



PEST MANAGEMENT & CROP DEVELOPMENT

BULLETIN

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EXTENSION

Also in This Issue

- **Conditions Favorable for Phytophthora Root and Stem Rot on Soybean, 102**
- **Soybean Planting Delays Continue, 102**
- **Nitrogen Applications Over the Top, 103**
- **Too Hot for Corn? 103**
- **Regional Reports, 105**

Reminder: Weed Science Field Day at Urbana

We would like to take this opportunity to reiterate the invitation to attend the 2009 University of Illinois Weed Science Field Day, to be held Wednesday, July 8, at the Crop Sciences Research and Education Center, located immediately south of the main campus. Coffee and refreshments will be available under the shade trees near the Seed House beginning at 8:00 a.m. The tour will provide ample opportunity to look at research plots and interact with weed science faculty, staff, and graduate students. Participants can compare their favorite corn and soybean herbicide programs to other commercial programs and get an early look at some new herbicide active ingredients. The tour will conclude around noon with a catered barbeque lunch at the Seed House.

Cost for the tour is \$10, which helps defray the cost of the tour book and refreshments. We will apply for 2 hours of CCA credit in the IPM category. If you have any questions or would like more information, please contact us at 217-333-4424 or 217-265-0344.

—Aaron Hager

WEEDS

Reminder about Corn Size and Postemergence Herbicides

The combination of ample soil moisture and very warm air temperatures has contributed to rapid corn growth and development over the past several days. As you can imagine, these conditions also promote rapid growth and development of weeds. Postemergence herbicide applications in corn are progressing as conditions allow, and we would like to offer a couple of reminders:

- Please remember that the labels of most postemergence corn herbicides indicate a maximum corn size or development stage beyond which broadcast applications should not be made. If these restrictions are not followed, the likelihood of corn injury may increase dramatically. The sizes for many postemergence corn herbicides were listed in Table 1 of “Maximum Corn Growth Stage for Postemergence Herbicides” (*the Bulletin*, issue 12, June 12). Broadcast applications of atrazine-containing products or glyphosate should not be made to corn over 12 and 30 inches tall, respectively.
- Corn stalks are often inherently “brittle” during periods of rapid growth and stem elongation. Be cautious with applying growth regulator herbicides to corn at this time, as they may enhance stalks’ brittleness.

—Aaron Hager

PLANT DISEASES

Conditions Favorable for Phytophthora Root and Stem Rot on Soybean

Phytophthora root and stem rot of soybean can occur when soil conditions are wet and the soil temperature is above 65 °F. The disease is caused by a soilborne pathogen known as *Phytophthora sojae*. Symptoms include wilting of plants, root systems with dark lesions that may be rotted, dark stem lesions extending upward from the soil line, and seedlings that have damped-off. Wet soil conditions are required for Phytophthora root and stem rot to be severe, because the pathogen produces spores (zoospores) that must “swim” through the soil to infect soybean plants. The most severely affected areas in a field generally are those that tend to hold moisture for extended periods (low areas, areas with higher clay content, etc.). Infection can take place throughout the season, and adult plants can be killed in severe conditions.

With the high amounts of rainfall received throughout Illinois, Phytophthora root and stem rot is likely to be observed more frequently this year. No “in-season” management options are available for control. The best tactic is to plant a resistant variety. Two types of resistance are available: race-specific resistance and field tolerance. In addition, some fungicide seed treatments may provide some control.

Race-specific resistance. Soybean varieties with race-specific resistance use one or several Rps genes to provide control of specific races of the pathogen. This type of resistance provides complete Phytophthora control as long as the races of the pathogen in the field are the same ones controlled by the specific Rps gene(s) used in that variety. Many different races of the pathogen are present in Illinois, and some can infect varieties that use some of the most common Rps genes for resistance.

Field tolerance. Field tolerance is effective against all races of the Phytophthora pathogen but does not provide complete control. Varieties with high levels of field tolerance can still be affected by Phytophthora, but they are not affected as severely as susceptible varieties. Seed companies may use varying terminology to describe “field tolerance.”

Fungicide seed treatments. Seed treatments that contain either mefenoxam or metalaxyl can provide some protection against Phytophthora but will not provide season-long control. Higher rates of mefenoxam and metalaxyl will provide better control of Phytophthora than standard rates that are typically used in Illinois. Research conducted at Ohio State University indicates that using seed treatments on varieties with high levels of field tolerance may be an effective combination in helping manage Phytophthora root and stem rot.

—Carl A. Bradley

CROP DEVELOPMENT

Soybean Planting Delays Continue

Soybean planting delays continued this week, with statewide progress moving forward only 6% from June 14. The June 21 Crops and Weather report indicated 79% planted, in contrast with 88% by the same date in 2008 and 96% averaged over the last 5 years. Progress was hampered by several thunderstorms and heavy rainfall, while the high temperatures and humidity contributing to those storms have helped growth of planted corn acres. The East Southeast and Southeast reporting districts are farthest behind, with 45% and 64% planted. Several acres in those two regions are in double-crop cropping systems (winter wheat followed by soybean); 98% of the wheat crop is filled, 42% is ripe, and 6% is already harvested. By now, quite a few soybean acres intended to be full-season single crop will be

planted at the same time as many double-cropped acres.

If you have both double-crop and single-crop soybean fields to be planted, scout to find the field offering the best planting conditions. Soybeans in the double-crop rotation (following winter wheat) could perhaps be planted even earlier than some single-season fields. Transpiration of water through the leaves of the winter wheat crop will have wicked water out of the ground at faster rates than soil surface evaporation prior to wheat maturity. However, the residue left following wheat harvest may create a dense mat of straw and slow the rate of surface evaporation if rainfall occurs between wheat harvest and soybean planting. These conflicting factors will create situations that are field-specific based on interactions between wheat maturity and harvest with rainfall timing.

As we approach very late single-crop planting, recommendations should start to follow those for double-cropped soybean:

- Continue to plant a mid- to full-season soybean variety. I would not switch to a variety with an exceptionally early maturity group for your area. When soybeans are planted late, the length of time contributed to vegetative development by the plant is dramatically shortened, while the time for reproductive development is little shortened. The higher temperatures, and more importantly the increasing night length, that will soon start to occur will cause the plants to flower very small and early in development (potentially V2–V3). If you plant an early-maturity variety, it will not have time to grow much stem length, which reduces the available nodes to set flowers and form pods. In addition to fewer pods, the ability to get under the lowest pods with the combine header could be reduced, increasing harvest loss. The trade-off, of course, is the concern for an early frost. So switching to a late-adapted maturity group for your area to offset these changes shouldn't be done either.

- The narrower the rows the better now. We are at the calendar date where I would suggest not planting soybeans in 30-inch rows if that is at all avoidable. Narrow (7- to 10-inch) rows from a no-till drill will consistently produce the highest yields when soybeans are planted in late June and early July.

- Seeding rates should also now be adjusted to place 50% to 100% more plants per acre than recommended for soybeans planted in early May. For most growers, this means targeting a final plant stand between 150,000 and 200,000 plants per acre.

- Timely July and August rainfall and a normal, or preferably later-than-normal, killing frost this fall would also be helpful. I know you can't control these, but with the right weather conditions through summer, good soybean yields could still be achieved.

—Vince M. Davis

Nitrogen Applications Over the Top

The season's prolonged wet conditions are leaving growers with no other alternative than sidedress applications for nitrogen (N). Many are now facing the decision of when and how to apply N.

How late can I apply N? Corn takes up large amounts of N during approximately the V8 to VT (tasseling) development stages. Nitrogen uptake is mostly done shortly after pollination. So applying N before the V8 development stage is probably the best time. Research has shown that if applications are done around V6, it is rare to see yield loss due to N stress. Of course, if N was applied preplant or at planting, a delay in application of supplemental N is not likely to cause plant N stress. In cases where no N was applied, or the N supply is very low, make it a priority to try to apply early (preferably before V6) to avoid loss of yield potential.

Can I apply N “over the top”?

Injection into the soil and dribbling between rows are the best ways to sidedress N because these applications can reduce volatilization of urea and protect the crop from foliar damage. If ammonia is used for the application, it is important to wait until soil conditions will allow the knife track to close properly. When injecting and dribbling are not viable options, broadcast application is another possibility. Applying dry products, such as ammonium nitrate and urea, over the top of the crop can result in foliar damage, in the form of small lesions, when granules fall into the whorl or leaf axil of the corn plant. Also, as the leaf emerges from the whorl, the margin might be white due to excess N in the leaf. Typically, though, this damage is merely an aesthetic concern and rarely translates into yield reduction. Also, urea is subject to volatilization if rain does not fall within 3 to 4 days after application. As much as 30% of the urea can volatilize if there is no rainfall within approximately 10 days after the application. For “over the top” applications, urea granules will have the least impact on leaf burn compared to UAN or dry products such as ammonium nitrate or ammonium sulfate. To minimize adhesion of dry products to the leaves, it is best to apply when the foliage is dry.

If UAN solution is broadcast over corn, this too can cause foliar damage. If the application is done when plants are small (about 6 inches), the damage will not likely result in yield loss. Even when plants are bigger (V4), the foliar damage caused by a rate as high as 90 to 100 pounds N per acre typically does not cause significant yield reduction.

One way to reduce damage from UAN is to apply in advance of rain. If rain falls within a few hours after application, it will wash the fertilizer off the foliage; it will also reduce the potential for volatilization of urea. If a broadcast application of UAN is the only option available, try to do it as

soon as possible, because the smaller the plant, the less the potential for foliar damage. However, if the plant is bigger and more N is needed, the yield benefit from the additional N will likely outweigh the leaf burn caused by the application.

Research from Minnesota has shown yield reduction when a rate of more than 60 pounds N per acre was applied at V8. When N applications are needed later than V8, to avoid extensive foliage damage it is very important to fit the high-clearance equipment with drop hoses so that UAN is applied directly to the soil surface without touching the crop canopy. If you plan to include herbicide with your UAN application, make sure you read the herbicide label to make sure such an application is allowed. Also, be aware that including herbicide with the UAN solution can intensify leaf burning. In Minnesota, adding 2 pounds atrazine per acre at a rate of more than 90 pounds N per acre at V3 development stage caused severe leaf burning. Applying 2 pounds atrazine per acre at 60 pounds N per acre causes similar leaf burning as applying 120 pounds N per acre with UAN alone.

—Fabián G. Fernández

Too Hot for Corn?

The corn crop in Illinois is finally mostly planted, though it's likely that some of the acres yet to be planted a week or two ago will not be planted to corn this year.

There have been several inquiries this week about hybrid maturity if corn must be planted this late for reasons such as having corn herbicide applied. The growing degree-days we can expect if summer temperatures are about average from July 1 to 50% chance of first frost are about 1,900, 2,100, and 2,450 for northern, central, and southern Illinois. Above-normal temperatures will increase these numbers by about 150 GDD. So even if we “credit” late-planted corn 300 GDD

less than rated maturity due to reduced requirements, it will be very risky to plant hybrids that need more than 2,400 GDD in central Illinois. This would suggest that hybrids for planting now be rated at about 100 days RM or less in central Illinois, while those in southern Illinois could still be in the 105- to 108-day range. To be clear: it is very risky to plant this late regardless of hybrid or its maturity, and it's not realistic to expect yields above 100 bushels per acre for corn planted in Illinois in the last week of June.

One of the more common questions this week has been the effect of the high temperatures on corn. Daytime high temperatures have exceeded 90 °F for most of Illinois over most of the last 4 or 5 days. Low temperatures have also been high, reflecting the high dewpoints. Dewpoint, the temperature at which the air is saturated with water vapor (that is, at 100% relative humidity), is a measure of the water content of the air. Night temperature at this time of the year is typically close to the dewpoint, and a dewpoint in the low to mid-70s is quite high. In fact, the water content of air with a dewpoint of 75 degrees is some 60% higher than the water content of air with a dewpoint of 60 degrees.

We have often said in the past that high nighttime temperatures increase respiration rates, thereby reducing the amount of sugar—produced by photosynthesis during the day—available for growth processes in the plant. That is true regardless of the developmental stage of the crop, but the consequences of this differ depending on whether the crop is in a sensitive growth stage. Fortunately, corn plants during vegetative growth are less sensitive to temporary reductions in the sugar supply than are plants during pollination. The earliest-planted corn in Illinois is getting close to tasseling, however, and as pollination approaches, shortages of sugars usually have considerable negative effects on yield potential. For most of the Illinois crop, though, high

night temperatures this week will not have much negative effect on yield potential. If warm nights persist, or if they return by the time of the peak pollination period (likely to be about the third week of July this year), yield potentials could drop.

What about daytime highs in the 90s? As long as the crop has enough water to keep the stomata open to allow photosynthesis to proceed normally, temperatures in the lower to mid-90s present no real challenge to corn plants. Corn is a plant of tropical origins, and its photosynthetic rate reaches a maximum at or even slightly above 90 degrees. As temperatures rise above 90, the rate will usually hold steady, only starting to drop when temperatures approach 100, providing there is adequate water. We use a cutoff of 86 degrees to calculate modified GDD, but that is because high temperatures are often associated with moisture stress, and moisture shortage lowers the temperature at which the photosynthetic rate is maximized.

So if we must have a week with high temperatures in the 90s, the last half of June is a relatively favorable time. It helps some that winds have been relatively calm, which helps reduce water loss through the leaves and preserve soil moisture. With the cutoff of 86 degrees and average high temperatures this time of year only a few degrees less than that, high daytime temperatures have only a modest effect on the rate of crop development. High nighttime temperatures, in contrast, directly increase the daily GDD accumulation. For example, typical day/night temperatures of 83/63 produce $73 - 50 = 23$ GDD, while a 92/74 temperature combination produces $80 - 50 = 30$ GDD (the high temperature is taken as the cutoff temperature of 86 degrees, and the average of 74 and 86 is 80.) The difference of 7 GDD may not seem like much, but over a week's time it's a difference of more than one leaf stage during mid-vegetative growth.

Leaf appearance and increase in plant height have been very rapid with the warm temperatures of the past week. The corn we planted here at Urbana on April 9 is now about 6 feet tall and at stage V13–V14. The last three or four leaf stages usually appear more quickly than the 50 GDD per leaf we normally assign, due to very rapid stem growth during this period. Thus we expect to see tassels on this crop by about July 1, and pollen shed could come as early as July 4. The last planting, in late May, is only about knee-high and so has at least a month to reach the VT, or tassel-emerged, stage. As is normal with high temperatures during vegetative growth, plant height is increased relative to the leaf stage. This suggests that late-planted plants will end up tall, and likely with smaller stalk diameters.

With the rapid plant development resulting from above-normal temperatures this year, GDD reductions from late planting will be considerably higher than they were in 2008. This means that development is partly catching up after a late start. But the downside is that we will likely end up with lower plant dry weight, leaves with less weight per unit area and perhaps less area, and perhaps one or even two fewer leaves. This could translate into incomplete canopy cover during and after pollination. This almost always means lower yields, even if water supplies remain adequate.

On the positive side, much of the crop I have seen in the last week that is past V6 or so has good color, at least in areas that have not had excess water problems. There are still concerns about the loss of N from some fields, and some producers have decided to apply some supplemental N. But high temperatures mean rapid leaf appearance and growth, which usually means that a relatively high percentage of the leaf area that we see is young leaf tissue.

Young tissue has lower (but increasing) chlorophyll content and so paler

color. But when good canopy color can develop under high temperatures, this indicates that the N supply is adequate to meet the needs of the crop and that the root system is functioning well to take up the N, at least up to its present stage. If temperatures drop to normal and we continue to get high amounts of sunlight, then the crop color will improve even more. A consistent dark-green color during mid- to late vegetative stage reflects a good N supply, but more importantly indicates a high likelihood of good leaf function going into the pollination period. If we continue to get rain, we could be set up for some good pollination conditions. What happens after that remains unknown, but at least good pollination is a start.

—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

There were widespread thunderstorms, some severe, throughout the region on Friday, June 19, with additional precipitation on Sunday, June 21. Total precipitation amounts varied widely, with some areas in Ogle County reporting over 5 inches and Winnebago County areas reporting over 3 inches. The DeKalb research farm reported about 0.7 inch, but other areas of DeKalb County received over 1.5 inches. Corn and soybeans in the region certainly have responded to the sunny, hot, weather that began Monday and continues.

Major activities have been postemergence herbicide application on corn and, early in the week, sidedressing nitrogen. Some producers have been struggling with alfalfa harvest due to the wet conditions.

Just a reminder that the next session of the 2009 Crops Training Center summer program will be Monday, July 6, from 9:00 am to noon at the Northern Illinois Agronomy Research Center,

Shabbona. The session will focus on sprayer technology and crop pest updates. Presenters will include Scott Bretthauer, University of Illinois Extension specialist, and area extension educators. The cost is \$30 per person, or \$40 for walk-in registration. Preregistration is requested by July 1; contact Greg Clark, gmclark@illinois.edu, Whiteside County Extension Unit, 815-772-4075. Certified Crop Adviser CEUs have been applied for.

Southern Illinois

The rain has finally stopped, and with temperatures in the mid-90s, things are beginning to dry out a bit. Growers are trying to get caught up by planting soybean, harvesting wheat, and planting double-crop soybean. Any thoughts of trying to plant and/or replant corn are probably at an end unless the crop can be used as silage. Corn is beginning to take on a darker green color as soils dry and become better aerated.

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