



PEST MANAGEMENT & CROP DEVELOPMENT

BULLETIN

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Executive editor: Kevin Steffey,
Extension Entomologist

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For subscription information, phone
217.244.5166, or e-mail
acesnews@uiuc.edu

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Welcome to the First 1999 Issue of the *Bulletin*

The weather has warmed up recently, and most of us in agriculture are excited about the forthcoming growing season. Who knows what this year will bring? Whatever happens, it's bound to be different!

As usual, those of us who write articles for this *Bulletin* intend to keep you up to date with insect, weed, and plant disease problems as they develop and to offer objective suggestions for managing those problems, both before and after they occur. Our overriding goal is to give you the best information possible to allow you to make informed decisions for yourselves and your customers. Using our own observations and reports we receive, we try to be as current as possible about pest problems and crop conditions. Therefore, we rely on your input, and we invite your comments. Please don't hesitate to contact us if you observe something you think others might benefit from knowing.

On behalf of all authors who contribute to this *Bulletin*, I thank you for your continued support of our efforts and wish you a successful year. We look forward to interacting with you and offering the best advice we can muster.—KS

The *Bulletin* on the Web in 1999

The Web version of the *Bulletin* is changing this year. As a result of a grant we received from the Illinois Council on Food and Agricultural Research (C-FAR), we are able to provide the Web version of the *Bulletin* free of charge in 1999 and 2000. By 2001 we hope that our cost-recovery system will allow us to continue to provide the electronic version of the *Bulletin* for free.

Printing the Web Version. First, allow me to clear up some confusion about printing the *Bulletin* from the Web. When you arrive at the home page of the *Bulletin* (<http://www.ag.uiuc.edu/cespubs/pest/>), clicking on "Enter" takes you to the most recently published issue. Because each article is placed in a different file, you can click to open any article you wish to read. However, if you print the article from the Web, it will not look like the article as it appears in the printed version of the *Bulletin*. If you wish to print the entire *Bulletin* to look just like the version we send through the mail, follow these simple steps. On the "front page" of any issue, you can click on "Download print-ready PDF", which allows you to open the file on-line or save it to disk. If you do not have the appropriate reader, you can click on "Download free PDF Reader" to download the Adobe® Acrobat® Reader. After you obtain the PDF version of the *Bulletin*, you can print it whenever you wish. Print it on colored paper if you want to be artistic!

Improved Searching. We will be cleaning up the index so that searching for articles by topic will be easier. All authors will submit key words for each article to ensure that you can find what you are seeking. This activity also will clean up our archives so that you can search back issues (1997 and 1998) more easily.

Updates. Last year we intended to initiate an “update” section, but we never accomplished the task. However, you can expect it this year. The articles we write are due in the editor’s office by Wednesday so that the *Bulletin* can be prepared and mailed by Friday morning. However, we frequently observe or hear about pest problems after the articles have been submitted. The “update” section will allow authors to provide additional information on the Web instead of waiting an entire week to get the word to you, enabling us to be even more timely with our information. Look for a special icon on the home page to find out if an “update” section has been attached to the most current issue of the *Bulletin*.

Other Enhancements. Look for more photographs, full-motion video, and audio clips to enhance the written information. We also will provide links to other Web-based information (for example, other states’ newsletters and other IPM-related information) that might provide more insight about a particular subject.

All we ask in return is that you remain patient with us. The *Bulletin* will be “under construction” all year, so we are bound to experience some glitches. Nevertheless, we invite your input and request feedback on the changes we make this year. Happy surfing to those of you who intend to plug in this year!—KS

INSECTS

New Insecticides Registered for Use in Field Crops

The pyrethroid insecticide Capture 2EC, manufactured by FMC Corporation, recently was registered for use on field corn (grain and silage), popcorn, and field corn grown for seed. Capture 2EC may be applied at 2.1 to 6.4 fl oz per acre (0.033 to 0.10 lb a.i./A) for control of corn earworms, corn rootworm adults, European corn borers, and southwestern corn borers in Illinois. Applied at 5.12 to 6.4 fl oz per acre (0.08 to 0.10 lb a.i./A), Capture 2EC will control spider mites. We will offer interpretations of efficacy data after we

have had an opportunity to review the results from research trials. Under “Restrictions—Corn” on the label, you will find the following statements:

Do not apply more than 0.2 pound active per acre per season.

Do not apply within 30 days of harvest.

Do not graze livestock in treated areas or cut treated crops for feed within 30 days of the last application.

Use of ultra low volume (ULV) application on corn is prohibited.

Do not make aerial or ground applications to corn if heavy rainfall is imminent.

A new *Bt*-based insecticide, Lepinox WDG, also has been registered for use on many different crops. Lepinox is manufactured by Ecogen, Inc., and will be distributed by FMC Corporation. It is labeled for control of several caterpillar pests in alfalfa, canola, corn, small grains (barley, oats, rye, and wheat), sorghum, and soybeans in Illinois. Refer to the label for rates of application and for mixing and application instructions.—KS

Resistance Management Update for *Bt*-Corn

Many of you probably are aware that the National Corn Growers Association (NCGA) and companies registering and selling most of the *Bt*-corn hybrids reached an agreement-in-principle this past January; the agreement takes effect in the year 2000. The key elements of the agreement regarding insect resistance management strategies are as follows:

- A single protective and practical corn refuge requirement for the primary corn-growing region (20%) and a single corn refuge requirement for the primary cotton-growing region (50%)
- A clear and consistent insect resistance management grower agreement
- Effective grower education programs
- Appropriate surveys to track grower adoption

- Continued monitoring for insect susceptibility to *Bt*

The objective of the agreement was to present a consistent, unified message about resistance management so that growers can implement practical strategies to preserve the technology.

In general, university and USDA entomologists applaud the agreement. However, some differences in recommendations about percentage non-*Bt*-corn refuge still exist among university and industry scientists. The North Central Regional Research Committee on Ecology and Management of European Corn Borer and Other Stalk-Boring Lepidoptera (the NC-205 Committee) recommends that if a grower wants to treat a non-*Bt*-corn refuge with conventional insecticides to control corn borers, the refuge must comprise 40% of his or her corn acres. However, neither industry scientists nor the NCGA has indicated that a non-*Bt*-corn refuge needs to comprise more than 20% of the corn acres. Therefore, a discrepancy still exists. When more information about size and configuration of non-*Bt*-corn refuges is generated, we will provide the information and offer our insight. In the meantime, we strongly encourage growers who plant *Bt*-corn to plant a non-*Bt*-corn refuge, minimum of 25%, treated or not. Implementation of resistance management strategies is essential for preservation of this excellent tool for managing corn borers.—KS

1999 Outlook for Western Corn Rootworm Injury in First-Year Corn

Western corn rootworms got off to a poor start last year due to the exceptionally wet spring. Saturated soils in late May and early June coincided with egg hatch. First-instar corn rootworm larvae maneuver poorly through wet soils and have difficulty finding corn roots to begin feeding on. Egg hatches in 1995 and 1997 were delayed considerably, with the bulk of the eggs hatching in mid-June. Egg hatch in 1998 was more “typical,” occurring in early June. Sweep-net surveys verified the decline in corn rootworm survival. Densities of adult western corn

rootworms were reduced by approximately 90% from 1998. So what's the outlook for the 1999 growing season?

Last year, many producers throughout east central Illinois and northern Indiana used Pherocon AM traps to monitor densities of western corn rootworm adults in their soybean fields. Based on research conducted by a graduate student, Matthew O'Neal, we have suggested that an average capture of two beetles per trap per day (in soybeans; 12 Pherocon AM traps, 4-week monitoring period) can result in an average root rating of 3.0 (Iowa State 1-to-6 root-rating scale). A root rating of 3.0 indicates that some pruning (never a complete node) has occurred on a root system. Recent long-term experiments suggest that root injury below a 3.0 can result in economic losses in certain years for some hybrids. If seven beetles per trap per day are captured with Pherocon AM traps in soybean fields, an average root-injury rating of 4.0 (one node of roots pruned severely) may occur the following season in first-year corn. A root rating of 4.0 suggests that a plant may be very susceptible to lodging. Fields that are lodged severely may suffer significant yield losses. For more complete information on western corn rootworm scouting procedures in soybean fields and calculating economic thresholds, consult the following web site: <http://www.aces.uiuc.edu/ipm/field/corn/insect/wcr.html>. If you would like to report your beetle capture information this season to University of Illinois Extension, please use this web site: <http://www.aces.uiuc.edu/ipm/field/corn/imr/wcrscout/wcrscout.html>. Thanks to the cooperation of producers last year, who reported electronically their trapping data to Sue Ratcliffe, we can provide county averages for adult western corn rootworms captured in soybean fields with Pherocon AM traps (Table 1).

Even though adult western corn rootworm populations in 1998 were less than last year's, the averages in Table 1 suggest that many first-year cornfields will be susceptible to economic densities of corn rootworm larvae this spring. Note the large number of cooperators in some areas, particularly Livingston (14) and

Table 1. County trap-capture averages for western corn rootworm adults 1998 (using Pherocon AM traps).

County	Trap Capture Average (12 Pherocon AM traps)	Number of Producers' Fields
Champaign	2.9	1
Coles	0.1	2
DeWitt	1.5	11
Douglas	1.4	3
Edgar	1.8	2
Ford	2.0	3
Grundy	2.5	1
Iroquois	6.4	2
LaSalle	2.5	2
Livingston	3.9	14
Logan	0.1	1
McLean	2.7	41
Piatt	13.5	3
Vermilion	0.5	1
Woodford	1.1	3

McLean (41) counties. Trap averages for Livingston and McLean were 3.9 and 2.7 beetles per trap per day, respectively. These averages suggest that if first-year cornfields were left untreated in 1999, average root injury would likely be well above 3.0. Although westward expansion of this new western corn rootworm strain was not dramatic last year, note that western corn rootworm adults were captured in DeWitt, Piatt, and Woodford counties. The average for Piatt County is quite impressive; however, only three cooperators used 12 Pherocon AM traps for the purposes of our calculation.

Many cooperators last season used fewer than 12 Pherocon AM traps in counties outside the so-called "epicenter" of east central Illinois. In addition, some producers used traps other than Pherocon AM traps. Using fewer than 12 traps makes good sense in counties in which the first-year corn problem has not yet surfaced. However, using traps other than the Pherocon AM trap results in captures that we cannot interpret. Our economic threshold is based on the use of Pherocon AM traps only. Figure 1 (see page 7) depicts trap-capture averages for 1998. Please note that asterisks mark counties in which fewer than 12 Pherocon AM traps were used in soybean fields. This map reveals that the likelihood for severe

first-year corn rootworm injury is still most acute in east central Illinois counties. However, western corn rootworm adults are beginning to "show up" in soybean fields further to the west.

For 1999 the use of a soil insecticide in first-year cornfields will continue to make good sense throughout much of east central Illinois. Densities of western corn rootworm adults vary considerably from field to field, and the importance of monitoring individual soybean fields with Pherocon AM traps cannot be overemphasized. If you did not monitor your east central Illinois soybean field last season for western corn rootworm adults, then using a soil insecticide at planting is your only responsible option. Producers in east central Illinois are encouraged to use 12 Pherocon AM traps this season in their soybean fields. Producers in Coles, Logan, Macon, Marshall, Moultrie, Peoria, Putnam, and Woodford counties are encouraged to use at least four Pherocon AM traps in their soybean fields this season.

If you are interested in monitoring your soybean fields this season, we offer the following two addresses. Note that there are probably many other sources for these traps; we encourage you to do some comparison shopping.

IPM Great Lakes, 10220 Church Road, NE, Vestaburg, MI 48891 (email: glipm@nethawk.com)

Gemplers, 100 Countryside Drive, PO Box 270, Belleville, WI 53508 (http://www.gemplers.com)

We will continue to provide updates on this continuing problem throughout the growing season. Stay tuned.—MG

PLANT DISEASES

Winter Wheat Disease Update

Several calls have come in from around the state concerning leaf symptoms on the wheat crop. Most are reporting that reddish to purple leaves, as well as leaf dieback, are showing up in patches in wheat fields. Varietal characteristics, nutrient imbalances, or viral diseases (which are very common this time of the year) can cause leaf discoloration. The most common viral diseases early in the spring are barley yellow dwarf virus (BYDV) and soilborne wheat mosaic virus (SBWMV); both can cause damage to plants. BYDV is the most damaging virus in Illinois.

Barley Yellow Dwarf Virus. Aphids carrying the virus spread BYDV disease by transmitting the virus to wheat plants through their saliva when they feed. The most serious yield loss results from fall infection by viruliferous aphids feeding on wheat seedlings. Fall infections typically result in stunted plants and fewer tillers when spring growth resumes. Leaf discoloration is usually the most notable early season symptom. Leaves may be various shades of red to purple or pinkish-yellow to brown. As an infected plant continues to grow, older leaves typically begin to die back from the tip and may feel somewhat leathery, while the new leaves begin to discolor. Spring infections occur as well, but these commonly discolor only the flag leaf and do not cause significant yield reductions.

Soilborne Wheat Mosaic Virus. The disease caused by SBWMV is usually one of the first plant diseases reported in the

spring. An unusual aspect of this disease is its mode of transmission to wheat plants: The virus is transmitted to the plant by a soilborne fungus. When the fungus enters wheat roots, it transmits the virus. The fungus is a water mold and favors low, wet areas of the field, and this is usually where the disease is first seen.

Plants infected with SBWMV can show two types of symptoms. The first is leaf mottling, which appears as a light green and light yellow mosaic on the leaves. The mottling will be seen only very early in the season. The second symptom is stunting to the point where the wheat plant looks like a rosette when growth begins in the spring. Under good growing conditions the infected plants may recover somewhat. SBWMV is not commonly a yield-reducing disease because higher spring temperatures inactivate the virus, and then symptoms do not appear on new leaves. Yield reductions with SBWMV are uncommon except where extremely susceptible plants are present. Most wheat varieties are resistant to this pathogen, although that can vary.

Life cycle. Viral diseases of wheat usually produce symptoms in newer growth. Viruses typically cause stunting of plants as well as a discoloration of leaves, with the most common color being either red or yellow. With some viruses, streaking of the leaves or a mosaic pattern also can be seen.

Viruses are unusual pathogens because they do not require a food source and lack the typical physiological processes associated with other biotic pathogens. Viruses are vectored to plant cells, release their genetic material, and cause the plant cell to replicate more copies of the virus. Most viruses consist of only genetic material and a protective protein outer coat. Once inside plant cells, the virus sheds the protein coat, and the genetic material begins replicating the virus. The simplicity of this system makes it difficult for plant pathologists to devise successful control strategies.

Management. The most common method of virus management is to plant resistant wheat varieties. These varieties do not

allow virus replication to occur, and the infection is stopped early. Other control measures are directed at reducing the time the plants are in the field when vectors are active—thus the recommendation to plant after the fly-free date, when insect activity is reduced. Systemic insecticide seed treatments have also shown some success.

Diagnosis. So which virus is in the field? First rule out any other problem that may have caused the symptoms, such as winterkill, nutrient imbalances, or herbicide carryover. This is an important step; the samples that have been sent in so far this season have been negative for BYDV. Next find out what virus resistance the variety is supposed to exhibit. There is good resistance to SBWMV in most of our varieties, whereas good resistance to BYDV is lacking.

If those things don't help, then the pattern may help you decide. BYDV usually shows up first in a typical insect-type pattern. Infected patches occur randomly in the field or are associated with areas where viruliferous aphids may have been feeding, such as grassy areas on field edges. In addition, BYDV infection is completely dependent on aphid movement, and symptoms can continue to spread throughout the season. SBWMV, on the other hand, will most typically be associated only with low, wet areas of a field, and symptoms will not continue to spread throughout the season.

The Plant Clinic at the University of Illinois can make only a visual estimation of the presence of a virus in a wheat plant. We cannot tell you which virus is actually present based on the visible symptoms. To have a virus identified, it is necessary to send it to a lab for serological testing. The cost of this procedure is \$25 per specimen if you desire to know exactly which virus is present; please indicate this on any specimen forms sent to the clinic. Note that fresh plant material is needed for serological analysis because the tests use fresh plant sap.—SB

WEEDS

New Corn Herbicides for 1999

Several new corn herbicides will be available for the 1999 growing season. Some are new active ingredients not previously available, while others are premixes of older products. Note that this article is a short summary of new additions to the market, not an exhaustive description of each product. Be sure to read and follow label directions for any pesticide.

Aim 40WDG (carfentrazone) is a post-emergence herbicide manufactured and marketed by FMC. It belongs to the same chemical and mode-of-action families as Authority (sulfentrazone), which is used preemergence in soybean. Aim may be applied at 0.33 ounce per acre until corn reaches the 8-collar leaf stage. Several other herbicides may be tank-mixed with Aim to broaden the weed control spectrum; however, the label indicates that Aim should not be tank-mixed with emulsified concentrate (EC) formulations, as this increases the probability of corn injury. Applications should include a non-ionic surfactant (NIS) at 0.25% v/v, but not crop oil concentrate (COC) unless under very dry soil moisture conditions. Labeled weeds include 1- to 4-inch nightshade, lambsquarters, and redroot pigweed; 2- to 3-leaf pitted and ivyleaf morningglory; and up to 36-inch velvetleaf. With the limited weed control spectrum, it is likely that Aim will be utilized primarily as a tank-mix component with other postemergence corn herbicides. Corn injury, primarily leaf chlorosis and necrosis, has been observed with this herbicide in research plots.

Axiom 68DF (flufenacet + metribuzin) received a label during the 1998 season, but too late to facilitate much utilization. Axiom may be applied preplant (up to 45 days prior to planting in conservation tillage systems), preplant incorporated, or preemergence for control of certain annual grass and broadleaf weed species. Rates range from 13 to 23 ounces per acre depending on soil type, organic matter, and tillage. Axiom may be tank-mixed with several other soil-applied herbicides

and may also be used in soybean. However, application rates range from 7 to 13 ounces per acre for soybean production systems.

Balance 75WDG (isoxaflutole) represents a new herbicide mode of action for use in corn. Balance inhibits an enzyme site in a pigment-synthesis pathway, which results in affected plants appearing white in color. This symptomology is similar to that of Command. Balance may be applied preplant (up to 14 days prior to planting conventional corn hybrids or 30 days prior to planting Roundup Ready or Liberty Link hybrids where a sequential postemergence application of glyphosate or glufosinate is planned), preplant incorporated, or preemergence for control of certain annual grass and broadleaf weed species. Application rates range from 1 to 3 ounces per acre and are determined by soil type, tillage system, and application timing. Balance should not be applied on sand, sandy loam, or loamy sand soils if the water table is less than 25 feet below ground surface. *Plant corn at least 1.5 inches deep, and be certain the seed is completely covered.* Do not apply Balance after corn emergence, or severe corn injury may result. Balance provides good control of several broadleaf and grass species (including woolly cupgrass) but is weak on cocklebur, morningglory, giant ragweed, yellow foxtail, crabgrass, and sandbur. Tank-mixing Balance with other herbicides can broaden the grass and broadleaf control spectrum.

Distinct 70WG (diflufenzopyr + dicamba) is a postemergence herbicide from BASF for control of annual broadleaf weed species and control or suppression of certain perennial broadleaf species. Although this herbicide does not actually control grass weeds, suppression of growth (grass 3 inches or less in height) following application can often be observed on species such as foxtails and fall panicum. The manufacturer has coined the term "herbistatic" to describe the grass activity of Distinct. Distinct may be applied at 6 ounces per acre to corn between 4 and 10 inches in height, and at 4 ounces to corn between 10 and 24 inches. Applications of Distinct should

include an NIS (0.25% v/v) and ammonium nitrogen source (1.25% v/v UAN or 17 pounds AMS per 100 gallons). Distinct is not recommended for use in tank mixes with plant growth regulator herbicides such as those products that contain dicamba, 2,4-D, or clopyralid.

Epic 48WDG (flufenacet + isoxaflutole) contains one active ingredient of Axiom premixed with the active ingredient of Balance. This herbicide may be applied preplant (up to 14 days prior to planting), preplant incorporated, or preemergence at 8 to 20 ounces per acre, depending on soil type and application timing, for control of annual grass and broadleaf weed species. Do not apply Epic after corn emergence, or severe corn injury may result. Because Epic contains the active ingredient of Balance, these products have many similar use restrictions.

Liberty ATZ 4.3L (glufosinate + atrazine) is a premix of Liberty and atrazine for postemergence applications to Liberty Link or GR corn hybrids only. Application rates range from 32 to 40 fluid ounces per acre. Always include AMS (3 pounds per acre) with Liberty ATZ, and make applications to corn up to 12 inches in height. Do not include any NIS or COC. Some limited soil-residual activity from the atrazine component may be expected following application.

NorthStar 51.4WDG (primisulfuron + dicamba) is a premix of Beacon and a dry formulation of Banvel marketed by Novartis. This product will replace herbicides containing prosulfuron (Exceed, Spirit) in areas of Illinois where prosulfuron carryover has occurred. NorthStar may be applied broadcast at 5 ounces per acre when corn is between 4 and 20 inches in height (V2-V6). Directed applications may be made to corn up to 36 inches in height. Although primarily for broadleaf weed control, NorthStar may provide some control or suppression of grass weeds as well. Applications should include NIS or COC (until corn reaches 12 inches in height), and an ammonium nitrogen fertilizer (UAN or AMS) may also be included. The NorthStar label contains several use precautions for appli-

cations to corn previously treated with certain insecticides.

LeadOff 5L (dimethenamid + atrazine) is marketed by DuPont. This formulation is identical to Guardsman.

Bicep Magnum TR 4.59L (metolachlor + atrazine + flumetsulam) has flumetsulam (Python) added to Bicep Magnum for improved control of triazine-resistant weed biotypes.—*AH and MG*

Corn Herbicide Label and Formulation Changes

Dual II Magnum, Bicep II Magnum, and Bicep Lite II Magnum formulations were all available in Illinois during 1998 in somewhat limited quantities. Full conversion to these formulations (replacing Dual II, Bicep II, and Bicep Lite II) will occur this year. “Magnum” formulations contain the resolved isomer of metolachlor; “II” indicates that the formula

tion contains the corn safener benoxacor. Rate conversion factors are $0.67x$ for Dual II to Dual II Magnum, $0.90x$ for Bicep II to Bicep II Magnum, and $0.66x$ for Bicep Lite II to Bicep Lite II Magnum, where x is the rate of the old formulation.

Frontier X2 contains the active isomer of dimethenamid. Very limited quantities will be in Illinois for the 1999 field season, but full conversion to the resolved isomer formulation should begin to take place during the 2000 field season. Frontier X2 will be used at 55% of the Frontier use rate.

Cyanazine (Bladex, a component of Extrazine II) is still scheduled to be phased out of the market. The original rate structure set for the 1999 season was to be 1 lb a.i. per acre. However, the EPA has approved labels of Bladex and Extrazine II herbicides *for the 1999 season only to be*

used at 3 lb a.i. cyanazine per acre, the same maximum allowable rate of these products that was permitted in 1998. Thus the maximum allowable per-acre application rates of cyanazine-containing products are 3 qt Bladex 4L, 3.3 lb Bladex 90DF, 4 qt Extrazine II 4L, and 4.4 lb Extrazine II 90DF.

Clarity (dicamba) may now be used at 0.5 pt per acre in corn 8 to 36 inches tall with directed application. Do not apply Clarity when soybeans are growing nearby if corn is more than 24 inches tall, soybean are more than 10 inches tall, or soybean have begun to bloom. An additional label change now allows the use of Clarity prior to planting soybean. Use rates prior to soybean planting range from 4 to 16 fl oz per acre. Following a Clarity application up to 8 fl oz, a minimum accumulation of 1 in. of precipitation and a waiting interval of 14 days must occur prior to planting. The waiting interval increases to 28 days (and still requires 1 in. of precipitation) for applications of Clarity greater than 8 fl oz.—*MG*

Crop Protection Workshop

You didn't miss the mailing for the Crop Protection Workshop. The workshop has been moved to November of this year.

The 25th Annual Crop Protection Workshop will be held November 9 and 10 at the Clarion Hotel in Champaign. Look for registration and details in an upcoming issue of the bulletin.—*SB*

CORRECTIONS

In the December 25, 1998, issue of the newsletter, the first row of data in Table 1 was incorrectly labeled as AgrEvo 8481. The correct label is Garst 8481.

In the same table, the seventh row was incorrectly labeled as AgrEvo 8366. The correct label is Garst 8366.

Contributing Authors

Suzanne Bissonnette
(bissonnettes@mail.aces.uiuc.edu),
IPM Educator, Champaign Extension
Center, (217)333-4901

Mike Gray (m-gray4@uiuc.edu),
Extension Entomology, (217) 333-6652

Aaron Hager (hager@uiuc.edu),
Extension Weed Science, (217)333-4424

Marshal McGlamery
(mcglamerym@ces.aces.uiuc.edu),
Extension Weed Science, (217)333-4424

Kevin Steffey (ksteffey@uiuc.edu),
Extension Entomology, (217)333-6652

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