

# PEST MANAGEMENT & CROP DEVELOPMENT

## BULLETIN

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## INSECTS

### Japanese Beetles Are Here!

Over the past 2 days, several reports have come in indicating that Japanese beetle adults are beginning to emerge. Adult Japanese beetles have been found from the southern tip of the state (Ron Hines reported 16 adults in his trap) all the way to central Illinois, where several observations have been made. On June 23, Brad Lindquist spotted them in Mechanicsburg; Dennis Bowman, Extension educator in crop systems, found not only an adult but several pupae that were very close to emerging in McLean County. Once again, in the research plots, the IPM graduate students and Ron Estes, coordinator of the insecticide efficacy trials, reported Japanese beetle adults in Piatt County; adult beetles were also spotted in cornfields in Champaign County near Rantoul by Brad Burnett, Pioneer, on June 24.

Japanese beetle adults pupate and emerge as adults in mid- to late June. During the summer months, females will mate several times during their 30- to 45-day life span. Females lay eggs in mid- to late summer. Larvae hatch and feed on root systems of various host plants in the fall. They overwinter as third instars deep in the soil. As temperatures warm in the spring, the grubs move back toward the soil surface, where they feed on organic matter and corn roots until late spring when they enter the pupal stage. Japanese beetles have only one generation per year.

Last year, Japanese beetles drew a lot of attention due to the massive numbers that were present in July and August. Many reports of beetles feeding in cornfields made their way to the *Bulletin* last summer. Joe Spencer, Center for Economic Entomology, Illinois Natural History Survey, and Scott Isard, Department of Geography, sampled soybean fields in all counties in the state of Illinois in 2002. The results of their sweep-net samples are presented in Figure 1 (see page 134), with the map illustrating which counties had beetle infestations. Beetles were present in 59 Illinois counties.

The presence of Japanese beetle adults should serve as a heads-up for growers across the state. As the beetles continue to emerge, they will begin seeking host plants to feed on, including corn and soybeans. Economic damage may be caused by silk clipping in corn and defoliation in soybeans. Continue to watch the *Bulletin* for future updates on this insect.—*Kelly Cook*

### Just a Reminder

Keep scouting for those European corn borers! While working in research plots in Champaign, the IPM graduate students found third-instar corn borers feeding in the whorl. Remember, once the larvae begin boring into the mid-ribs of leaves and stalks, rescue treatments are no longer an option. A list of rescue treatment options can be found in issue no. 11 (June 5, 2003) of the *Bulletin* (<http://www.ag.uiuc.edu/cespubs/pest/articles/v200311.html>).—*Kelly Cook*

### Planting Date and Bt Economics for European Corn Borer

As mentioned in previous issues of the *Bulletin* and again now, first-generation European corn borer larvae are presently active in many cornfields throughout Illinois. Scouting for first-generation larvae and injury should have begun several weeks ago for most areas in the state, especially in the

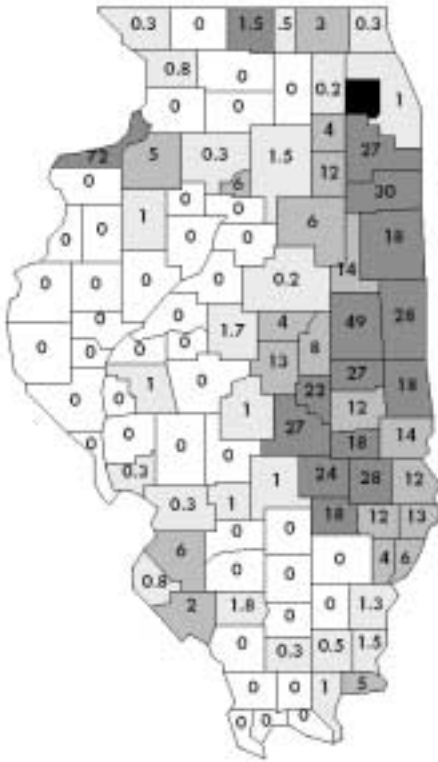


Figure 1. Japanese beetle adults captured per 100 sweeps in soybean fields during 2002. (Map courtesy of Scott Isard, Department of Geography, and Joe Spencer, Center for Economic Entomology, Illinois Natural History Survey.)

southern half of Illinois. The statewide progress of corn planting was quite good this year, except for many rain-soaked areas of southern Illinois. A recently published paper proves clearly that planting date can significantly influence the return on the investment of a Bt hybrid purchased for European corn borer protection.

The influence of planting date on the economics of Bt corn utilization for European corn borer management was recently discussed in a journal article (*Journal of Economic Entomology*, June 2003 issue) by Clint Pilcher and Marlin Rice, Department of Entomology at Iowa State University. The title of their paper is "Economic Analysis of Planting Dates to Manage European Corn Borer (*Lepidoptera: Crambidae*) with Bt Corn." Their research was conducted from 1996 through 1998 in three Iowa locations (Ames, central

Iowa; Lewis, southwestern Iowa; Nashua, northeastern Iowa). They evaluated the interactions of planting date for two Bt events designed to provide European corn borer control: event 176 (no longer commercialized) and event Bt11, Cry1A(b), Northrup King/Syngenta Seeds. This article summarizes the results only for the Bt11 event.

In 1996, N6800Bt and N6800 (non-Bt near isoline) hybrids were planted near Ames, Lewis, and Nashua, Iowa. In 1997 and 1998, N7333Bt and N7333 (non-Bt near isoline) hybrids were planted near Ames and Lewis. At the Nashua location, N4640Bt and N4640 (non-Bt near isoline) hybrids were planted in 1997 and 1998. The hybrids planted in Ames and Lewis required 110 to 112 days to reach maturity. In Nashua, 102- to 106-day hybrids were utilized. A split-plot design was used for the experiment, with Bt or non-Bt (near isolines) serving as the whole plots. Three planting date targets (early, April 20–30; middle, May 1–10; late, May 11–20) served as the split-plot treatments. All treatments were replicated four times at each location. Individual plots were 24 rows wide (30-inch rows) and varied in length from approximately 60 to 90 feet. Seeding rates ranged from 27,680 to 28,770 per acre. Event Bt11 provided 100% control of first- and second-generation European corn borers for all three planting dates. The middle six or eight rows were machine harvested at physiological maturity.

A Bt premium of \$10.00 per acre was used for Pilcher and Rice's economic analyses. The authors compared yields of the Bt (Bt11 event) and non-Bt (near isoline) hybrids and estimated overall profits (above and beyond the cost of the Bt premium) according to the following planting dates: early planting date—\$3.74 per acre; middle planting date—\$7.85 per acre; late planting date—\$16.90 per acre. The investigators observed that approximately a third of the moisture levels in Bt corn were greater than in non-Bt corn at harvest. They speculated that

increased stalk tunneling from European corn borer larvae in non-Bt corn led to more rapid drying of stalks and ultimately of the grain. They offered the following remarks with respect to the feasibility of recommending planting dates for Bt hybrids to maximize profits: "Consistently recommending when during the planting sequence a grower should plant Bt corn to realize the greatest benefit is impossible; however, results from this study suggest that planting Bt corn late during the spring planting sequence provides the greatest opportunity for economic benefit."

Readers are encouraged to obtain reprints of the full article by contacting the authors. Specific data for losses and profits (dollars per acre) are provided for each year by location by planting date combination. Results from this research clearly highlight the value of Bt corn for European corn borer management, especially in late-planted fields.—Mike Gray

### Corn Rootworm Pupa and Prepupae Detected in Central Illinois Cornfield

Joe Spencer, an entomologist with the Center for Economic Entomology, Illinois Natural History Survey, reported finding (June 23) a pupa and prepupae in a cornfield located in Champaign County. Joe indicated that he was somewhat surprised to find a pupa at this point in June. This observation suggests that first sightings of adult western corn rootworms could begin very soon. Typically, we begin to receive initial reports of adult western corn rootworms after the Fourth of July celebration. A range of 6 to 13 days is required for the completion of the pupal stage. With the above-average temperatures that occurred during the last week of June, pupal development will proceed more rapidly. Let us know when you see adult corn rootworms emerging in your respective area of the state.—Mike Gray

## Reduced Soil Insecticide Rates for Corn Rootworms: An Old Story Revisited

In recent years, renewed interest in the economics of various corn rootworm control tactics has emerged. Specifically, many producers are increasingly seeking more information regarding the potential benefits and drawbacks of using seed treatments, transgenic (Bt) hybrids for corn rootworms, liquid formulations, and reduced rates of traditional corn rootworm granular products. As the western corn rootworm variant continues to spread and damage first-year cornfields due to the oviposition of eggs in soybean fields the preceding year, many growers who have traditionally relied on crop rotation for management of corn rootworm larvae are beginning to seek answers for the first time regarding corn rootworm control.

In evaluating the potential benefits and risks of these various control tactics, don't forget to at least consider the well-documented research on the efficacy (regarding the prevention of corn rootworm larval injury) of reduced rates of granular soil insecticides. In the most recent issue of the *Journal of Economic Entomology* (June 2003), scientists at South Dakota State University (Billy Fuller and Paul Evenson) and North Dakota State University (Mark Boetel) reported the results of some research on reduced rates of terbufos (Counter 15G), tefluthrin (Force 1.5G), and chlorethoxyfos (Fortress 5G). Their research was conducted in 1993, 1994, and 1996; therefore, these formulations reflect those that were used during this time period. The title of their article is "Emergence of Adult Northern and Western Corn Rootworm (Coleoptera: Chrysomelidae) following Reduced Soil Insecticide Applications." They offered the following concluding remarks: "Because application rates of these compounds have generally failed to impart marked impacts on corn rootworm feeding injury, survival, temporal emergence patterns, or reproductive capacity, pest managers choos-

ing to apply one of these compounds at full-labeled rates should consider the option of reducing the application rate to a 0.75X level. Given the preponderance of evidence cited herein, this strategy should be both economically and environmentally beneficial if steps are taken to properly and accurately calibrate and apply these materials. Costs for applying these insecticides to protect corn from rootworm larvae could conceivably be cut by 25%. In addition, less toxic material would be released into the environment, thereby minimizing the potential for negative effects on nontarget organisms and reducing the risks of groundwater contamination. Notwithstanding, pest managers and producers should note that use of an application rate lower than that prescribed on the product label for control of the target pest voids any otherwise implicit warranty for an acceptable performance level."

The results of small-plot research conducted previously throughout the north-central United States at various universities were summarized and published by Billy Fuller and others in 1997 (*Journal of Economic Entomology*). These data also confirmed the utility of using reduced application rates (0.75X) of granular soil insecticides for corn rootworm larval control. On-farm research conducted across 10 northern Illinois counties (29 producers) in the early 1990s further confirmed that 0.75X rates of certain granular soil insecticides (primarily evaluated terbufos [then Counter 15G] and chlorpyrifos [Lorsban 15G]) provided similar root protection and yields as compared with the labeled rates.

As producers evaluate (compare root injury in treated portions of a field with untreated areas) the return on their capital investment in rootworm protection this season, they may choose to consider the option of using 0.75X rates next spring. As stated previously, producers assume full liability for using less than a labeled rate. In addition, time of planting should

influence a producer's decision regarding rate selection of a given soil insecticide. If planting occurs in early April, the efficacy of granular soil insecticides may be compromised if they are applied at the 0.75X rate, particularly in years in which corn rootworm larvae hatch late (mid-June).—Mike Gray

## CROP DEVELOPMENT

### Can We Relax Yet?

With the performance of most of the corn and soybean crops now solely at the whims of the weather, many people will have anxious eyes on the sky, especially over the next month. Corn continues to develop at a rapid pace, though average height for the state is a bit below average, mostly because of the late planting in southern Illinois. With 75% of the crop rated "good" or "excellent," the crop is certainly off to a good start in most areas.

The most recent report indicates that 1% of the state's crop was tasseling by June 22. This is more than the zero percent average for this date and is coming from the crop that was planted in early April or even late March. Our March 24 planting here is about head-high to a tall person and will likely show some tassels by July 1, though the cooler weather forecast for this weekend may delay that by a day or two. On a trip to DeKalb on June 24, most of the corn looked outstanding, with probably the best uniformity of plant size and stand that I have seen in my 22 seasons in Illinois. In my (slightly biased) opinion, the uniform dark green of a solid canopy of a corn crop is truly one of the best sights there is.

Leaf color is excellent in most fields. Although we expected that soils would mineralize N (convert it to a form available to the plant) slowly due to low temperatures and May rainfall, one N study here, where continuous corn has not had N applied for 6 years now, shows much less N deficiency than it has most years. The N needed to green the crop there had to come from soil organic matter, including some that was

probably mineralized last fall and that stayed in place due to the dry conditions.

Concerns still remain about the water supply for the corn crop this season, although we have had enough rainfall to recharge the surface soil. Although there's not much we can do about this, we can tell by observing the plants when they are undergoing a shortage of water. Corn leaves curl when the loss of water vapor through the leaves even slightly exceeds the rate of uptake of water from the soil. On hot, windy afternoons, water loss is so rapid that plants can show curling even if soil moisture supplies are fairly good. Soil compaction contributes to less root growth and earlier leaf curling as well.

As long as leaves curl only for an hour or two on a hot afternoon but are relaxed the rest of the day (and night, when even severely stressed plants relax their leaves), then the loss of photosynthesis is probably minor. The longer it goes without rain to replenish soil water in the rooting zone, though, the earlier in the day the leaves will roll and the more severe the effect of increasing lack of photosynthesis. This is particularly true as the plants approach the tasseling stage; if leaf curling occurs at all after tassels appear, it's a signal that water supply in the soil may be inadequate to allow silks to grow to receive pollen. Also, any lack of photosynthate (sugars) during this critical period will probably mean fewer kernels formed and filled. Cooler temperatures help, mostly by reducing the rate of water loss from leaves.

Soybeans will likely start to flower about the second week of July, but the most critical stage for moisture supply is in late July and early August, as pods start to fill. Soybean growth has finally taken off, and if water supplies stay adequate, soybean canopies should fill reasonably well in most fields. Soybeans planted in mid-May are mostly in the V4 or V5 stage now, but I saw soybeans in northern Illinois that were planted in late May and are

still only in stage V1 or so. These may have their flowering delayed by plant size more than photoperiod, and it will be difficult for these to form a full canopy if they are in wide rows.

Good news on wheat: Most wheat growers are pleased to find yields coming in higher than had been expected. Reports from southern Illinois indicate that yields in the 50s and 60s are common, with some fields producing yields in the 80-bushel range. Quality concerns from *Fusarium* scab remain, but yields may well approach the 61 that we harvested as a state average in 2001. I expect to hear about how "intensive management" helped bring about such high yields this year. Although some of the "intensive" practices are no doubt sound, favorable conditions this year will mean that the sound management that most producers use, while not "intensive" in the sense that the word is usually used, will produce very good yields. As an example, I heard in northern Illinois that some wheat fields were sprayed with foliar fungicides several weeks ago, even though virtually no fungal disease has developed under the favorable weather conditions there. Such practices may be "intensive," but they certainly reduce profits. Sound management and spending more money to produce a crop do not necessarily go together.—*Emerson D. Nafziger*

### Potassium Deficiency in Corn

There have been numerous reports of yellowing of the older (lower) corn leaves in central and northern Illinois, especially in the western areas. The symptoms described are characteristic of potassium (K) deficiency: yellowing begins at the leaf tip and proceeds along the leaf margin of the older leaves, with some chlorosis of the interior of the leaves, and newer leaves remain green. The fact that the newer leaves are green does not necessarily mean that the plant is growing out of the problem but rather that the plant is translocating the potassium from the older leaves to the newer ones.

Greg Jones, with Pioneer Hi-Bred near Galesburg, indicates that these symptoms are appearing in some fields where soil conditions have been relatively good. Eric Adey, at Monmouth, also reported that these symptoms were associated with grape colaspis injury, which caused uneven growth and K deficiency symptoms on the smaller plants. It's thus possible that there may be multiple causes of this root-related problem and that K deficiency symptoms are just the "indicator."

This problem was widespread in 2000, in about the same area of western-northwestern Illinois, roughly west of Peoria and south of the Quad Cities, and at about the same time and crop-growth stage. Fortunately, a good rain in early July appeared to alleviate the problem in 2000, and the affected fields produced good corn yields. That is not to say that the same thing will happen this year, but we can hope.

### Causes of the Problem

*Poor root system.* The root system seems to have not developed rapidly enough to allow for adequate K uptake to meet the needs of the vegetation. There are several possible reasons for the slow root development, including cool and wet or cool and dry soils, compaction, nematodes, insects, herbicide injury, and fertilizer burn. Based on reports that we have received, it appears that the most likely cause this year is related to the cool soils experienced in May and much of early June. If that is the case, the root system should start to expand rapidly and overcome the problem.

*Low soil K.* Over the past several years, yields have been high, and thus crop removal of K has been higher than normal. If producers did not adjust their fertilizer application accordingly, it is possible that the soil supply has been depleted to the point where the soil is not capable of supplying an adequate quantity. Soil testing will confirm whether this is the problem. If you are seeing streaks through the field of good and deficient

plants, check to see whether the good plants line up with the center of last year's harvest area. If they do, it is possible that the residue left behind the combine, particularly if it did not have a straw spreader, could have provided enough K to meet the needs of the crop. Remember that K is soluble in plant tissue and will be leached out into the soil with the first rains on the dead tissue.

**Tillage.** In 2000, this problem seemed to be worse on fields that had a history of long-term reduced or no-tillage. Under those tillage systems, K and other immobile nutrients will remain near the surface of the soil, and if it is dry near the surface but moist underneath, the roots will be most active in the moist zone, which is also where K may be low.

**Oxygen availability.** Potassium uptake may be inhibited by low soil oxygen levels, a problem that can be caused by compaction and/or excessively wet soils. Most of the soils in the affected area received a lot of rainfall in May but have not been excessively wet for long periods after the crops emerged.

### Solution to the Problem

It is too late to correct the problem this year. Attempts to use foliar and or sidedress potassium have not been successful.

If the field in question has not been soil tested for several years, make sure that you have it tested this fall to ascertain the potassium status and to correct it if the level is low. Other practices that will provide better conditions for root growth may also be helpful, but as previously indicated, this problem may not have the same cause in all fields.—*Robert G. Hoeft and Emerson D. Nafziger*

## REGIONAL REPORTS

Extension center educators, unit educators, and unit assistants in northern, west-central, east-central, and southern Illinois prepare regional reports to provide more localized insight into

pest situations and crop conditions in Illinois. The reports will keep you up to date on situations in field and forage crops as they develop throughout the season. The regions have been defined broadly to include the agricultural statistics districts as designated by the Illinois Agricultural Statistics Service, with slight modifications:

**North** (Northwest and Northeast districts, plus Stark and Marshall counties)

**West-central** (West and West Southwest districts, and Peoria, Woodford, Tazewell, Mason, Menard, and Logan counties from the Central district)

**East-central** (East and East Southeast districts [except Marion, Clay, Richland, and Lawrence counties], McLean, DeWitt, and Macon counties from the Central district)

**South** (Southwest and Southeast districts, and Marion, Clay, Richland, and Lawrence counties from the East Southeast district)

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

### East-Central Illinois

The heat is really pushing the corn along. Some fields have developed a ragged uneven appearance, because plants that have suffered root pruning from grape colaspis and grubs are falling behind. Rootworm larvae activity is adding to the problem. Japanese beetles are pupating and starting to emerge.

Soybeans are starting to develop rapidly as well. Postemergence spraying has been the major activity in soybeans.

Wheat harvest has started to the south but is still probably a week away in the north. Potato leafhoppers are currently very active in alfalfa fields.

### Northern Illinois

The main activity this past week focused on soybean postemergence herbicide application. Also, cultivation

and herbicide application were occurring in some of the later-planted corn.

Rainfall early in the week of June 15 ranged from 0.2 to 2.0 inches throughout the region. Rainfall would be welcome throughout the region, as some corn on the lighter soils has begun to show heat stress with this week's hot temperatures. Generally, from May 1 to June 22, most of the region is behind by 160 to 200 growing degree-days from the long-term average, according to the Illinois Agricultural Statistics Service's recent crop report.

To date, this season we have received few reports of insect problems, including European corn borers. We did receive a report of possible frost injury on corn from last Friday evening's cool temperatures.

### Southern Illinois

An entire week of dry weather has growers scrambling to plant full-season soybean, replant soybean previously drowned out, harvest wheat, and plant double-cropped soybean.

Wheat harvest is progressing at a rapid rate, with yields better than expected considering the level of scab infection present. Reports of yields averaging from 60 to 80-plus bushels per acre are common, with test weights ranging from 58 to 63 pounds per bushel. We have also received reports of some wheat being rejected at the elevator due to the presence of DON (vomitoxin) as a result of scab infection.

Numerous reports are also coming in regarding alfalfa leaf spot diseases. Common leaf spot, *Leptosphaerulina* leaf spot, and *Stemphylium* leaf spot may all be part of the disease complex being seen. These diseases can become serious when weather conditions remain wet and warm for an extended period. An additional factor this year was the harvest delay and lodging of the first cutting. The lodging resulted in many long stems being left after first cutting, providing fungal inoculum to infect the second cutting. Unfortunately, there are no effective fungicide treatments for these leaf spot

diseases. The most effective preventive measure is to harvest plants as close to the ground as possible to reduce inoculum levels.

Reports of potato leafhopper attacking alfalfa also have escalated in the past couple of days. Growers should monitor stands closely after the second cutting.

Also right on schedule, Japanese beetle adults have emerged in the area. We have received no reports of problems from adult feeding yet, but early-planted cornfields approaching pollination will need to be monitored for silk clipping.

#### **West-Central Illinois**

No rainfall has been received in the region for at least 10 days in most areas, and it has been as much as 2 weeks since some areas have received any precipitation. On Tuesday, temperatures reached the mid-90s for the first time this summer, and later-planted corn has begun to demonstrate

signs of crop response to the high temperatures.

Most of the corn is V6–V11, with some of the earliest-planted fields as far along as V15. Soybean growth stages range from the first trifoliolate to the sixth trifoliolate, with a good portion of fields having canopied within the last week.

Alfalfa regrowth in harvested fields looks very good, and only a few reports of treatments being made for potato leafhopper have been received. Some fields being grown for high-quality hay have been cut for the second time. Pasture condition has begun to deteriorate the past few weeks, and many graziers have made the comment that pasture growth has been less than expected this year.

Field activities consisted mainly of postemergence herbicide applications on soybeans, mowing, baling hay, some sidedressing of nitrogen on late-planted corn, and prepping combines

for wheat harvest, which is expected to begin within the next week in the southern portions of the region.

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