

PEST MANAGEMENT & CROP DEVELOPMENT

BULLETIN

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Also in This Issue

- Update on Heat Unit Accumulations for Corn Rootworm Larval Hatch, 102
- Prime Time for Stalk Borers, 102
- Bean Pod Mottle Virus in Illinois, 103
- Estimating Nitrogen Loss, 104
- Regional Reports, 106

University of Illinois Weed Science Field Days

We invite you to attend the annual University of Illinois Weed Science Field Day, to be held at the Crop Sciences Research and Education Center (CSREC) on June 25. The CSREC is located just south of St. Mary's Road in Urbana. Registration begins at 7:30 a.m., with the field tour kicking off at 8:30 a.m. The tour will provide ample opportunity to look at research plots and participate in some short field presentations (be sure to bring a hat and sunscreen!). Participants can compare their favorite corn and soybean herbicide programs to other commercial programs; get an "early" look at some new herbicides; evaluate some new programs (such as fall-applied herbicide programs); and interact with weed science faculty, staff, and graduate students. The tour ends with lunch at 12:00 noon. Registration for the Weed Science Field Day tour is \$15 per person, which includes a tour booklet and a lunch ticket.

If you are unable to attend the field day in Urbana, a twilight tour will be given on Wednesday, July 9 at the Northern Illinois Research and Education Center near DeKalb. The tour is free, and registration will begin at 5:00 p.m. If you have any questions or would like additional information, please call (217)333-4424.—*Christy Sprague and Aaron Hager*

INSECTS

Synopsis of Insects in Field Crops

Reports of insect problems by telephone and e-mail have been relatively infrequent in offices during the past couple of weeks. It's been fairly quiet. We suspect that a lot of people are assessing corn stands, planting soybeans, monitoring wheat fields, and cutting alfalfa. We seem to be in a lull period for insects in most of these crops, but some problems (current or potential) are worth considering.

Corn

Corn rootworms and stalk borers are discussed in other articles in this issue of the *Bulletin*. Other insects to watch for or be prepared for at this time of year are secondary insect pests, black cutworm, and European corn borer.

Secondary insects. After some initial reports of injury caused by white grubs and wireworms, not much has been reported regarding these perennial insect pests. Some replanting has been necessary, but an overall assessment of these pests is that they have caused fewer problems in 2003 than they have during the preceding 3 or 4 years. Maybe the increased use of insecticidal seed treatments has provided some benefit. However, that's difficult to assess without surveys or studies designed to ascertain the prevalence of the pests and the impact of seed treatments and soil insecticides.

Reports of southern corn leaf beetle activity continue to trickle in, and some fields have been damaged fairly severely. In addition to their usual leaf feeding, some of the beetles have chewed into stems and killed the plants outright. This is an insect sorely in need of some research effort. The thresholds being used in the field are based solely on best guesses, and management options have not been well defined.

Black cutworm. We kept you apprised of the moth flights this spring, but not many people have experienced economic levels of black cutworm damage. Remember that intense captures of adults in pheromone traps do not necessarily result in economic infestations of larvae. Black cutworm larvae may not have survived well with the cool, wet weather that has prevailed. Nevertheless, for those growers who have not planted corn yet because of wet soils, black cutworms remain a threat. Late-planted corn almost always is more susceptible to black cutworm infestation than early-planted corn.

European corn borer. Based on captures of adult European corn borers in traps in Massac, Pope, and Pulaski counties (see the Hines Report at http://www.ipm.uiuc.edu/pubs/hines_report/index.html), peak moth flight in southern Illinois appears to have occurred during the week ending May 20. Many fewer moths were captured at all four locations during the week ending May 27. Consequently, females undoubtedly have been laying eggs in southern counties, and larvae should be evident in plants tall enough to support them. Remember, corn borer larvae typically do not become established on corn younger than the 6-leaf stage. We have received no information about European corn borers elsewhere in Illinois, but it's likely that moths have emerged or soon will emerge in central counties. Keep your eyes open. The numbers of overwintering larvae were quite high in an area roughly from counties near St. Louis northeast into central Illinois. Refer to the article titled "The 2002 Survey for Second-Generation European Corn Borers in Illinois Is Complete" in issue no. 24 (November 1, 2002) of the *Bulletin* for a refresher about overwintering corn borers.

Soybeans

Bean leaf beetle. After a flurry of reports of bean leaf beetles feeding on soybeans a couple of weeks ago, all has become rather quiet. Many soybean fields remain to be planted, and

the later soybeans are planted, the potential for infestations later in the season is reduced. This also would reduce the potential for bean leaf beetles to spread the bean pod mottle virus. Very shortly, the bean leaf beetles that are present now will have finished feeding, deposited their eggs, and died. First-generation adults will appear in about a month.

Wheat

Armyworm. As we indicated in articles in previous issues of the *Bulletin*, captures of armyworm moths have occurred throughout the spring. However, their numbers have not been alarming, and thus far, no one has reported finding significant numbers of armyworms in wheat fields. Keep looking, and let us know if you find any injury worth reporting.

Cereal leaf beetle. Entomologists at the University of Missouri have reported finding low to moderate numbers of adults and larvae in wheat fields throughout the state, so you should add these pests to your list as you scout for armyworms. Cereal leaf beetles rarely cause economic damage to wheat in Illinois, but extensive feeding on flag leaves by the larvae can threaten yield. Look for small, brown globs on the leaves. What appears to be drops of mud may be cereal leaf beetle larvae covered in their own fecal material, a protection against predators and parasitoids. (Think about it. Would you eat them?) Underneath the fecal material, cereal leaf beetle larvae are yellow. The adults are colorful metallic blue and orange insects, but they usually cause no economic damage in wheat. Treatment of wheat may be warranted if you find one or more cereal leaf beetle larvae per plant.

Alfalfa

Potato leafhopper. The cool, wet weather has slowed the drying of the first cutting of hay, especially in southern counties. Consequently, not many people have focused on scouting for potato leafhoppers. However, numbers of leafhoppers in northern

counties, reported by Jim Morrison, Extension crop systems educator in Rockford, have been worth noting. He found slightly fewer than one leafhopper per sweep in a field in Lee County on May 22. The plants were at the bud stage and were 26 inches tall. The field was cut that day, so it's possible that numbers of leafhoppers will build back up to threatening levels soon. However, the cool temperatures have slowed leafhopper development. In addition, leafhopper injury usually is more prevalent when the weather is hot and dry. The threat posed by potato leafhoppers is minimal right now, but a change in weather conditions could bring them to our attention again.

Stay in touch. We are always thankful for your reports.—*Kevin Steffey*

Update on Heat Unit Accumulations for Corn Rootworm Larval Hatch

Soil heat unit accumulations (base 52°) at the 4-inch level, from January 1 through May 26, 2003 (Figure 1), indicate that the corn rootworm larval hatch should be well under way throughout central Illinois counties. After 380 to 426 soil heat units have accumulated, from January 1, approximately 50% of corn rootworm larvae should have hatched. I do not anticipate reports of larval hatch in northern Illinois counties until sometime toward the end of the first week of June. A conversation with John Obermeyer, Purdue University entomologist, indicated that the hatch has yet to be confirmed in Indiana. However, he anticipates this event will occur within the next few days.—*Mike Gray*

Prime Time for Stalk Borers

Although we have not received many reports of stalk borer activity in corn, it's prime time for stalk borer larvae to be moving from small weed hosts into corn plants along field margins. At this time of year, we cease producing maps of accumulated degree-days for virtu-

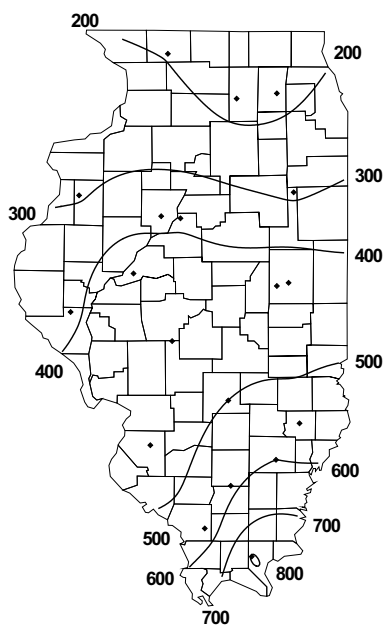


Figure 1. Actual soil degree-day accumulations (base 52°F) at the 4-inch level, from January 1 through May 26, 2003. (Map courtesy of Bob Scott, Illinois State Water Survey.)

ally all insects that attack field crops. However, based on last week's accumulated degree-days above a base temperature of 41°F, we anticipate that stalk borers, if present, can be found in corn plants almost anywhere in Illinois right now.

As with most insect pests of field crops, scouting is essential for determining whether management of stalk borers is necessary. As the small larvae move from weed hosts into corn plants along field edges, you'll begin to notice symptoms of their feeding inside the stems—ragged leaves, stunting, and/or wilting. If a stalk borer larva kills the growing point of a plant, the plant may exhibit “dead heart”—the center leaves wilt and die. After the stalk borer kills a small corn plant, it moves into a nearby healthy plant. If you observe plants that have symptoms of stalk borer injury, dissect the stem to find the relatively small borer. The striking striped pattern, the purple “saddle” midway along the body, and the yellow head are identifying characteristics of stalk borer larvae.

The key to managing stalk borers is to anticipate their movement into the rows bordering grassy areas and to treat before many of the borers have caused enough damage to kill plants. The larvae are difficult to kill after they have bored into corn stalks. Remember that dispersal of stalk borer larvae (generally fifth to seventh instars) from weed hosts begins when approximately 1,100 degree-days (base 41°F) have accumulated since January 1. You should make a decision whether treatment is necessary after approximately 1,400 to 1,700 degree-days have accumulated since January 1.

The article “Update on Stalk Borer Development and Management Tips” in issue no. 8 (May 16, 2003) of the *Bulletin* includes more details about control of stalk borers, including a list of suggested insecticides. Keep the information handy during the next couple of weeks, when stalk borers probably will cause the most damage.—Kevin Steffey

PLANT DISEASES

Bean Pod Mottle Virus in Illinois

Based on recent surveys in Illinois, bean pod mottle virus (BPMV) appears to be the state's most common soybean virus. BPMV was first reported in Illinois in 1975 and now occurs across the state. Many soybean producers, especially those involved with food-grade soybean and seed production, are concerned about this virus and the effects it may have on crop quality and yield in 2003. In the May 16, 2003, edition of the *Bulletin*, Kevin Steffey (UIUC Extension entomologist) wrote about bean leaf beetles and briefly discussed BPMV in relation to this insect pest. This article summarizes selected key information on BPMV and its vectors.

Several different symptoms are associated with infection of soybean by BPMV. Common symptoms are green to yellow mottling of leaves, and se-

vere strains of the virus may cause puckering and distortion of leaves. These symptoms may be masked by high temperatures and not seen after pod set. BPMV infection is associated with seed coat mottling and green stem syndrome. BPMV can also cause reduced seed size, weight, and number, and can predispose plants to infection by *Phomopsis* (a fungal pathogen).

It is important to keep in mind that these symptoms can also have other causes. Leaf symptoms can be similar to some types of nutrient deficiency and injury caused by benzoic acid or phenoxy herbicides. The similarity between some virus symptoms and herbicide injury can be confusing; the true problem can best be determined by careful diagnosis and by observing the pattern of symptoms in a field and the timing and history of herbicide applications.

The relationship between seed mottling and green stem syndrome is also complex. Based on recent research from Illinois, BPMV has been associated with these symptoms, but it is often not a cause-and-effect relationship. Seeds and plants that have mottling or green stem syndrome often do not have detectable levels of the virus, and vice versa—seeds and plants with BPMV often show no symptoms at all. The symptoms resulting from virus infection can vary depending on environmental conditions, time of infection, strain of virus, and soybean variety. Laboratory diagnosis is required to confirm whether or not plants or seeds are infected with BPMV. Contact the University of Illinois Plant Clinic for information on testing for BPMV (217-333-0519 or e-mail npatak@uiuc.edu).

BPMV is transmitted by beetles (bean leaf beetle and western corn rootworm) and infected seed. Studies have indicated that the rate of transmission of BPMV through seed is low (0.1%), but even at this low rate, the number of infected plants per acre may be high enough to initiate problems if vectors are present to spread the virus. The

bean leaf beetle may be the most important vector over much of the state of Illinois and in other nearby states. This insect pest can harbor the virus over the winter or acquire it by feeding on infected soybeans or other host plants in the spring.

In addition, the western corn rootworm also may be an important vector in Illinois. Recent research in Illinois by the Illinois Natural History Survey, University of Illinois, and USDA scientists has shown for the first time that the western corn rootworm beetles are able to transmit BPMV to soybean. The presence of BPMV in western corn rootworm has been confirmed in at least 20 counties in east-central Illinois. It is important to note that the transmission efficiency of BPMV was lower for the western corn rootworm than for the bean leaf beetle, but the western corn rootworm has greater mobility and could result in increased spread of BPMV.

Management of BPMV is a challenge. The following tactics may be useful but are largely unproven: delay planting to avoid overwintering beetles, plant virus-free seed, control perennial weeds that may be alternate hosts for the virus, and in some cases insecticides may be warranted. At this point, the use of insecticides (either foliar sprays or seed treatments) in Illinois to control BPMV cannot be justified based on available research data. Some possible exceptions may be in areas where BPMV has been verified to cause significant yield loss or mottling of seed, and near woods, alfalfa fields, and other areas where large numbers of bean leaf beetles have been observed. Remember that even if all bean leaf beetles are controlled (an impossible achievement), infection via seed or western corn rootworms may also occur. Commercial soybean cultivars with resistance to BPMV are not available, although there appear to be differences in susceptibility and expression of symptoms among some cultivars. Many questions remain to be answered, and research is under way to develop answers to some of the critical questions.—*Dean Malvick*

CROP DEVELOPMENT

Estimating Nitrogen Loss

Many areas, particularly in southern Illinois, have received significantly more rain than normal. The excess water has created numerous problems, not the least of which is enhanced nitrogen (N) loss potential.

Different techniques can be used to estimate or measure the amount of N loss that might have occurred during this excessively wet period. None of these techniques are sure bets; in fact, unless used with caution, any of them may be misleading. The options along with their precautions follow.

Amino Sugar-N Test (Illinois N Soil Test)

This test will not predict N loss from excess water. It is designed to predict the ability of the soil to release nitrogen through the mineralization process from organic N sources. These organic N sources will not be lost during excess water events. The amino sugar-N test is not ready for commercial use by farmers and likely won't be ready for at least another year.

Presidedress Nitrate Test (PSNT)

The presidedress nitrogen test may provide an indication of the need for additional nitrogen. However, the reliability of results from this testing procedure is heavily dependent on making sure the samples are collected, handled, and processed correctly. Even if sampling, handling, and processing are done correctly, the reliability of this test when values are low is questionable. If the values are high—greater than 25 ppm—then the odds are good that no additional N will be needed for the 2003 crop. The following suggestions are derived in large part from research conducted by faculty at Iowa State University.

Sample collection. Collect soil samples to a 1-foot depth, at eight positions perpendicular to the direction of travel of the nitrogen applica-

tor. The eight positions are preassigned as follows: one in the corn row (this assumes that the ammonia was applied in the same direction as the corn rows) or knife track of the applicator (assuming you can still see where the knife track was), and the other seven positions sequentially 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, and 7/8 the distance between the row. All of the soil from the eight cores to the full 1-foot depth needs to be placed into the sample bag. Collection of any probe to less than the full 1-foot depth or elimination of any of the cores will render the results suspect. Because most commercial soil sample bags will not hold that much soil, be sure to use a larger bag. The normal recommended time of sampling is when corn is 6 to 12 inches tall. However, because many fields have not yet been planted, we suggest that the samples be collected in late May or early June, irrespective of corn height. Although this sampling pattern should minimize sampling errors, keep in mind that there will likely be significant variation across sample areas. Collect at least one sample for each 10 acres in the field. Wait until soils have dried enough to allow you to obtain a representative core.

Sample handling. If the samples cannot be delivered to the laboratory immediately (same day), freeze them and then deliver them to the laboratory. Another option is to air-dry them before sending them to the laboratory, but since the laboratory has better drying facilities than most farmers, it is best to freeze and then ship. If you do air-dry the samples, spread them out on a paper, crush the cores, and direct a fan on them to allow them to dry as fast as possible.

Laboratory instructions. Be sure to tell the laboratory that you want nitrate nitrogen determined on the samples and that all soil in the sample bag must be dried and ground before a subsample is pulled. There is no way that anyone can accurately subsample from wet cores.

Interpretation of results. If the results from the PSNT test are at 20 to 22 ppm N or higher, you need not apply any additional N. If the results are less than 22 ppm N, use the calculations given in the section “Estimation of N Loss Based on Soil Temperature” to determine whether you need to use supplemental N. The PSNT may underestimate the soil’s capacity to supply N this year because some of the N may have leached below the 1-foot sampling depth but still be within the rooting zone.

Supplemental Nitrogen Strip

As soon as all crops are planted, consider applying two or three strips of supplemental nitrogen across the field at a rate of 60 to 80 lb N/acre. As the season progresses, compare the color of the corn in the strips with the corn in the remainder of the field. This comparison can be done visually or by using a SPAD meter. The SPAD meter will predict N-deficient corn sooner than a visual inspection, but these instruments are not readily available. Check to see if your local dealer has access to a SPAD meter. If the corn in the supplemental strips is noticeably darker green than the rest, consider applying an additional 60 lb N/acre to the rest of the field. Our research has indicated that a yield response can be obtained by application of N as late as 2 weeks after tasseling. The risk associated with this option is that the color difference may not show up until the corn is in grain fill, a time when it is too late to apply the supplemental N. Another risk with this option is that the late-applied N will require a significant rain after the N is applied to move the N into the root zone. Rains during that time are traditionally less frequent.

Estimation of N Loss Based on Soil Temperature

Nitrogen loss associated with excessively wet soils will occur only from that portion of the fertilizer N that was in the nitrate form when soils became saturated. Because most fertilizers are applied as ammonium or a form that quickly converts to ammonium, you

must first determine how much of the applied nitrogen has been converted to nitrate. The rate of this conversion is dependent on soil temperature since the time of application and whether or not a nitrification inhibitor has been used. Refer to Table 1 to help you make this determination.

The conversion of ammonium to nitrate does not mean that it has been lost from the soil system but rather that it is susceptible to loss in fields that have been saturated with water for several days. When soils are excessively wet, nitrogen will be lost through the process of denitrification or leaching.

Denitrification is the major nitrogen loss mechanism in most Illinois soils, particularly in medium- to heavy-textured soils. Illinois research has shown that 4 to 5% of the amount of nitrate nitrogen present (note that this is not 4 to 5% of the total nitrogen applied) will be lost via denitrification for each day that soils are saturated when soil temperature is above 65 to 70°F. At temperatures less than 55°F, it is estimated that denitrification will be closer to 1 to 2% of the nitrogen that is in the nitrate form and increase to 2 to 3% when temperatures are between 55 and 65°F.

How much N loss has occurred? The loss will vary, but the following example provides a guide for how to determine losses from specific situations. Assume that

(a) 140 pounds of N/acre was applied on April 1 without a nitrification inhibitor in southern Illinois;

(b) corn was planted on a silty clay loam soil on May 15, with a resultant stand of 25,000 plants per acre;

(c) soils were saturated for 9 days, from April 26 to May 8;

(d) the 5-year average yield for the field is 150 bushels per acre; and

(e) the previous crop was soybean.

Step 1

Calculate N present as nitrate

N applied X % in nitrate form

140 pounds N/acre X 0.55 = 77 lb N/acre

Step 2

Calculate N denitrified

N in nitrate form X % denitrified

77 X .29 (13 days X 3% per day)

30 pounds N/acre lost

Will it pay to apply more N? That depends on how much was lost and what the yield potential will be. If yield potential is reduced because of delayed planting or poor stands, the remaining N may be adequate.

If you calculate that the nitrogen remaining from your earlier application is 40 to 80 pounds N per acre less than you will need, apply an additional 60 pounds N per acre. If the calculated need is over 100 pounds N per acre, add an additional 90 pounds N.

How do I apply the supplemental N? If the corn is small enough that you can utilize conventional equipment, the

Table 1. Effect of N material and time of N application on the rate of conversion of ammonium to nitrate nitrogen in soil

Form of N	Nitrification inhibitor	Percent of applied N in nitrate form as of May 15			
		Fall application		Spring application	
		Before Nov. 1	After Nov. 2	Before Apr. 15	After Apr. 16
Anhydrous ammonia	No	90	60	55	40
Anhydrous ammonia	Yes	50	40	30	25
Ammonium sulfate	No	92	75	70	50
Urea	No			75	50
UAN solution	No			80	60

choices in rank order would be the following:

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

If the corn is too large for conventional ground equipment, urea could be aerially applied, or UAN solutions could be applied with a high-clearance sprayer using drop nozzles that will keep the nitrogen solutions off the corn. *Do not aerially apply UAN solutions as they will cause severe foliar burn.*

How late can I apply the N and expect an economical response? An economical yield response has been obtained to the application of nitrogen as late as tasseling on corn that was severely deficient. However, keep in mind that a rain will be required to move nitrogen that was surface-applied into the active rooting zone. If rain is not received, the supplemental application will be of no value.—*Robert G. Hoelt*

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

Overall, corn emergence has been uniform throughout the region, with the warmer temperatures last week helping to improve plant color. As mentioned in earlier issues, since early April Extension personnel and volunteer cooperators have been monitoring 20 black cutworm moth traps. To date, very few moths have been caught, and only one intense capture has been

reported over the past 7 weeks.

Field activity the past week has focused on soybean planting and corn postemergence herbicide application. Soybean planting is estimated at 80%+ complete.

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