PEST MANAGEMENT & CROP DEVELOPMENT

BULLETIN

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In This Issue

INSECTS

Correction: Degree-Day Maps in *Bulletin* Issue No. 9, May 24, 2002

The captions for the degree-day maps on page 98 of the print version of the *Bulletin* (issue no. 9, May 24, 2002) were inadvertently transposed. The caption for Figure 1 actually describes the information in Figure 2, and vice versa. In other words, the captions for Figures 1 and 2 should be exchanged. We regret the error.—*Kevin Steffey*

A Summary of the Insect Situation

The persistent wet, cool weather has slowed down crop growth (and production in some areas) so dramatically that we find ourselves at a virtual standstill regarding insect problems. Although I continue to receive insect reports from here and there, the weather is far more attention-grabbing than insects are. Consequently, I see no reason to provide a lot of additional detail about scouting for insects while crops in many areas

- are very small,
- have just been planted, or
- have not been planted.

Following is an overview of the insect situation in Illinois, such as it is, by crop. Where appropriate, maps of accumulated degree-days are provided. When corn and soybeans begin to grow more rapidly, we'll resume more in-depth articles about the insect situation and management suggestions.

Corn

Corn rootworms. No one has confirmed hatch of corn rootworm larvae, so we don't know whether larvae have begun to feed or are just hatching. Rootworm development models predicted hatch in central Illinois as early as the week of May 20, but the abnormal weather conditions may render development models less reliable. Figure 1 shows the accumulated soil degree-days (base 52ºF), at the 4-inch level, from January 1 through May 27, 2002. Only 50 (central and northern counties) to 100 (southern counties) degree-days accumulated from May 20 through May 27. Approximately 380 to 426 accumulated degree-days are required for 50% of the larvae to hatch. Hatch should be well under way in the southern two-thirds of the state. However, rootworm survival is unknown.

Cutworms. Reports of black cutworm damage have increased a little, primarily from western Illinois, but the reports are not numerous. Tom Leezer, a consultant in Stark County, reported that a few fields around Peoria and Galesburg have cutworm damage at or slightly above the 3%-cutting threshold. In general, however, reports of black cutworm damage are few and far between.

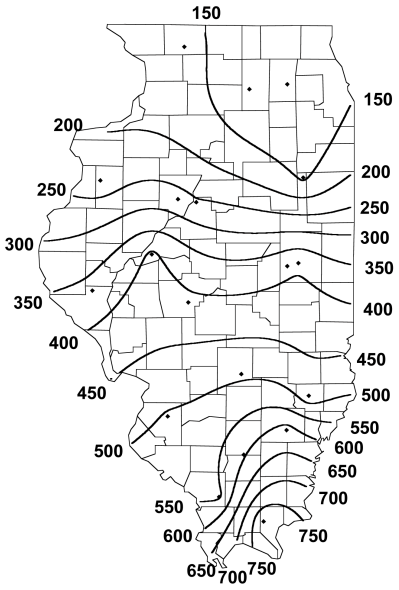

Figure 1. Actual soil degree-day accumulations (base 52ºF), at the 4-inch level, from January 1 through May 27, 2002. (Map courtesy of Bob Scott, Illinois State Water Survey.)

European corn borer. Ron Hines, senior research specialist at the University of Illinois Dixon Springs Agricultural Center, has been capturing European corn borer moths throughout May. I also recently received a report of some moths in grassy areas near cornfields in central Illinois. However, as most of you know, the odds of European corn borer larvae surviving are quite diminished on small corn plants. The following paragraph, extracted from *European Corn Borer: Ecology and Management* (North Central Regional Extension Publication No. 327, 1996), explains the interaction of small corn plants and European corn borer larvae:

"If the corn plant is small (usually before the 6th-leaf stage) when eggs hatch, most of the larvae fail to become established. They wander off and die due to several factors, including natural feeding deterrents. In many corn hybrids, a primary factor for behavioral deterrence is a plant aglucone, 2-4 dihydroxy-7-methoxy-1, 4-benzoxazin-3-one (DIMBOA). The concentration of DIMBOA in a given corn hybrid usually decreases proportionally with plant growth. A greater proportion of larvae survive on corn in mid-to-late whorl stage, which is when plants are in the 8th- to 12th-leaf stage."

So, judge for yourself. In counties on the western side of Illinois, some corn may be large enough to allow for survival of European corn borer larvae. But the overall prospects for corn borers are not good right now.

Southwestern corn borer. During the week ending May 28, Ron Hines also captured the largest number of first-flight southwestern corn borer moths since 1998, indicating that survival of these insects over winter, at least in some areas, was better than had been anticipated. However, the lack of corn or the small size of emerged corn probably will reduce the potential for larval survival.

Stalk borer. I received one unconfirmed report of stalk borers in central Illinois. Based on degree-day accumulations (base 41ºF, Figure 2), initial movement of stalk borers from weed hosts into corn (~1,100 degree-days) may have begun as far north as Quincy in western Illinois, Springfield in south-central Illinois, and Marshall in eastern Illinois. We recommend scouting when 1,300 to 1,400 degree-days have accumulated, and a decision to treat with an insecticide should be made when 1,400 to 1,700 degree-days have accumulated. Corn in the southern one-third of the state should be monitored right now for stalk borers.

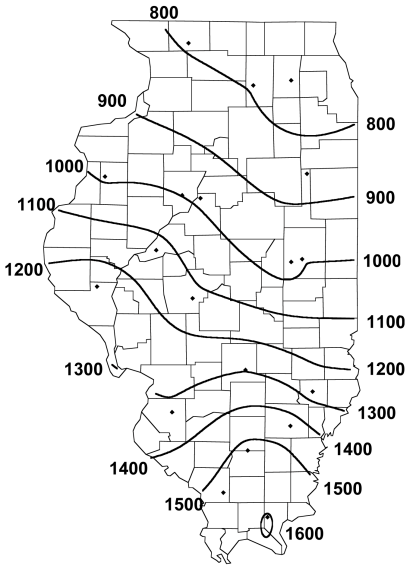

Figure 2. Actual degree-day accumulations (base 41ºF), from January 1 through May 27, 2002. (Map courtesy of Bob Scott, Illinois State Water Survey.)

Economic thresholds for stalk borers have been developed and published by Iowa State University. These thresholds (Table 1) are based on six corn-leaf stages, three corn prices (admittedly at least one of these prices is a little optimistic), control costs of $13 per acre, and a control level of 80%. The information in the table reveals that, as corn price increases, the economic thresholds decline. The economic thresholds for smaller plants are lower than they are for taller plants. Also, recognize that these are guidelines, not carved in stone. If you can treat for a lower price or if you can achieve better control than 80%, feel free to manipulate the thresholds accordingly. Economic thresholds decline as cost of control decreases and effectiveness of control increases. Insecticides for control of stalk borers are presented in Table 2.

White grubs, wireworms. Although people continue to find white grubs (primarily Japanese beetle grubs), these larvae will complete their feeding soon, at which time injury will cease. In the meantime, I have received some reports of insecticides not providing acceptable control of white grubs. If you have any information about the performance of different insecticides, I'd be interested in learning more.

The cool soil temperatures have prolonged wireworm activity, and reports of wireworm damage have increased slightly. Unfortunately, replanting corn as a consequence of wireworm (or white grub) damage is becoming an unattractive option as the season progresses. Farmers who are encountering damage caused by these pests

Table 1. Economic thresholds (expressed as a percentage of infested plants) for corn in border rows attacked by stalk borer. (Developed from research conducted at Iowa State University.)

Leaf stage	*$2 per bushel*	*$3 per bushel*	*$4 per bushel*
1-leaf	10%	7%	5%
2-leaf	12%	8%	6%
3-leaf	15%	10%	8%
4-leaf	27%	11%	9%
5-leaf	27%	11%	9%
6-leaf	34%	23%	17%

Table 2. Insecticides suggested for control of stalk borers in corn.

Product	*Amount of product per acre*
*Ambush	6.4 to 12.8 oz
*Asana XL	5.8 to 9.6 oz
*Capture 2EC	2.1 to 6.4 oz
*Lorsban 4E	2 to 3 pt
*Mustang	2.9 to 4.3 oz
*Pounce 3.2EC	4 to 8 oz
*Warrior	2.56 to 3.84 oz

*Use restricted to certified applicators.

may have to accept the decreased stands.

Soybeans

Bean leaf beetle. Early-planted soybean fields are attracting large numbers of bean leaf beetles. However, early-planted soybean fields are not that common. I believe it's only a matter of time before many bean leaf beetles begin to perish due to the lack of an adequate food source. Although bean leaf beetles will feed on alfalfa and clover, and even a little on corn, these crops cannot sustain them.

Watch early-planted soybeans carefully. Bean leaf beetles are quite mobile, and their search for food will bring them into fields in which soybean seedlings are present.

Seedcorn maggot. Injury caused by seedcorn maggots is more prevalent during cool, wet springs. Fields most likely to harbor seedcorn maggots are

- fields to which manure was applied,
- fields with high organic matter content, and
- fields with vegetation decaying in the soil (e.g., plowed-under cover crops).

Farmers concerned about soybean maggots in soybeans may consider the use of an insecticidal seed treatment to prevent seedcorn maggot injury. Seed treatments that contain lindane as an active ingredient are effective, as is Kernel Guard Supreme (active insecticide is permethrin).

Alfalfa

Alfalfa weevil. Alfalfa weevil activity, for the most part, is over with in 2002. Some larvae hangers-on can be found in alfalfa fields in northern counties, but adults are present throughout most of the state. They will leave alfalfa fields soon to "oversummer" in noncrop areas.

Potato leafhopper. We are beginning to receive reports of the presence of potato leafhoppers in alfalfa fields throughout Illinois. Although the numbers are low right now, alfalfa farmers should be alerted to the presence of this important insect pest. When temperatures increase, the development of potato leafhoppers will accelerate, and injurious levels could be encountered soon.

Send any reports of insect activity you have. We want to know what's happening around the state, and so do our readers.—*Kevin Steffey*

PLANT DISEASES

Phytophthora and Pythium Seed Rot and Damping-Off of Soybean in Illinois

Field conditions in much of Illinois are prime for damage to soybeans caused by *Phytophthora* and *Pythium*. These pathogens have often been called "water molds." *Pythium* is most favored by cool, saturated soil conditions, and *Phytophthora* is highly favored by intermittently wet soil conditions—conditions that are occurring across much of Illinois. This article will cover basic aspects of *Pythium* and *Phytophthora* diseases of soybean and their management, and will briefly discuss some new research on Phytophthora rot of soybean in Illinois.

Phytophthora and *Pythium* cause very similar damage to soybean seed and seedlings. In fact, they are virtually indistinguishable without laboratory tests. Both pathogens cause seed rot, preemergence damping-off, and postemergence damping-off, all often associated with tan-brown, soft, rotted tissue. They can cause serious disease damage under favorable environmental conditions. For more information and photos of symptoms, please see the soybean section of a new University of Illinois *Field Crop Disease* website that is under development (http://cropdisease.cropsci.uiuc.edu).

Pythium is a widespread pathogen that affects soybean and corn. There are a number of different *Pythium* species that affect these crops. Last week in the *Bulletin* (May 24, 2002), *Pythium* was briefly discussed as a pathogen of corn. It is often considered to be a minor problem compared to *Pythium* diseases of soybean; however, we received reports from Illinois in the last week of scattered wilted, rotting corn seedlings that have symptoms typical of *Pythium*. If conditions are favorable for *Pythium* infection of corn, they almost certainly are favorable for *Pythium* infection of soybean.

After planting, not much can be done to manage *Pythium* diseases, but it would be worth the effort to take notes on which fields are having a problem with seed and seedling diseases and consider improving drainage and using seed treatments in those same areas in the future. Soybean varieties are not available with resistance to *Pythium*. Seed treatments containing metalaxyl (e.g., Apron or Allegiance) or mefenoxam (e.g., ApronMaxx or Apron XL) are effective for control of *Pythium* for perhaps up to about 2+ weeks after planting.

Phytophthora (species *sojae*) does not cause disease of corn but can cause devastating disease on soybean. And unlike *Pythium,* which causes most damage to seed and seedlings, *Phytophthora* can attack and kill soybeans from planting to harvest. In addition to improving drainage in fields where possible, there are two keys to managing Phytophthora rot of soybean. First, plant good-quality soybean seed that has specific resistance to *Phytophthora*. Look for major resistance genes such as Rps1a, Rps1c, or Rps1k. (Note: Rps stands for resistance to *Phytophthora sojae*.) Unfortunately, in several midwestern states and in parts of Illinois, the Rps genes are losing their efficacy (more on this in the following paragraphs). Second, fungicidal seed treatments are recommended as good insurance, especially in areas that have previously had problems with seed and seedling rot. The same seed treatments previously noted that are effective for *Pythium* are also effective for control of *Phytophthora* (e.g., metalaxyl and mefenoxam).

A new research project on Phytophthora rot of soybean in Illinois was initiated recently, with funding provided by the Illinois Soybean Checkoff. More information was needed to determine if *Phytophthora* populations in Illinois are developing the ability to kill plants with available resistance (Rps) genes as they are in nearby states. The project is still in progress, but this will serve as a brief project summary to date. With the help of seed company representatives and regional extension educators, more than 200 soil samples, mostly from soybean fields with a history of Phytophthora rot or similar seedling health problems, have been collected and tested. The soils originated from more than 23 counties in Illinois, representing north-central, northeast, west-central, east-central, southern, and southeastern regions of the state.

We obtained isolates of *P. sojae* from many of the soil samples and have tested these isolates against commercial soybean varieties with Rps genes 1a, 1c, and 1k. We found (as expected) that many of the isolates from Illinois can defeat Rps1a and a smaller number can defeat 1c. Unfortunately, in our preliminary work, we also found a few aggressive isolates of *Phytophthora* that can defeat all of the resistance genes (Rps 1a, 1c, and 1k) that are commonly available in commercial varieties sold in Illinois. Although we know these aggressive isolates exist in Illinois, we do not know how much damage they may be causing. The aggressive isolates do not seem to be widespread in the state, and Rps 1c and 1k are still effective in most areas of Illinois. We will continue this research and will determine races of *Phytophthora* in Illinois. The results will help with selection of soybean varieties with appropriate *Phytophthora* resistance for Illinois and will be of value for breeders developing soybean varieties with *Phytophthora* resistance best suited for Illinois.

I would like to obtain additional soil samples from selected areas of Illinois where *Phytophthora* has been a problem. I especially would like to obtain soil samples from northeastern counties (Kankakee, Iroquois, Will, and Ford). Please contact me if you know of fields anywhere in Illinois where Phytophthora rot or seed or seedling rot of soybean has been a problem, and we can discuss whether it would be appropriate to collect soil samples from those areas for *Phytophthora* research.—*Dean Malvick*

WEEDS

Corn Stage Is Critical for Postemergence Herbicide Applications

Due to early-season conditions, the Illinois corn crop is at several different stages, with corn sizes ranging from emergence to growth stages critical to postemergence herbicide applications. Issue no. 6 of the *Bulletin* addressed the use of soil-applied herbicides after corn emergence to control early-emerging weeds and the critical timing associated with this practice. However, this window has closed in many areas of the state, and we need to look at postemergence herbicides to control later-emerging grass and broadleaf weeds. One thing to keep in mind when planning these postemergence herbicide programs and rescue applications is that maximum corn size is extremely critical. Many times, if these restrictions are not followed, substantial crop injury can result that can lead to yield reductions.

Herbicide labels often refer to plant height, crop growth stage, or both when discussing timing of postemergence applications. On labels where both crop height and growth stage are mentioned, it is important to follow the more restrictive of the two. This is extremely critical with the cool weather that the corn crop has been experiencing this season. During these conditions corn usually remains relatively small in regards to plant height. However, corn continues to advance developmentally. For example, the Clarity label indicates that 1 pint per acre can be applied to corn up to the five-leaf stage or 8 inches tall, whichever is more restrictive. Under cooler growing conditions, a corn plant may be less than 8 inches tall but have five or six leaves. If the herbicide application was made by only looking at corn height, there is a possibility that corn injury could occur because the application was made to corn beyond the labeled growth stage. Following the more restrictive of the two restrictions is extremely critical.

Since it is important to know the height and growth stage for timely postemergence herbicide applications, here are a couple of methods for determining these factors. The most common method for determining corn height is done by using free-standing plants. When measuring corn height, measure from the soil surface to the arch of the uppermost leaf that is more than 50% emerged. This should be done on a number of plants and then averaged to overcome any variability among corn plants in the field. In determining corn growth stage, the collar method is the most appropriate to use. Vegetative growth can be done by counting the number of leaves with visible collars. The collar is the part of the leaf that joins the leaf blade and leaf sheath. Collars are not apparent until the leaves are developed and emerged from the whorl. Therefore, leaves that are just emerging from the whorl are not counted. For example, a plant may appear to have six leaves. However, after closer examination, there may only be four leaves with collars. Therefore, this plant would be considered in the V4 growth stage. For more information on staging corn

Table 3. Postemergence herbicide application timings in corn.

Herbicide	*Maximum corn heights and growth stages*[a]
2,4-D	Broadcast before corn exceeds 8" tall; use drop nozzles from >8" to tassel emergence.
Accent	Broadcast up to 20" tall or 6 collars (V6). Apply with drop nozzles from 20" to 36" tall. Do not apply to corn >36" tall or that exhibits >10 collars (V10).
Accent Gold	Apply up to 12" tall or 6 collars (V6).
Aim	Apply up to 8-leaf collar growth stage (V8).
Atrazine	Apply up to 12" tall.
Basagran	No height specified.
Basis	Apply to corn spike to 4-leaf (V2). Do not apply to corn with 3 fully emerged collars or >6" tall.
Basis Gold	Apply up to 12" tall; do not apply to corn exhibiting 6 leaf collars.
Beacon	Broadcast between 4" to 20" tall. After corn is 20" tall or exhibits more than 6 collars, use directed applications up to tassel emergence.
Buctril	Prior to tassel emergence.
Buctril + atrazine	Apply up to 12" tall.
Callisto	Broadcast up to 30"-tall or 8-leaf corn.
Celebrity Plus	Broadcast between 4" to 24" tall.
Clarity or Banvel	At 1 pt/A rate, apply through the 5-leaf stage or 8" tall; at 0.5 pt/A rate, apply from 8" to 36", or if 6th leaf is emerging, or if 15 days prior to tassel emergence. Use directed applications when (1) corn leaves prevent proper spray coverage, (2) sensitive crops are growing nearby, or (3) tank mixing with 2,4-D.
Distinct	At 6 oz/A rate, from 4" to 10" tall; at 4 oz/A rate, 10" to 24" tall.
Hornet WDG	Apply until corn reaches 20" tall or V6 stage. Apply with drop nozzles from 20" to 36" tall.
Liberty (LL corn)	Broadcast up to 24"-tall or V7 corn. Use drop nozzles from 24"- to 36"-tall corn.
Liberty ATZ (LL corn)	Apply up to 12" tall.
Lightning (Clearfield corn)	Apply up through 20"-tall corn or corn with 6 leaf collars (V6); apply with drop nozzles when corn exceeds these stages or if crop canopy prevents adequate weed coverage. Do not apply within 45 days of harvest.
Marksman	Apply up through 5-leaf corn or 8" tall.
NorthStar	Broadcast between 4" to 20" tall (V2–V6). Use directed applications from 20"- to 36"-tall corn.
Option	Broadcast up to 16" tall or through V5 growth stage. Use drop nozzles from 16"- to 36"-tall corn.
Permit	Spike through layby.
Resource	Apply from 2- to 10-leaf corn.
Glyphosate (RR corn)	Apply through 30"-tall or V8 corn.
ReadyMaster ATZ (RR corn)	Apply up to 12" tall.
Sencor	Pretassel.
Shotgun	Broadcast up to 4 leaf or 8" tall; directed spray 5 leaf or 8" to 12" tall.
Spirit	Broadcast between 4" to 24" tall. Use drop nozzles when field corn is 20" to 24" tall or exhibits more than 6 collars (V6).
Steadfast	Broadcast up to 12" tall or exhibiting 6 collars (V6).
Stinger	Apply through 24" tall.
Yukon	Apply broadcast or with drop nozzles from spike to 36".

[a] Use the most restrictive of the two restrictions.

growth, refer to Iowa State publication "How a Corn Plant Develops" at http://maize.agron.iastate.edu/corngrows.html#how.

Table 3 summarizes the recommended timings for several postemergence herbicides used in corn. Always check the product label for specific directions.—*Christy Sprague and Aaron Hager*

CROP DEVELOPMENT

Replanting Question Continues

While the return to warmer temperatures has the existing corn crop looking much better this week, we have received some rather unexpected reports that frost damage resulted in extensive plant death in some areas and that replanting will be needed in some of these fields. The problem appears not to be direct freeze injury to the growing point but rather the loss of leaf area on early-planted corn (mostly planted during the mid-April warm spell) and the inability of the crop to grow back. We think that the unusually cool, wet weather and soils both slowed regrowth and stimulated attack on the remaining plant tissue by diseases. As a quick assessment, if the plant is not showing green regrowth by 3 or 4 days after the damage, it will probably not survive. If you have fields that were in the 2- or 3-leaf collar stage during the period of overnight temperatures in the low 30s, you will want to check those fields as soon as possible.

For guidelines and more detailed information on replant decisions for corn, please check the *Illinois Agronomy Handbook,* either the paper version or the Web-based version at http://web.aces.uiuc.edu/aim/IAH/ch2/replant.html. The calculator in the Web-based version will help with the replanting decision. Replanting costs can be entered, along with existing stand and original planting date. As we all know, replanting this late means a serious yield penalty from late planting—existing stands become "more valuable" the later it gets. Using the calculator for 170-bushel yield potential fields and minimal replanting costs of $10.00 per acre indicates that existing stands of corn planted in late April would need to be less than 12,000 per acre to make June 1 replanting break even.

On the side favoring replanting, however, is the fact that predicted replant returns are based on *healthy* surviving plants, not on plants that have had their yield potential affected by disease or other ongoing damage. We don't have a good way to estimate this, but a plant that has lost its leaf area and is growing back very slowly will not yield up to its potential. Perhaps one approach would be to count such plants as "partial" plants (say, 3/4 or 1/2 a plant, depending on how "sick" the plant looks) when a damaged stand is being counted. To count stands, the measuring wheel method described in the *Illinois Agronomy Handbook* works well, or use the time-tested 1,000th acre (17'5" in 30-inch rows) counts, making sure to take enough of these to assess the stand adequately.

Wheat Crop Comment

While the extensive rainfall has hammered the wheat crop this spring, the crop seems to be holding its own, with diseases likely present but not spreading very rapidly due to cool temperatures. Heading date ranged from about normal in southern Illinois to later than normal in central and northern parts of the state. As a rule of thumb, we use 6 weeks from heading to predicted harvest date. If it's much less than that, it is usually because high temperatures cut short the filling period and usually the yield, as well. Warm temperatures will help diseases to spread rapidly as long as it stays wet. Standing water also has taken its toll on the crop. If we get some drier weather with some sunshine, the crop can fill quite rapidly and quite well. But the maximum filling period lasts only about 4 weeks under average temperatures, so every day of poor weather in the next 3 to 4 weeks will take a bite out of yield.—*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

Most of the area received about 1/2 inch of rain, with some areas receiving up to 1 inch. However, progress was made in finishing up corn planting, except for "drowned-out" areas, and

progress was made with soybean planting. Other activities focused on rotary hoeing and early corn postherbicide application. Corn emergence last week was very slow, with some reports of corn leafing out under ground. Warmer temperatures beginning on May 26 have contributed to corn exhibiting a more normal green color. Frost 10 days ago will have minimal yield effect on corn.

Alfalfa harvest is under way, and some fields have alfalfa weevil populations approaching economic thresholds. Reports of fungicide application on wheat were received.

West-Central Illinois

Isolated heavy rain fell in some parts of the region, once again filling the ponded areas and delaying planting.

A significant amount of corn was planted and replanted during the past week. Planting is about 90% complete. Early-planted corn is still not growing very rapidly, with most of it still in the V2–V4 stages.

Not many insect problems have been reported in corn. However, wireworm has been observed in some fields in the western part of the region. Postemergence herbicides are being applied where soil and weather conditions allow them.

Soybean planting has begun, with about 15% to 20% of the acres planted. No pest problems have been reported in soybean. Frost damage on soybean is suspected in some fields in western Illinois.

Hay harvest has begun in the area. Quality has been reduced because of the extreme wet weather.

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