

**SWSS WEED CONTEST**  
**Memphis AgriCenter – Memphis, TN**  
**Primary contact: Bruce Kirksey – [bkirksey@agricenter.org](mailto:bkirksey@agricenter.org)**  
**August 2, 2022**

**RULES, REGULATIONS, AND GUIDELINES**

**Purpose:**

The purpose of the Southern Weed Contest is to provide an educational experience from which undergraduate and graduate students in Southern Universities can broaden their applied skills in Weed Science. The contest provides an opportunity for Weed Science students be exposed to weed scientists from other universities and industry, apply what they have learned using a contest to measure their capabilities, as well as to socialize. It is hopeful that the contest will increase the visibility of Weed Science and intensify the interest level of those participating in the discipline of Weed Science.

**Eligibility:**

Any undergraduate or graduate student currently enrolled and pursuing a B.S., M.S., or Ph.D. degree is eligible to participate. Each graduate team will consist of three or four members, composed of (a) graduate, (b) undergraduate, or (c) a combination of graduate and undergraduate students. If a university does not have sufficient students for a team, up to two students may enter as individuals. All students will compete using the same contest material. A team may also bring two alternates. Alternate scores will only count toward individual awards. Team scores will be determined from averaging the individual scores from each team member; unless a three-person team is entered. Then the three highest individuals will be averaged. A maximum of two coaches per team can attend the contest. Students will be allowed to participate in the contest five times as a team member or alternate; however, the student can only participate as a team member three times. Undergraduate participation will not count against the five-time rule.

**All teams must enter the contest by May 1, 2022. Names of team members and alternates must be provided by July 1, 2022 to Bruce Kirksey:**  
**[bkirksey@agricenter.org](mailto:bkirksey@agricenter.org)**

**Awards:**

**TEAM**-The highest average team score from all events will determine the overall contest winner. A traveling "**Broken Hoe**" trophy will be presented to the overall winner and will rotate yearly. The first place team will receive a check for \$500 and each member and coach will receive an engraved plaque. The second and third place teams will receive checks of \$300 and \$200, respectively. Each will also receive an engraved plaque as

described above.

**INDIVIDUAL**-The highest combined score from all events, except team sprayer calibration, will determine the overall-winning individual. The Top 5 awarded a plaque and the top 10 individuals will be recognized. The winning individual will receive a check for \$400. Individuals finishing second, third, fourth, and fifth will receive checks from \$250, \$100, \$75, and \$50, respectively. The high individual in Weed Identification, Crop Response to Herbicides, Sprayer Calibration Problem Set, and Crop/Weed Situation and Recommendations will be recognized and awarded a plaque. If at least four undergraduate students participate in the contest, the top three individual scores will be recognized with first, second, and third place plaques and checks for \$200, \$100, and \$50, respectively.

### **Events:**

**The contest will consist of four major events plus a mystery event. Inclement weather may delay the contest; however, it will continue as soon as conditions permit.**

While contestants are briefed on contest details during breakfast, coaches will be taken to the contest site to review all aspects of the contest. Coaches will review the six phases of the contest: weed identification, herbicide identification, sprayer and written calibration, field problem solving, and mystery event. The coaches will then be taken to a neutral site for breakfast. No contact, electronic or otherwise, with contestants will be allowed until all events have been completed. A committee meeting will also be conducted, if needed, either the day before the contest or on the day of the contest.

#### **1. Weed Identification (100 points)**

From the contest weed identification list of 100 weeds and weed seeds/tubers, the host will pick a total of 50 weeds and/or weed seeds to be identified. Plants could either be grown in a field weed nursery or pots or presented in digital picture form (must be of good quality and clarity) and may be in any stage of growth or development within reason. A complete weed identification list is provided with the correct spelling of each species (Table 1). Students will be responsible for the correct WSSA common and scientific name and spelling (Weed Science Composite List of Weeds - 2011). **All answers must be printed (no cursive allowed) and must be legible to be awarded credit for correct answers. Undergraduate students will only use the common names.** The fall preceding the contest the host should evaluate its weed seed supply and obtain additional seeds/tubers if needed so that an excellent representation of the weed species can be selected for identification. **It is important to utilize as many plant species as possible.** The plants will be grown in sufficient numbers so that adequate samples are available so that 30 to 70 contestants can have specimens for identification.

The contestants will be allowed ample time to identify each specimen. The percentage of samples will range from 50 to 80% weeds and from 50 to 20% seeds.

Uncontaminated weed seed and plant samples are essential for effective identification.

**Pure samples are essential.** The contestant's score will be figured as follows: 2 points for each correctly identified species (1 point for common name and 1 point for scientific name with 0.5 points for Genus and 0.5 points for species) x 50 = 100 points.

**If names are not spelled correctly or capitalized correctly, they are wrong.**

**Likewise, answers must be in the correct column.** Teams will not be supplied weed seed for study, but rather rely on their own training resources.

However, teams are encouraged to expand/improve their training resources through contacts with other weed scientists. This approach may better reflect individual and team preparation for the contest.

## 2. Calibration (100 points)

This event consists of two sections: an individual written test worth 50 points and a team sprayer calibration event worth 50 points.

The individual written test will cover problems and factual information about sprayer and seed treatment calibration of all types; the written portion will be scored as an individual and team event (50 points per person). The host should take particular care to insure all banded application and skip-row calibration problems are stated clearly.

Individual team members and alternates will be given a maximum of 1 hour to complete the written exam. **The host will provide calculators and students will not be allowed to use their own.** The three or four individual team member scores will be added and divided by the number of individuals on the team to give the number of points out of 50 for the team score.

In the team section, the host will provide a hands-on calibration activity that focuses on team, rather than individual performance. Students should have practical calibration knowledge for air blast sprayers, tractor sprayers, backpack sprayers, granular applicators, greenhouse spray chambers, etc. **Differences in time for the competition will count no more than 40% of the overall score. Accuracy of calibration is critical.**

To determine final team score for the calibration event, the number of points scored out of 50 obtained in the team event will be added to the average score of the three or four high team members from the individual calibration problems for a maximum possible of 100 points.

Reference material for the individual problems will be Chapter 23 of Applied Weed Science by Ross and Lembi (2009); Circular 1192 - Equipment and Calibration; Low-Pressure Sprayers, and Circular 1240 - Equipment and Calibration: Granular

Applicators, both by Bode and Pearson (University of Illinois); Roth, L.O. and H.L. Fields, eds. 1991. Introduction to Agricultural Engineering: A Problem Solving Approach, Second Edition, New York: Chapman and Hall; Aerial Application Handbook for Applicators by Dennis K. Kuhlman, Kansas State University; Research Methods in Weed Science, 3rd ed. SWSS 1986; Physiology of Herbicide Action. M.D. Devine, S. O. Duke, and C. Fedtke, 1993; Herbicide Handbook. WSSA 9th ed. 2007, and various unit conversions.

### 3. Crop Response to Herbicides (100 points)

This is an area of extreme difficulty for the students. **Thus, the host must have available a sprinkler irrigation system so that residual herbicides may be activated and weeds and crops maintained in an active growth stage for postemergence treatments.** A list of possible crops and herbicides with rate and method of application are provided in Table 2. The test must contain at least 6 crops and 6 weeds and will be planted and treated with a wide range of preemergence and postemergence herbicides from the list. Each herbicide plot will contain a 1X rate of the unknown herbicide. It is suggested that the test be planted 4 to 5 weeks prior to the contest, with postemergence herbicides being applied 10 to 14 days prior to the contest. Each contestant will be required to identify the unknown herbicides by WSSA-approved chemical family and common name by observation of crop and weed responses. Both names will be given equal credit; in other words missing family or common name will be half right. Put the letter for the correct family listed above, and follow it with the correctly spelled common name.

There should be from 10 to 15 plots. Herbicide plots may be duplicated and check plots can be utilized. It would be of great benefit to the students if they could be led back through the plots following the event. **Students will not be allowed to pull any portion of the plants in the plots. If plants are pulled, the student will lose the points for that plot.**

### 4. Crop/weed Situation and Recommendations (100 points)

Contestants will be required within 15 minutes to determine and evaluate a crop/weed situation and recommend the most effective legal remedy to the problem. **Each contestant will have two field problems to solve.** Recommendations must comply with the label of each herbicide recommended. Students should give consideration to such factors as stage of growth, crop tolerance, climatological factors, agricultural spraying procedures, weed control, economics, and impact upon the environment. The host will determine the best answer considering all alternatives for a situation, although several possible answers may be correct. The latest Federal (Section 3) or State (Section 24C) labels of the product constitutes legal control. The event will be conducted as a "role-play" situation and the potential problem will be in one of the crops on the

problem-solving sheet. Also, the potential herbicide and weed problem will involve only the listed herbicides and weeds on the predetermined problem-solving sheet. The contestant will be asked to assume the role of a chemical company representative, state extension specialist, or independent crop consultant when dealing with the farmer and scored as follows:

- 5 points - proper approach/greeting to farmer
- 20 points - understanding and solving problem
- 12.5 points - recommendations for this year's crop
- 12.5 points - recommendations for next year's crop

Each team will be divided at random into two groups in order to handle one of two different problem situations. Following completion of the first problem, the groups will switch problems and repeat the procedure. **Each participant will evaluate the same two problems.** Alternates and other individuals will be equally divided between the two groups. The assigned judge and farmer will independently score each participant from a predetermined scoring sheet with assigned points for each statement, compare scores, and adjust if necessary. **Prior to the contest, judges and farmers will be tested to ensure that the scorers will give equivalent scores within each individual field problem.** Each field problem will be worth 50 points and to obtain the participants score, the two scores will be added for a maximum of 100 points.

#### 5. **Mystery Event** (15 to 20 points)

This team or individual event will be an agronomic related problem and the contestants will not be advised of the area to study prior to the contest. The mystery event will count toward the team score and individual scores.

### **Scoring**

Overall team ranking of each respective school should be provided to the team coach the night of the banquet following the event. Individual score sheets including their respective ranking against all other competitors should be distributed back to the contestants or their coach at the end of the banquet. An answer key should also be distributed to the team coach.

Scores should be tabulated using a scoring format as listed in the examples below. Each phase of the contest will be scored equally (100 pts. each) except for the mystery event (15 or 20 pts) for a total of 415 or 420 points per team.

Examples are:

A. All teams with four individuals.

Super University	ID	Crop/Weed Response	Events								Team Placing
			Field Problem			Calibration					
			1	2	Avg.	Team	Ind.	Myst.	Score	Ind.	
John Doe	86	60	25	19	44	--	45	5	240	9	
Bill Smith	80	65	47	31	78	--	35	5	263	5	
Jane Doe	95	75	35	25	60	--	45	0	275	1	
Roy James	63	50	43	43	86	--	45	3	247	7	
Total	324.0	250.0	--	--	268	--	170	13			
Team Avg.	81.0	62.5	--	--	67	40	42.5	3.25			
Team											3
Total	296.25										
Alternates											
Pat Ray	80	60	31	201	51	--	45	5	241	8	
Jim Jones	65	45	27	18	45	--	50	0	205	20	

B. Mixed three and four individual teams (if teams with three individuals attend).

Super University	ID	Crop/Weed Response	Events								Team Placing
			Field Problem			Calibration					
			1	2	Avg.	Team	Ind.	Myst.	Score	Ind.	
John Doe	--	--	--	--	--	--	--	--	240	9	
Bill Smith	80	65	47	31	78	--	35	5	263	5	
Jane Doe	95	75	35	25	60	--	45	0	275	1	
Roy James	63	50	43	43	86	--	45	3	247	7	
Total	238.0	190.0	--	--	224	--	125	8			
Team Avg.	79.33	63.33	--	--	74.6	40	41.67	2.67			
Team											3
Total	301.67										
Alternates											
Pat Ray	80	60	31	20	51	--	45	5	241	8	
Jim Jones	65	45	27	18	45	--	50	0	205	20	

Alternates and low individuals of four member teams will not be scored as part of a team, but can win individual prizes.

### **Contest Committee:**

All coaches and individuals within academia, research, and industry, as well as potential contest hosts are invited to serve on the committee. On the morning of the contest, prior to contestants entering the events, individuals from the host location and all committee members will review each event and last minute corrections will be made and be the authority for all questions relating to the contest. If questions arise that cannot be resolved through interpretation of the standing rules or cannot be resolved through communication with the committee chairman or members of the committee, the contest host has the authority to make the final decision in the best interest of the contest.

### **Expenses:**

Each university will provide its own transportation to and from the contest and cover all expenses incurred during travel. The host will provide meals the evening before and the day of the contest. The weed contest committee will provide the prize money and the plaques.

### **Location:**

The Southern Weed Contest will be held at any facility within the Southern Weed Science Region with the capability of providing all the designated events.

### **Dishonesty:**

All coaches are charged with ensuring that teams abide by rules of the contest, and that no team gains an unfair advantage. This includes, but is not limited to, cheating. Cheating is defined as a dishonest violation of rules as determined by the coaches attending the contest. A committee made up of all coaches attending the contest will deal with acts related to cheating. A team and/or individual that does not abide by the rules of the contest will be disqualified and will automatically receive last place at the contest. Teams are not allowed to visit contest site 30 days prior to contest without permission of host. **All contestants' cell phones, iPad's, or computers will be collected by team coaches and bagged by individual name when arriving at the contest site on the morning of the event.**

**Table 1. 2022 SWSS WEED CONTEST WEED LIST**

<b>Common name</b>	<b>Genus</b>	<b>Species</b>
velvetleaf	<i>Abutilon</i>	<i>theophrasti</i>
hophornbeam copperleaf	<i>Acalypha</i>	<i>ostryifolia</i>
northern jointvetch	<i>Aeschynomene</i>	<i>virginica</i>
<b>alligatorweed</b>	<b><i>Alternanthera</i></b>	<b><i>philoxeroides</i></b>
Palmer amaranth	<i>Amaranthus</i>	<i>palmeri</i>
<b>redroot pigweed</b>	<b><i>Amaranthus</i></b>	<b><i>retroflexus</i></b>
<b>spiny amaranth</b>	<b><i>Amaranthus</i></b>	<b><i>spinousus</i></b>
<b>tall waterhemp</b>	<b><i>Amaranthus</i></b>	<b><i>tuberculatus</i></b>
common ragweed	<i>Ambrosia</i>	<i>artemisiifolia</i>
giant ragweed	<i>Ambrosia</i>	<i>trifida</i>
purple ammannia	<i>Ammannia</i>	<i>robusta</i>
broomsedge	<i>Andropogon</i>	<i>virginicus</i>
trumpetcreeper	<i>Campsis</i>	<i>radicans</i>
musk thistle	<i>Carduus</i>	<i>nutans</i>
smellmelon	<i>Cucumis</i>	<i>melo</i>
southern sandbur	<i>Cenchrus</i>	<i>echinatus</i>
ground spurge	<i>Chamaesyce</i>	<i>humistrata</i>
spotted spurge	<i>Chamaesyce</i>	<i>maculata</i>
common lambsquarters	<i>Chenopodium</i>	<i>album</i>
bull thistle	<i>Cirsium</i>	<i>vulgare</i>
Benghal dayflower	<i>Commelina</i>	<i>benghalensis</i>
spreading dayflower	<i>Commelina</i>	<i>diffusa</i>
field bindweed	<i>Convolvulus</i>	<i>arvensis</i>
horseweed	<i>Conyza</i>	<i>canadensis</i>
showy crotalaria	<i>Crotalaria</i>	<i>spectabilis</i>
woolly croton	<i>Croton</i>	<i>capitatus</i>
tropic croton	<i>Croton</i>	<i>glandulosus</i> var. <i>septentrionalis</i>
bermudagrass	<i>Cynodon</i>	<i>dactylon</i>
yellow nutsedge	<i>Cyperus</i>	<i>esculentus</i>
purple nutsedge	<i>Cyperus</i>	<i>rotundus</i>
rice flatsedge	<i>Cyperus</i>	<i>iria</i>
crowfootgrass	<i>Dactyloctenium</i>	<i>aegyptium</i>
jimsonweed	<i>Datura</i>	<i>stramonium</i>

Florida beggarweed	<i>Desmodium</i>	<i>tortuosum</i>
<b>smooth crabgrass</b>	<b><i>Digitaria</i></b>	<b><i>ischaemum</i></b>
large crabgrass	<i>Digitaria</i>	<i>sanguinalis</i>
Virginia buttonweed	<i>Diodia</i>	<i>virginiana</i>
junglerice	<i>Echinochloa</i>	<i>colona</i>
barnyardgrass	<i>Echinochloa</i>	<i>crus-galli</i>
eclipta	<i>Eclipta</i>	<i>prostrata</i>
goosegrass	<i>Eleusine</i>	<i>indica</i>
southwestern cupgrass	<i>Eriochloa</i>	<i>acuminata</i>
wild poinsettia	<i>Euphorbia</i>	<i>heterophylla</i>
Carolina geranium	<i>Geranium</i>	<i>carolinianum</i>
ground ivy	<i>Glechoma</i>	<i>hederacea</i>
common sunflower	<i>Helianthus</i>	<i>annuus</i>
<b>ducksalad</b>	<b><i>Heteranthera</i></b>	<b><i>limosa</i></b>
<b>hydrilla</b>	<b><i>Hydrilla</i></b>	<b><i>verticillata</i></b>
cogongrass	<i>Imperata</i>	<i>cylindrica</i>
red morningglory	<i>Ipomoea</i>	<i>coccinea</i>
ivyleaf morningglory	<i>Ipomoea</i>	<i>hederacea</i>
pitted morningglory	<i>Ipomoea</i>	<i>lacunosa</i>
bigroot morningglory	<i>Ipomoea</i>	<i>pandurata</i>
tall morningglory	<i>Ipomoea</i>	<i>purpurea</i>
palmleaf morningglory	<i>Ipomoea</i>	<i>wrightii</i>
smallflower morningglory	<i>Jacquemontia</i>	<i>tamifolia</i>
<b>green kyllinga</b>	<b><i>Kyllinga</i></b>	<b><i>brevifolia</i></b>
henbit	<i>Lamium</i>	<i>amplexicaule</i>
Amazon sprangletop	<i>Leptochloa</i>	<i>panicoides</i>
bearded sprangletop	<i>Leptochloa</i>	<i>fusca var. fascicularis</i>
tall fescue	<i>Lolium</i>	<i>arundinaceum</i>
Italian ryegrass	<i>Lolium</i>	<i>perenne ssp. multiflorum</i>
carpetweed	<i>Mollugo</i>	<i>verticillata</i>
cutleaf evening-primrose	<i>Oenothera</i>	<i>laciniata</i>
red rice	<i>Oryza</i>	<i>sativa</i>
yellow woodsorrel	<i>Oxalis</i>	<i>stricta</i>
fall panicum	<i>Panicum</i>	<i>dichotomiflorum</i>
torpedograss	<i>Panicum</i>	<i>repens</i>

dallisgrass	<i>Paspalum</i>	<i>dilatatum</i>
cutleaf groundcherry	<i>Physalis</i>	<i>angulata</i>
clammy groundcherry	<i>Physalis</i>	<i>heterophylla</i>
buckhorn plantain	<i>Plantago</i>	<i>lanceolata</i>
annual bluegrass	<i>Poa</i>	<i>annua</i>
prostrate knotweed	<i>Polygonum</i>	<i>aviculare</i>
Pennsylvania smartweed	<i>Polygonum</i>	<i>pensylvanica</i>
ladysthumb	<i>Polygonum</i>	<i>persicaria</i>
common purslane	<i>Portulaca</i>	<i>oleracea</i>
wild radish	<i>Raphanus</i>	<i>raphanistrum</i>
Florida pusley	<i>Richardia</i>	<i>scabra</i>
curly dock	<i>Rumex</i>	<i>crispus</i>
sicklepod	<i>Senna</i>	<i>obtusifolia</i>
coffee senna	<i>Senna</i>	<i>occidentalis</i>
hemp sesbania	<i>Sesbania</i>	<i>herbacea</i>
giant foxtail	<i>Setaria</i>	<i>faberi</i>
yellow foxtail	<i>Setaria</i>	<i>pumila</i>
green foxtail	<i>Setaria</i>	<i>viridis</i>
arrowleaf sida	<i>Sida</i>	<i>rhombifolia</i>
prickly sida	<i>Sida</i>	<i>spinosa</i>
horsenettle	<i>Solanum</i>	<i>carolinense</i>
silverleaf nightshade	<i>Solanum</i>	<i>elaeagnifolium</i>
eastern black nightshade	<i>Solanum</i>	<i>ptychanthum</i>
lawn burweed	<i>Soliva</i>	<i>sessilis</i>
johnsongrass	<i>Sorghum</i>	<i>halepense</i>
common chickweed	<i>Stellaria</i>	<i>media</i>
dandelion	<i>Taraxacum</i>	<i>officinale</i>
puncturevine	<i>Tribulus</i>	<i>terrestris</i>
broadleaf signalgrass	<i>Urochloa</i>	<i>platyphylla</i>
Texas millet	<i>Urochloa</i>	<i>texana</i>
common cocklebur	<i>Xanthium</i>	<i>strumarium</i>

\* **Bold -- plants only**

**Table 2. 2022 SOUTHERN WEED CONTEST CROP  
AND WEED RESPONSE TO HERBICIDES**

Crops*		Weeds	
1. cotton	6. southern pea	1. broadleaf signalgrass	7. Palmer amaranth
2. field corn	7. soybean	2. ivyleaf morningglory	8. pitted morningglory
3. grain sorghum	8. sunflower	3. fall panicum	9. prickly sida
4. peanut	9. sesame	4. hemp sesbania	10. seedling johnsongrass
5. rice	10. canola	5. large crabgrass	11. velvetleaf
		6. barnyardgrass	12. sicklepod

\*At least 6 crops and 6 weeds must be included

Potential Herbicide Families and Herbicides	
<b>Amide</b> 1. propanil (4.0 lb ai/A POST)	<b>Isoxazoline</b> 12. pyroxasulfone (0.106 lb ai/A PRE)
<b>Sulfonanilide</b> 2. diclosulam (0.0236 lb ai/A PRE)	<b>Phenoxy</b> 13. 2,4-D (0.5 lb ae/A POST)
<b>Benzoic acid</b> 3. dicamba (0.25 lb ai/A POST)	<b>N-Phenylphthalimide</b> 14. flumioxazin (0.064 lb ai/A PRE)
<b>Bipyridylum</b> 4. paraquat (0.5 lb ai/A POST) + NIS	<b>Phosphinic acid</b> 15. glufosinate (0.54 lb ai/A POST) + NIS
<b>Chloroacetamide</b> 5. acetochlor (1.75 lb ai/A PRE)	<b>Pyrimidinedione</b> 16. saflufenacil (0.0223 lb ai/A POST) + MSO
<b>Arloxyphenoxypropionate</b> 6. quizalofop-P (0.085 lb ai/A POST) + COC	<b>Quinoline carboxylic acid</b> 17. quinclorac (0.375 lb ae/A POST) + MSO
<b>Dinitroaniline</b> 7. pendimethalin (1.0 lb ai/A PRE)	<b>Substituted urea</b> 18. diuron (0.5 lb ai/A POST) + COC 19. fluometuron (1.0 lb ai/A PRE)
<b>Diphenylether</b> 8. fomesafen (0.25 lb ai/A POST) + COC	<b>Sulfonylurea</b> 20. chlorimuron (0.0104 lb ai/A POST) + NIS 21. trifloxysulfuron (0.007 lb ai/A POST) + NIS
<b>Glycine</b> 9. glyphosate (0.77 lb ae/A POST) + NIS	<b>Triazine</b> 22. atrazine (1.5 lb ai/A PRE) 23. metribuzin (0.375 lb ai/A PRE)
<b>Imidazolinone</b> 10. imazethapyr (0.063 lb ai/A POST) + NIS	<b>Triazolinones</b> 24. carfentrazone (0.023 lb ai/A POST) + COC
<b>Isoxazolidinone</b> 11. clomazone (0.375 lb ai/A PRE)	<b>Pyrazole</b> 26. topramezone (0.022 lb ai/A POST) + MSO

\*\*COC = crop oil concentrate at 1% (v/v); NIS = nonionic surfactant at 0.25% (v/v); MSO = methylated seed oil at 1% v/v. Some herbicide formulations may include an adjuvant system and do not require additional adjuvants. Label rates should be followed and adjusted based on soil type. The soil types will range from a silt loam to sandy loam (<2% O.M., pH of 5.5-7).

## PROBLEM SOLVING AND RECOMMENDATIONS

### **Potential Crops (6):**

Cotton, Field corn,  
Grain sorghum, Soybean,  
Peanut, and Rice

### **Weeds:**

Any weed from the 2022 weed identification list.

### **Herbicides:**

Any herbicide labeled in the crops listed above.

### **Scoring:**

The 'farmer' and a judge will independently score each contestant from predetermined scoring sheet.

### **Role:**

Each contestant will be assuming the role of a chemical company representative, independent crop consultant, or state extension specialist.