



PEST MANAGEMENT & CROP DEVELOPMENT

BULLETIN

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INSECTS

Significant Black Cutworm Injury Reported in Ohio: Don't Forget to Scout Corn Fields

A recent report from Ron Hammond, extension entomologist at Ohio State University, indicates that some corn fields in Ohio have significant densities of black cutworms, exceeding the economic threshold in several instances. Producers should anticipate some cutting of plants this spring because of the wet weather, excessive weed growth in many fields, delayed planting, and intense captures of black cutworm moths. When dry weather returns and planting resumes in earnest, producers will increasingly find themselves squeezed for time and may neglect to scout corn fields and miss the early signs of black cutworm leaf feeding that signal potential cutting. This could be a costly mistake, especially as replanting decisions for corn at this point result in stiff yield penalties.

If you discover that 1% of your corn seedlings have leaf feeding, this injury signals that future cutting is possible at economic levels (3% to 5% cutting). Don't assume that Bt corn, insecticidal seed treatments, or the use of a soil insecticide at planting will eliminate the threat of black cutworm damage. Significant infestations of this pest present a challenge for many management options. For a complete review of black cutworm biology, life cycle information, and management strategies, take a look at this University of Illinois Extension fact sheet: ipm.illinois.edu/fieldcrops/insects/black_cutworm/index.html.

If you are experiencing black cutworm cutting in your area of the state, please let me know so I can share your observations with our readers.—
Mike Gray

Don't Neglect Scouting of Alfalfa for Potato Leafhoppers

In many areas of Illinois, late May and the arrival of potato leafhoppers coincide. These small (1/8-inch long), pale-green, "wedge-shaped" insects represent an important economic threat to alfalfa production each year. Potato leafhoppers are migratory and fly into Illinois each spring from southern states. The females can lay two to three eggs in the stems and veins of plants every day. The immature leafhoppers (nymphs) hatch after 7 to 10 days and subsequently reach maturity in roughly 2 weeks. Depending on temperatures throughout the summer, three to four generations of this pest occur each year in Illinois.

Potato leafhoppers, with piercing and sucking mouthparts, remove fluids while also injecting toxins into a plant's vascular system. Plants that have been fed upon may display the characteristic "hopper burn"—a yellow V-shaped area at leaf tips. This symptom is often found on older leaves because damage may not become obvious for a few weeks following injury. Alfalfa that is severely damaged will become stunted and bushy.

Scouting alfalfa for potato leafhoppers and making subsequent sound management decisions requires the use of a sweep net. As few as 0.2 leafhoppers

per sweep represents a potential economic threat in stands of alfalfa that have been harvested recently (stubble-alfalfa height less than 3 inches).

A University of Illinois fact sheet contains a more detailed description of the biology, life cycle, and management tactics: ipm.illinois.edu/fieldcrops/insects/potato_leafhopper/index.html. —Mike Gray

WEEDS

Replanting Corn: How to Control Corn Plants from the Initial Planting

Certain areas of Illinois received excessive precipitation over the Memorial Day weekend, and it appears likely that some corn replanting will occur when field conditions improve. Losses of the initial corn stand will likely range from complete to partial, so farmers may need to implement practices to control any remaining corn plants before replanting. What options are available to control emerged corn from a first planting?

Tillage can effectively remove corn plants remaining from the first planting, regardless of their herbicide sensitivity or resistance characteristics. This option introduces very little risk of injury to the replanted corn, unlike some herbicide alternatives described in the following paragraphs. Tillage also can effectively control any weeds that might have emerged in the first planting, providing weed-free conditions into which to replant. However, for myriad reasons farmers may not want to disturb the soil prior to replanting and thus look to herbicide alternatives. If herbicides will be used, they should be applied *before* the fields are replanted.

Glyphosate is very effective at controlling existing stands of (sensitive) corn. There is no waiting interval between application and replanting specified on the label, but overall control may be improved if at least 24 hours elapses between application and replanting. Glyphosate would also control most

emerged weeds, allowing replanting into weed-free conditions. However, glyphosate obviously would not control existing stands of glyphosate-resistant corn (or any glyphosate-resistant weeds that might already have emerged), so alternative herbicides would be required.

Poast, Poast Plus, Fusion, Fusilade, Select, and Assure II are effective for controlling volunteer corn (including volunteer glyphosate-resistant corn) in soybean, but each product label includes an interval that must elapse between application and rotation to or replanting with grass crops, such as corn. These intervals range in days from 30 (Poast, Poast Plus, Select) to 60 (Fusion, Fusilade) to as many as 120 (Assure II), making these products unlikely choices for this particular use.

We have evaluated several different herbicides or herbicide combinations for control of an existing stand of corn. Some results from this research, conducted in 2006 and 2007, are summarized in **Table 1**. Treatments that included glufosinate, paraquat, or isoxaflutole often appeared to be providing good control at 7 days after application, but corn frequently recovered by the evaluation 14 days after application.

SelectMax has a supplemental label for control of an existing stand of

glyphosate-resistant corn prior to replanting field corn. The label allows applications of 6 fluid ounces per acre for control of glyphosate-resistant field corn up to 12 inches tall. We have limited research experience with this particular rate of SelectMax, but we have observed good to excellent control of corn with a 4-ounce rate of SelectMax. Applications should include NIS and AMS (do not use a COC or MSO in this particular use), and care must be taken to avoid in-field overlaps, or excessive injury to the replanted corn may occur. **Do not** replant fields treated in this way sooner than 6 days after application. Previous research has shown that clethodim, the active ingredient in SelectMax, has some soil persistence and can cause significant damage to corn when applied at higher rates prior to planting. It is strongly advised that rates not exceed the rate labeled for this type of application, that in-field overlaps be avoided, and that the 6-day waiting interval be *fully* expired before treated fields are replanted. —Aaron Hager

CROP DEVELOPMENT

Nitrogen Management in a Challenging Spring

Substantial rainfall that creates ponded soils this late in the growing season results in loss of nitrogen (N). Nitro-

Table 1. Control of a first-planting corn stand as influenced by herbicide treatment and corn growth stage.

Treatment	Rate	% control ^a	
		V1 at time of application	V2–V3 at time of application
Liberty	32 fl oz	50	75
Gramoxone Inteon	2.25 pt	27	48
Gramoxone Inteon	2.50 pt	— ^b	40
Gramoxone Inteon + Sencor	2.25 pt + 3 oz	65	—
Gramoxone Inteon + Sencor	2.50 pt + 3 oz	—	70
Balance Pro + atrazine	3 fl oz + 1 lb	—	25
SelectMax	1 fl oz	12	33
SelectMax	2 fl oz	58	68
SelectMax	3 fl oz	—	75
SelectMax	4 fl oz	98	94

Data averaged over experiments conducted in 2006 and 2007.

^aControl ratings taken 14 days after herbicide application.

^bNot all treatments were applied at each corn growth stage.

gen loss is difficult to predict because it depends on many factors, including time of application, type of N source, soil type and temperature, and amount of precipitation received. While it is difficult to know how much N is lost, I'd like to provide some information to help you estimate N loss for your situation, and I'd like to share some thoughts on how to apply additional N this late in the planting season.

Significant N losses occur only when N is in the nitrate (NO_3^-) form. The exception to this is urea, which is as leachable as nitrate. Urea transforms rapidly to ammonium (NH_4^+) once in the soil, but if rain comes within about a day after application, some of the N from urea or urea-containing fertilizers (like UAN) can be leached out of the root zone, especially in light-textured (sandy) soils.

Even though anhydrous ammonia and urea do not contain nitrate at the time of application, and 28% contains only one quarter of the N in nitrate form, of all these fertilizers are subject to nitrification. Nitrification is a process in which soil bacteria converts ammonium to nitrate. So before we can start talking about N loss, we need to estimate how much of the fertilizer applied is in the nitrate form.

For urea and UAN solutions, the conversion to nitrate starts fairly quickly after application at this time of the year because soil temperatures and moisture are close to optimal for the activity of nitrification bacteria. In the case of anhydrous ammonia, nitrification can be delayed as much as two weeks because this source kills the bacteria in the area surrounding the application. However, after that period nitrification will proceed quickly. For a while now, soil temperatures have been above 60 to 70 °F. At such temperatures it takes between one and two weeks for all nitrogen to be fully converted to nitrate. In other words, regardless of the source of N that you use for your preplant application, if you did the application at the beginning of May, most or all of that N would now be in the nitrate form and

subject to leaching and/or denitrification.

In a recent article in *the Bulletin* (issue 7, May 8), I discussed some of the ways you can estimate how much N is still available in the soil. There is no doubt that since that article was written the first week of May, N has been lost in most fields. With some of the heavy rains and high temperatures we had recently, if you applied urea or UAN at the end of April or anhydrous ammonia before the middle of April, it is possible that you will need between 40 and 100 pounds of N per acre if your field was saturated for several days and you are replanting or have not yet planted. If you find that only about 30 or 40 pounds of N per acre are lost, it is likely not worth your money to apply additional N.

If you have not yet applied N, you have several options. If you are still thinking of planting corn, very soon you will have to look into shorter-season hybrids; even for full-season hybrids you will want to consider the reduced yield potential and plan your N application accordingly, with the aim of getting a better return on your N investment. Optimum planting dates for Illinois are around April 10 to 15 in southern Illinois, April 20 to May 1 in central Illinois, and May 1 to 10 in northern Illinois. For each week that planting is delayed from the optimum for your area, it is recommended that you reduce N rate by 20 pounds per acre down to a minimum of 80 pounds per acre (for very late planting).

Due to the reduced yield potential with delayed planting, priority should be given to planting as soon as conditions are adequate; you can apply N later as a sidedress application. All of the typical N fertilizers can be used for sidedress applications. But in order of preference I would apply injected anhydrous ammonia or UAN solution between rows; broadcast of solid ammonium-containing fertilizers, such as ammonium nitrate or ammonium sulfate; broadcast urea; dribble UAN solution between rows; and broadcast UAN solution.

If you do a surface application, you must incorporate the fertilizer by rain or irrigation to move N to the root zone. With injection applications, place N between rows to reduce the potential for plant injury. Remember that there is no advantage to trying to apply N close to the row since roots will grow into the row-middles by the 4th-leaf stage.

Another option is to apply N in every other row instead of every row. Research has shown that this does not negatively affect yield because every row will have N applied on one side or the other. Of course, the outside injectors should deliver half the rate since the injector will pass between those rows twice. If you are concerned that corn might be too big by the time you can make N applications, it is possible, though not desirable, to apply N with high-clearance equipment or by aerial application. When doing aerial application it is important to keep rates below 125 lb N acre⁻¹ and to avoid doing the application when the canopy is wet to reduce plant injury. If liquid applications are to be used, the rate should not exceed 10 lb N acre⁻¹. For the time being, though, let's hope we can get all corn planted soon and prepare to sidedress N sometime before the 5th-leaf stage. —*Fabián G. Fernández*

Soybean Development and Considerations After Planting

According to the Illinois Weather and Crops Report, Illinois soybean acres planted increased from 1% to 12% between May 17 and May 24, and corn acres planted increased from 20% to 62%. This still left us 57% behind the 5-year average for planted soybean acres by May 24, but it was the most progress of any week so far this spring. Most of us have spent recent weeks worrying about when conditions will allow planting, but a new set of worries presents itself once the crop is in the ground. Here are some things to expect and look for once your soybeans have been planted, whether under ideal or not-so-ideal conditions.

Under ideal conditions, soybean seeds rapidly imbibe water after planting; the radical, or primary root, elongates out of the seed coat in 24 to 48 hours. The cotyledons appear after 3 or 4 days. The primary root grows rapidly, and secondary roots develop in 4 to 5 days. The upper region of the hypocotyl also grows rapidly and straightens the “crook,” pulling the cotyledons above the soil surface in approximately 6 to 7 days. Emergence can easily take as long as 14 days depending on soil compaction, soil moisture, and air and soil temperatures. The growing degree-day (GDD) requirements are not as well refined for soybean as they are for corn, but preliminary work done by Shawn Conley in Wisconsin suggests about 100 GDDs are needed to achieve emergence. That is a little less than the GDD requirements for corn emergence. The energy that’s needed for seedling development as just outlined comes from lipids stored in the seed and cotyledons. The stored energy is a finite amount, so once seeds start germinating, it is a race to get the cotyledons above the soil surface. They turn green as they emerge above the surface and photosynthesize to help supply energy for continued growth. The cotyledons still supply some energy for the seedling for several more days after emergence, but the green vegetative tissue slowly begins to take over.

Under not-so-ideal conditions, a number of adverse things can occur that slow growth and development, or even stop them altogether. One problem multiple producers have faced this year is heavy rainfall that leads to saturated and possibly compacted soils. I have witnessed several farmers avoiding the “wet holes” and several rotary hoes in action this spring. The germinating soybean seed needs oxygen to live and can perish after anaerobic conditions of 2 to 4 days, depending on soil and air temperatures. You might want to start scouting to assess how much of the wet holes you will need to replant. Dig up the seeds and determine if they are rotting or just developing slowly.

If the soil surface became compacted by the combination of hard rainfall and fast surface drying, you might dig to look at the diameter of the hypocotyl. If hypocotyls do not have the strength to lift the cotyledons through compacted soils, they swell from continued growth, which makes them increasingly brittle. With subsequent rainfall to “soften” the soil surface again, these seedlings may still emerge until they run out of energy reserve or the hypocotyls break under pressure. A rotary hoe may also help; however, rotary hoes can damage soybean seedlings more easily than emerging corn seedlings, so they can do significant damage. This is primarily because soybean seedlings are a much larger target than corn seedlings, particularly if they are brittle because they are actively trying to pull the cotyledon above the surface.

Other adverse conditions are biotic ones, such as seedling diseases, and bird or insect feeding. Within the first week or two is a good time to scout to determine whether your seed treatment helped protect you from these pests, or if their presence means you might want to consider seed treatments next year.

Seedling diseases generally are considered more of a problem when planting earlier than now into cooler soils (see “Considerations for Using Fungicide Seed Treatments on Soybean” in issue 3 of *the Bulletin*, April 10). The four main pathogens often involved in the soybean seedling disease complex (*Fusarium*, *Phytophthora*, *Pythium*, and *Rhizoctonia*) have different temperature requirements, and some are more active at higher soil temperatures. In general, seedling diseases

caused by *Pythium* in Illinois tend to occur when soil temperatures are less than 60 °F. When soil temperatures are higher, soybean seedlings emerge much more quickly and *Pythium* is less active, which helps seedlings avoid infection by *Pythium*. Pathogens such as *Fusarium*, *Phytophthora*, and *Rhizoctonia* become more active when soil temperatures are above 60 °F. In fact, some strains of *Rhizoctonia* present in Illinois become even more active as soil temperatures climb. So even when soil temperatures are warmer, seedling diseases can still be a problem when soil conditions are soggy. For seedling diseases caused by *Rhizoctonia*, additional stresses can predispose seedlings to infection by this fungus. Under certain conditions, some soil-applied herbicides can increase severity of seedling diseases caused by *Rhizoctonia* (Table 2). Resistant varieties are available that protect soybean seedlings against *Phytophthora* infection, but varieties resistant to *Rhizoctonia* and *Fusarium* are not available. For help in diagnosing if a seedling emergence problem is due to a biotic pathogen, send samples of affected seedlings to the University of Illinois Plant Clinic.—Vince M. Davis and Carl A. Bradley

Expectations for Late-Planted Corn

The Illinois corn crop was only 62% planted by May 24, indicating rapid progress over the past week, with 42% planted between May 17 and May 24. Some areas of the state were too wet to plant until late last week, and some got wet again over this past weekend, so progress will be slow again this week in some areas.

Table 2. Effect of soil-applied herbicides on *Rhizoctonia* root rot in a field trial conducted in Champaign, IL, in 1999 and in a greenhouse trial.

Treatment	<i>Rhizoctonia</i> disease severity index (0–100)	
	Field trial	Greenhouse trial
Hand-weeded control	12 a*	54 a
Dimethenamid + metribuzin	12 a	80 b
Pendimethalin	42 b	84 b

See Bradley et al., *Crop Protection* 21:679–687 (2002).

*Values within a column followed by the same letter are not significantly different with a 95% level of confidence.

This all means that 2009 will have the slowest finish to corn planting since 1995, when only 50% of the corn was planted by the end of May. Not to be overly pessimistic, but 1995 was not a good corn year; after the late planting, pollination was late but harvest was not especially late, indicating that the crop had simply “droughted out” or “burned up,” depending on your perspective. The state average yield was 113 bushels per acre in 1995.

Will 2009 be a repeat of 1995, or will we luck out like we did in 2008? Much has been made of the improvements in hybrids that have made them less subject to stress, so able to yield much more under poor weather conditions. It is certainly true that selection of hybrids that tolerate high plant populations has resulted in plants that are more stress-tolerant in general. Addition of protective traits like rootworm Bt has also diminished the danger from stresses that result from poor root development. On the other hand, we have had relatively good growing season weather over most of Illinois since 1996, including the astonishing weather of 2008, where late planting did little to diminish corn yields, and in some cases even increased them.

The most reasonable expectation today is that the growing season weather from now on will be more or less normal. It's likely that some current long-term forecasts are for weather that is better than average and others worse than average. Such forecasts have a fairly poor track record, and I don't place much stock in them. Temperatures in April and May have been more or less normal in Illinois. Rainfall has been well above normal over much of the state over the past two months, but close to normal during May in many areas. I'm not joining the ranks of the amateur weather forecasters here, but until and unless the dreaded “blocking high” develops over the southeastern U.S., we seem to have little reason to expect that the weather will be too far off normal during the remainder of the season.

What does “normal” weather for the rest of the growing season mean? Much of our corn crop will have lost 200 to 400 growing degree-days as a result of the delay in planting. The fact that the corn was not planted, not yet up, or not very large when we had the cool temperatures in the middle of May will, I think, prove to be an advantage; we think that temperatures in the low 40s or upper 30s after corn has three or four leaf collars emerged can have a physiological effect that results in lower yield potential. It is an advantage for corn to have relatively warm weather during its entire life cycle, and though we would not recommend planting late to assure this, it will be one small benefit of the crop's late start.

Even with the loss of several hundred GDD, there should be enough temperature to produce a good crop if frost is not early. From June 1 through the date of a 50% chance of frost, about 2,550, 2,800, and 3,150 GDD can be expected to accumulate in northern, central, and southern Illinois, respectively. Given that corn hybrids planted in late May typically require 150 to 200 GDD less than their rated requirement (though not if the weather stays cool throughout the season), getting the crop to develop and reach maturity should not be a problem. In northern Illinois, however, it might be prudent to switch to hybrids rated at no more than 2,400 GDD if planting is delayed into June.

So our real concern for the 2009 corn crop is not a lack of temperature so much as a potential lack of water at critical times. Late planting means that water is much more likely to be the factor that limits yield.

The following are factors to consider as we track this year's late-planted corn crop:

- **Light:** The longest days and hence the days with the most sunlight available (summer solstice is June 21) will come well before the crop has a full canopy, and the crop will benefit less

from these hours of sunlight. This also means that the days during grain-fill are shorter, which probably will have a larger negative effect than will the inability to fully use the light in June.

- **Water:** The period of most critical need for water—the week before, week of, and week after pollination—is moved back to a time when water demand is high due to high temperatures and when there has already been a considerable amount of water lost from the soil through evaporation and crop uptake. This means that short periods without rain will likely be both more frequent and more damaging during this critical period.

- **Roots:** Higher temperatures tend to favor the aboveground growth of corn over growth of the root system. Perhaps an even bigger factor is that so much of the crop was (and will be) planted into soils that were not yet dry so were compacted more than normal during tillage and planting. Many of our Illinois soils can be quite forgiving of this and can allow adequate root growth even when planted too wet, but even modest restriction of root growth can mean inability to take up some stored soil moisture later in the season when the crop most needs it. Corn rootworm can damage later-planted, root-restricted corn more severely as well and add to the problem. Some dry weather during vegetative growth can encourage roots to grow deeper, but the fact remains that small, shallow root systems are a major reason why late-planted corn sometimes does poorly. The best we can hope for is that rainfall is uniform and adequate throughout the season so that smaller roots are not a problem. Failing that, dry weather coming in June or late August may not hurt too much, as long as there is enough rainfall during July.

- **Stalks:** Late planting can result in taller but more spindly stalks, which often have more difficulty supporting full-sized ears to maturity and harvest. It will help to have adequate soil fertility and to have leaves that stay green throughout grain-fill.

• **Leaves:** Late planting means that the critical grain-filling gets pushed later, to a time when foliar diseases have had more time to develop. This is not saying that fungicides should be used routinely on late-planted crops, but disease development should be watched carefully, especially after pollination and for the six weeks (starting about two weeks after pollination) during which the yield will be produced.

Late planting means greater dependence on favorable weather for good yields, but we need to stay on top of this crop in order to get the yields that the weather makes possible. Having everything come together to negate the effects of late planting as happened in 2008 is a tall order, but if the weather is good for the whole season, we should be able to at least approach “trend line” yields for Illinois. The prices are up some, which helps, but much of the crop west of Illinois was planted on time, and it may not be our turn for Illinois to have the highest corn yields this year.—*Emerson Nafziger*

REGIONAL REPORTS

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

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

Richland, and Lawrence counties], McLean, DeWitt, and Macon counties from the Central district)

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

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

Northern Illinois

Uninterrupted field work was possible throughout most of the region from Tuesday, May 19, through Tuesday, May 26. Completion estimates for corn planting range from 90% to 95% in the western and central portions of the region, with lower levels in the east. Major activities the past week included corn and soybean planting, rotary-hoeing corn, and preemergence herbicide application. Corn planted around May 1 is at V2 to V3.

Corn emergence to date appears uniform and looks good. However, there are some emergence concerns, with fields that have been or need to be rotary-hoed and have not yet emerged. Precipitation through most of the region on Tuesday, May 26, will halt field activity for a few days.

Completion estimates for soybean planting range from 75% in the northwestern portion of the region to 40% to 50% complete in the central portion and lesser amounts in the east.

Wheat appears good and is beginning to head. Some alfalfa has been harvested.

Southern Illinois

Several days of dry, sunny weather late last week and early into the Memorial Day weekend allowed corn planting to resume, though field conditions were not always ideal. Storms beginning early Monday shut down much, but not all, of the region again. Rainfall amounts ranged widely; some areas received almost nothing, while parts of Madison County received 4 to 9 inches and more. Some of the newly

planted corn will likely have to be replanted. The earliest wheat should soon be approaching soft-dough stage.

West-Central Illinois

Depending on location in the region, producers had anywhere from 3 to 6 days of opportunity for field work. Needless to say, quite a bit of corn was planted. Other tasks included NH₃ application, rotary-hoeing corn that was planted May 11 to 13, tillage work, and herbicide and fertilizer application. Quite a bit of tillage and diesel fuel have been used to bring weeds under control as well to allow fields to dry before planting and to fill in the ditches. A guess as to the amount of corn planted would be 65%. Corn maturity ranges from VE to V5.

Just a few soybean fields have been planted, and some of the early ones have emerged. Populations look good thus far.

The early-sown wheat has flowered, while later-planted is approaching flowering. Very few disease symptoms on the upper leaves have been noted. Stands are somewhat erratic, based on soil moisture levels.

Alfalfa weevil populations have not been noticeable. The alfalfa crop varies from flowering in the south to bud in the north.

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