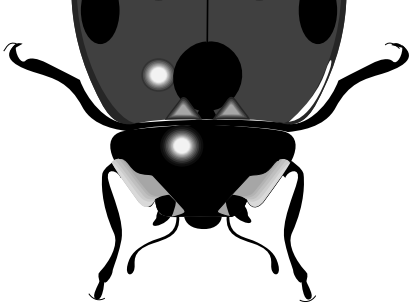

PEST MANAGEMENT & CROP DEVELOPMENT

BULLETIN

FOR IMMEDIATE RELEASE
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Also in This Issue

Training Session to Focus on Managing Summer Insects

Producers, agribusiness dealers, and crop scouts are invited to participate in the workshop "Managing the Insects of Summer" on Tuesday, July 13, in DeKalb County. The workshop, sponsored by University of Illinois Extension, will be conducted at the Crops Training Center on the Northern Illinois Agronomy Research Center, 14509 University Road, Shabbona.

Classroom discussion and in-field demonstrations (weather permitting) will focus on the variant western corn rootworm, European corn borer, and soybean aphid. Management strategies, scouting guidelines, economic thresholds, and performance of control products will be discussed. Dr. Mike Gray, an Extension entomologist, will lead the discussion. Continuing education units have been applied for certified crop advisers.

Registration begins at 8:30 a.m., with the workshop from 9:00 a.m. to noon (no lunch provided). The cost is $25 per person, and reservations are due by July 6 to the Quad Cities Extension Center, c/o Dave Feltes, 4550 Kennedy Drive, Suite 2, East Moline, IL 61244, telephone (309)792-2500. Make your check payable to University of Illinois Extension. At least 20 reservations are needed to conduct the workshop.—*Jim Morrison*

INSECTS

Corn Rootworms Are Causing Serious Damage in Some Areas

As you have read in previous issues of *the Bulletin*, we have received a significant number of reports of severe damage caused by corn rootworm larvae feeding on corn roots. Many of these reports have come from fields in which a rootworm-control product (a soil insecticide or an insecticidal seed treatment) was used at planting time. Consequently, all sorts of explanations for lack of performance of a given product have been volunteered. Some explanations probably are legitimate; others sound fabricated. The truth of the matter is that performance of most rootworm-control products can be compromised by many factors, including, but not limited to, early planting, less-than-ideal environmental conditions (e.g., dry soil), and faulty application. If you are involved in assessing the performance of a rootworm-control product, please consider all possible reasons why a product may not have provided adequate protection of the roots. At the same time, please try to avoid extraordinary excuses that try one's sense of reason.

One of our research trials this year has been established to test the hypothesis that planting time has an impact on efficacy of rootworm-control products. In a split-plot, randomized, complete block design, we are evaluating four treatments (Aztec 2.1G, Poncho 1250, YieldGard Rootworm hybrid, and untreated check) at two different planting dates—April 15 and May 16. The trial is duplicated in two cropping sequences: corn planted after a trap crop (corn and pumpkins), and corn planted after soybeans.

The level of rootworm larval damage in some plots is severe. When we assess rootworm larval damage in mid-July, we will be able to compare root damage among the four treatments and between planting dates. Monitoring emergence

of rootworm adults throughout the season in all plots also will help us determine whether the timing and pattern of emergence are affected by treatments, time of planting, and crop sequence. We hope to share some of the information with you in a future issue of *the Bulletin*.

As always, we also have established three "standard" trials to assess the efficacy of several rootworm-control products, including granular and liquid soil insecticides, insecticidal seed treatments, and transgenic hybrids. Root digs in these and other rootworm-focused research trials will begin in earnest in mid-July. Again, we will share the results with you at some time in the near future.

In the meantime, many people will continue to assess the performance of different rootworm-control products in many fields throughout Illinois, and some will be disappointed with the results, as we have learned already. The level of rootworm larval damage in several fields has been severe—roots completely destroyed, plants lodging and then goosenecking as they continue to grow. Ear development in these fields will be hampered, and yield undoubtedly reduced. Depending on the hybrid and the growing conditions during the next few weeks, some corn will be able to compensate for the root damage by growing new roots and/or producing reasonable ears. It is likely, however, that badly lodged fields will be difficult to harvest.

To help assess rootworm larval damage, you should be familiar with two rootworm larval injury rating scales. The 1-to-6 root-rating scale developed at Iowa State University many years ago is a relatively easy scale for assessing gross levels of injury. We still use this scale to evaluate the root systems we extract from many of our rootworm trials. The 0-to-3 node-injury scale, developed more recently by Jim Oleson and Jon Tollefson at Iowa State University, lets you quantify the amount of rootworm larval injury based on the amount of injury on each node of roots. Following are descriptions of the two scales.

1-to-6 root-rating scale:

1. No damage, or only a few minor feeding scars
2. Feeding scars evident, but no roots eaten off to within 1-1/2 inches of the plant
3. Several roots eaten off to within 1-1/2 inches of the plant, but never the equivalent of an entire node of roots destroyed
4. One node of roots completely destroyed
5. Two nodes of roots completely destroyed
6. Three or more nodes of roots completely destroyed

0-to-3 node-injury scale:

0. No feeding damage (lowest rating that can be given)
1. One node (circle of roots), or the equivalent of an entire node, eaten back to within approximately 2 inches of the stalk (soil line on the 7th node)
2. Two complete nodes eaten
3. Three or more nodes eaten (highest rating that can be given)

Damage in between complete nodes eaten is noted as the percentage of the node missing (1.50 = 1-1/2 nodes eaten, 0.25 = 1/4 of one node eaten, etc.).

Whatever rating scale you use, significant root pruning is an obvious indication of severe rootworm larval damage. For an excellent, interactive explanation of the node-injury scale, go to http://www.ent.iastate.edu/pest/rootworm/nodeinjury/nodeinjury.html. To watch a video with a considerably younger Kevin Steffey explaining the 1-to-6 root-rating scale, go to http://www.ipm.uiuc.edu/videos/index.html, then click on "Western Corn Rootworm Damage Ratings."

Another concern in fields with significant rootworm larval damage is the impact that adults will have on pollination. In severely damaged fields, many adults will emerge, so the potential for significant silk clipping exists. Whether such badly damaged fields would benefit from application of an insecticide to protect the pollination process depends on many interrelated factors. Making a rootworm management decision in such fields is challenging, and one management recommendation will not fit all situations.

Rootworm adults have been emerging in several areas of Illinois for at least 2 weeks, and in some areas, corn is tasseling and silking. The adults will be attracted to these flowering parts of corn plants, and their feeding on silks may interfere with pollination. As a rule of thumb, a treatment to protect against excessive silk clipping by rootworm adults may be warranted when there are five or more beetles per plant, pollination is not complete, and silk clipping is observed. Although silks will continue to grow after they have been clipped by insects, rootworm adults have a tendency to congregate on ear tips and continue feeding. Insecticides suggested for control of rootworm adults interfering with pollination are presented in Table 1. Please abide by all label directions and precautions.

All indications are that 2004 will be a "rootworm year" in Illinois, so take advantage of the opportunity, wanted or not, to assess the performance of whatever rootworm-control product has been used within given fields. The assessments always are more meaningful if there is at least one untreated strip within a field, to facilitate comparisons of roots from treated and

Table 1. Insecticides suggested for control of corn rootworm adults in Illinois, 2004.

Product	*Amount of product per acre*
*Ambush	6.4 to 12.8 oz
*Asana XL	5.8 to 9.6 oz
*Baythroid 2	1.6 to 2.8 oz
*Capture 2EC	2.1 to 6.4 oz
*Discipline 2EC	2.1 to 6.4 oz
Dimethoate 4EC	2/3 to 1 pt
*Lorsban 4E	1 to 2 pt
*Mustang Max	2.72 to 4 oz
*Nufos 4E	1 to 2 pt
*Penncap-M	1 to 2 pt
*Pounce 3.2EC	4 to 8 oz
Sevin XLR Plus	1 to 2 qt
*Warrior	2.56 to 3.84 oz

*Use restricted to certified applicators.

untreated areas in a field. Regardless, learning more about the consistency of performance of different products over time and geography will enable better decision making about rootworm management in the future. —*Kevin Steffey*

More on Japanese Beetles

More and more reports of Japanese beetles have come in over the past week. However, reports of severe infestations have not been widespread. Rather, there are "hot spots" around the state with heavy populations of beetles and other areas where populations are very small or nonexistent.

As mentioned in last week's article (issue no. 14, June 25, 2004, "Japanese Beetle Update"), scouting for Japanese beetles and the injury they cause is critical in corn, especially in fields nearing or at pollination. Current thresholds suggest considering an insecticide treatment when there are three or more beetles per ear, pollination is less than 50% complete, and silk clipping is occurring. We cannot stress enough the importance of scouting throughout the entire field. Questions have risen about possibly spraying the perimeter of the field. This technique is questionable. While it is true that most reports note a heavier population near the field borders, these insects are quite mobile. From 2003, in one instance the perimeter of a cornfield was sprayed because of very high numbers of Japanese beetles. However, within a couple of days, beetles were found clipping silks throughout the interior of the field. The good news is that silks continue to extend after the beetles leave for another food source. If the field has adequate moisture and silk extension is not impeded, silks that are 1/2 inch or longer can still intercept pollen.

This insect poses a great challenge when contemplating management options. We'll continue to pass information along as we receive it. —*Kelly Cook*

European Corn Borer in Northern Illinois

Little has been mentioned yet this summer about European corn borer infestations. Reports filter in every now and again concerning small corn borer infestations around the state. Last week, Russ Higgins, an IPM Extension educator at the Matteson center, and Gary Bretthauer, a unit educator in Kendall County, found an average of 40% of plants infested with corn borer larvae in a few fields they checked. Dave Feltes, an IPM Extension educator at the Quad Cities center, found approximately 30% of plants infested with corn borer larvae in a field in Whiteside County. I also had the opportunity to look into some fields in northwest Illinois over the weekend and found much of the same. Most fields I looked at had anywhere from 20% to 50% of plants exhibiting larval feeding, with two to five larvae per plant. Larvae were first and second instars feeding in the whorls.

Kelly Robertson, CCA, reported finding several instances in Franklin County where corn plants are starting to break off where larvae have tunneled low in the plant. In corn nearing tassel, as many as three tunnels per plant—one about one joint above the ground, one at the ear leaf, and one about two or three joints down from the top—were found.

While southern Illinois is nearing the end of first generations and beginning to gear up for second-generation moth flights, those in the northern part of the state are in the middle of first-generation feeding. If you have the opportunity, stop and take a look at your fields. Once corn borers begin to tunnel in the cornstalk, rescue treatments are no longer a viable control option. More information on the European corn borer can be found at http://www.ipm.uiuc.edu/fieldcrops/insects/european_corn_borer.pdf. —*Kelly Cook*

Diligent Scouting for Soybean Aphids Keeps Us Apprised of Developments Throughout the Midwest

As one consequence of last year's outbreak of soybean aphids, many pairs of eyes have been searching for any sign of this invasive pest in soybean fields throughout the Midwest. Fortunately, thus far, although soybean aphids have been "discovered" here and there, densities have been very low in all of the typically affected states. Unfortunately, also as a consequence of last year's outbreak, some people already have applied insecticides to control very low densities of soybean aphids in Illinois. We cannot overemphasize the need to remain patient as soybean aphid populations develop—or do not. We understand that many people believe they waited too late in 2003 to treat for soybean aphids; however, overcompensating for mistakes made last year is not a suitable insect management strategy. Applying insecticides too early will kill predators (e.g., multicolored Asian lady beetle) and parasitoids, and soybean aphid populations can resurge in the absence of natural enemies, possibly necessitating a second insecticide application. Also, multiple applications of insecticides will place a great deal of selection pressure on the soybean aphid population, increasing the potential for the development of resistance to insecticides.

By this time last year, densities of soybean aphids in northern Illinois were increasing rapidly; by early to mid-July, their numbers approached or exceeded economic levels. One recent report from northern Illinois deserves attention. Craig Kilby, a technical service agronomist with Golden Harvest, found high numbers of soybean aphids on individual plants in a field west of Wilmington on the border of Grundy and Will counties on June 28. Most of the aphids were on the stems and petioles rather than on the leaves. Craig reported that many of the plants harbored more than 100 aphids of various sizes.

Given the incredible reproductive capacity of soybean aphids, the numbers of aphids per infested plant could double by week's end, and more plants within the field will become infested. If this type of isolated infestation is occurring elsewhere, economic infestations might develop. As is always our advice and request, remain vigilant, and please let us know what you find.

Counter to Craig Kilby's report, Dr. David Onstad, with the Department of Natural Resources and Environmental Sciences at the University of Illinois, has found very few soybean aphids thus far. David and his crew sampled 650 plants in 13 fields in Champaign, Kendall, Tazewell, and Woodford counties, and they had found only one soybean aphid as of June 24. The stages of soybean growth in Champaign, Tazewell, and Woodford counties ranged from V5 to V6, and in Kendall County from V1 to V3. I should point out that Craig Kilby found no other fields in which densities of soybean aphids were high, including fields he sampled in Tazewell County.

The "working" economic threshold (developed at the University of Minnesota) agreed on by entomologists throughout the Midwest is 250 or more aphids per plant through the R4 stage of soybean growth. This threshold incorporates a 7-day lead time during which insecticide application can be scheduled. At the end of the 7-day lead time, soybean aphid densities might reach 1,000 per plant, the density of aphids still believed to cause economic injury equal to the cost of control. Benefits of applying an insecticide to control soybean aphids when soybeans are in the R5 or R6 stages of growth still are being debated. From information we learned in 2003, the yield benefit from controlling aphids during the R1 and R2 stages of soybean growth averaged 10 bushels per acre. The yield benefit from controlling aphids during the R3 and R4 stages of growth averaged 5 bushels per acre.

Insecticides suggested for control of soybean aphids in Illinois are presented in Table 2. Please abide by all label directions and precautions. Once more, don't let emotion control your decision making. Determine the density of soybean aphids within a field by scouting thoroughly, and if the density is below the threshold, keep scouting to determine whether the numbers are increasing or decreasing. Only increasing numbers are threatening.—*Kevin Steffey*

Table 2. Insecticides suggested for control of soybean aphids in Illinois, 2004.

Product	*Amount of product per acre*
*Asana XL	5.8 to 9.6 oz
*Furadan 4F	1/2 pt
*Lorsban 4E	1 to 2 pt
*Mustang Max	2.8 to 4 oz
*Nufos 4E	1 to 2 pt
*Penncap-M	1 to 3 pt
*Warrior	1.92 to 3.2 oz

*Use restricted to certified applicators.

PLANT DISEASES

Wheat Scab and Testing for Mycotoxins

Scab (Fusarium head blight) has been a problem faced by many wheat producers in Illinois this spring, with the major problem occurring in the northern half of Illinois. Not only does this disease reduce yields, the Fusarium pathogen that causes this disease also can produce the mycotoxin called dexoynivalenol (DON, vomitoxin) in grain and reduce the value of wheat. This disease has been discussed in two previous 2004 editions of *the Bulletin* (issues no. 5 and 11, April 23 and June 4, 2004). Questions have come up recently on tolerance levels and testing for the mycotoxin DON (vomitoxin) in grain samples.

The information in Table 3 on guidelines and advisory levels for DON (vomitoxin) was taken from the Web site "Moldy Grains, Mycotoxins, and Feeding Problems" (www.oardc.ohio-state.edu/ohiofieldcropdisease/Mycotoxins/mycopagedefaul). Please see this site for additional information on DON (vomitoxin) and other mycotoxins in wheat, corn, and other grains.

Grain samples can be tested for DON (vomitoxin) at the two laboratories in Illinois. They prefer sample sizes of about 1 pound, although they may be able to do the testing with smaller samples. The fee for individual DON (vomitoxin) analysis and quantitation is about $25 to $30 as of June 2004. Please contact a testing laboratory for details on sample submission and fees.

Veterinary Diagnostic Laboratory
University of Illinois
P.O. Box U
2001 South Lincoln Avenue
Urbana, IL 61802-6199
(217)333-1620

Centralia Animal Disease Laboratory
Illinois Department of Agriculture
9732 Shattuc Road
Centralia, IL 62801-5858
(618)532-6701
—*Dean Malvick*

Disease Update for Field Crops in Illinois

The corn crop appears to be doing well, with only minor disease problems in most of the state; the wheat situation is still focused on widespread head scab in the northern half of Illinois (see "Wheat Scab and Testing for

Table 3. Guidelines for use of grain contaminated with deoxynivalenol (DON)/vomitoxin.

Intended use	*FDA Advisory Level (concentration at which regulatory agency urges caution)*
Humans—wheat, barley (finished products)	1 ppm
Cattle and chickens (all grains)	10 ppm, not to exceed 50% of diet
Swine (all grains; DON-contaminated feed causes vomiting and feed refusal)	5 ppm, not to exceed 20% of diet

Mycotoxins" in this issue of *the Bulletin*); scattered root rot and foliar disease problems have been reported for alfalfa; and foliar and root rot diseases have been reported for soybean.

Corn. Corn is tasseling now in central Illinois, and the time is right to scout for foliar diseases. Common rust has been reported in localized areas, but it should not become a major problem if the weather trends move toward normal warm late-June and early-July temperatures. Gray leaf spot could be developing now when dews are heavy and long lasting, primarily in susceptible hybrids or inbreds. Anthracnose leaf blight has been reported in northern Illinois. Poor root growth has been reported in some areas, but this is likely caused primarily by saturated soils earlier in the season and insect damage, with disease possibly playing a secondary role. Crazy top may be developing in some fields that were flooded in May and June; it may be seen as excessive tillering, twisting of the upper leaves, and proliferation and deformation of the tassel.

Soybean. Frequent disease problems are being reported for soybean, especially Septoria brown spot and root rots. By far the most frequently reported problem is Septoria brown spot on soybean leaves. This common disease has been favored by the warm, moist weather in much of Illinois. Septoria brown spot can cause premature defoliation, which is usually restricted to leaves in the lower part of the plant. Yield losses from Septoria brown spot are usually considered insignificant, although in severe cases it can cause losses of 5% to 15%.

Root rots caused by a complex of pathogens, including *Phytophthora*, *Fusarium*, *Pythium*, and *Rhizoctonia* are causing damage across the state. In some cases, plants have died in patches in wet areas of fields. In other cases, the infected plants are surviving, but the lateral and tap roots and nodules are rotted and damaged to the point that plants may "limp along" and suffer from stresses throughout the season and have reduced yields. Phytophthora rot alone will be another problem to watch for now and as the season progresses. Wet soil conditions have been favorable in much of Illinois for initial infection and subsequent development of this disease. Additional information on these and other soybean, corn, and alfalfa diseases can be found at the University of Illinois Field Crop Diseases Web site: http://cropdisease.cropsci.uiuc.edu/.
—Dean Malvick

WEEDS

Soybean Leaf Cupping

Reports have been received from some areas of Illinois about soybean leaves that are cupped. This phenomenon is not unique to the 2004 growing season, and soybean leaf cupping has been common for several years. We've addressed this issue in previous years' editions of *the Bulletin*, and we will present the information again.

The most frequently reported scenario is that symptoms are noticed after a soybean field has been sprayed with a postemergence herbicide. We've observed leaf cupping in as few as 3 days following a postemergence soybean herbicide application, but in other cases no symptoms were evident for up to 3 weeks after application. And, yes, entire soybean fields have demonstrated leaf cupping where no postemergence herbicide has been applied.

Reported symptoms include these:

- extreme cupping of trifoliolate leaves, usually most pronounced on the upper trifoliolates
- veins of affected leaves tend to assume a parallel orientation instead of the usual net veination pattern
- tips of cupped leaves with parallel veins are often brown
- plants are stunted as compared with plants not demonstrating the aforementioned symptoms. These plants may remain stunted for several weeks, but this does not always happen.

The most difficult factor to determine with respect to cupped soybean leaves is identifying the cause or causal agent(s). Several theories have been proposed by weed scientists across states in the north-central region and are presented here. *It is very unlikely that a single one of these theories explains the cause of cupped soybean leaves in all instances.*

Theory 1. Somehow, soybean has been exposed to a growth-regulator herbicide used for weed control in corn. The growth-regulator herbicides tend to mimic the effects of endogenous plant hormones, in particular, auxins. Plant hormones control many developmental processes affecting the growth of the plant. These hormones are physiologically active within the plant at extremely low concentrations (parts per million or billion). Exposing a soybean plant to a synthetic type of hormone (i.e., a plant growth-regulator herbicide) can induce a wide range of responses within the plant, ranging from slight morphological modifications (leaf abnormalities, for example) to plant death. The degree or severity of response depends partially on the concentration of herbicide the plant was exposed to as well as environmental conditions and crop variety. The literature has many references to research on the response of various crops to exposure of sub-lethal amounts of various growth-regulator herbicides. Most of these studies were conducted more than 20 years ago, but the symptoms of exposure these studies describe are very similar to those encountered during this and previous growing seasons.

How much (concentration) growth regulator does it take to induce symptoms? Dicotyledonous plants can and do vary in their sensitivity to growth-regulator herbicides. Sensitivity of a particular plant species can also vary by growth-regulator herbicide. For example, many species of the Polygonaceae family are more sensitive to dicamba than to 2,4-D. Stage of plant growth when exposure occurs can also influence the amount of injury induced. Several studies in the literature

report that soybean tolerated exposure to growth regulators better when in early vegetative development than when plants were larger and nearing the reproductive stage.

The herbicide most often discussed or implicated in the cupping response of soybean is dicamba. How would soybean plants be exposed to this corn herbicide? Here are three possible avenues of exposure.

a. Residues remaining in or on the spray equipment from previous applications in cornfields are detached and applied with the soybean herbicide at low concentrations.

   Labels of many products containing dicamba provide techniques for cleaning application equipment to remove residues. If these cleaning procedures are not followed exactly, how much residue would remain in the application equipment, and would it be enough to cause injury to soybean? Many producers and applicators who reported cupped soybean leaves in the past indicated that the symptoms appeared to follow the spray equipment "to the row." Drift (discussed next) generally does not stop at a selected row in a field. Rather, there is often the feathering effect—symptoms are most severe on the side of the field closest to the source of drift and lessen with increasing distance. Unfortunately, failure to thoroughly clean application equipment does not always appear to explain the reported cases of ". . . the soybean plants sprayed with the first load cupped, those sprayed with the second and third loads are fine, but the ones sprayed with the fourth load cupped," when all other factors are held relatively constant.

b. Herbicide vapors on the plant or soil surface move out of the treated area and are absorbed by soybean (vapor drift).

   The volatility of a herbicide is a function of several factors: those related to the formulation of the herbicide and those related to prevailing environmental conditions. Vapor pressure is a measure of the tendency of a herbicide to volatilize. As the vapor pressure of a herbicide increases, so does the potential for volatility. Ester formulations of 2,4-D are generally more volatile than amine formulations. Banvel is formulated as the dimethylamine salt of dicamba, Clarity as the diglycolamine salt, and Marksman as the potassium salt. Each of these salt formulations differs in its potential to volatilize. With respect to environmental conditions, volatility tends to increase as soil moisture and temperature increase. As soil moisture decreases, the amount of herbicide adsorbed to soil particles can increase and thus reduces the amount of herbicide available to volatilize.

c. Physical drift of spray particles during the actual application process.

   This cause of exposure may be the easiest to identify based on field observations. The labels of many postemergence herbicides have statements regarding wind speed and drift. Most specify that applications should not be made when wind speed exceeds *x* miles per hour or wind is moving toward a sensitive crop. Soybean exposed to growth-regulator corn herbicides through drift will usually have been exposed to much more herbicide than if the exposure occurred via the processes outlined in item 1 or 2. The symptoms from exposure to high doses often differ from those caused by exposure to very low doses.

Theory 2: The soybean plant is expressing a physiological response to adverse growing conditions. This theory generally attempts to exclude exposure to a growth-regulating herbicide as the causal agent. Rather, soybean expresses leaf cupping symptoms due to environmental factors that adversely impact growth. Very few components in the cupped-soybean-leaf "equation" have held consistent over the past several years, except that the majority of cases are not noticed or reported until after the first few days when air temperatures exceed 90˚. Soybean may be entering a phase of very rapid growth and development, and some speculate that adverse environmental conditions during this phase of growth may disrupt the hormonal balance within the plant. This *theory* has been proposed to attempt to explain instances of cupped soybean leaves in which soybean had not been sprayed with any postemergence herbicide and no cornfields were nearby. There are, however, no data available in the literature to support this theory.

Theory 3. The response is induced by a postemergence soybean herbicide application. The majority of soybean samples received at the Plant Clinic demonstrating leaf cupping were previously treated with a postemergence herbicide, usually a translocated herbicide such as Raptor, Classic, FirstRate or a glyphosate-containing product, but in some instances a contact herbicide. Many of these applications include spray additives such as crop oil concentrates (petroleum or vegetable base) and an ammonium nitrogen fertilizer (28% UAN or ammonium sulfate). How can these applications induce leaf cupping? Some *theoretical* explanations include the following:

- Translocated herbicides move into the apical meristem, the location of hormonal control, and disrupt the hormone balance of the plant. Following the disruption of hormonal balance, the plant may exhibit an abnormal growth response, such as leaf cupping.
- The spray additives are able to remove dicamba residues from the spray equipment (see item 1).
- If 28% UAN was used, the level of biuret may be high enough to induce the response.

So what exactly *is* the cause of cupped soybean leaves? It is unlikely that one blanket explanation exists—each case may be somewhat unique. Data exist that describe the response of soybean to growth-regulator herbicides, but other factors may also be at work. If cupped soybean plants were actually

exposed to a plant growth-regulator herbicide such as dicamba, will yield be adversely affected? The available literature tends to suggest that this type of injury does not necessarily result in soybean yield loss, but several factors are involved in determining whether loss will occur. In particular, soybean variety, time of exposure, and dosage are important factors that determine whether yield loss will or will not occur. Much of the available literature suggests that if minor exposure occurs during early vegetative development, yield loss is less likely than if exposure occurs when soybean has entered the reproductive stage of development.
—Aaron Hager and Dawn Nordby

CROP DEVELOPMENT

Flowering Fields

The latest crop report indicates that 16% of the Illinois corn crop was silking and 14% of the soybean crop was blooming by June 27. This is true even after temperatures during the week of June 20 averaged 10 degrees below normal, dropping the growing degree day (GDD) accumulations since May 1 to below normal for many reporting stations.

At Urbana, a midseason hybrid we planted on April 15 reached silking (R1 stage) by June 30. GDD accumulations since planting have totaled about 1,270, which is just slightly less than half the requirement for this hybrid and is very close to what the GDD model would predict. Let's assume that this hybrid requires 1,350 more GDDs to reach black layer, or physiological maturity, at which point grain filling stops and the crop dries to harvest moisture. GDD accumulation averages about 25 per day during July, or about 775 for the month. Daily accumulation slows slightly in August, to about 23.5, on average. Thus, if we get average temperatures in July and August, the crop will accumulate the 1,350 GDDs needed to complete grain filling by about August 20. That would mean reaching harvest moisture by early September.

The fact that we have adequate soil moisture almost everywhere in Illinois means that the crop is likely to pollinate successfully, with relatively high potential kernel number. Is there an advantage to pollinating early and finishing grain filling in August? The answer to this question is probably yes to pollinating early and no to finishing grain filling. It is great to have pollination finish before heat and dryness set in, so early pollination is good, especially during the moderate stretch of weather we're in now, with sunshine and cooler nights. If we can keep insects at bay, we should be able to count 650 to 750 developing kernels per plant (18 to 20 million kernels per acre) by about 2 weeks from now.

We would, though, prefer to have grain filling end in September rather than in August. That uses the sunlight we get during the first weeks of September. But more important, the cooler nights and more moderate temperatures in September are often better grain-filling conditions than we get in August. We certainly saw this last year and have generally noted that cooler-than-average temperatures during August usually mean higher-than-average corn yields. The chances of getting August weather cool enough to extend grain filling much are not large; even 3 degrees lower than average would only extend grain filling by less than a week. If black-layer development is delayed by a week or two, though, the crop will still come off in time, but very likely with higher yields. On the opposite end, if it's warmer than average and grain fill stops by August 15, it will likely mean lower yields.

Are all the flowers on soybean a positive sign, as well? We usually start to see flowers only about now, but in many fields this year, there have been flowers for several weeks already. This is unusual enough that we don't know how to predict the consequences very well. If an early start to flowering and podding means an earlier end to flowering, it could be positive, but only if pod numbers are high enough when flowering stops. We saw last year how delayed development in July followed by a lack of water in August hurt soybean yields, so we'll be cautiously optimistic that an early start to pod and seed development will be a good thing. We do not really expect soybean seed filling to extend longer than usual, though, so an early start to seed filling will likely mean early maturity and early harvest, much like we're likely to see in corn. If moisture supplies remain good and temperatures are average or slightly below, good yields should be possible.
—Emerson Nafziger

REGIONAL REPORTS

Southern Illinois

Early-planted corn is currently pollinating and in excellent condition, thanks to moderate temperatures. Areas of fields that were excessively wet previously would now benefit from rainfall due to shallow-rooted corn. There have been some reports of Japanese beetles clipping silks, but these insects appear to be pretty widely dispersed in most cases because of the abundant food supply. Southwestern corn borer is hitting non-Bt corn in the southern and eastern portion of the region pretty heavily.

Double-cropped soybeans are now planted. Japanese beetles are causing defoliation in some full-season beans. Outside of septoria brown spot on some of the lower leaves, there are no noticeable disease problems at this time.

Alfalfa growers should continue monitoring regrowth after second cutting for damage from potato leafhopper.

West-Central Illinois

The second cutting of hay is well along or about ready in much of the area.

Some wheat fields remain untouched, with many more but a memory. While not awe inspiring, that crop fared well in the face of scab pressure.

Silks have emerged in many cornfields, and with the emergence of silks have come "silk clipping" insect pests.

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Japanese beetles and/or rootworm adults (both western and northern) are the culprits in fields displaying such injury. Japanese beetles have apparently extended their territory this year (being observed in many areas for the first time), but reports of severe infestations are largely restricted to counties near the east-central edge of the west-central region. Many European corn borers are now moving inside the stalk.

As expected, foliar diseases fared well following a recent extended period of wet weather in some portions of this region. Soybean rust "look-alikes," such as Septoria, have been abundant, with reports of bacterial pustule as well. Gray leaf spot lesions have also started to appear in cornfields.

A second application of glyphosate will likely occur soon in some areas due to scattered ragweed recovery, and there is evidence that stem feeders have contributed to some of these resiliency problems once again.

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