Videos of Short Courses Are Accessible on the Web

On February 28 and March 6, 2007, entomologists from several states delivered short courses via distance education technology. The course on February 28 focused on western bean cutworms, and the one on March 6 focused on biological control of soybean aphids. Both courses were recorded, and the resulting videos, which synchronize the audio files with the PowerPoint presentations, can be accessed at the North Central IPM Center Web site.

The “Western Bean Cutworm Short Course” videos are available at www.ncipmc.org/teleconference/wbc2007/videos, with presentations by Eileen Cullen (University of Wisconsin), Gary Hein (University of Nebraska), Marlin Rice (Iowa State University), and Kevin Steffey (University of Illinois) on these topics:

• Review of the situation (Iowa, Illinois, Wisconsin)
• History and biology of the western bean cutworm
• Economic impact of the western bean cutworm
• Look-alikes—moths and larvae
• Managing western bean cutworms

The videos for “Managing Soybean Aphids in 2007: How Will Biological Control Contribute?” can be accessed at www.ncipmc.org/teleconference/soybean2007/videos. Entomologists from eight states made presentations on these topics:

• History and biology of the soybean aphid (David Voegtlin, Illinois Natural History Survey)
• Review of the situation with soybean aphids in the Midwest (David Ragsdale, University of Minnesota)
• What is biological control, and what do we have to work with in the Midwest? (Bob O’Neil, Purdue University)
• Predators, parasitoids, and pathogens (Kelley Tilmom, South Dakota State University)
• Practices to conserve and use natural enemies (Matt O’Neal, Iowa State University)
• Introducing new natural enemies into the U.S. (Bob O’Neil)
• Foreign exploration (Kim Hoelmer, USDA-ARS, Newark, Delaware)
• Host specificity testing (George Heimpel, University of Minnesota)
• Studies with nontarget aphids (Cory Straub, University of Wisconsin)
• Management guidelines and potential for biological control (Chris DiFonzo, Michigan State University, and Marlin Rice, Iowa State University)
INSECTS

Armyworm and Black Cutworm Moths Are Being Trapped Throughout the State

Captures of both armyworm and black cutworm moths picked up where they left off before the cold weather we experienced in early April. Weather fronts and prevailing winds have directed both species our way, and their captures over time and compared with previous years’ captures are worth noting.

For southern Illinois, the most consistent source for this type of information is “The Hines Report” (www.ipm.uiuc.edu/pubs/hines_report), which is updated weekly. Ron Hines, now a seed agronomist for the southern region for Growmark, continues to work with cooperators at six locations to run a “trap line” from the southern tip of Illinois (Pulaski County) to Fayette County in the I-70 corridor. Ron reported two intense captures of black cutworm moths (nine or more moths captured in one or two nights), one at the Pulaski County site (April 19 and 20) and one at the St. Clair County site (April 18 and 19). Dale Baird, University of Illinois Extension crop systems educator in Rockford, reported an intense capture on April 23 in Lee County in northwestern Illinois.

The black cutworm larvae that derive from these and last week’s intense captures will threaten corn in vulnerable stages during the first two weeks of May. A lot of corn went into the ground over the past week before widespread rains, so those fields should be targeted for scouting first because the seedlings will be at risk. It’s important to note that corn hybrids with Herculex I Insect Protection (with the Cry 1F Bt protein) are labeled for control of black cutworm larvae. These hybrids should effectively control young (first and second) instars before they begin cutting. Cruiser 250 and Poncho 250 also are labeled for control of black cutworms, but past experience and some studies have shown that black cutworms are not controlled very well by either product. We would be interested in receiving any reports of efficacy of these preventive products (Bt corn or seed-applied insecticides), or lack thereof, after cutworm larvae begin their feeding.

Maybe of greater significance are the numbers of armyworm moths being captured at some sites in southern Illinois—Pope, Pulaski, and St. Clair counties. The numbers of moths (270!) captured in the trap in Pope County during the week ending April 24 will make you sit up and take notice. Obviously, wheat and grass pastures will be at risk from the larvae that derive from these flights (refer to related articles in this issue of the Bulletin), so scouting for armyworms and symptoms of their feeding injury by mid-May should be on everyone’s to-do list. No-till cornfields with grassy weeds or previous grass crops also should be scouted for armyworm larvae. The armyworm outbreak in 2001 is still fresh enough in most people’s minds that vigilance should be much improved this year. —Kevin Steffey

Effects of Feeding by Alfalfa Weevil Larvae on Freeze-Damaged Alfalfa and Armyworm Larvae on Freeze-Damaged Wheat

A question posed by an agricultural reporter last week spurred me to share my thoughts on the potential effects of alfalfa weevils and armyworms on freeze-damaged alfalfa and wheat, respectively. The article I wrote in last week’s issue of the Bulletin (No. 4, April 20, 2007) focused primarily on the effects of freezing temperatures on some insects. (By the way, check out the results from Marlin Rice’s experiment regarding freezing temperatures and black cutworm eggs at www.ipm.iastate.edu/ipm/icm/2007/4-16/bcw.html.) However, one wonders what will happen when larvae resume feeding (alfalfa weevils on alfalfa) or
Some People Are Finding Lots of White Grubs

In addition to the report of survival of Japanese beetle grubs in last week’s issue of the Bulletin (no. 4, April 20, 2007), we have received several reports of people turning up lots of white grubs, especially Japanese beetle grubs, during field cultivation in preparation for planting. So what do we do with this type of information? Well, if the grubs being turned up are Japanese beetle grubs, I wouldn’t get terribly concerned. Our experience over the past few years has been that they don’t seem to cause much noticeable injury to corn seedlings, at least not if there is plenty of soil moisture. On the other hand, white grubs with 3-year life cycles (Phyllophaga species) are definite threats to corn seedlings by their feeding on the roots, so the use of a seed- or soil-applied insecticide to control these grubs is warranted.

The type of white grubs being found in fields can be determined by examining the underside of the rear end of the grubs. The pattern of hairs on the raster, the name given to the underside of the last segment of the abdomen, signifies the type of white grub being examined. Japanese beetle grubs have a V-shaped arrangement of hairs, and Phyllophaga grubs a zipperlike arrangement. There is no apparent pattern of hairs on the rasters of Cy clocephala grubs, the masked chafer, which do not cause economic damage to corn roots. Figure 1 compares the rasters of these three types of white grubs. Also, Marlin Rice, extension entomologist at Iowa State University, has published several very good photos of rasters of white grubs in issues of Integrated Crop Management (www.ipm.iastate.edu/ipm/icm) over the years.

As requested for black cutworms and preventive control measures, we would appreciate receiving any reports of efficacy, or lack thereof, of products (especially seed-applied insecticides) used for control of white grubs. There is very little data on efficacy of seed-applied insecticides for control of white grubs in field situations, so we often have to rely on experiences to address concerns or answer questions.—Kevin Steffey

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Mustang Max Labeled for Control of Armyworms in Pastures

FMC has notified us that Mustang Max now is labeled for use on mix-stand alfalfa and grasses. The latter labeling will come in handy if armyworms threaten pastures like they did in 2001. The labeled rates of application for Mustang Max for control of armyworms feeding on “grass forage, fodder, and hay group and grass grown for seed” are 2.8 to 4 oz/A. Please comply with all precautions and restrictions indicated on the label.—Kevin Steffey

UPDATE ON THE OCCURRENCE OF Glyphosate-Resistant WEEDS

Since the commercialization of glyphosate-resistant crops, the question of whether glyphosate-resistant weeds will or will not be selected has been extensively bantered around by individuals involved in virtually every phase of production agriculture. The first contemporary report of glyphosate resistance in a weed species occurred in Australia, where scientists discovered a biotype of rigid ryegrass (Lolium rigidum) that was not controlled by glyphosate. Shortly after this watershed report of glyphosate resistance, another grass species, a biotype of goosegrass (Eleusine indica) in Malaysia, was reported to

Figure 1. Raster patterns of (A) Popillia japonica (Japanese beetle), (B) Cyclocephala (masked chafer), and (C) Phyllophaga ("true" white grubs) grubs.
be glyphosate-resistant. While these initial instances occurred in grass species outside of the United States, it didn’t take long for glyphosate resistance to be discovered in broadleaf species within sovereign borders of this country.

A list of confirmed glyphosate-resistant weeds (as well as cases of resistance to myriad other herbicide families) is maintained by The International Survey of Herbicide Resistant Weeds. According to the organization’s Web site (www.weedscience.org), “The International Survey of Herbicide Resistant Weeds is a collaborative effort between weed scientists in over 80 countries. Our main aim is to maintain scientific accuracy in the reporting of herbicide resistant weeds globally. This collaborative effort is supported and funded by the Herbicide Resistance Action Committee, the North American Herbicide Resistance Action Committee, and the Weed Science Society of America.”

Table 1 provides an updated list of confirmed glyphosate-resistant weeds. The table includes grass and broadleaf species, weeds with an annual or perennial life cycle, and species that occur in the United States and around the globe. Significant progress has been made toward understanding the mechanisms some of these biotypes use to survive glyphosate. A recent article in the journal Weed Technology provided a very good summary of what is currently known about these mechanisms. Table 2 is produced from that article.

As Illinois farmers enter the 2007 growing season, weed scientists continue to stress several significant points related to glyphosate-resistant weeds:

1. A selection pressure for herbicide-resistant weeds occurs each time the same herbicide is applied to a particular field.

2. Increased adoption of glyphosate-resistant corn hybrids, with a concomitant use of glyphosate to the exclusion of other weed management tools, will speed the selection of glyphosate-resistant weeds.

### Table 1. Glyphosate-resistant weeds in the United States and around the world.

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Year identified and location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid ryegrass</td>
<td>Lolium rigidum</td>
<td>1996: Australia (Victoria)</td>
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<tr>
<td></td>
<td></td>
<td>1998: California</td>
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<tr>
<td></td>
<td></td>
<td>2001: South Africa</td>
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<tr>
<td></td>
<td></td>
<td>2005: France</td>
</tr>
<tr>
<td>Goosegrass</td>
<td>Eleusine indica</td>
<td>1997: Malaysia</td>
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<tr>
<td>Horseweed</td>
<td>Conyza canadensis</td>
<td>2000: Delaware</td>
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<tr>
<td>Italian ryegrass</td>
<td>Loliun multiform</td>
<td>2001: Chile</td>
</tr>
<tr>
<td>Hairy fleabane</td>
<td>Conyza bonariensis</td>
<td>2003: South Africa</td>
</tr>
<tr>
<td>Common ragweed</td>
<td>Ambrosia artemisifolia</td>
<td>2004: Missouri, Arkansas</td>
</tr>
<tr>
<td>Palmer amaranth</td>
<td>Amaranthus palmeri</td>
<td>2005: Georgia</td>
</tr>
<tr>
<td>Johnsongrass</td>
<td>Sorghum halepense</td>
<td>2005: Argentina</td>
</tr>
<tr>
<td>Waterhemp</td>
<td>Amaranthus rudis</td>
<td>2005: Missouri</td>
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<tr>
<td>Wild poinsettia</td>
<td>Euphorbia heterophylla</td>
<td>2005: Brazil</td>
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<tr>
<td>Giant ragweed</td>
<td>Ambrosia trifida</td>
<td>2004: Ohio</td>
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<td></td>
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<td>2005: Indiana</td>
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</tbody>
</table>


### Table 2. Glyphosate-resistant weed populations and mechanisms of resistance identified in resistant populations.

<table>
<thead>
<tr>
<th>Weed species</th>
<th>Scientific name</th>
<th>Country</th>
<th>Mechanism of resistance identifieda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common ragweed</td>
<td>Ambrosia artemisifolia</td>
<td>United States</td>
<td>—</td>
</tr>
<tr>
<td>Flaxleaf fleabane</td>
<td>Conyza bonariensis</td>
<td>South Africa</td>
<td>—</td>
</tr>
<tr>
<td>Canada</td>
<td>Conyza canadensis</td>
<td>United States</td>
<td>Reduced translocationb</td>
</tr>
<tr>
<td>horseweed</td>
<td></td>
<td></td>
<td>Target sitec</td>
</tr>
<tr>
<td>Goosegrass</td>
<td>Eleusine indica</td>
<td>Malaysia</td>
<td>—</td>
</tr>
<tr>
<td>Italian ryegrass</td>
<td>Loliun multiform</td>
<td>Brazil</td>
<td>—</td>
</tr>
<tr>
<td>Rigid ryegrass</td>
<td>Loliun rigidum</td>
<td>Australia</td>
<td>Reduced translocation</td>
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<td>Target site</td>
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3. Rotating herbicides (sites of action) or tank-mixing herbicides may help slow the selection of glyphosate-resistant weeds, but it is unlikely to completely prevent their selection. Keep in mind that it’s nearly impossible to make blanket statements about how effective a particular alternative herbicide or tank-mix partner will be in slowing the selection of glyphosate-resistant weeds.

4. Stewardship of glyphosate herbicide is an easy concept to discuss, but it is often more difficult to implement.

—Aaron Hager

**PLANT DISEASES**

**Using the Fusarium Head Blight Risk Assessment Tool to Help Make Fungicide Application Decisions for Wheat**

Fusarium head blight of wheat (also known as “scab”) is caused by the fungus *Fusarium graminearum*. Another form of the same fungus can cause Gibberella stalk and ear rot of corn. Wheat heads are most susceptible to infection by spores of the scab fungus during the flowering stage. Symptoms of scab on wheat appear as white heads or heads that are half white and half green. Scab can reduce both yield and quality of winter wheat. Infected wheat kernels may be lightweight, shriveled, and chalky in appearance. Also, the fungus can produce toxins that may be found within infected kernels. The most common toxin produced by the scab fungus is deoxynivalenol (DON), also known as vomitoxin.

Management of scab includes several strategies, including crop rotation, planting partially resistant (or tolerant) varieties, and spraying a fungicide. A Fusarium head blight risk assessment tool, developed by a team of researchers from several universities with the help of funding from the U.S. Wheat and Barley Scab Initiative, assists producers with the decision of whether to spray a fungicide for scab control. The risk assessment tool, which can be accessed at www.wheatscab.psu.edu, uses weather data to estimate the risk of scab development. While not 100% accurate, the models used to develop the risk assessment have been shown to have nearly 80% accuracy.

The fungicides Folicur (Bayer CropScience), Orius (Makhteshim Agan), and Proline (Bayer CropScience) are available to Illinois wheat growers this year for management of scab. In addition to providing disease control, these fungicides have been shown to reduce the level of DON in the grain produced by the scab fungus. Both Folicur and Orius contain the active ingredient tebuconazole and have section 18 emergency exemptions for use in the 2007 season; the use rate for Folicur and Orius is 4 fl oz/A. Proline, which contains prothioconazole, recently received a full section 3 registration for use on wheat; its use rate is 4.3 to 5.7 fl oz/A. For best results, these products should be applied at early flowering (Feekes 10.51). Seven to ten days before flowering, check the risk assessment tool to help with a decision on fungicide application.—Carl A. Bradley

**CROP DEVELOPMENT**

**Notes on an Unusual Spring**

It may just be playing a word game, but when it comes to weather as it affects crops, “normal” is not the same as “average.” “Normal” is within range of our expectations based on previous experience, and normal conditions range around, but seldom fall right on, “average” conditions. So nearly every spring is unusual in some way, but 2007 has been perhaps a little farther from the average than most.

The cold temperatures during the second week of April have been the most unusual occurrence, along with the slow warmup since. Will there be consequences, or will the season progress as usual from here on out?

Damage to the wheat crop continues to be very hard to call, even more than two weeks after the coldest temperatures. Reports from this past week are that some insurance adjusters are predicting losses larger than we would have expected, in fields that have shown some regrowth and that have with good stands. Other fields, even those in southern Illinois, are now showing some regrowth and are looking better than expected. The most difficult decisions are in fields where some plants seem okay but others are not. I can’t add much to what I said last week on this topic, other than the obvious point that fields that are torn up or destroyed with herbicide and planted to another crop will shift anxiety from seeing how the wheat turns out to seeing how the replacement crop turns out. Guarantees are hard to find.

The corn that we planted on April 2 emerged on April 24, after about 120 growing degree days. Emergence was very uniform, and there are no obvious problems caused by the seeds’ having been “refrigerated” for some 10 days. It is important to note that the soil around and atop the seed stayed mel-low throughout, with no crust formation at all. Heavy rains that are falling in places in Illinois on April 25 and 26 may cause soil crusting in some planted fields, which may prove to be a bigger challenge to emergence than cold temperatures have been. There have been some reports of soils being on the wet side when they were worked and planted, with some fields worked one more time than normal to get them into shape to plant. This might have improved seed-soil contact, but it may also mean greater potential to form a crust. Crust formation is not fully understood, but it is related to soil type and is usually a greater problem when soils have been wet and cool (thus slowing the emergence process) followed by warm and sunny weather, with drying wind. Rotary hoeing is the normal method for breaking up surface crusts, but this is not always effective where crusting is severe.

As we move as quickly as we can to finish up corn planting and to start planting soybean, we need to remem-
ber that damage done with soil compaction or from putting seed into poor seedbed conditions caused by working or planting fields too wet can be damage that affects the crop throughout the year. At some point it may become necessary to work and plant fields “on the wet side” because the delay in planting corn will cause more yield loss than will poor soil conditions. But we’re at least three weeks away from that date in Illinois. — Emerson Nafziger

**REGIONAL REPORTS**

Extension center educators, unit educators, and unit assistants in northern, west-central, east-central, and southern Illinois prepare regional reports to provide more localized insight into pest situations and crop conditions in Illinois. The reports will keep you up to date on situations in field and forage crops as they develop throughout the season. The regions have been defined broadly to include the agricultural statistics districts as designated by the Illinois Agricultural Statistics Service, with slight modifications:

- **North** (Northwest and Northeast districts, plus Stark and Marshall counties)
- **West-central** (West and West Southwest districts, and Peoria, Woodford, Tazewell, Mason, Menard, and Logan counties from the Central district)
- **East-central** (East and East Southeast districts [except Marion, Clay, Richland, and Lawrence counties], McLean, DeWitt, and Macon counties from the Central district)
- **South** (Southwest and Southeast districts, and Marion, Clay, Richland, and Lawrence counties from the East Southeast district)

We hope these reports will provide additional benefits for staying current as the season progresses.

**East-Central Illinois**

A brief break in the weather allowed a significant amount of corn planting to occur in the drier areas. Anhydrous ammonia was still being applied to many fields; corn planting will have to wait for the next “weather window” in those fields.

Established alfalfa stands are slowly recovering from the freeze injury, with new growth from the axillary buds.

Some wheat at the southern end of the region had entered the jointing stage prior to the freeze and was heavily damaged. Damage appears to be slight at the northern end of the region, where plants were just breaking dormancy, tillering, and starting to elongate.

**Northern Illinois**

Area-wide field activity began late last week and has continued through midweek. Activities focused on anhydrous ammonia application, secondary tillage, and corn planting. Corn planting estimates as of April 24 vary from 10% to 30% complete within the northern region.

Alfalfa fields still exhibit a brownish cast due to the previous cold weather, but fields appear to be recovering. However, first harvest of alfalfa will be delayed. As a reminder, soil temperature and moisture conditions are available at this Illinois State Water Survey Web site: www.sws.uiuc.edu/warm/agdata.asp.

An intense black cutworm moth capture (nine or more moths captured in one or two consecutive days) was reported in Lee County on April 23.

**Southern Illinois**

The weather continues to be the focus of crop agriculture in southern Illinois.

Wheat growers are still evaluating freeze-damaged fields. The level of foliage damage is easy to assess. Splitting plant stems allows quick evaluation of the wheat head and growing point. The real remaining question is the level of freeze damage to the lower stem. Some stems are brown and collapsed, others are damaged but not dead, and some have minimal damage. Hopefully the next week will allow an accurate determination of stem health and integrity.

Forage plants are attempting to slowly recover and regrow from freeze injury. A potentially early harvest has changed to a later reduced harvest.

Some corn has been planted; the amount varies by location. A number of farmers have limited their activities because of “heavy” soils and forecasted rainfall.

**West-Central Illinois**

Tillage, nitrogen and chemical applications, and corn planting are in full swing around the region. We are about one to two weeks behind schedule, and recent scattered rainfall may set some planting operations even farther back.

Wheat is hanging on, and growth stages range from tiller to at least Feekes 7 stage. Most wheat plants are growing out okay but have lower leaves turning brown from frost and cold damage. A very small percentage of plants have tillers showing soft areas along the lower stem above and below the lowest node, indicating dead and dying tissue. Some barley yellow dwarf virus was found in fields of wheat following wheat.

Alfalfa regrowth is occurring mostly from the crown area, with less regrowth coming from axillary buds. Some alfalfa has been cut and baled in the southern part of the region. Alfalfa weevils have reappeared following the cold weather, so continue to scout.

Other insects being noted in high numbers in the central and eastern portions of Sangamon County are grubs, most likely to be Japanese beetle grubs.
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