AgroSciences has developed the Enlist™ Weed Control System, a novel weed control technology to combat herbicide-resistant and hard-to-control weed populations that will improve upon the proven benefits of the glyphosate-tolerant cropping system. The Enlist Weed Control System is enabled through the cultivation of Enlist crops which contain multiple herbicide tolerance traits that allow for the post emergence application of Enlist Duo™ herbicide, a proprietary blend of glyphosate and 2,4-D choline. Just as important as the trait and herbicide solution, Enlist™ Ahead is a management resource designed to help growers succeed while promoting responsible use of the system. Built on a three-pillar foundation, Enlist Ahead will offer farmers, applicators and ag retailers technology advancements, management recommendations and resources, and education and training. The Enlist Duo label details specific requirements for the application of the product onto Enlist-traited crops. These requirements represent several years of research aimed at reducing the potential of off-target movement of Enlist Duo herbicide. The key requirements focus on making applications with the correct application equipment setup, making applications in environmental conditions that are consistent with minimal off-target movement potential and the proper identification and protection of sensitive areas around the treatment area. Dow AgroSciences is committed to responsibly commercializing the Enlist Weed Control System and to sustain its longevity.

TOLERANCE OF ENLIST COTTON TO ENLIST DUO, 2,4-D CHOLINE AND GLUFOSINATE: A MULTI-YEAR RESEARCH SUMMARY. J.S. Richburg*[1], B. Braxton[2], B.B. Haygood[3], R. Huckaba[4], M. Lovelace[5], D.H. Perry[6], G.D. Thompson[7], R. Viator[8], L.L. Walton[9]; [1]Dow AgroSciences, Headline, AL, [2]Dow AgroSciences, Travelers Rest, SC,[3]Dow AgroSciences, Collierville, TN, [4]Dow AgroSciences, Wake Forest, NC, [5]Dow AgroSciences, Lubbock, TX, [6]Dow AgroSciences, Greenville, MS, [7]Dow AgroSciences, Omaha, AR, [8]Dow AgroSciences, Houma, LA, [9]Dow AgroSciences, Tupelo, MS (185)

ABSTRACT

The Enlist™ Weed Control System by Dow AgroSciences is a new weed control tool incorporating unique herbicide tolerance traits, a new herbicide featuring a 2,4-D choline based formulation and the Enlist Ahead management resource. The primary objective of this multi-year research was tolerance characterization of Enlist cotton to 2,4-D, glyphosate and glufosinate. Data collected included visual percent injury, droop/epinasty, necrosis, chlorosis, growth inhibition and cotton yield at harvest. Since 2010, Dow AgroSciences and university researchers have conducted 233 trials throughout the cotton-growing regions of the southern U.S. This research included characterization of dose response to the enabled herbicides as well as the effects of tank mixtures, multiple applications, and crop growth stage. Results demonstrated Enlist cotton tolerance to 2,4-D, glyphosate and glufosinate with no negative impacts on yield. Enlist cotton weed management programs utilizing these herbicide modes of action will provide growers an additional tool to achieve greater control of economically-important and herbicide-resistant weed biotypes.

ENLIST WEED CONTROL SYSTEMS FOR COTTON: A MULTI-YEAR RESEARCH SUMMARY. D.H. Perry*[1], B. Braxton[2], B.B. Haygood[3], R. Huckaba[4], M. Lovelace[5], J.S. Richburg[6], G.D. Thompson[7], R. Viator[8], L.L. Walton[9]; [1]Dow AgroSciences, Greenville, MS, [2]Dow AgroSciences, Travelers Rest, SC, [3]Dow AgroSciences, Collierville, TN, [4]Dow AgroSciences, Wake Forest, NC, [5]Dow AgroSciences, Lubbock, TX, [6]Dow AgroSciences, Headline, AL, [7]Dow AgroSciences, Omaha, AR, [8]Dow AgroSciences, Houma, LA, [9]Dow AgroSciences, Tupelo, MS (186)

ABSTRACT

The Enlist Weed Control System by Dow AgroSciences is a new weed control technology incorporating unique herbicide tolerance traits, a new herbicide featuring a 2,4-D choline formulation, and the Enlist Ahead management resource. The primary objective of this multi-year research was to collect key weed efficacy data on glyphosate-resistant biotypes such as Palmer amaranth (*Amaranthus palmeri*) and marestail (*Conyza canadensis*), as well as other economically-important weed species. Since 2007, Dow AgroSciences and university researchers have conducted 218 trials throughout the cotton-growing regions of the southern U.S. evaluating Enlist Duo™ herbicide (a proprietary blend of 2,4-D choline + glyphosate) or 2,4-D choline within weed control programs for controlling herbicide-resistant and -susceptible weeds in Enlist™ cotton. Herbicide efficacy research ranged from standard characterization trials to full-season weed control systems. Characterization trials evaluated Enlist Duo and other 2,4-D choline-based treatments compared to other commercially-available herbicides. Herbicide programs evaluated consisted of a preemergence herbicide followed by sequential postemergence applications of Enlist Duo, 2,4-D choline + glufosinate and glufosinate applied alone and in tank mixture with other herbicide modes of action (MOA). All programs containing Enlist Duo or 2,4-D choline + glufosinate controlled glyphosate-resistant Palmer amaranth more than 90%. Programs containing Enlist Duo or 2,4-D choline + glufosinate provided greater levels of glyphosate-resistant Palmer amaranth control than glufosinate-only programs and also incorporate two additional modes of action (MOA). While sequential applications of glufosinate provided greater than 85% Palmer amaranth control, these single MOA programs are not sustainable. Research results demonstrate a full-season, Enlist-enabled approach utilizing multiple herbicide MOAs applied preemergence and postemergence will allow growers to achieve greater control of economically-important and herbicide-resistant weed biotypes in the U.S. mid-South.

Weed Survey – Southern States 2015
Aquatic, Industrial, Nursery and Container Ornamentals, Power Lines, and Rights-Of-Way

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Table 1. The Southern States 10 Most Common and Troublesome Aquatic Weeds.

Ranking	Arkansas	Florida	Missouri	Puerto Rico	Tennessee
Ten Most Common Weeds					
1	waterprimrose	algae spp.	filamentous algae	waterhyacinth	filamentous algae
2	duckweed	duckweed spp.	duckweed spp.	flatsedge spp.	duckweed spp.
3	pondweed	torpedograss	pondweed spp.	cattail spp.	pondweed spp.
4	watermeal	cattail	cattail spp.	smartweed spp.	naiad spp.
5	hydrilla	waterprimrose	*Phragmites*	waterlettuce	watermilfoil spp.
6	watershield	spikerushes	waterlily spp.	colocasia (wild	watermeal
7	algae	hydrilla	naiad spp.	*Sesbania* spp.	cattail spp.
8	cattail	waterhyacinth	waterprimrose	alligatorweed	waterlily spp.
9	waterlily	southern naiad	smartweed spp.	waterlily spp.	bulrush spp.
10	spatterdock	alligatorweed	spikerush		watershield
Ten Most Troublesome Weeds					
1	alligatorweed	Old world climbing fern	duckweed spp.	waterhyacinth	watermeal
2	water willow	hydrilla	filamentous algae	hydrilla	duckweed spp.
3	pondweed	waterhyacinth	*Phragmites*	*Salvinia* spp.	filamentous
4	water pennywort	waterlettuce	pondweed spp.	waterlettuce	chara spp.
5	waterlily	algae spp.	waterprimrose	flatsedge spp.	pondweed spp.
6	algae	torpedograss	naiad spp.	cattail spp.	spikerush spp.
7	duckweed	Cuban sedge	smartweed spp.	colocasia (wild	bulrush spp.
8	cattail	crested floatingheart	waterlily spp.	smartweed spp.	naiad spp.
9	watermeal	waterprimrose	spikerush	*Sesbania* spp.	cattail spp.
10	waterprimrose	cabomba/ hygrophilla	cattail spp.		watershield

Table 2. The Southern States 10 Most Common and Troublesome Weeds in Industrial Areas

Ranking	Arkansas	Florida	Kentucky	Puerto Rico	Tennessee
Ten Most Common Weeds					
1	goosegrass	crabgrass spp.	crabgrass spp.	guineagrass	crabgrass spp.
2	crabgrasses	goosegrass	foxtail spp.	talquezal (Paspalum virgatum)	bermudagrass
3	bermudagrass	*Cyperus* spp.	horseweed/marestail	wild tamarind (*Leucaena leucacephala*)	johnsongrass
4	privet	dogfennel	spotted spurge	dallisgrass	tall fescue
5	broomsedge	Florida/Brazilian	dandelion	morningglory spp.	dallisgrass
6	spurge	bermudagrass	purple deadnettle	johnsongrass	brambles
7	*Rubus* spp.	common ragweed	white clover	sour paspalum	musk thistle
8	bahiagrass	spotted spurge	wild lettuce	Cyperus spp./sedges	yellow nutsedge
9	pigweed	spanish needle	johnsongrass	Venezuelan grass	broomsedge
10	honeysuckle	cogongrass	bittercress	bahiagrass	kudzu
Ten Most Troublesome Weeds					
1	trumpetcreeper	cogongrass	horseweed/marestail	johnsongrass	bermudagrass
2	greenbriar	*Cyperus* spp.	bermudagrass	guineagrass	johnsongrass
3	bermudagrass	lantana	Virginia copperleaf	Leucaena	kudzu
4	privet	bamboo	dandelion	morningglory spp.	musk thistle
5	broomsedge	Florida/Brazilian pusley	curly dock	Cyperus spp./sedges	horseweed
6	spurges	dogfennel	woodsorrel	Venezuelan grass	privet spp.
7	*Rubus* spp.	Chinese tallow	buckhorn plantain	dallisgrass	dandelion
8	bahiagrass	saltbush	johnsongrass	sour paspalum	crabgrass spp.
9	pigweed	broomsedge	field bindweed	bahiagrass	Japanese honeysuckle
10	honeysuckle	privet spp.	broomsedge	*Desmodium* spp.	Virginia creeper

Table 3. The Southern States 10 Most Common and Troublesome Weeds in Nursery and Container Ornamentals.

Ranking	Alabama	Arkansas	Florida
Ten Most Common Weeds			
1	spotted spurge	bittercress	spurge (*Chamaesyce* spp.)
2	prostrate spurge	woodsorrel	woodsorrel (*Oxalis* spp.)
3	eclipta	chamberbitter	eclipta
4	bittercress	chickweed spp.	bittercress (*Cardamine* spp.)
5	*Oxalis* spp.	spurge spp.	mulberryweed (*Fatuoa villosa*)
6	longstalk phyllanthus	mulberryweed	tassel-flower (*Emilia* spp.)
7	liverwort	crabgrass spp.	Asiatic hawksbeard (*Youngia japonica*)
8	chickweed spp.	yellow nutsedge	crabgrass (*Digitaria* spp.)
9	crabgrass spp.	purple nutsedge	*Phyllanthus* spp.
10	common groundsel		thickhead (*Crassocephalum crepidioides*)
Ten Most Troublesome Weeds			
1	spotted spurge	bittercress	spurge (*Chamaesyce* spp.)
2	prostrate spurge	woodsorrel	eclipta (*Eclipta prostrata*)
3	eclipta	chamberbitter	*Cyperus/Kyllinga* spp.
4	bittercress	Asiatic hawksbeard	mulberryweed (*Fatuoa villosa*)
5	liverwort	spurge spp.	bittercress (*Cardamine* spp.)
6	longstalk phyllanthus	mulberryweed	Benghal dayflower (*Commelina benghalensis*)
7	*Oxalis* spp.	crabgrass spp.	ragweed parthenium (*Parthenium hysterophorus*)
8	chickweed spp.	yellow nutsedge	woodsorreL (*Oxalis* spp.)
9	crabgrass spp.	purple nutsedge	thickhead (*Crassocephalum crepidioides*)
10	common groundsel	eclipta	*Nostoc* spp.

Table 3. The Southern States 10 Most Common and Troublesome Weeds in Nursery and Container Ornamentals (continued).

Ranking	Kentucky	Louisiana	Louisiana
Ten Most Common Weeds		**Container Ornamentals**	**Field Ornamentals**
1	large crabgrass	spurge spp.	spurge spp.
2	giant foxtail	*Oxalis* spp.	purslane spp.
3	yellow nutsedge	*Phyllanthus* spp.	*Phyllanthus* spp.
4	johnsongrass	bittercress spp.	morningglory spp.
5	common chickweed	crabgrass spp.	*Amaranthus* spp.
6	hairy galinsoga	yellow nutsedge	sedge spp.
7	dandelion	mulberryweed	foxtail spp.
8	purple deadnettle	dogfennel	*Oxalis* spp.
9	smooth pigweed	sowthistle	sowthistle spp.
10	hairy bittercress	Asiatic hawksbeard	eclipta
Ten Most Troublesome Weeds			
1	bindweeds	bittercress spp.	spurge spp.
2	johnsongrass	spurge spp.	*Amaranthus* spp.
3	dandelion	*Phyllanthus* spp.	eclipta
4	nimblewill	*Oxalis* spp.	sedge spp.
5	horseweed/marestail	mulberryweed	common purslane
6	wild mustard	eclipta	*Phyllanthus* spp.
7	quackgrass	dogfennel	morningglory spp.
8	large crabgrass	yellow nutsedge	*Oxalis* spp.
9	giant foxtail	doveweed	sowthistle spp.
10	common chickweed	*Ludwigia* spp.	foxtail spp.

Table 3. The Southern States 10 Most Common and Troublesome Weeds in Nursery and Container Ornamentals (continued).

Ranking	Missouri	Puerto Rico	Tennessee	Tennessee
Ten Most Common Weeds			**Container Ornamentals**	**Nursery Ornamentals**
1	woodsorrel spp.	artillery plant/military fern	common yellow woodsorrel	crabgrass spp.
2	spurge spp.	hairy bittercress	bittercress spp.	musk thistle
3	field bindweed	goosegrass	chickweed spp.	yellow nutsedge
4	crabgrass spp.	crabgrass spp.	annual bluegrass	*Amaranthus* spp.
5	common chickweed	little ironweed	crabgrass spp.	wild garlic
6	*Amaranthus* spp.	nutsedge spp.	dandelion	bermudagrass
7	yellow nutsedge	bermudagrass spp.	yellow nutsedge	common ragweed
8	common bermudagrass	junglerice	*Amaranthus* spp.	goosegrass
9	giant foxtail	flatsedge	purple deadnettle	horseweed
10	mulberryweed	fimbristylis	eclipta	American burnweed
Ten Most Troublesome Weeds				
1	common bermudagrass	artillery plant/military fern	common yellow woodsorrel	mugwort
2	spurge spp.	hairy bittercress	American burnweed	yellow nutsedge
3	field bindweed	goosegrass	horseweed	musk thistle
4	yellow nutsedge	fimbristylis	prostrate spurge	horseweed
5	woodsorrel spp.	nutsedge spp.	eclipta	bermudagrass
6	mulberryweed	little ironweed	yellow nutsedge	morningglory spp.
7	crabgrass spp.	bermudagrass spp.	dandelion	American burnweed
8	common chickweed	junglerice	prickly lettuce	tall fescue
9	*Amaranthus* spp.	crabgrass spp.	bittercress spp.	horsenettle
10	giant foxtail	flatsedge		johnsongrass

Table 3. The Southern States 10 Most Common and Troublesome Weeds in Nursery and Container Ornamentals (continued).

Ranking	Virginia	Virginia
Ten Most Common Weeds	**Container Ornamentals**	**Field Ornamentals**
1	spotted spurge	large crabgrass
2	flexuous bittercress	*Amaranthus* spp.
3	*Oxalis* spp.	common lambsquarters
4	common groundsel	giant foxtail
5	eclipta	common ragweed
6	large crabgrass	common chickweed
7	sowthistle spp.	dandelion
8	horseweed	buckhorn plantain
9	common chickweed	henbit
10	annual bluegrass	horseweed
Ten Most Troublesome Weeds		
1	tasselflower	mugwort
2	eclipta	bindweed spp.
3	Long-stalked phyllanthus	yellow nutsedge
4	spotted spurge	horsenettle
5	common groundsel	wild garlic
6	flexuous bittercress	morningglory spp.
7	mulberryweed	bermudagrass
8	doveweed	quackgrass
9	American burnweed	johnsongrass
10	*Oxalis* spp.	Canada thistle

Table 4. The Southern States 10 Most Common and Troublesome Weeds of Utility Rights-of-Way.

Ranking	Arkansas	Florida	Kentucky	Puerto Rico	Tennessee
Ten Most Common Weeds					
1	*Rubus* spp.	oak spp.	sumac spp.	tropical kudzu	bramble spp.
2	pine spp.	sweet gum	sweetgum	hempvine	sumac spp.
3	sumac spp.	maple spp.	black locust	tall albizia	oak spp.
4	sweet gum	cherry spp.	wild black cherry	pudding vine	sweetgum
5	red cedar	sumac	eastern red cedar	itchweed	poplar
6	oak spp.	wax myrtle	redbud	black-eye susan vine	maple spp.
7	locust spp.	pine spp.	musk thistle	*Dioscorea* (air-potato)	eastern red cedar
8	privet spp.	saw palmetto	trumpetcreeper	morningglory spp.	sassafras
9	red maple	persimmon	honeysuckle spp.	African tuliptree	pine spp.
10	*Prunus* spp.	blackberry	common milkweed	ball moss	black locust
Ten Most Troublesome Weeds					
1	box elder	cogongrass	sweetgum	pudding vine	sweetgum
2	hackberry	oak spp.	black locust	tropical kudzu	kudzu
3	greenbriar spp.	vines (all spp.)	kudzu	morningglory spp.	privet spp.
4	osage orange	wax myrtle	Russian olive	black-eye susan vine	eastern red cedar
5	pine spp.	melaleuca	eastern red cedar	ball moss	oak spp.
6	oak spp.	Australian pine	honeysuckle spp.	itchweed	maple spp.
7	privet spp.	pine spp.	Japanese knotweed	*Dioscorea* (air-potato)	black locust
8	red maple	Chinese tallow	multiflora rose	tall albizia	poplar
9	red cedar	mimosa	*Alianthus* spp.	hempvine	sassafras
10	locust spp.	Brazilian pepper	wild black cherry	African tuliptree	bramble spp.

Table 5. The Southern States 10 Most Common and Troublesome Weeds in Highway Rights-of-Way

Ranking	Arkansas	Florida	Kentucky	Puerto Rico	Tennessee
Ten Most Common Weeds					
1	horseweed	spanish needle	foxtail spp.	railroad grass	Japanese honeysuckle
2	wild carrot	smutgrass	johnsongrass	smutgrass	johnsongrass
3	ryegrass	Carolina geranium	Canada thistle	guineagrass	sumac spp.
4	*Lactuca* spp.	wild radish	common ragweed	wild tamarind	sweetgum
5	broomsedge	vaseygrass	amur honeysuckle	talquezal	eastern red cedar
6	dallisgrass	common ragweed	poison hemlock	jaragua grass	black locust
7	vaseygrass	dogfennel	horseweed/marestail	tall albizia	bramble spp.
8	johnsongrass	*Amaranthus* spp.	common teasel	thibet tree	musk thistle
9	dogfennel	false ragweed	kudzu	sour paspalum	wild cherry
10	*Rubus* spp.	matchweed	Japanese knotweed	razorgrass	privet spp.
Ten Most Troublesome Weeds					
1	horseweed	cogongrass	amur honeysuckle	jaragua grass	sweetgum
2	wild carrot	Brazilian pepper	Japanese knotweed	railroad grass	privet spp.
3	ryegrass	Australian pine	johnsongrass	guineagrass	honeysuckle spp.
4	*Lactuca* spp.	mimosa	Chinese silvergrass	smutgrass	eastern red cedar
5	broomsedge	sweet gum	Canada thistle	talquezal	kudzu
6	dallisgrass	privet spp.	kudzu	razorgrass	bramble spp.
7	vaseygrass	tropical soda apple	horseweed/marestail	sour paspalum	black locust
8	johnsongrass	lantana	purple loosestrife	tall albizia	teasel
9	dogfennel	southern sida	spotted knapweed	wild tamarind	maple spp.
10	*Rubus* spp.	johnsongrass	kochia	thibet tree	oak spp.

Herbicide-Resistant Weeds in SWSS (03/27/2015)

State	Year	Weed	WSSA Mechanism of Action
Alabama	1980	annual bluegrass (*Poa annua*)	5
	1987	goosegrass (*Eleucine indica*)	3
	1988	common cocklebur (*Xanthium strumarium)*	17
	2008	Palmer amaranth (*Amaranthus palmeri)*	9
	2012	annual bluegrass (*Poa annua*)	2
	2012	annual bluegrass (*Poa annua*)	3
	2013	horseweed (*Conyza candensis*)	9
	2013	common ragweed (*Ambrosia artemisiifolia*)	9
Arksansas	1989	goosegrass (*Eleucine Indica)*	3
	1989	common cocklebur (*Xanthium strumarium*)	17
	1990	barnyardgrass (*Echinochloa crus-galli var.crus-galli)*	7
	1994	Palmer amaranth (*Amaranthus palmeri*)	2
	1995	common cocklebur (*Xanthium strumarium*)	2
	1995	redoot pigweed (*Amaranthus retroflexus)*	2
	1995	Italian ryegrass (*Lolium perenne ssp. multiflorum)*	1&2
	1999	barnyardgrass (*Echinochloa crus-galli var.crus-galli*)	4&7
	2003	horseweed (*Conyza candensis*)	9
	2003	Italian ryegrass (*Lolium perenne ssp. multiflorum*)	2
	2004	common ragweed (*Ambrosia artemisiifolia)*	9
	2005	Italian ryegrass (*Lolium perenne ssp. multiflorum*)	1
	2005	giant ragweed (*Ambrosia trifida)*	*9*
	2006	Palmer amaranth (*Amaranthus palmeri*)	9
	2007	johnsongrass (*Sorghum halepense)*	*9*
	2008	barnyardgrass (*Echinochloa crus-galli var.crus-galli*)	13
	2008	Italian ryegrass (*Lolium perenne ssp. multiflorum*)	9
	2010	rice flatsedge (*Cyperus iria)*	2
	2010	smallflower umbrella sedge (*Cyperus difformis)*	2
	2013	yellow nutsedge (*Cyperus esculentus)*	2
	2015	tall waterhemp (*Amaranthus tuberculatus*)	9
	2015	junglerice (*Echinochloa colona*)	2&7
	2015	junglerice (*Echinochloa colona*)	4&7
	2015	junglerice (*Echinochloa colona*)	2,4,7
Florida	1985	American black nightshade (*Solanum americanum)*	*22*
	1996	goosegrass (*Eleucine indica*)	22
	2001	dotted duckweed (*Landoltia punctata)*	22
	2002	hydrilla (*Hydrilla verticillata)*	12
	2008	Palmer amaranth (*Amaranthus palmeri*)	2
	2013	Palmer amaranth (*Amaranthus palmeri*)	9
	2013	Palmer amaranth (*Amaranthus palmeri)*	2&9

State	Year	Weed	WSSA Mechanism of Action
Georgia	1993	prickly sida (*Sida spinosa)*	2
	1995	Italian ryegrass (*Lolium perenne ssp. multiflorum*)	1
	2000	Palmer amaranth (*Amaranthus palmeri*)	2
	2005	Palmer amaranth (*Amaranthus palmeri*)	9
	2008	Palmer amaranth (*Amaranthus palmeri*)	2&9
	2008	Palmer amaranth (*Amaranthus palmeri*)	5
	2008	large crabgrass (*Digitaria sanguinalis)*	1
	2009	Italian ryegrass (*Lolium perenne ssp. multiflorum*)	1&2
	2010	Palmer amaranth (*Amaranthus palmeri*)	2&5&9
Kentucky	1987	smooth pigweed (*Amaranthus hybridus)*	5
	1991	johnsongrass (*Sorghum halepense*)	1
	1992	smooth pigweed (*Amaranthus hybridus*)	2
	2001	horseweed (*Conyza candensis*)	9
	2004	Italian ryegrass (*Lolium perenne ssp. multiflorum*)	1
	2005	giant ragweed (*Ambrosia trifida*)	9
	2006	common ragweed (*Ambrosia artemisiifolia)*	9
	2006	johnsongrass (*Sorghum halepense*)	2
	2010	tall waterhemp (*Amaranthus tuberculatus)*	9
	2010	Palmer amaranth (*Amaranthus palmeri*)	9
	2013	common chickweed (*Stellaria media)*	2
	2013	Italian ryegrass (*Lolium perenne ssp. multiflorum*)	2
Mississippi	1989	common cocklebur (*Xanthium strumarium*)	2
	1991	johnsongrass (*Sorghum halepense)*	1
	1992	johnsongrass (*Sorghum halepense)*	3
	1994	common cocklebur (*Xanthium strumarium)*	17
	1994	goosegrass (*Eleucine indica*)	3
	1994	horseweed (*Conyza candensis*)	22
	1995	Italian ryegrass (*Lolium perenne ssp. multiflorum*)	2
	1996	annual bluegrass (*Poa annua*)	5
	2003	horseweed (*Conyza candensis)*	9
	2005	Italian ryegrass (*Lolium perenne ssp. multiflorum)*	9
	2007	horseweed (*Conyza candensis*)	9&22
	2008	johnsongrass (*Sorghum halepense)*	9
	2008	Palmer amaranth (*Amaranthus palmeri*)	2&9
	2010	tall waterhemp (*Amaranthus tuberculatus*)	9

State	Year	Weed	WSSA Mechanism of Action
Mississippi	2010	goosegrass (*Eleucine indica*)	9
	2010	giant ragweed (*Ambrosia trifida*)	9
	2011	barnyardgrass (*Echinochloa crus-galli var.crus-galli)*	1,2,7,&26
	2012	spiny amaranth (*Amaranthus spinosus*)	9
	2014	common ragweed (*Ambrosia artemisiifolia*)	9
North Carolina	1973	goosegrass (*Eleucine indica*)	3
	1980	common Lambsquarters (*Chenopodium album)*	5
	1980	smooth Pigweed (*Amaranthus hybridu*)	5
	1990	Italian ryegrass (*Lolium perenne ssp. multiflorum)*	1
	1994	common cocklebur (*Xanthium strumarium*)	17
	1995	Palmer amaranth (*Amaranthus palmeri*)	2
	1995	annual bluegrass (*Poa annua*)	5
	1997	annual bluegrass (*Poa annua*)	3
	1999	common cocklebur (*Xanthium strumarium)*	2
	2003	horseweed (*Conyza candensis*)	9
	2005	Palmer amaranth (*Amaranthus palmeri*)	9
	2006	common ragweed (*Ambrosia artemisiifolia*)	2
	2006	common ragweed (*Ambrosia artemisiifolia)*	9
	2007	Italian ryegrass (*Lolium perenne ssp. multiflorum*)	2
	2007	Italian ryegrass (*Lolium perenne ssp. multiflorum)*	1&2
	2009	Italian ryegrass (*Lolium perenne ssp. multiflorum*)	9
Oklahoma	1992	kochia (*Kochia scoparia)*	2
	1996	common cocklebur *(Xanthium strumarium)*	2
	2002	tall waterhemp (*Amaranthus tuberculatus A.rudis)*	2
	2009	cheat (*Bromus secalinus)*	2
	2009	horseweed (*Conyza candensis)*	9
	2011	tall waterhemp (*Amaranthus tuberculatus A.rudis)*	9
	2013	kochia (*Kochia scoparia*)	9
South Carolina	1974	goosegrass (*Eleucine Indica*)	3
	1985	common cocklebur (*Xanthium strumarium*)	17
	1989	Palmer amaranth (*Amaranthus palmeri)*	3
	1990	Italian ryegrass (*Lolium perenne ssp. multiflorum)*	1
	1997	Palmer amaranth (*Amaranthus palmeri)*	2
	2006	Palmer amaranth (*Amaranthus palmeri*)	9
	2010	Palmer amaranth (*Amaranthus palmeri*)	2&9
	2010	Italian ryegrass (*Lolium perenne ssp. multiflorum)*	1&2

State	Year	Weed	WSSA Mechanism of Action
Tennessee	1988	goosegrass (*Eleucine indica*)	3
	1991	common cocklebur (*Xanthium strumarium)*	17
	1992	common cocklebur (*Xanthium strumarium)*	2
	1994	Palmer amaranth *(Amaranthus palmeri)*	2
	1995	johnsongrass (*Sorghum halepense)*	1
	1998	common lambsquarters (*Chenopodium album)*	5
	1998	Palmer amaranth (*Amaranthus palmeri)*	3
	2001	horseweed (*Conyza candensis)*	9
	2006	Italian ryegrass (*Lolium perenne ssp. Multiflorum*)	1
	2006	Palmer amaranth (*Amaranthus palmeri*)	9
	2007	annual bluegrass (*Poa annua*)	3
	2007	giant ragweed (*Ambrosia trifida)*	9
	2007	tall waterhemp (*Amaranthus tuberculatus)*	2
	2009	Palmer amaranth (*Amaranthus palmeri*)	2&9
	2011	tall waterhemp (*Amaranthus tuberculatus*)	9
	2011	annual bluegrass (*Poa annua*)	9
	2011	goosegrass (*Eleucine indica*)	9
	2012	Italian ryegrass (*Lolium perenne ssp. multiflorum*)	9
	2013	annual bluegrass (*Poa annua*)	2&5
Texas	1989	perennial ryegrass (*Lolium perenne)*	2
	1991	barnyardgrass (*Echinochloa crus-galli var.crus-galli*)	7
	1993	Palmer amaranth (*Amaranthus palmeri*)	5
	1998	kochia (*Kochia scoparia*)	2
	2000	johnsongrass (*Sorghum halepense*)	2
	2006	tall waterhemp (*Amaranthus tuberculatus A.rudis)*	9
	2011	Palmer amaranth (*Amaranthus palmeri*)	9
Virginia	1976	smooth pigweed (*Amaranthus hybridus)*	5
	1979	common lambsquarters *(Chenopodium album*)	5
	1993	Italian ryegrass *(Lolium perenne ssp. multiflorum)*	1
	1993	redoot pigweed (*Amaranthus retroflexus*)	5
	1994	smooth pigweed (*Amaranthus hybridus)*	2
	1995	johnsongrass (*Sorghum halepense)*	1
	2001	annual bluegrass (*Poa annua*)	5
	2003	shattercane *(Sorghum bicolor)*	2
	2005	horseweed (*Conyza candensis)*	9
	2008	common chickweed (*Stellaria media*)	2
	2011	Palmer amaranth (*Amaranthus palmeri)*	9

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