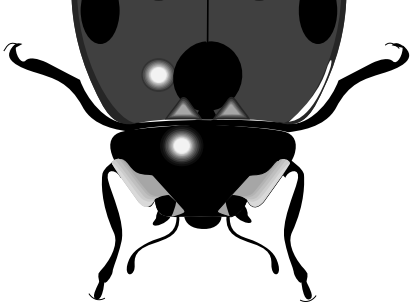

PEST MANAGEMENT & CROP DEVELOPMENT

BULLETIN

FOR IMMEDIATE RELEASE
No. 3 / April 12, 2002

Executive editor: Kevin Steffey, Extension Entomologist

Available on the Web at http://www.ag.uiuc.edu/cespubs/pest/
For subscription information, phone 217.244.5166, or e-mail acesnews@uiuc.edu

In This Issue

- ❑ **Choose the Proper Gloves When Handling Pesticides, 25**
- ❑ **Learn More About Corn Insects, 27**
- ❑ **More Intense Captures of Black Cutworm Moths Have Occurred, 27**
- ❑ **Survival of Overwintering Borers, 28**
- ❑ **Growers Should Remember to Plant Non-Bt Corn Refuges If They Plant Bt Corn, 29**
- ❑ **Update for Slug Control, 29**
- ❑ **And More!**

Choose the Proper Gloves When Handling Pesticides

As every applicator knows, gloves (among other personal protective equipment) should be worn to protect yourself from contact with pesticides. However, choosing the right glove for the job may be confusing, especially when using a variety of pesticides. All pesticide labels give options for the type of glove material to wear. These options are not random selections but are based on the ability of that material to withstand the pesticide formulation for the longest time.

Pesticide active ingredients are dissolved in carrier solvents such as water, alcohols, and petroleum distillates. All solvents (except water) are able to penetrate glove materials faster than the pesticide active ingredient alone. In other words, the solvents carry the pesticide through the glove material and into contact with your skin. Glove materials differ in their resistance to particular solvents—the ones that hold the solvent at bay the longest, protect from pesticide contamination the longest. Solvents are classified as part of the inert ingredients and, in most cases, are not disclosed on the label.

While some pesticide labels may specify the exact type of glove to be used, other labels may simply indicate the general type of glove that is appropriate, such as waterproof or chemical resistant, and then provide acceptable options. In addition, some labels provide chemical-resistance category letters, which indicate the type of solvents used in the pesticide formulation. Where specific information is given, use only the glove materials listed on the label for that product. Do not assume that one type of glove will work for all the pesticides you may use. In addition, if you are tank-mixing pesticides, follow the most restrictive pesticide label when selecting gloves and other personal protective equipment.

Categories (A–H) on Pesticide Labels and the EPA Glove Chart

The letter designation refers to the carrier solvent and its concentration in the pesticide formulation, not the type of pesticide. The letter designation, if provided, is found on the pesticide label under **Precautionary Statements.** There also usually will be several choices of glove materials listed on the label. Listed below are the letter designations for various pesticide solvents:

A. Any dry or water-based pesticide formulation

B. Any pesticide with acetate as the carrier solvent

C. Any pesticide with alcohol as the carrier solvent

D. Any pesticide with halogenated hydrocarbons as the carrier

E. Any pesticide with ketones (such as acetone) as the carrier solvent

F. Any pesticide with a ketone and aromatic petroleum distillates mixture as the carrier solvent

G. Any pesticide with aliphatic petroleum distillates (such as kerosene, petroleum oil, or mineral oil) as the carrier solvent

H. Any pesticide that has aromatic petroleum distillates (such as xylene) as the carrier solvent

USEPA Chemical-Resistance Category Selection

Table 1 shows the information to be used when the personal protective equipment section on the pesticide label lists a chemical-resistance category.

Glove Materials

Barrier laminate (foil type)—the most chemically resistant but uncomfortable, with poor dexterity, because of design limitations. Common brand names include Silver Shield and 4-H. Chemical resistance: High for categories A–H ($7/pair).

Butyl rubber (at least 14 mils)—a synthetic rubber that is resistant to gas and water vapors and is a good choice for certain fumigants. Good dexterity. Chemical resistance: High for categories A–D and F; slight for E, G, and H ($20/pair).

Natural rubber (latex) (at least 14 mils)—good only for dry or water-based formulations ($10–$24/pair).

Nitrile rubber (at least 14 mils)—resists punctures better than other materials. Good dexterity and slip-proof grip. Comes in a range of lengths, thickness, and lined or unlined. Chemical resistance: High for categories A, C, E, and F; moderate for D; and slight for B, G, and H ($3–$9/pair).

Neoprene rubber (at least 14 mils)—a synthetic rubber with good dexterity. Remains flexible at low temperatures. Some versions have a two-color process, allowing you to tell when the coating material is wearing thin. Chemical resistance: High for categories A, C, and E ($2–$50/pair)

Polyethylene—no information available.

PVC (at least 14 mils)—liquidproof PVC coated gloves can be used for protection against anhydrous ammonia. Chemical resistance: High for categories A and C, moderate for E, slight for B and F ($4/pair).

Viton (at least 14 mils)—the most chemically resistant "rubber" glove available. Thick, but very flexible and comfortable to wear. Also available as Viton-over-nitrile, which is more economical than 100% Viton. Chemical resistance: High for categories A, C, and E–H; slight for B and D (usually over $100/pair; Viton-over-nitrile gloves are much less expensive).

Glove Use Tips

Keep one set of gloves for pouring and mixing concentrates and another set for spraying. The 4-H glove is so named because it is able to keep out most solvents for at least 4 hours. Because the 4-H and other barrier laminates are the most chemically resistant gloves, realize that other glove materials are likely to keep out some solvents with their pesticides for even shorter periods. Reduce the exposure time by washing your gloves and other personal protective equipment after each use. Allow them to dry before they are placed in a storage area.

Since the manufacturers label the glove packages, but not the gloves themselves, with the name of the material, write the name of the glove material on the inside of the glove cuff with a permanent marker. This will save confusion later.

Finally, don't use gloves that have a lining because the lining will absorb pesticides. Gloves that have a thin lining of flocking are acceptable.

Table 1. USEPA Chemical Resistance Category Selection Chart. (For use when the Personal Protective Equipment [PPE] section on the pesticide label lists a chemical resistance category.)

Chemical resistance category	*Type of personal protective material*							
	Barrier laminate	*Butyl rubber*	*Nitrile rubber*	*Neoprene rubber*	*Natural rubber**	*Poly-ethylene*	*PVC*	*Viton*
A	High	high	high	high	high	high	high	high
B	High	high	slight	slight	none	slight	slight	slight
C	High	high	high	high	moderate	moderate	high	high
D	High	high	moderate	moderate	none	none	none	slight
E	High	slight	high	high	slight	none	moderate	high
F	High	high	high	moderate	slight	none	slight	high
G	High	slight	slight	slight	none	none	none	high
H	High	slight	slight	slight	none	none	none	high

High: Highly chemical resistant. Clean or replace PPE at end of each day's work period. Rinse off pesticides at rest breaks.
Moderate: Moderately chemical resistant. Clean or replace PPE within an hour or two of contact.
Slight: Slightly chemical resistant. Clean or replace PPE within 10 minutes of contact.
None: No chemical resistance. Do not wear this type of material as PPE when contact is possible.
* Natural rubber type includes natural rubber blends and laminates.

These gloves will have a thin, white coating, making the gloves more comfortable to wear.—*Bruce Paulsrud and Phil Nixon*, adapted from Mississippi State University Extension

INSECTS

Learn More About Corn Insects

If you are looking for references that will help you identify, scout for, and manage insect pests of corn, look no further than *Corn Insect Pests: A Diagnostic Guide* and the Entomological Society of America's *Handbook of Corn Insects*. The former reference was originally published in 1998, as a joint effort between entomologists at the University of Missouri and the University of Illinois. It's a field guide that focuses on 20 of the insect pests most harmful to corn production in the Midwest. Color photographs of pests and the injury they cause are plentiful, and "help boxes" focus attention on symptoms, diagnostic tips, and confusing look-alikes. Insects discussed in the guide are separated by time of occurrence for easy reference: corn planting to full emergence (up to V2), emergence to knee-high corn (VE to V8), knee-high to tasseling corn (V8 to VT), and tasseling corn to maturity (VT to R6). The guide is available from Information Technology and Communications Services. It sells for $8 (plus $3.50 for shipping) from Marketing and Distribution, 1917 S. Wright, Champaign IL 61820. Ask for publication C1358.

The Entomological Society of America published the *Handbook of Corn Insects* in 1999. This handbook outlines fundamental approaches to corn pest management that can aid in reducing crop damage and loss. With contributions from 73 experts throughout the United States, it provides detailed descriptions of topics, including insect identification, life-history data, and management options. This comprehensive guide includes discussions on corn ecology and physiology; corn insect pests, predators, and parasitoids; and corn pest management procedures. It includes 158 color photographs, 132 illustrations, a directory of local information, and a glossary. If you are interested in obtaining this publication ($37), contact sales@entsoc.org.

If you regularly need information about corn insect biology and management, both of these publications would be excellent additions to your bookshelf.—*Kevin Steffey*

More Intense Captures of Black Cutworm Moths Have Occurred

Continued wet weather in most areas of Illinois will increase concern about black cutworms. The vegetation growing in fields, especially the winter annual weeds, are attractive egg-laying sites for incoming black cutworm females. Consequently, the potential for black cutworm problems increases when planting is delayed.

I discussed one "intense capture" (nine or more moths captured over a 1- to 2-day period) of black cutworm males in last week's *Bulletin*, but that was just the beginning. Other people are beginning to capture black cutworm moths in pheromone traps, and we want to keep you apprised of their findings. Randy Kenke, with Hamel Seed in Madison County, has established four pheromone traps to monitor black cutworm flights. In one trap he captured 15 black cutworm moths, from April 2 through April 5. In another trap he captured 10 moths, from April 6 through April 8. Jerry Harbour (Lincoln Land FS near Springfield in Sangamon County) captured 14 and 10 black cutworm moths on April 7 and 8, respectively. Steve Albrecht, with Illinois Valley Supply Company in Carrollton (Greene County), captured 15 black cutworm moths, between April 4 and April 8, then captured another 9 moths on April 9. I received a couple of other reports of black cutworm moth captures, as far north as Piatt County, but no other reports of intense captures.

It's likely that interest in black cutworms will continue to increase as the spring rolls on, so now is a good time to review what we know about black cutworms. Although they have been sporadic pests for the past several years, outbreaks can be devastating. Therefore, it's best to be prepared.

Description. The first life stage of black cutworms we encounter is the adult moth as it flies into Illinois from the southern states. The moths are robust, with a wingspan of approximately 1 1/2 inches. The basal two-thirds of the forewing is dark, and the outer third is much paler. Each forewing has a dagger-shaped marking at the outer edge of a kidney-shaped spot toward the middle of the wing. You'll find an excellent photograph of a black cutworm moth in the June 4, 2001, issue of Iowa State University's *Integrated Crop Management*. Other moths also identified in this article are found at the following URL on the Web: http://www.ipm.iastate.edu/ipm/icm/2001/6-4-2001/moths.html.

Black cutworm larvae pass through six or seven instars, so their size varies with age. The average lengths (of the different instars) of the black to pale gray larvae are 1/4 inch (third instar), 1/2 inch (fourth instar), 1 inch (fifth instar), and 1 1/2 inches (sixth or seventh instar). The "skin" of a black cutworm larva is covered with convex granules, which can be seen readily under a microscope. The four knotlike tubercles (bumps, or protuberances) on each abdominal segment along the top of the back are unequal in size. Each pair of tubercles closest to the center of the body is two to three times smaller than the pair directly, and more widely spaced, behind them. Because of Marlin Rice's (Extension entomologist at Iowa State University) excellent photographic skills, the best photos of black cutworm larvae can be found in *Integrated Crop Management*. Check out different types of caterpillars in corn at http://www.ipm.iastate.edu/ipm/icm/2000/5-8-2000/cutworm2000.html.

Life cycle. As most people know, black cutworms do not overwinter in most of the Midwest. Adults migrate from the Gulf States into the Midwest, primarily during April and May. Upon their arrival, mated females seek vegetation or debris on which to deposit their eggs (they prefer vegetation over debris). Damp, low-lying areas in fields that have not been tilled are particularly attractive for oviposition. Some of their preferred hosts of oviposition are curled dock, yellow rocket, velvetleaf, and rough pigweed, as well as winter annuals such as chickweed.

After hatching, the larvae feed on plants and grow through six or seven instars (as indicated previously). Depending on temperature, the larvae may feed for more than a month. Larvae pupate in the soil, and adults emerge about a week later to begin mating and laying eggs for a second generation. In Illinois, black cutworms complete two to three generations, although the first generation is the only one of concern to most corn growers.

Injury. Young instars feed on leaves of seedling corn, causing small shot holes to appear. Although this feeding injury is not economic, it's an early indication of the presence of black cutworm larvae. Fourth to seventh instars feed at night, cutting seedlings at or below the soil surface. Cutting of corn seedlings usually begins when approximately 300 degree-days (above a base temperature of 50ºF) have accumulated after an intense capture of moths. If the corn has grown beyond the stage when black cutworm larvae can cut the plants, larger larvae may drill into the base of a plant, often killing the growing point.

Management. Because the occurrence of black cutworms is difficult to predict, we still suggest the "wait and see" approach for managing this pest. In other words, instead of applying a preventive insecticide, timely scouting and application of an insecticide if needed usually make more economic sense in most fields. However, insecticides intended to prevent cutworm damage may be warranted in some fields (e.g., weedy fields before late planting, no-till fields).

If you intend to scout for cutworms and make control decisions after the corn seedlings are growing, be sure to scout early and frequently (probably every 2 to 3 days or so). Look for early signs of the presence of small instars (small shot holes in leaves), but don't overreact. Many early instars perish (environmental conditions, predators) before they can cause economic damage. If cutting is detected, an application of an insecticide may be warranted when 3% or more of the plants are cut below ground and larvae are present.

Insecticides registered for control of cutworms are listed in Tables 2 and 3 (Table 2—preventive insecticides, Table 3—"rescue" insecticides). Be sure to follow all label directions and precautions.

We'll provide more information about scouting for and treating for black cutworms after corn has been planted and has begun to emerge. In the meantime, keep those reports of moth captures coming.—*Kevin Steffey*

Table 3. "Rescue" insecticides registered for control of black cutworms.

Product	*Rate of application*
*Ambush 2E	6.4 to 12.8 oz per acre
*Asana XL	5.8 to 9.6 oz per acre
*Capture 2EC	2.1 to 6.4 oz per acre
*Lorsban 4E	1 to 2 pt per acre
*Pounce 3.2EC	4. to 8 oz per acre
*Warrior	1.92 to 3.2 oz per acre

* Use restricted to certified applicators.

Survival of Overwintering Borers

Much has been made of the potential for insect problems after this past "mild" winter. Although mild winter

Table 2. Preventive insecticides registered for control of black cutworms in corn, with suggested timing and placement of application.

Product	*Rate of application*	*Timing, placement*
*Ambush	0.5 oz per 1,000 ft of row	At planting, band
*Asana XL	5.8 to 9.6 oz	Pre-emergence
*Aztec 2.1G	6.7 oz per 1,000 ft of row	At planting, band
*Aztec 4.67G	3 oz per 1,000 ft of row, SmartBox system only	At planting, band
*Capture 2EC	0.15 to 0.3 oz per 1,000 ft of row	At planting, band
*Capture 2EC	2.56 oz per acre	Pre-emergence
*Capture 2EC	3 to 4 oz per acre	Pre-plant incorporated, broadcast
*Force 3G	4 to 5 oz per 1,000 ft of row	At planting, band
*Fortress 2.5G	6 oz per 1,000 ft of row	At planting, band
*Fortress 5G	3 oz per 1,000 ft of row	At planting, band
*Lorsban 4E	2 to 4 pt per acre	Pre-plant incorporated, broadcast
*Lorsban 4E	1 to 2 pt per acre	Pre-emergence
*Lorsban 4E	2.4 oz per 1,000 ft of row	At planting, band
Lorsban 15G	8 oz per 1,000 ft of row	At planting, band
*Pounce 1.5G	8 oz per 1,000 ft of row	At planting, band
*Pounce 3.2EC	4 to 8 oz per acre	Pre-emergence
*Pounce 3.2EC	0.3 oz per 1,000 ft of row	At planting, band

* Use restricted to certified applicators.

weather is beneficial for the survival of some insects (e.g., bean leaf beetle, corn flea beetle), winter weather by itself has little effect on some insects. In fact, the survival of overwintering European corn borers, for example, is predicated more by the level of infection of the larvae by disease organisms.

Kevin Black, with Growmark in Bloomington, is collecting overwintering European corn borer larvae and sending them to Leellen ("Lee") Solter, insect pathologist with the Illinois Natural History Survey. Lee is checking the borers for the presence of *Nosema pyrausta*, a microsporidium that infects only European corn borers. Overwintering larvae infected with *N. pyrausta* often survive, but the infection continues through the pupal stage and into the adults. Infected females often lay fewer eggs, and fewer larvae hatch from the eggs. Infected larvae that hatch may experience delayed growth or may die. Consequently, the percentage of overwintering European corn borers infected with *N. pyrausta* will have an impact on the potential for corn borer problems this spring.

Kevin Black reported that 20% of the borers he collected from DeKalb County were infected with *N. pyrausta*. However, he has just begun examining the borers from this site, so the results are far from complete. Kevin also plans to collect borers from west-central and east-central Illinois. We'll report rates of infection in future issues of the *Bulletin*.

Ron Hines, senior research specialist at the Dixon Springs Agricultural Center, is more interested in survival of overwintering southwestern corn borers. Apparently, the cold snap toward the end of March had a negative impact on these borers, which do not fare well during colder winters. During the first week of April, Ron split about 20 stalks in five plot areas at the Dixon Springs Ag Center. He found only two living southwestern corn borer larvae, although 95 of the stalks had cavities below ground. He also found some dead larvae, apparently killed by the early spring freezing weather.

So, the jury is still out. We really won't know the full potential of either species until after corn has been planted (planting time also will affect the survival of these species) and moths begin to fly. That's when efforts to monitor the moth flights will pay off.—*Kevin Steffey*

Growers Should Remember to Plant Non-Bt Corn Refuges If They Plant Bt Corn

In an article in the *Bulletin* last year (issue no. 24, November 9, 2001), I reported that the United States Environmental Protection Agency had approved Bt corn for use for another 7 years. I also shared EPA's strong intent for corn growers to comply with resistance management strategies recommended by seed companies and university and government entomologists. It is critical that corn growers "follow the rules" this year and in the future so that we can reap the benefits of Bt corn, and other transgenic crop technology, for pest management programs for years to come. Recommendations for resistance management are not made lightly; a lot of effort and thought went into the development of these resistance management strategies. So, for the benefit of everyone in agriculture, we urge growers to comply with the following recommendations:

- At least 20% non-Bt corn refuge should be planted on each farm.
- Non-Bt corn refuges should be planted within 1/2 mile of Bt corn. However, we (University of Illinois entomologists) recommend that the refuge be planted adjacent to or within Bt cornfields. The objective of the refuge is to generate European corn borer or southwestern corn borer adults that have not been exposed to Bt. These adults would mate with any rare individuals that emerge from Bt corn. Therefore, the closer the refuge is to Bt corn, the more likely the moths from the two types of fields will mingle and mate.
- Non-Bt corn refuges can be planted in a number of ways:
  - Adjacent to, or at least nearby (within 1/2 mile), fields
  - Blocks of non-Bt corn within a field of Bt corn (e.g., a 16-acre block within an 80-acre field)
  - Split-planter strips—some planter boxes with Bt corn, other planter boxes with non-Bt corn (e.g., three boxes of non-Bt corn in a 12-row planter is a 25% refuge). Non-Bt corn strips must be a minimum of four rows wide. This approach obviously is not an option for growers with air planters.
  - Perimeter plantings—non-Bt corn planted along the sides and in the turn rows of cornfields.

Non-Bt corn refuges can be treated for control of European or southwestern corn borers if their densities exceed economic thresholds. Consequently, if a grower intends to protect his or her refuge, the "split-planter strips" option is not the favored approach.

Insect resistance management is a new concept to most corn and soybean growers in the Midwest. However, cotton growers have been implementing insect-resistance management strategies for years. If they can do it, so can we. Our stewardship of this technology should ensure its continued use. Remember, planting non-Bt corn refuges is the right thing to do.—*Kevin Steffey*

Update for Slug Control

My article about slugs in last week's *Bulletin* (issue no. 2, April 5, 2002) elicited a response from Ron Hammond, my friend and fellow entomologist at Ohio State University. Ron has conducted more research on slugs

and their management in corn and soybeans than anyone else in the Midwest. Therefore, I consider his advice golden.

Ron informed me that the slug-control product of choice is Deadline MPs, not Deadline Bullets, as I reported. Apparently the pieces in the "Bullets" formulation are too big and not enough of them get distributed at the application rate of 10 pounds per acre. Ron indicated that the MP formulation has smaller pieces and comes closer to the required number (four to five pieces per square foot) for good control. Remember, this is a bait formulation, so the distribution of bait pieces is important. Ron also indicated that a newer product, Trail's end LG, also provides good control of slugs.

So, thanks to Ron for setting the record straight. I hope growers in Illinois don't have to resort to using slug baits, but if they do, it's best to know which ones are most effective.—*Kevin Steffey*

Alfalfa Weevils Are Active in Southern Illinois

Several people from southern Illinois reported alfalfa weevil activity during the past week. For the most part, the larvae being found are quite small, and the injury is limited to pinholes in the terminal leaves. However, in some fields in which environmental conditions have accelerated weevil development, the larvae have reached the third instar and the damage is quite noticeable.

Vince Ochs, with Fruit Belt Service Company in Vienna (Johnson County), found "a lot" of small alfalfa weevil larvae (about 1/8 inch) in a field on April 5. Alan Mosler, with Twin County Service Company in Marion (Williamson County), has found alfalfa weevil larvae in about 60% of the tips he examined, with one to two larvae per tip. Omar Koester, Extension unit assistant, crop systems, in Randolph County, checked several fields in southern Monroe County and western Randolph County on April 8 and discovered varying sizes of larvae and levels of infestation. In most of the fields the larvae were small. However, in a few fields Omar found four to eight first through third instars per tip, with 50% or more skeletonization. The alfalfa was only 2 to 3 inches tall. Omar indicated that these infestations were among "the most intense insect pressure [he has] seen in 40 years." Matt Montgomery, Sangamon/Menard Extension unit educator in crop systems, may have found some early-instar alfalfa weevils in a field in Menard County. However, we need to verify the report.

The time to scout for alfalfa weevils is now. Be sure to look for alfalfa weevil larvae and the symptoms of their feeding injury throughout the field, not just along the edges. We recommend walking in a U-shaped pattern through the field, stopping at least 30 times to check for alfalfa weevils and to measure the height of the alfalfa. The best way to count the larvae is to snap a stem off at ground level and place it top down into a white bucket. After collecting 30 stems, you can beat the stems, a few at a time, against the sides of the bucket to dislodge the larvae. You also can select a sample of 10 of the stems to measure the height.

An insecticide for control of alfalfa weevils may be warranted when you find 25% to 50% are being skeletonized and three or more larvae per stem. However, a more dynamic set of guidelines for alfalfa weevil control are presented in Table 4. These guidelines incorporate alfalfa height, value of alfalfa hay, and numbers of alfalfa weevil larvae per stem for making decisions.

Table 4. Economic thresholds based on numbers of alfalfa weevil larvae per stem. (Adapted from *Pest Management of Alfalfa Insects in the Upper Midwest*, 1999, Leopold Center for Sustainable Agriculture, Iowa State University, Ames.)

Plant height	*$40 per ton*	*$70 per ton*	*$100 per ton*	*Management decision*
4 in.	1.8–2.8	0.8–1.3	0.6–0.8	Reevaluate in 4 days. If damage and larval numbers are increasing, a long-residual insecticide is recommended to prevent severe yield loss.
6 in.	2.0–3.0	0.8–1.5	0.6–1.0	
8 in.	2.2–3.2	0.9–1.7	0.7–1.2	
Plant height	*$40 per ton*	*$70 per ton*	*$100 per ton*	*Management decision*
10 in.	2.3–3.5	0.9–1.9	0.8–1.4	If alfalfa is in vegetative stages, a short-residual insecticide should be used. If fields are harvested, closely evaluate stubble damage and larval densities.
12 in.	2.4–3.8	1.0–2.2	0.9–1.6	
14 in.	2.5–4.2	1.2–2.5	1.0–1.8	
Plant height	*$40 per ton*	*$70 per ton*	*$100 per ton*	*Management decision*
16 in.	2.6–4.6	1.5–2.8	1.1–2.0	If more than 60% of alfalfa is in the bud stage, harvest is recommended. If not scheduled to be cut in 7–10 days, a short-residual insecticide is recommended.
18 in.	2.7–5.0	1.7–3.1	1.2–2.3	
20 in.	2.8–5.8	2.0–3.4	1.4–2.6	
>20 in.	3.0–7.0	2.4–4.0	1.6–3.0	

Use lower density (number of alfalfa weevil larvae per stem) if alfalfa is drought stressed, and/or control costs are relatively cheap ($7–$10 per acre).

Use higher density (number of alfalfa weevil larvae per stem) if rainfall is abundant, diseased larvae are present, or control costs are relatively high ($11–$14 per acre).

Table 5. Insecticides suggested for control of alfalfa weevil larvae in Illinois.

Insecticide	*Amount of product per acre*
*Ambush	12.8 oz
*Baythroid 2	1.6 to 2.8 oz
*Furadan 4F	1/2 to 2 pt
Imidan 70W	1 to 1 1/3 lb
*Lorsban 4E	1 to 2 pt
*Pounce 3.2EC	8 oz
*Warrior	2.56 to 3.84 oz

* Use restricted to certified applicators.

Insecticides suggested for control of alfalfa weevils are listed in Table 5. Please follow all label directions and precautions.—*Kevin Steffey*

An Important Note

The article titled "Insecticides for Alfalfa and Grass: EPA's Interpretation" in last week's *Bulletin* (issue no. 2, April 5, 2002) was extracted *verbatim* from EPA's Office of Enforcement and Compliance Assistance. Please note that Penncap-M (active ingredient is methyl parathion) no longer is registered for use on alfalfa.—*Kevin Steffey*

Supplemental Label for Capture 2EC

FMC Corporation has issued a supplemental label for use of Capture 2EC in Illinois (south of U.S. Route 136), Indiana (south of U.S. Route 36), Kentucky, Missouri, and Ohio. Capture 2EC can be applied as a broadcast preplant incorporated treatment for control of black cutworm, seedcorn maggot, white grubs, and wireworms. The rate of application is 3 to 4 ounces of product per acre. Incorporation of Capture should not be any deeper than the intended planting depth and no deeper than 3 inches.

Obviously this supplemental label is intended as an option for growers who do not have granular or liquid insecticide applicators mounted on their planters. This application method has not been thoroughly evaluated by university entomologists in the Midwest, so I can't offer any readily available efficacy data. If I learn more, I will report the findings in a future issue of the *Bulletin*.—*Kevin Steffey*

PLANT DISEASES

Winter Wheat Disease Portrait

Disease reports are at a minimum on the wheat crop this season. Robert Bellm, crop systems educator at the Edwardsville Extension Center, reports that he has seen little or no viral or fungal disease to date. Robert noted that some fields that started off the season looking fairly yellow have greened up well following nitrogen application. The time is right, however, to scout for virus diseases, paying special attention to those fields that seem a bit off color. With the recent rains, this should also be a good week to look for the presence of fungal diseases in the lower canopy as well.

Early-Season Wheat Virus Disease

When scouting, keep in mind that varietal characteristics, nutrient imbalances, or viral diseases can each or all be causes of leaf discoloration this time of the year. If viruses are going to be a problem, symptoms should be evident now. The most common virus diseases that you will see early in the spring in Illinois are barley yellow dwarf virus (BYDV) and soilborne wheat mosaic virus (SBWMV). Each of these viruses can cause damage to the plants, with BYDV being the most damaging.

Soilborne wheat mosaic virus. SBWMV is a very common disease, causing leaf discoloration in the spring. It is usually one of the first plant diseases reported in the growing season. An unusual aspect of this disease is the mode of transmission to wheat plants. The virus is transmitted to the plant by a soilborne fungus. The virus is carried in the fungus and when the fungus enters wheat roots it transmits the virus. The fungus is a water mold and favors low, wet areas of the field, where the disease usually is seen first. 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 only be seen very early in the season. If temperatures continue to quickly rise, this symptom disappears quickly. 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 consideration in variety selection is still important.

Barley yellow dwarf virus. Aphids spread BYDV disease. Aphids carrying the virus transmit 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. We had a long fall, which was a good situation for the aphids. 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 varying shades of red to purple, pinkish yellow to brown. As the 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 commonly only discolor the flag leaf and do not cause significant yield reductions.

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

either red or yellow. In some viruses, streaking of the leaves or a mosaic pattern also can be seen. Viruses are unusual pathogens because they neither require a food source, nor do they have 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 a genetic and a protective protein outer coat. Once inside plant cells, the virus sheds the protein coat, and the genetic material begins replicating the virus.

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, which explains the recommendation to plant after the fly-free date when insect activity is reduced. Systemic insecticide seed treatments have also shown some success.

Diagnosis. If you suspect virus infection when you are scouting, how do you know which virus may be in the field? First, rule out any other problem that may have caused the symptoms, such as winterkill, nutrient imbalances, or herbicide carryover. 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 first shows up in a typical insect-type pattern. Infected patches occur randomly in the field or are associated with areas on which viruliferous aphids may have been feeding, such as grassy areas on field edges. Also, 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 or our Distance Diagnostic online service at the University of Illinois can only make 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. Frankly, it is not always necessary to know specifically which virus may be present. However, if you want to have a virus positively identified, either you or we have to send virus-infected tissue to a lab such as AgDia for serological testing (http://www.agdia.com/). The cost of this procedure starts at about $50 per specimen if you desire to know exactly which virus is present. Fresh plant material is needed for serological analysis because the tests use fresh plant sap.—*Suzanne Bissonnette*

Sclerotinia Crown and Stem Rot of Alfalfa

Of the many diseases that damage alfalfa in Illinois, sclerotinia crown and stem rot can be one of the most devastating. Some years it can be severe, resulting in thinning or destruction of stands and reduced yields, and other years it is uncommon. The disease may also be overlooked because it often occurs sporadically and may kill small patches of plants. Last year (2001) the disease was uncommon in Illinois, and we received only a few reports of it causing damage. Watch for the disease in April and into mid-May.

Sclerotinia crown and stem rot of alfalfa is most common in the southern half of Illinois, although it can occur anywhere in the state. The disease usually causes most damage in fall-seeded stands, but single or groups of plants in stands of any age can be killed. Sclerotinia in alfalfa is favored by cool, wet weather in the late fall and snow cover in the winter. The disease can easily go unnoticed if only scattered plants or small patches in fields are killed, and may be mistaken for winterkill.

Sclerotinia crown and stem rot of alfalfa is fairly easy to recognize. If you see dead plants or wilting or dead stems in April or May, look for white moldy growth (especially in wet conditions) and sclerotia. The telltale sign of infection by *Sclerotinia* is sclerotia on infected tissue. Sclerotia are small, hard, black fungal structures about 1/8 inch in diameter and nearly round or elongated, up to 1/4 inch or more. If you find dead plants killed by *Sclerotinia* before they completely decompose, you may be able to find white moldy growth and sclerotia on the dead tissues. In other cases, the infection may have infected the crown but not killed the plants. The crown can be soft and covered partially with white moldy growth, the internal crown tissue will have a yellow-brown color, and sclerotia may be scattered over the surface. Wilting and dead stems are another indication of *Sclerotinia* infections. The lower half of stems are most frequently infected, and they also often contain white moldy growth and sclerotia. Some or all stems of a plant may be infected.

Sclerotinia crown and stem rot of alfalfa in the Midwest is thought to be caused primarily by the soilborne fungus *Sclerotinia trifoliorum.* A very similar disease, white mold of soybean, is caused by a different species, *Sclerotinia sclerotiorum*. Both species can infect alfalfa.

Sclerotinia typically infects alfalfa in the late fall. Sclerotia near the soil surface germinate in the fall to produce small mushroom-shaped structures, called apothecia. The apothecia release thousands of small spores (ascospores) that land on plants and initiate infection when the weather is cool and wet. The infection may quickly kill plants or may progress slowly over the winter and into spring.

Management of sclerotinia crown and stem rot of alfalfa is based on site selection, planting date, crop rotation, and tolerant varieties. If possible, new

fields of alfalfa should be established where there is no history of severe sclerotinia crown and stem rot of alfalfa or red clover. Spring planting allows the plants to develop resistance prior to the time that most infection occurs in the late fall. Alfalfa should not be rotated with red clover. Fungicides are not available for control of this disease. Alfalfa cultivars have been developed that can have increased survival and productivity under conditions of low to moderate sclerotinia disease pressure. These may be beneficial where sclerotinia crown and stem rot is a problem.

Help is requested to collect *Sclerotinia* samples from Illinois for a research project. We encourage anyone who sees or hears about sclerotinia crown and stem rot damage to alfalfa to collect infected plants and report the disease to Dean Malvick. Keep infected plants in a paper bag. If you report, please include the date the disease was observed, the age of the stand, the field location (county, township, section number), and the level of damage.—*Dean Malvick*

WEEDS

Changes in Giant Ragweed Emergence

Once the snow melts and the temperature starts to warm, one of the first weed species that emerges through the cool, moist soil appears with a pair of large oval cotyledons. This species is giant ragweed. The emergence of this weed marks the beginning of spring. Over the last couple of years, giant ragweed has grown in prominence to become one of the top five troublesome weeds that corn and soybean producers face. The species has not always been a problem for corn and soybean producers in Illinois. In fact, in the 1960s and 1970s, most giant ragweed plants were found along drainage ditches and roadsides and in the occasional field along a floodplain. So, what has caused this weed to be one of the major challenges that Illinois growers face today?

One could speculate that something has changed in the biology of giant ragweed to make it more of a problem for Illinois corn and soybean farmers. Changes in the duration of giant ragweed emergence appear to be one such modification. In the late 1960s, Drs. Stoller and Wax, USDA-ARS scientists at the University of Illinois, conducted research on the emergence patterns of eight weed species, one of which was giant ragweed. In this study they demonstrated that virtually all giant ragweed plants emerged early in the growing season, usually before May 1. Because these populations emerged relatively early, giant ragweed management was not a problem because tillage operations prior to planting controlled giant ragweed. This does not appear to be the case for contemporary giant ragweed populations in Illinois. Over the years, these same researchers noticed that the species was becoming more of a problem and was showing up in fields much later in the season.

What was happening? Was giant ragweed emerging later in the growing season than it had in the past? To test this hypothesis, they initiated another emergence study in the fall of 1998 and repeated it in 1999. They collected giant ragweed seeds from two separate sites in northern Illinois. The first population came from a production field that was in a corn–soybean rotation, while the second population was collected from an undisturbed area along a railway, approximately 15 miles away from the production field. One hundred seeds from each population were planted at 1-, 2-, and 4-inch depths. Emergence was then monitored weekly the following spring. Giant ragweed from the undisturbed site started to emerge the second week of March, while plants from the field started one week later. Both populations then continued to emerge at the same rate until the first of April. Then something very interesting started to occur. Emergence rates of plants collected from the field slowed, while plants from the undisturbed site continued to emerge at the same rate. Giant ragweed collected from the undisturbed site reached total emergence by May 1, but field-collected giant ragweed continued to emerge well into June. The shift in giant ragweed's emergence duration from seeds collected from production fields, coupled with a shift in production practices to less tillage and earlier planting, has made giant ragweed a tremendous weed management problem for many producers in Illinois.

Even though we may never be able to pinpoint the exact cause for the shift in emergence patterns of giant ragweed, we are currently studying the weed's emergence patterns. The year 2002 is the second year of a research study examining giant ragweed emergence under different cropping systems. In addition, last fall, a multistate collaborative study with weed scientists from USDA-ARS, The Ohio State University, Iowa State University, and the University of Illinois was initiated to examine giant ragweed emergence patterns from four giant ragweed populations from each of the three states. Results from these studies may provide more insight into why we observe differences in giant ragweed from state to state.—*Christy Sprague and Aaron Hager*

Option and Yukon Receive State Registration

In issue no. 1 of the *Bulletin,* we mentioned two new herbicides that were pending registration. In the last week, both of these herbicides have received state registration. These two new herbicides are Option and Yukon and are briefly described below.

Option 35WDG is manufactured and sold by Aventis CropScience and contains the new active ingredient foramsulfuron. Option is a sulfonylurea herbicide and is labeled for postemergence use in field corn. Use rates range from 1.5 to 1.75 ounces per acre. Broadcast applications may be made when corn is between zero and 16 inches in height or through the V5 growth stage. Drop nozzles must

be used when corn is between 16 and 36 inches in height. Applications of Option must include a methylated seed oil and a nitrogen fertilizer (UAN or AMS). The use of non-ionic surfactants or crop oil concentrates will result in unacceptable weed control. Do not make more than two applications or apply more than 3.5 ounces of Option per acre per year.

Option has good activity on several grass and broadleaf weed species. Grasses that Option controls include foxtail, fall panicum, barnyardgrass, shattercane, johnsongrass, quackgrass, and wirestem muhly. Some of the broadleaf weeds that Option controls are common lambsquarter, pigweed, velvetleaf, common ragweed, and eastern black nightshade. Since Option is an ALS inhibitor, it will not provide satisfactory control of ALS-resistant weed biotypes. Tank mixtures with herbicides having other modes of action will be needed to control these species. Labeled tank-mix partners include atrazine, Beacon, dicamba, Distinct, Exceed, Harness, Hornet WDG, Marksman, NorthStar, Prowl, Spirit, Surpass, TopNotch, and Tough. Certain corn hybrids are sensitive to Option, so as a precaution consult seed company hybrid sensitivity charts. Do not apply Option in the same season if Counter, Dyfonate, or Thimet was used. Do not make foliar applications of an organophosphate insecticide within 7 days of an Option application. Replant intervals for Option are 7 days for corn, 14 days for soybean, and 60 days for all other crops; the preharvest interval for Option is 70 days for corn grain and 45 days for corn forage.

Yukon 67.5WDG is marketed by Monsanto and is a premixture of halosulfuron and dicamba. Yukon is labeled for use in field corn, field corn grown for seed, and grain sorghum. The common use rate of Yukon is 4 ounces per acre, which delivers 2/3 ounce per acre of Permit and 4 ounces per acre of Banvel. However, it can be applied up to 8 ounces per acre to control larger weed species in corn (6-ounce maximum rate for sorghum). Applications of Yukon must include either a non-ionic surfactant or a crop oil concentrate but not both. A nitrogen fertilizer (UAN or AMS) may be added to the spray solution; however, it is not required. Two applications of Yukon may be applied to corn per year, with a total application not to exceed 8 ounces per acre. Yukon can be applied over the top or with drop nozzles, from spike through 36-inch-tall field corn and from the two-leaf stage to 15-inch-tall grain sorghum. Yukon controls both large- and small-seeded broadleaf weeds, with the added benefit of yellow nutsedge control. Since Yukon contains dicamba, special precautions need to be taken when applications are made near dicamba-sensitive species.—*Christy Sprague and Aaron Hager*

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

With 2.5 to 4.5 inches of rain in the last 3 weeks and cool temperatures, almost no fieldwork has been done. Tillage equipment and planters are poised at many farmsteads waiting for the first sustained break in the weather.

Northern Illinois

Many areas received at least 2 inches of rain on April 8 and 9. This precipitation, along with the rain and snow received April 1 and 2, has limited most fieldwork across northern Illinois so far during April.

Some concern has been expressed about potential alfalfa winter injury due to the mild winter and then sudden temperature drops when there was no snow cover. Jim Morrison, Extension educator, encourages alfalfa growers to dig random plants and check the conditions of tap roots, crown and shoots. Consider renovating/abandoning the stand if there are less than six plants per square foot for a second-year stand or three plants per square foot for a third-year or older stand. Once alfalfa starts growing and is 4 to 6 inches tall, consider destroying the stand if there are less than 39 stems (note: stems, not plants) per square foot. Fifty-five alfalfa stems per square foot is considered optimum stand density.

Southern Illinois

Recent rain on top of already saturated soil has halted most fieldwork. Some early flights of black cutworm and true armyworm have been noted by Ron Hines at the Dixon Agricultural Experiment Station.

Omar Koester (Monroe and Randolph counties) indicated that there had been the start of some planting late last week. He had scouted some alfalfa fields and found alfalfa weevil feeding, with a few fields at threshold levels. He specifically mentioned shaking eight small larvae out of one alfalfa tip. He mentioned that most alfalfa is quite short (3 inches) and may be more subject to damage.

West-Central Illinois

Cool temperatures and wet soil conditions have kept most farmers out of the field so far this spring. However, a significant number of corn acres were planted last week in the region north and west of Springfield.

A few ag chem dealers are reporting that some of their customers will be planting as much as 70 to 80% of their acres into corn this year if weather conditions allow it.

Winter annuals are becoming apparent in numerous fields this spring.

Most of the wheat acres have nitrogen applied this spring. Harmony application has also begun.

Contributing Authors

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

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

Dean Malvick (dmalvick@uiuc.edu), Extension Plant Pathology, (217)265-5166

Phil Nixon (nixonp@mail.aces.uiuc.edu), Extension Entomology, (217)333-6650

Bruce Paulsrud (paulsrud@uiuc.edu), Extension Specialist/Pesticide Applicator Training/ Plant Pathology, (217) 244-9646

Christy Sprague (lsprague@staff.uiuc.edu), Extension Weed Science, (217)333-4424

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

U of I Extension Newsletter Service
University of Illinois
at Urbana-Champaign
528 Bevier Hall, MC-184
905 S. Goodwin Avenue
Urbana, IL 61801

Return Service Requested

The *Pest Management & Crop Development Bulletin* is brought to you by University of Illinois Extension and Information Technology and Communication Services, College of Agricultural, Consumer and Environmental Sciences, University of Illinois at Urbana-Champaign. This newsletter is edited by Erin Cler and formatted by Oneda VanDyke, ACES/ITCS.

Helping You Put Knowledge to Work

University of Illinois
U.S. Department of Agriculture
Local Extension Councils Cooperating