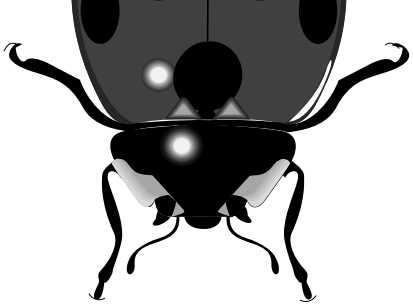

PEST MANAGEMENT & CROP DEVELOPMENT

BULLETIN

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In This Issue

INSECTS

U.S. Drought Monitor

Recent rains in some areas of Illinois have alleviated concerns, at least for a while, about dry soil conditions. However, the weather in southern counties continues to be hot and dry, and the crops could use some rain. Dennis Epplin, crop systems educator, Mt. Vernon Extension Center, called my attention to the U.S. Drought Monitor on the Web at http://enso.unl.edu/monitor/monitor.html. The main federal partners that maintain the site are the National Oceanic and Atmospheric Administration; the U.S. Department of Agriculture; and the National Weather Service, Climate Prediction Center. The academic partner is the National Drought Mitigation Center at the University of Nebraska in Lincoln.

The U.S. Drought Monitor includes a map that delineates dry and droughty conditions throughout the United States. Maps are released each Thursday at 8:30 a.m. Eastern Time. The map released on May 3, 2001, indicated that the southern one-quarter of Illinois was in a moderate drought. At that time, the area from the moderate drought to parts of central Illinois was abnormally dry.

You might want to keep this Web site handy if you want to stay current with drought conditions. The site also has forecasts well into the growing season. Let's hope that we don't need to refer to the Web site very often this year.—*Kevin Steffey*

Black Cutworm Captures Continue: Don't Delay Scouting Efforts in Central and Southern Illinois

Sporadic captures of black cutworm moths continue to be observed throughout the state of Illinois. Jim Morrison, crop systems educator, Rockford Extension Center, reported an intense flight (nine or more moths captured over a 1- to 2-day period) on May 7 in Winnebago County. In addition to intense flights, there are confirmed cases of black cutworm injury in some counties. Kevin Black, technical specialist, Growmark, Bloomington, Illinois, reported that third and fourth instars were found (May 3) in Randolph County. He indicated that because of hot and dry soil conditions, much of the cutting was occurring below ground. Up to 15 to 20% of corn seedlings were cut in certain areas of some fields. Doug Gucker, Piatt County Extension Unit, also reported (May 7) minor leaf feeding and occasional cutting of plants by black cutworms in Piatt County. Flights of black cutworms will continue to take place throughout the state. Late-planted and weedy fields will be the prime targets for egg-laying female moths.

During the rush to get soybeans planted, don't neglect to scout cornfields that have emerging seedlings. Because black cutworm cutting may take place below ground in some fields, scouting requires some effort. However, some energy expended may be very worthwhile. Please refer to earlier is-

sues (nos. 4 and 5) of the *Bulletin* for more detailed scouting information and other management tips.—*Mike Gray*

Armyworms in No-Till Corn, Wheat, and Pasture

In last week's *Bulletin* (issue no. 6, May 4, 2001), Mike Gray wrote an in-depth article about armyworms in wheat and corn. Since then, reports about armyworms causing damage in no-till corn and wheat have been numerous. Joe Reed, technical service representative with FMC Corp., reported on May 8 that he had found armyworms primarily in fields of no-till corn in Randolph, St. Clair, Madison, and Bond counties. Armyworms also were present in wheat fields, although slightly less prevalent. According to several observers, sizes of armyworm larvae found have ranged from 1/2 inch to 1-1/4 inches long.

Ron Hines, senior research specialist, Dixon Springs Agricultural Center, also witnessed significant defoliation caused by armyworms in grass pastures and grass hay fields in his area. In one 30-acre pasture, nothing but stems is left, a characteristic of armyworm damage in any type of grass crop. The densities at the edges of the pasture were 6 to 12 armyworms per square foot.

In last week's article, Mike provided information about scouting, thresholds, and suggested insecticides for armyworms in wheat and corn. In grass pasture, only malathion and Sevin XLR Plus are suggested for control of armyworms. However, Ron Hines reported poor control (less than 20% control of armyworms less than 1 inch long) with malathion applied at the recommended rate on the 30-acre pasture.

Growers with grass pasture and grass hay fields need to look for armyworms right now before the damage gets out of hand. Lack of scouting may result in a significant lack of grass for livestock. Armyworms often cause significant damage seemingly overnight, so scouting is the only way to detect an infestation before it's too late.—*Kevin Steffey*

Reports of White Grub and Grape Colaspis Damage

Many of you will recall that grape colaspis larvae caused some significant damage over the past couple of years in fields of corn planted after soybean in west-central and western counties. Well, let's make it 3 years in a row. I received my first report of grape colaspis injury this morning from Don Rhodes, Burrus Power Hybrids, Arenzville in Morgan County. Don and Kevin Adams with Bayer reported aboveground symptoms in fields at the V3 and V4 development stage. Further investigations confirmed grape colaspis was responsible for the damage. Remember that plants injured by grape colaspis larvae resemble plants injured by white grubs (wilted leaves and purple coloration). In addition, the edges of the leaves may appear yellow or burned. Grape colaspis larvae chew off root hairs, and injured plants cannot take up water and phosphorus efficiently. Severe infestations may cause plant death and reduced plant populations. Injury is more severe when weather conditions retard the growth of the seedlings.

Duane Frederking with Pioneer informed us that several cornfields have already been replanted as a result of white grub damage in Menard County near Greenview. In addition to white grub larvae, the fields contained grape colaspis larvae. In fields near Beardstown in Schuyler County and Hardin in Calhoun County, Duane reported white grub adult emergence and the presence of larvae. Pete Fandel, Extension unit educator, crop systems, Woodford Extension Unit, has found white grub larval damage in numerous fields. The level of damage, on average, is 1 out of every 10 plants.

As all of you know, there are no rescue treatments for either white grubs or grape colaspis. After damage by these pests is discovered, the only reasonable response is to determine whether the current stand will provide the yield hoped for. If the plant population has been reduced substantially, replanting might be the right thing to do.

If you think you need to replant because of insect damage, make certain you identify the guilty insect correctly. We know that annual white grubs can cause some injury to early-planted corn, but they do not cause as much damage as "true" white grubs. For more information on white grubs, refer to the article "White Grubs: Expectations and Management Recommendations for 2001" in the April 13, 2001, issue of the *Bulletin*.

If you decide to use an insecticide during replanting, it should be selected based on its control of the insects in the field that is being replanted, and be aware that there are some restrictions regarding the amount of an insecticide that can be applied per season. For some insecticides, if you applied a full rate during the first planting, the insecticide cannot be applied during replanting because the amount will exceed the maximum allowable amount. Do not exceed the following amounts of specific products per acre per season: 7.3 lb of Aztec 2.1G; 6.5 lb of Counter CR; 13.5 lb of Lorsban 15G; 4.2 oz of Regent 4SC; 6.5 lb of Thimet 20G. The language on the label of Force 3G states: Use Force 3G only once per crop.—*Susan Ratcliffe and Kevin Steffey*

Grape Colaspis: A Quick Review

Let's review some of what we know and some of what we don't know about grape colaspis.

What types of fields are most susceptible to injury caused by grape colaspis?

As reports on grape colaspis damage in cornfields and soybean fields begin to arrive again this year, we must

consider the possibility that the grape colaspis has adapted to modern corn/soybean rotation to survive. If such an adaptation has occurred, we can expect to encounter grape colaspis problems more frequently in the future. The literature indicates that patches of smartweed and bull nettle are attractive egg-laying sites. We wonder if other weeds might be attractive, too. Very little modern information is available, but we hope current research projects will begin to shed some light on this pest. Last year, researchers conducted sweep net sampling for grape colaspis. This data may help producers predict the likelihood of injury in their fields, but remember that there is currently no economic threshold available for grape colaspis (Figure 1).

What does injury caused by grape colaspis look like?

Grape colaspis larvae feed on root hairs and may eat narrow strips from the roots. Denuded roots cannot obtain moisture and nutrients efficiently. Injury symptoms above ground include stunting, wilting, purpling of the leaves and stem (indicating a phosphorus deficiency), and browning of the tips and edges of the leaves. Severe infestations may cause plant death and reduced plant populations. Injury is more severe when weather conditions retard the growth of the seedlings.

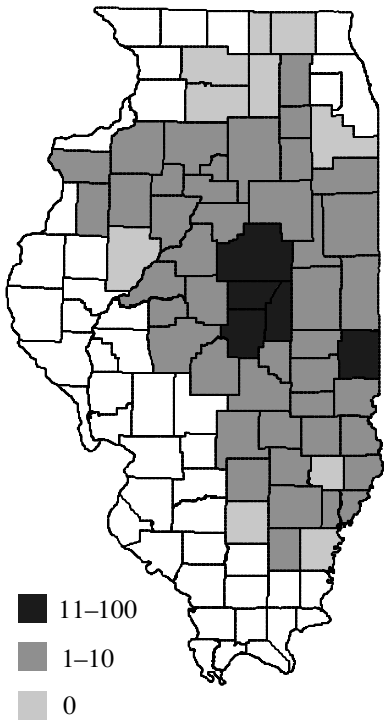

Figure 1. Grape colaspis adults per 100 sweeps, July–August 2000 (64 counties, 340 samples).

What do grape colaspis larvae look like?

The larva is 1/8 to 1/6 inch long; it is slightly curved (comma shaped); and it has a plump, white body with a tan head and prothoracic shield (the plate just behind the head). Its three pairs of legs are short. Bunches of hairs arise from bumps on the underside of the abdomen. In essence, they resemble miniature white grubs.

What do we know about their life cycle?

The grape colaspis completes only one generation per year in Illinois. It overwinters as a small larva in the soil 8 to 10 inches deep. Larvae become active early in the spring, feed on the roots of host plants, and complete their development from mid-June to early July. Pupation takes place in an earthen cell 2 to 3 inches below the soil surface. Adults emerge from the soil in July. Females lay eggs in the soil near host plants, including patches of smartweed and bull nettle. Eggs hatch in 7 to 14 days. Newly hatched larvae feed on roots during the latter part of summer and early fall.

Are any soil insecticides registered for control of grape colaspis larvae?

Regent 4SC is currently labeled for grape colaspis at a rate of 0.13 lb ai/acre. Capture 2EC is not registered for grape colaspis but may suppress the population at a rate of 0.3 oz per 1,000 ft of row.

Seed treatments are *not* labeled for control of grape colaspis larvae. The University of Illinois and the Illinois Natural History Survey are conducting insecticide efficacy trails again this year to evaluate their effectiveness in controlling grape colaspis. The results of last year's grape colaspis, white grub, and wireworm insecticide efficacy trials are available on the University of Illinois IPM web site. Menard County results are available at http://ipm.uiuc.edu/publications/evaluations/eval-2000/grape-colapsis.htm and results from Logan County are available at http://ipm.uiuc.edu/publications/evaluations/eval-2000/wireworm.htm.

So what can be done if grape colaspis larvae are causing significant stand reduction?

Rescue treatments probably would not be effective against grape colaspis larvae. Therefore, replanting is the only option in fields with significant stand reduction.—*Susan Ratcliffe and Kevin Steffey*

Southern Corn Leaf Beetles Found in Lots of Fields

In last week's *Bulletin* (issue no. 6, May 4, 2001), Mike Gray wrote an in-depth article about southern corn leaf beetles. We have received numerous reports about the presence of these interesting pests throughout southern, western, and west-central Illinois since our first report (*Bulletin* issue no. 5, April 27, 2001) of their presence, and they continue to cause significant damage in some fields throughout the affected area.

With black cutworms and other insect pests working in cornfields right now, proper diagnosis of the pest causing the damage is extremely important. The injury caused by southern corn leaf beetles can be confused with injury caused by cutworms. And as many of you already know, southern corn leaf beetles can be difficult to find. But keep looking if you're having trouble locating the source of the problem. If an insecticide is warranted, you will have to identify the pest correctly to choose the appropriate product.—*Kevin Steffey*

More European Corn Borer Moth Captures Reported in Southern Illinois

Ron Hines, senior research specialist, Dixon Springs Agricultural Center, reported the capture of 13 European corn borer moths in a pheromone trap on May 8. Additional moths were caught in other pheromone traps. Ron indicated that these captures represent the greatest weekly totals in the last 4 years for his trapping location. Does this mean the first generation of European corn borers may cause more problems than anticipated? I think it is too early to answer this question. We'll continue to offer weekly updates on the status of the 2001 European corn borer flight. Please let us know of the first sightings of European corn borer moths in central Illinois. We would like to track the emergence of these moths throughout the state. This will enable us to offer more accurate predictions regarding the optimum time for scouting efforts to begin.

Entomologists have developed a system to predict the occurrence of different life stages and activity of European corn borers throughout a growing season, based on the initial capture of moths in the spring. By using May 1 as the first flight date in southern Illinois, we can predict when eggs are likely to hatch, and more importantly, when stalk boring will begin. When 212 heat units (base 50°F) have accumulated from the first spring flight, we should expect that egg hatch has occurred and first-instar larvae are beginning to create pinholes on corn leaves. Second instars and shot-hole leaf feeding can be found when 318 heat units (base 50°F) have accumulated. Third instars and stalk boring can be observed when 435 heat units (base 50°F) have accumulated. Treatment decisions must be made prior to the stalk-boring event because larvae that have tunneled into stalks cannot be killed with rescue treatments. By late this week and certainly by early next week, we should begin to observe some egg masses on corn plants in southern Illinois and possibly even some first-instar larvae.

Prospects for survival are dim for first-generation borers that find themselves on small corn plants. Southern Illinois producers who planted corn in late March or early April should monitor fields that in essence will serve as trap crops for egg-laying corn borer moths. Corn plants that are small (less than 18 inches, extended leaf height) are less susceptible to corn borer injury. Corn borers that feed on corn less than 18 inches in height typically fail to establish. The explanation for this response is the presence of a plant compound commonly referred to as DIMBOA (2-4 dihydroxy-7-methoxy-1, 4-benzoxazin-3-one), which prevents larvae from establishing. As plants mature, the concentration of DIMBOA decreases. Larval survival is much better on corn plants that are in mid- to late-whorl stage of development. Please let us know when you first begin to observe egg masses in your respective areas of the state.—*Mike Gray*

Bean Leaf Beetles Will Converge on Early-Planted Soybean Fields

Bean leaf beetle adults can now be observed commonly throughout the state. Matt Montgomery, crop systems Extension unit educator, Sangamon/Menard Extension Unit, reported on April 27 that bean leaf beetles were easy to find in alfalfa. Similar sightings from other areas of the state have been reported. Dave Feltes, IPM educator, Quad Cites Extension Center, has observed bean leaf beetles in northwestern Illinois counties since early May. As seedling soybeans begin to emerge, don't be surprised if bean leaf beetle adults "swarm" into early-planted fields to "dine" on tender plants. The following questions and answers are intended to provide a brief review of the life cycle of bean leaf beetles and also to offer some insights on management strategies.

What's the best way to correctly identify bean leaf beetle adults?

Bean leaf beetle adults are about 1/4 inch long with considerable variation in color. The background color of most bean leaf beetles is light yellow to tan; however, some bean leaf beetles are green, and others are red. Their wing covers usually have four main black spots and stripes along the edges, but these markings may be absent. A black triangle is always present behind the "neck" region.

Where do bean leaf beetles spend the winter?

Bean leaf beetle adults overwinter throughout the Midwest primarily beneath leaf litter in woodlots surrounding soybean fields. Dr. Larry Pedigo, professor of entomology, Iowa State University, reports that approximately 80% of adults spend the winter in wooded areas, 20% beneath soybean residue in fields, and fewer than 1% in protected areas of alfalfa stands, cornfields, and other grassy areas. Bean leaf beetle adults become active in April and are commonly observed in stands of alfalfa. While in alfalfa, some feeding and egg laying takes place; however, bean leaf beetles are not considered of any economic importance to this crop.

When do bean leaf beetle adults abandon alfalfa?

As the first cutting of alfalfa is taking place and the earliest-planted soybean fields begin to emerge, bean leaf beetle adults leave alfalfa and colonize soybeans. Females that fly to soybean fields have typically mated already and have abdomens full of eggs. Females are capable of laying between 130 and 200 eggs in the upper 1 to 2 inches of the soil near soybean plants. The eggs hatch in about 1 week, and larvae feed on the roots and nodules of soybean plants. The larvae closely resemble corn rootworm grubs. This shouldn't be too much of a surprise since they belong to the same family of beetles (Chrysomelidae). Many folks the past few seasons have mistakenly assumed that corn rootworm

larvae were feeding on the roots of soybean plants. Although we know that western corn rootworm adults can feed on the leaves of soybean plants in east-central Illinois, the larvae are unable to utilize soybean roots as a food source.

Are bean leaf beetle larvae considered of any economic importance?

No, at least not directly. While feeding on roots and nodules, bean leaf beetle larvae molt three times during a 15- to 30-day period. The pupal stage requires an additional week, after which the second "flush" of adults begins to emerge in July.

How many generations of bean leaf beetles occur in Illinois?

In Illinois, we have two generations annually. The bean leaf beetle adults that emerge in July feed on soybean foliage, mate, and lay eggs to begin a second generation. Some entomologists consider the larvae of the second generation to have the most effect on soybean nodules. Adults of the second generation are common in late summer, densities peaking from late August to mid-September. In the north-central region of the United States, second-generation bean leaf adults do not mate in late summer or early fall. Adults of this generation feed on tender soybean leaves and pods and by early fall return to alfalfa. As cool fall temperatures become more common, adults begin to seek out suitable overwintering sites.

What are the suggested economic thresholds for bean leaf beetle adults on seedling soybeans?

We suggest that an insecticide treatment for seedling soybeans is rarely justified. Densities of 16 per foot of row in the early seedling stage or 39 per foot of row at stage V2+ are necessary before economic losses begin to accrue. Although rescue treatments are typically not needed for seedling soybeans, the following products are labeled for use: *Ambush (3.2 to 6.4 oz), *Asana XL (5.8 to 9.6 oz), dimethoate (see product label), *Lorsban 4E (1 to 2 pt), *Penncap-M (2 to 3 pt), *Pounce 3.2EC (2 to 4 oz), Sevin XLR Plus (1/2 to 1 qt), and *Warrior (1.92 to 3.2 oz). Products that are preceded by an asterisk are restricted for use to certified applicators. Please read and follow all product labels for more detailed application instructions.

Do bean leaf beetles vector the bean pod mottle virus?

Last year, Dr. Marlin Rice, Extension entomologist, Iowa State University, reported that the bean pod mottle virus was confirmed in several central and western Iowa counties. To date, the virus has primarily been of most concern to soybean producers in the southern United States. Soybean plants that are infected with the virus may have a mottled appearance and crinkled leaves, and some may be stunted. Plants with these symptoms may be misdiagnosed as injured by herbicide drift or infected with soybean mosaic virus. Dr. Rice indicated that bean leaf beetles are considered the most important vector of bean pod mottle virus in Iowa. However, he indicated that uncertainty remains regarding when the virus is vectored to soybean plants by bean leaf beetle adults. Apparently, earlier infections are associated with the greatest potential yield reductions. Until more is learned about the relationship between bean leaf beetles and transmission of this virus, we cannot offer firm management recommendations.—*Mike Gray and Kevin Steffey*

First Soybean Aphids of the Season in Illinois

Plenty of people from the University of Illinois and the Illinois Natural History Survey have been searching for soybean aphids that overwintered on buckthorn, *Rhamnus* species. Until recently, no one had found the little critters. However, David Onstad, associate professor in the Department of Natural Resources and Environmental Sciences, found two soybean aphids on a *Rhamnus* shrub in Kane County on May 7, 2001. His discovery answers one of the burning questions about this pest: Will soybean aphids survive the winter in Illinois?

Now the watch begins. David's finding only two aphids doesn't mean that soybean aphids will become problematic in soybeans again this year. However, knowing that they're still present in the state at least gives us a "heads up."

In issue no. 1 (March 16, 2001) of the *Bulletin*, I mentioned that we would establish a network of suction traps to determine when soybean aphids begin flying from buckthorn to soybean. On May 8, one trap was erected at the University of Illinois Crop Sciences Research and Education Center (South Farm). The trap is approximately 25 feet tall and will sample flying aphids within a 30-mile radius. (Not all of them, mind you. What an incredible control tool that would be.) During the next couple of weeks, a crew of people from Urbana–Champaign will be erecting suction traps at six additional locations: Freeport (Stephenson County), DeKalb (DeKalb County), Monmouth (Warren County), Perry (Pike County), Brownstown (Fayette County), and Dixon Springs (Pope County). The suction traps in the northern locations will be erected first.

The cooperator at each site will retrieve the collection bottle at the base of the trap once each week and send it to David Voegtlin, aphid specialist at the Illinois Natural History Survey. He and his coworkers will sort through the samples looking for soybean aphids. We will begin reporting captures of flying soybean aphids as soon as we receive them in the collections. The data will be reported on a page (currently under construction) at the IPM Web site; this data-reporting page will be available within a couple of weeks. Also, as the season progresses, we will pick up reports about soybean aphids throughout the Midwest and keep you informed.

Again, we have no idea whether soybean aphids will be prevalent or scarce

in Illinois and elsewhere this summer. However, a lot of people are watching the situation very carefully, so you will know what we learn as quickly as we can get the information out.—*Kevin Steffey*

Alfalfa Weevils and Biological Control Agents

By now we have reported the status of alfalfa weevils throughout the state for several weeks in the *Bulletin*. The weevils have done their damage to the first crop in southern Illinois, have caused significant damage to the first crop in some fields in central and western Illinois, and currently are present and causing injury in northern counties. Matt Montgomery, Extension unit educator in crop systems, Springfield, and Mike Roegge, Extension unit educator in crop systems, Quincy, have reported that damage in some fields in their areas was extensive and that insecticide applications have been ongoing for at least a couple of weeks. Russ Higgins, IPM educator, Matteson Extension Center, Will County, found as many as six larvae per stem and "major defoliation" in a field in Grundy County on May 6. All of these folks indicated that many growers were caught by surprise, as if the alfalfa weevil larvae appeared overnight. Obviously this underlines the importance of early and frequent scouting.

Figure 2 shows the accumulated degree-days (base 48°F) from January 1 through May 7, 2001. Figure 3 shows projected degree-day accumulations (base 48°F) from January 1 through May 21. Based on Figure 1 and field observations, alfalfa weevils are well into their business throughout northern Illinois, so we will cease printing the degree-day maps. As always, our hats are off to Bob Scott with the Illinois State Water Survey, who diligently produces these maps (and others) for us throughout the spring. Thanks, Bob.

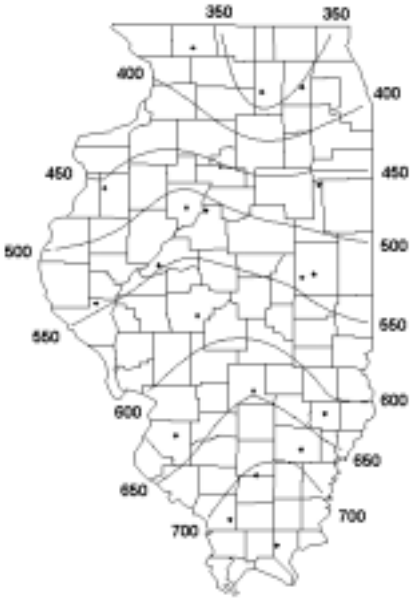

Figure 2. Actual degree-day accumulations (48°F) from January 1 through May 7, 2001. (Map courtesy of Bob Scott, Illinois State Water Survey.)

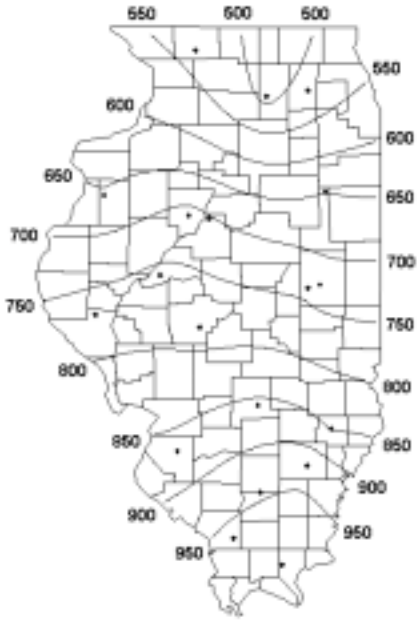

Figure 3. Projected degree-day accumulations (48°F) from January 1 through May 21, 2001. (Map courtesy of Bob Scott, Illinois State Water Survey.)

As alfalfa producers in central and northern Illinois continue or begin to contend with alfalfa weevil larvae in the first crop, producers who have made the first cutting need to watch the regrowth carefully. Both fully grown larvae and adults feed on the buds of regrowing alfalfa and delay "greenup." Damage to regrowing alfalfa can significantly reduce dry-matter yield by stunting growth. To determine whether the regrowth will be affected economically, count alfalfa weevil larvae and adults from five randomly selected square-foot samples in a field. If the alfalfa stubble has been completely defoliated for 3 to 5 days, or you observe 50% defoliation on 30 to 50 stems samples, or you find four to eight larvae and/or adults per square foot, an insecticide to prevent further damage is warranted. Use the lower thresholds if alfalfa is drought stressed and control costs are low; use the higher thresholds if rainfall is abundant and control costs are high. Don't treat if 50% of the larvae are dying from disease. Insecticides suggested for control of alfalfa weevils and preharvest intervals for insecticides were presented in *Bulletin* issues no. 3 (April 13, 2001) and no. 5 (April 27, 2001), respectively.

Biological control agents have been active throughout southern and central Illinois, but unfortunately, they usually have made their presence known after the alfalfa weevils had caused significant damage. Nevertheless, watching for evidence of the fungal disease organism *Zoophthora phytonomi* and parasitic wasps, *Bathyplectes* species, is important if you are scouting for weevils. A *Bathyplectes* cocoon typically is oval and brown with a distinct light-colored equatorial band, encasing the pupal stage of the parasitoid as it changes from a larva to an adult. The parasitoid larva finishes feeding within the alfalfa weevil larvae and emerges from the dead host to construct its cocoon inside the weevil's cocoon.

During his forays in alfalfa fields, Matt Montgomery also found some pea aphid mummies—dead aphids from which parasitoids had emerged. The globular, somewhat copper-colored aphid mummies are additional evidence that biological control agents are at work. And in the case of pea aphids, parasitoids, predators, and pathogens almost always combine to keep the numbers of aphids below economic levels. So natural biological control can and does work for some of our potential pests in Illinois.

Alfalfa weevils will be present in some stage of development in most of Illinois throughout May, so keep your eye on them. However, as temperatures increase, the adults eventually leave alfalfa fields seeking shelter from the heat. The adults won't return to the alfalfa fields until the fall to begin the cycle all over again.—*Kevin Steffey*

Potato Leafhoppers Can Be Found Statewide

On May 2, Dave Feltes, IPM educator, Quad Cities Extension Center, reported his first observations of potato leafhoppers for the 2001 growing season. His observations are 3 weeks earlier than last year. Because potato leafhoppers will remain for the duration of the growing season, they have a longer period of opportunity in 2001 to create challenges for alfalfa producers. Potato leafhoppers not only reduce yields but they also may have a significant negative effect on the nutritional quality of hay and also may impair the vigor of a stand. Growers should begin scouting alfalfa fields now and at least on a weekly basis throughout the growing season. Potato leafhoppers will be with us through the first several hard frosts.

What do potato leafhoppers look like?

Adult potato leafhoppers are lime-green, wedge-shaped insects approximately 1/8 of an inch in length. Adults have fully developed wings and are very active fliers. The nymphs, smaller versions of the adults, are yellowish green and lack wings. When disturbed, the nymphs move sideways or backwards ("crablike" movements).

What kind of life cycle do leafhoppers have?

Potato leafhoppers do not overwinter in Illinois. Instead, they migrate northward from southern states assisted by wind currents. Soon after their arrival in the Midwest, the females begin to lay eggs in stems and larger leaf veins. The eggs hatch in 6 to 9 days into nymphs. Multiple generations are accomplished throughout the summer, with leafhoppers persisting until cooler fall temperatures return.

How do leafhoppers injure plants?

Potato leafhoppers suck fluids from alfalfa plants with their piercing–sucking mouthparts. They inject saliva that contains a compound toxic to plants. In addition, their feeding clogs the conductive tissue of plants, resulting in an accumulation of starches. This accumulation causes a relative nitrogen deficiency resulting in yellowing or injured leaves. Most people notice the first symptom of potato leafhopper injury as a V-shaped yellowing at the tips of the leaflets, commonly referred to as "hopperburn" or "tipburn." As injury progresses, the leaves may turn purple or brown and then die. Severely injured plants also are stunted and bushy in appearance because the internodes stop growing normally.

What's the best way to scout for potato leafhoppers?

Invest in a sweep net. A 15-inch (diameter) sweep net is a valuable insect sampling tool for alfalfa producers. Static treatment thresholds are based on the number of leafhoppers per sweep of the net. The threshold increases as alfalfa grows and becomes more tolerant to leafhopper feeding: 0.2 per sweep on stubble (up to 3 inches), 0.5 per sweep on 3- to 6-inch alfalfa, 1.0 per sweep on 6- to 12-inch alfalfa, and 2.0 or more per sweep on plants 12 inches or taller. The sweep net should be swung like a broom through the top 4 to 6 inches of growth. Each thrust with the net is a sweep. Take 20 sweeps per location in 5 to 10 sites within the field if the alfalfa is taller than 4 inches. If the alfalfa is shorter than 4 inches, more sweeps are required for a precise sample estimate. Count the number of leafhoppers caught in the net and divide by the number of sweeps taken. If the number exceeds suggested treatment thresholds, an insecticide application may be warranted.

Entomologists with Iowa State University suggest that economic thresholds need not depend on plant height. Table 1 provides some economic thresholds for your consideration based on crop value, control costs, and leafhopper densities. In general, these thresholds are less conservative than those (based on plant height) mentioned previously for shorter plants

Table 1. Economic thresholds for potato leafhoppers (numbers per sweep) at different crop values and control costs (from Iowa State University).

Crop value ($ per ton)	*Insecticide cost—$6 per acre*	*Insecticide cost—$8 per acre*	*Insecticide cost—$10 per acre*
$50	1.3	1.5	1.8
$75	1.2	1.1	1.3
$100	0.8	0.9	1.1
$125	0.7	0.8	0.9

and more conservative for taller (12 inches or more) stands.

Insecticides suggested for control of potato leafhoppers in alfalfa include the following: *Ambush (3.2 to 12.8 oz product per acre), *Baythroid 2 (0.8 to 1.6 oz product per acre), dimethoate (see product label), Imidan 70W (1 to 1-1/3 pounds product per acre), *Lorsban 4E (1/2 to 1 pt product per acre), *Pounce 3.2EC (4 to 8 oz product per acre), Sevin XLR Plus (1 qt product per acre), and *Warrior (1.92 to 3.2 oz product per acre). Those products preceded by an asterisk may be applied only by a certified applicator. Please follow all label directions and precautions.—*Mike Gray*

Alfalfa Blotch Leafminer Confirmed in Will County

During the past 3 years or so, we have addressed the alfalfa blotch leafminer in some issues of the *Bulletin*. The alfalfa blotch leafminer was first introduced into North America (Massachusetts) in 1968, but it's a relative newcomer to the Midwest. Experts believe the leafminer was introduced into Minnesota from Canada in 1994. Between 1994 and 1997, the leafminer spread throughout Minnesota and Wisconsin and was detected in two counties in Illinois—McHenry and Lake. Since that time, we have not learned much more about this introduced pest.

In 2001, Jon Lundgren, a Ph.D. candidate with Rob Wiedenmann, biological control specialist in the Center for Economic Entomology at the Illinois Natural History Survey, initiated a survey effort to see whether the alfalfa blotch leafminer still is present in Illinois and, if so, where it occurs. David Feltes, IPM educator, Quad Cities Extension Center; Jim Morrison, crop systems educator, Rockford Extension Center; and I are helping Jon with the survey effort. During the week of April 30 and continuing into the week of May 7, we started surveying all counties north of I-80 (except Cook and DuPage), including those counties through which I-80 passes: JoDaviess, Stephenson, Winnebago, Boone, McHenry, Lake, Carroll, Ogle, DeKalb, Kane, Whiteside, Lee, Rock Island, Henry, Bureau, LaSalle, Kendall, Grundy, and Will. Although we have not completed the survey, Jon has confirmed finding adult alfalfa blotch leafminers (four per 100 sweeps) and a little pinhole injury in a field in Will County. He also believes he may have collected the primary parasitoid, *Dacnusa dryas*, in Will County.

Jon has a lot of samples to examine, but I thought that the initial finding was worth mentioning. There's nothing to become terribly excited about, but it is noteworthy that the pest has found its way farther south into Illinois than its original occurrence. We probably will extend our survey efforts south of Will County to determine its current distribution in Illinois.

The alfalfa blotch leafminer is capable of becoming an economic problem, although the presence of natural enemies often keeps leafminer densities below economic levels. Knowing that it is present in Illinois alfalfa now, even in low numbers, will enable us to mount an educational campaign to alert producers and others about what to look for and when.

I will provide updates of our findings in future issues of the *Bulletin*.—*Kevin Steffey*

PLANT DISEASES

Virus Disease Risk in Early-Emerged Soybeans

In east-central Illinois, the earliest-planted soybeans are emerging well and are big enough that rows can be distinguished. The first pest customer for early-emerged soybeans, seedling blights aside, is the bean leaf beetle (BLB). The bean leaf beetle overwinters as an adult and has been waiting not so patiently for the soybeans to emerge. Why not just let the entomologists write about bean leaf beetle? Well, many pest species interact to cause larger problems than they would singly. BLB is one such pest. It not only causes physical damage to the plant by feasting on the leaves but can also transmit a viral plant disease called bean pod mottle virus (BPMV). First-emerged soybean fields are at a greater risk of BLB feeding than later-emerged fields. Consequently these fields are at greater risk of being infected with BPMV.

The disease: Bean pod mottle virus (BPMV) is not a new disease to Illinois and has been present in many of the southern soybean-growing states for many years. Infection by BPMV can cause losses of 10 to 17% but can become even more significant if dually infected with soybean mosaic virus (SMV), where losses can approach 60%. Losses are greater when the plants are infected with BPMV in the seedling stage. Plants infected with BPMV have a higher incidence of other seed diseases as well.

The symptoms: The disease causes a mottling and distortion of leaves in the upper canopy of the plant during periods of rapid growth and cooler temperatures. Another symptom that can be exhibited by BPMV-infected plants is "green stems," after the plant matures. However, not all BPMV-infected plants exhibit the green-stem symptom. Plants may also exhibit death of new terminal leaf growth. Seeds of BPMV-infected plants may have a very light purplish discoloration of their seed coat. BPMV natural and experimental host range is limited to three families of legumes. Its natural host range of concern to producers is soybean and green bean.

The transmission: BPMV is a sap-transmitted virus. Several beetles can move the infective sap around to spread the virus disease, the most prevalent being *Cerotoma trifurcata* (bean leaf beetle). Other beetles can transmit the virus including *Colaspis brunnea* (grape colaspis), *C. lata, Diabrotica balteata* (banded cucumber beetle), *D. umdecimpunctata howardi*

(southern corn rootworm beetle), and *Epicauta vittata* (striped blister beetle). It can be mechanically, graft, and seed transmitted in a very low (0.1%) percentage.

Some added confusion: Well, at first glance, this seems to be a pretty straightforward disease. It has fairly recognizable leaf and seed symptoms, is transmitted by beetles that spread infective sap from plant to plant because of their messy eating habits, and seems to be increasing in frequency. So what's the confusion? Well, the confusion is introduced because of the "green stem" symptom that can be exhibited by this disease. There is a syndrome in soybean called "green stem syndrome." The syndrome has been accredited to any number of potential causes, including genetic mutants, BPMV infection, male sterility, and low potassium soils. The message on "green stem syndrome" is that at this point we don't have a complete explanation of what may actually cause it. Research so far indicates that while BMPV can cause a green stem symptom, it doesn't always. Also, while it is known that the bean leaf beetle can transmit BPMV, it is not the only vector, and the association is not thoroughly understood.

Management: So what about management? First, determine what you are trying to manage. You'll find this isn't easy. Are you trying to manage BPMV? Green stem syndrome? Bean leaf beetle? Some or all of these things? If you think you have virus infection, do you even know that's what may be causing the foliar or stem symptoms? You won't know for sure unless you have the tissue tested. As with most of our field viruses, you can send a sample to Agdia for virus testing to find out.

What should you do about the bean leaf beetle? Should you spray to reduce the possibility of transmission of BPMV? Well, there is no definitive answer to this. However, I can draw on experience with other virus diseases that have insect vectors that are present throughout the growing season (for example, barley yellow dwarf virus transmitted by aphids) and make the observation that spraying for a vector that is present throughout the growing season to reduce virus transmission is a *very ineffective* method of reducing virus disease. And, of course, if the only symptom you get is green stem and no foliar symptoms, the question of spraying is moot because the season is over. If you want to spray for bean leaf beetle, do it because the percent defoliation from the beetle has reached the threshold for treatment.

Many questions remain to be answered about the role of bean leaf beetle and other beetles in the transmission of BPMV and what the cause of green stem syndrome might be. Stay tuned.—*Suzanne Bissonnette*

WEEDS

Hophornbeam Copperleaf

We have previously described the biology and management options for several problematic weed species encountered by Illinois soybean and corn producers. The next weed species in this series is hophornbeam copperleaf *(Acalypha ostryifolia)*. Hophornbeam copperleaf is a summer annual species in the Euphorbiaceae family. This plant family, also referred to as the Spurge family, includes several other problematic weed species, many of which have a milky sap. Hophornbeam copperleaf, however, does not contain the characteristic milky sap of other Euphorbiaceae family members. It is indigenous to Illinois and most commonly found in the southern third of the state. Over the past 5 years, however, we have identified populations in cornfields and soybean fields progressively farther north in the state, and in 2000 we identified a population as far north as Tazewell County. Several other copperleaf species can be found in Illinois, and while most of these other species are not generally considered problematic in agronomic production systems, Virginia copperleaf *(Acalypha virginica)* can be a troublesome weed species in southern Illinois.

Hophornbeam Copperleaf Morphology and Biology

Hophornbeam copperleaf has pubescent cotyledons and true leaves with short hairs and finely toothed (serrated) margins. The leaves are simple and alternate and somewhat heart-shaped at the base. Additionally, a reddish coloration is often observed where the main leaf vein intersects the petiole. Hophornbeam copperleaf may sometimes be misidentified (especially during early vegetative development) as prickly sida *(Sida spinosa)*. The leaf margins of prickly sida are more coarsely serrated than those of hophornbeam copperleaf, and hophornbeam copperleaf does not have the small stipules (spines) in the leaf axils like prickly sida.

Hophornbeam copperleaf is monoecious (male and female flowers on the same plant), with staminate (male) flowers produced on axillary spikes and pistillate (female) flowers produced on a long, terminal spike. Seed pods of hophornbeam copperleaf are dehiscent (pods split open at maturity to release seed), and seeds appear to require warm temperatures for germination. A warm soil temperature germination requirement may suggest that this species is able to germinate and emerge later during the growing season. Emergence can begin in late May or early June and may continue for most of the remaining growing season. Additional flushes of hophornbeam copperleaf frequently appear following precipitation. A recently published experiment reported the average seed production of hophornbeam copperleaf plants growing alone (without competition) was approximately 12,518 seeds per plant, much greater than the average seed production (980 seeds per plant) when grown with soybean.

Hophornbeam Copperleaf Control

In general, DNA herbicides do not control hophornbeam copperleaf, and

response to ALS-inhibiting herbicides is variable. We initiated a field research experiment in 2000 to evaluate several soil-applied and postemergence soybean herbicides for hophornbeam copperleaf control. Results from the experiment appear in Tables 2 and 3. Six weeks after preemergence application, all rates of Authority, FirstRate, and Boundary provided good-to-excellent control, while most other soil-applied herbicides provided poor control (Table 2). Postemergence control was good to excellent with all rates of glyphosate and the high rate of Cobra and Flexstar (Table 3). Soybean injury can be a concern with Cobra, and loss of soybean leaves, coupled with precipitation and the later-emergence pattern of hophornbeam copperleaf, in some instances may allow additional hophornbeam copperleaf growth to occur.

Data on corn herbicides for hophornbeam copperleaf control are very limited. Atrazine, in previous work from Oklahoma State University in 1971, performed well, but present-day application rates may not provide sufficient residual control for a species that can emerge late in the growing season. Postemergence applications of atrazine and crop oil may also provide control, but again, application-timing restrictions may reduce the effectiveness of this treatment.

This season, we have again initiated field research to examine the effectiveness of several soybean and corn herbicides for hophornbeam copperleaf control. These experiments are located in Edgar, Macon, and Tazewell counties on producer fields with a history of hophornbeam copperleaf infestations. Preemergence and postemergence corn and soybean herbicide treatments will be evaluated to determine which of those products can provide effective hophornbeam copperleaf control. In addition to herbicide efficacy experiments, we also plan to conduct several biology/ecology experiments to help elucidate the growth characteristics of this species.—*Aaron Hager and Christy Sprague*

CROP DEVELOPMENT

Sidedress N Application

From a plant-growth viewpoint, sidedressing is the ideal time for N application. However, if not done correctly, it can cause seedling injury. If the corn has emerged and is still small enough that you can use conventional equipment, the choices in rank order are:

- Inject anhydrous ammonia or UAN solutions
- Broadcast ammonium nitrate or ammonium sulfate
- Broadcast urea
- Dribble UAN solutions between the row
- Broadcast UAN solutions

The first two will clearly be the most effective and safest techniques to use. Broadcast urea and dribble UAN (assuming that the dribble hoses do not go over the top of the row) will not damage the crop, but as with any nonincorporated urea treatment, they

Table 2. Hophornbeam copperleaf control from preemergence soybean herbicides, Tazewell County, 2000.

		Soybean injury	*Copperleaf control (weeks after application)*	
		4 weeks	*4 weeks*	*6 weeks*
Herbicide	*Rate (product/acre)*	--------(%)--------	----------(%)----------	
Authority 75DF	2 ounces	0	97	99
Authority 75DF	4 ounces	6	99	99
Authority 75DF	5.3 ounces	5	99	99
FirstRate 84WG	0.6 ounce	0	88	90
Steel 2.59EC	3 pints	5	40	30
Boundary 7.8L	2.25 pints	1	91	88
Command 3ME	2 pints	0	65	30
Python 80WG	0.8 ounce	1	20	10
Python + Sencor 75DF	0.8 ounce + 4 ounces	2	88	73
Valor 51WDG	2 ounces	5	90	50
Valor 51WDG	2.5 ounces	8	93	77
LSD $_{(0.05)}$		**2**	**3**	**3**

Table 3. Hophornbeam copperleaf control 10 days after postemergence soybean herbicide application, Tazewell County, 2000.

		Soybean injury	*Copperleaf control*
Herbicide	*Rate (product/acre)*	---------*(%)*---------	---------*(%)*---------
Roundup Ultra 3L	1 pint	0	93
Roundup Ultra 3L	1.5 pints	0	95
Roundup Ultra 3L	2 pints	0	95
Cobra 2EC	4 fluid ounces	20	87
Cobra 2EC	6 fluid ounces	30	90
Flexstar 1.88ME	10 fluid ounces	13	70
Flexstar 1.88ME	20 fluid ounces	25	88
Blazer 2SL	8 fluid ounces	10	68
Blazer 2SL	16 fluid ounces	15	83
LSD $_{(0.05)}$		**2**	**4**

have the risk of N loss from volatilization. Broadcast UAN solutions have the dual risk of volatilization as well as plant injury.

Minnesota research reported slight to moderate leaf burn and stunting of early-season growth from the broadcast application of UAN at the V3 stage of growth at rates of 60 and 90 lb N/acre and severe burn with 120 lb N/acre. In this research, the early-season stunting did not translate into a yield reduction at harvest. However, one always needs to keep in mind that other environmental stresses, such as cold temperature, excessive precipitation, dry soils, and so on, in combination with the fertilizer injury could cause yield reduction.

Inclusion of atrazine at the rate of 2 lb/acre with the UAN treatments enhanced the leaf burn and stunting and resulted in significant yield reduction when the N rate exceeded 90 lb N/acre with the atrazine.

If fertilizer and herbicide need to be applied to corn that has emerged, the choices in rank order are:

- Apply a herbicide that is labeled for postemergence application, using water as the carrier, and then wait 5 to 7 days (check the label for the herbicide to see how soon tillage can be done after application) before injecting UAN or ammonia.
- Apply a herbicide that is labeled for postemergence application, using water as the carrier, and then broadcast ammonium nitrate or dry ammonium sulfate.
- Apply a herbicide that is labeled for postemergence application, using water as the carrier, and then broadcast urea.

Do not use a fluid fertilizer (including UAN solution) as the carrier when applying herbicides after corn emergence.—*Robert Hoeft*

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.

Northern Illinois

In most areas of northern Illinois, more than 90% of the corn acreage has been planted. Far northwest Illinois is the only exception, with 65% of the corn acres planted due to rainfall late last week, ranging from 1 to 3 inches. Soybean planting may be approaching 50% or more in most areas.

Russ Higgins, IPM Extension educator, reported economic damage by alfalfa weevil larvae in a Grundy County alfalfa field over the weekend. Alfalfa weevil larvae have been observed early this week throughout northern Illinois, but most have been below threshold. Populations may change after another week of accumulated degree-days.

Bean leaf beetles have been found in alfalfa fields; therefore, early-planted soybeans should be scouted at emergence.

Southern Ilinois

Dry weather continues in southern Illinois. Approximately 0.2 to 0.5 inch of precipitation was received May 6 and 7, but dust is again flying. Windy conditions over the past week have also accelerated drying and have made spray applications difficult.

Wheat is GS 10.5 (flowering) and relatively disease free. In the few fields that have not been sprayed or tilled, little barley, *Hordeum pusillum,* is fully headed.

Southern corn leaf beetle pressure is heavy in some cornfields. Japanese beetle larvae have been found feeding on corn roots. Dixon Springs reports heavy true armyworm feeding in grass hay fields. European corn borer moths continue to fly. Significant bird damage to emerging corn has been observed.

West-Central Illinois

Rain was scattered throughout most of the region. Amounts reported ranged from a trace to 1 inch or more. As a result, soybean planting will resume.

Almost all corn is planted. Some is in V4 stage and growing very rapidly. Stands are excellent in most fields.

Corn problems reported include cutworms, grubs, and flea beetles. Fourth-instar cutworm larvae have been found in Logan County, and some corn was replanted in Montgomery County because of white grubs. Postemergence herbicide applications are needed in some fields. Pokeweed and other weeds are developing quickly in no-till fields.

Some soybeans have emerged and already show signs of bean leaf beetle injury. Many fields will emerge very soon.

Wheat is in the heading stages. So far there have been no reports of significant disease problems. Producers should scout their fields periodically for armyworm and other insects.

Alfalfa weevil injury has been severe in some fields. If not treated before harvest, some fields may have to be treated after harvest if it does not green up in a few days. Some producers were able to harvest first cutting without rain.

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