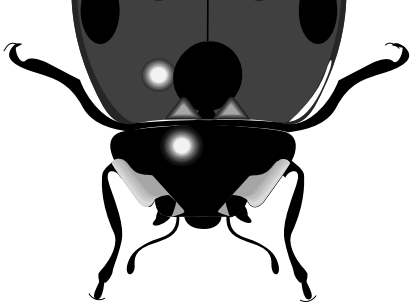

PEST MANAGEMENT & CROP DEVELOPMENT

BULLETIN

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In This Issue

Estimating Alfalfa Quality in the Field

When to take the first cutting of alfalfa is an important question for those desiring to harvest high-quality hay or haylage. Estimating the relative feed value (RFV) of standing alfalfa can be accomplished by using PEAQ (predictive equations for alfalfa quality), a system developed at the University of Wisconsin and used in Illinois the past few years.

PEAQ is a function of plant height (soil surface to stem tip) and stage of maturity (vegetative, bud, or flower). From these two factors, the estimated RFV of standing alfalfa is obtained. PEAQ can be determined by using a yardstick and a table, or a PEAQ measuring stick available from many alfalfa seed dealers and companies.

You are encouraged to check the Illini PEAQ Web site at http://peaq.outreach.uiuc.edu/. At this Web site you can learn how to calculate PEAQ, view PEAQ values for Illinois (by region and by county), enter and track your own PEAQ values, and so on.

As a general guide, if 150 RFV alfalfa hay is desired, harvest when PEAQ indicates 170 RFV. Many times RFV will drop 3 to 5 points per day.

PEAQ is designed for 16- to 42-inch-tall alfalfa, but it is not intended to balance rations. It does not account for quality changes due to wilting, harvesting, and storage. The procedure is most accurate for good stands of pure alfalfa with healthy growth.—*Jim Morrison*

INSECTS

White Grubs and Wireworms Can Injure Slow-Growing Corn

The report from the Illinois Agricultural Statistics Service (http://www.agstats.state.il.us/), issued for the week ending April 28, indicated that 25% of the corn crop in Illinois had been planted, and only 5% had emerged. Wet weather has delayed planting in many areas, and cool soils are not encouraging rapid corn growth. Consequently, subterranean insects such as white grubs and wireworms can ravage slow-growing corn seedlings.

I have reported that many people have observed large numbers of white grubs (primarily Japanese beetle grubs) this season, so it's only a matter of time before we start to receive more reports of injury to corn. Although I haven't said much thus far about wireworms, they are causing a few problems as well. Entomologists at the University of Kentucky have received reports of serious wireworm activity. Not surprisingly, our first report of wireworm activity in Illinois came from a southern county. Dale Burmester, crop specialist with Gateway FS in Redbud, found a lot of wireworms in a field near Sparta (Randolph County).

As folks wait anxiously to resume planting corn, don't forget the corn already in the ground. Check fields for wilted and/or missing plants, signs of injury by underground insects. Keep in mind that other factors can cause similar injury, so you have to find the culprits to blame the problem on white grubs or wireworms. Considering the numbers of these pests that have been reported thus far, finding them shouldn't be too difficult.

Unfortunately, because there are no rescue treatments of insecticides that will control white grubs or wireworms, fields that are heavily infested may have to be replanted. Both types of pests will remain a threat into mid-May, after which concern about their feeding will diminish.—*Kevin Steffey*

More Reports of Moth Captures—Armyworms and Black Cutworms

A lot of people throughout the Midwest have reported captures of armyworm and black cutworm moths all spring. Always remember that although these captures offer some insight about the timing of moth flights, large captures do not always relate to outbreaks of the respective larvae. Many factors can cause mortality to eggs and young larvae of both armyworms and black cutworms, so infestations often don't materialize, even if large numbers of adults have been captured. That having been said, stay alert for both insects. Both are capable of causing serious damage rather quickly.

The folks at the Missouri Delta Research Center reported an enormous capture of armyworm moths (1,093) in Mississippi County (the "bootheel") on April 24. Entomologists at Purdue University reported a capture of 280 moths in a blacklight trap operating in north-central Indiana between April 16 and 22. Fewer armyworm moths have been captured in pheromone traps in southern Illinois, but we are still watching them closely (see "The Hines Report," http://ipm.uiuc.edu/publications/hines-report).

Dale Burmester, crop specialist with Gateway FS in Redbud, has found evidence of a little feeding activity by small armyworm larvae in wheat. Ron Hines, senior research specialist at the University of Illinois Dixon Springs Agricultural Center, has found small armyworm larvae in grass hay fields in Massac, Pope, and Pulaski counties. These early reports of small larvae should be noted. Although it's unlikely that we will experience an outbreak similar to the outbreak in 2001, it never hurts to be prepared.

Intense captures of black cutworms have been reported from many locations. But quite honestly, predicting the dates of first cutting activity (300 accumulated degree-days after an intense capture) makes little sense right now. Any corn that has emerged should be monitored carefully now for black cutworms and signs of their injury. The same will hold true for corn that will be planted soon. Remember, the potential for black cutworm damage increases significantly when corn is planted late, after the moths have had time to find egg-laying sites.—*Kevin Steffey*

Bean Leaf Beetles Are Active

Several entomologists have reported finding bean leaf beetles recently active in alfalfa and clover fields and in noncrop areas. Although very few soybeans have been planted yet this year, any early-planted fields should be monitored very carefully as soon as plants emerge. These early fields will be "magnets" for bean leaf beetles.

Bean leaf beetles overwinter as adults, becoming active in the spring soon after the temperature rises above 50 to 55ºF. They fly first to alfalfa and clover fields where males and females mate. However, the females do not lay eggs in alfalfa and clover. As soon as soybean seedlings emerge, the beetles abandon the forage fields and colonize soybean fields. They feed on emerging seedlings and deposit eggs in the soil near the plants.

Because bean leaf beetle adults overwinter above ground, their survival through the winter hinges on winter temperatures. Research and Extension entomologists at Iowa State University have accumulated some really good stuff regarding survival (or mortality) of bean leaf beetles through the winter. Broadly stated, bean leaf beetle mortality is less during mild winters than during winters with plenty of cold temperatures. The entomologists at Iowa State University have compiled a table of bean leaf beetle mortality, from 1989 through 2001 (http://www.ipm.iastate.edu/ipm/icm/2001/5-7-2001/blbsurvival.html). In the article, they explain how they developed the model to predict mortality of bean leaf beetles. Average beetle mortality in central Iowa during this period was 71%. Average beetle mortality in central Iowa from the 2001–2002 winter was only 48% (http://www.ipm.iastate.edu/ipm/icm/2002/4-29-2002/blbwinter.html). If the information from Iowa is any indication of survival of bean leaf beetles in Illinois this year, we'd better be ready.

Bean leaf beetles are about 1/4 inch long, with considerable variation in color pattern. Most bean leaf beetles are light yellow to tan, but they may be red. Wing covers may have four main black spots and stripes, but these markings may be absent. However, a black triangle is always present behind the prothorax ("neck").

If large numbers of bean leaf beetles feed on newly emerged soybean seedlings, the damage can be severe. Feeding on VE (plant emergence) and VC (expansion of the unifoliolate leaves) can result in plant death and reduced stands. As soon as the first trifoliolate emerges, the soybean plant is better equipped to compensate for injury to the foliage. Nevertheless, large numbers of bean leaf beetles can overwhelm small soybean plants.

Economic thresholds for bean leaf beetles are much higher now than they were a few years ago, based on research conducted at the University of Nebraska. Densities of 16 per foot of row in the early seedling stage or 39 per foot of row at stage V2+ are necessary before economic losses occur. I'll offer a list of insecticides suggested for control of bean leaf beetles in soybeans in a forthcoming issue of the *Bulletin*.

Much of the concern about bean leaf beetles in recent years has resulted from the discovery that the beetles can transmit bean pod mottle virus. However, although research regarding the disease and the insect is being conducted in several midwestern states, definitive results have yet to be determined. Following is information taken verbatim from the May 14, 2001, issue of Iowa State University's *Integrated Crop Management:*

> "However, we do not know what percentage of beetles carry the living virus in their gut when they emerged. The virus may not overwinter very well inside the beetle. Studies conducted by Craig Grau, plant pathologist at University of Wisconsin, suggest that alfalfa may harbor bean pod mottle virus so it would be relatively easy for beetles to acquire the virus from alfalfa before moving to soybean.
>
> "The rise of bean leaf beetle populations and bean pod mottle virus problems during the past 2–3 years also strongly suggests that we may need to manage our early-season bean leaf beetle population much differently than we did in the 1990s. We are researching the bean leaf beetle–bean pod mottle virus problem but we have few solid answers regarding management at present. However, some soybean fields, especially very early emerging fields, may benefit from an early-season insecticide application during the VC–V2 stages to control bean leaf beetles, which would then help reduce viral infection."

There's still a lot to learn about bean leaf beetles and bean pod mottle virus. Let's keep this in perspective.—*Kevin Steffey*

Alfalfa Weevils Creating Headaches in Many Fields

By now it's no secret that alfalfa weevils have caused more damage to alfalfa this year than in several recent years. They survived the mild winter conditions quite well, and they seemed to come on early and strong in most areas. Alfalfa weevils have been active in southern Illinois for a few weeks. During the week of April 22, alfalfa weevils captured a great deal of attention as far north as I-80. Entomologists at Purdue University reported high densities of alfalfa weevils in west-central and northwestern Indiana during the same week.

On April 24, Kevin Black, with Growmark, reported that 50 to 100% of alfalfa plants were infested with alfalfa weevils in Ford County. Kevin Foreman, with Crop Production Services, reported that spraying for alfalfa weevil control began in Henderson County on April 25. It's apparent from these reports that scouting for alfalfa weevils in central counties should have been initiated well before now. So, I strongly encourage people in northern counties to look for weevil activity in their alfalfa fields.

The maps of actual degree-day accumulations (Figure 1) and projected degree-day accumulations (Figure 2) pretty much tell the story. Based on actual degree-day accumulations, alfalfa weevils should be evident throughout the state, although the larvae should be rather small in northern counties. In southern Illinois, the second peak of larvae from spring-deposited eggs (~575 degree-days [base 48ºF] from January 1) should be occurring. Omar Koester, Monroe/Randolph Extension unit assistant in crop systems, observed newly hatched larvae on April 30.

Omar Koester also reported that, in alfalfa fields that were sprayed too late (after the weevils had caused extensive damage) or not sprayed at all, the first cutting is virtually lost. In these fields, he noticed new growth from the crowns. The absence of foliage and the penetration of sunlight have initiated this new growth. In fields with

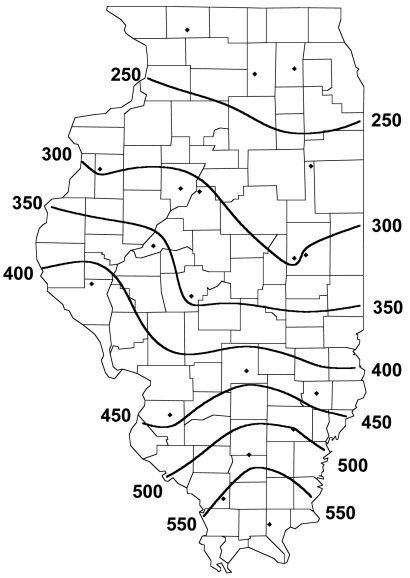

Figure 1. Actual degree-day accumulations (base 48ºF), from January 1 through April 29, 2002. (Map courtesy of Bob Scott, Illinois State Water Survey.)

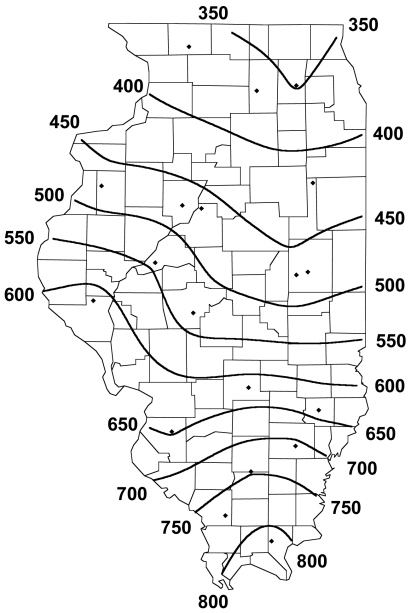

Figure 2. Projected degree-day accumulations (base 48ºF), from January 1 through May 12, 2002. (Map courtesy of Bob Scott, Illinois State Water Survey.)

little foliage left, chickweed has "taken over" if herbicides were not used.

Shortly after I had submitted my article about alfalfa weevils to the editor last week, I received a report (April 24) from Doug Kirkbride, M & J Fertilizer, that alfalfa weevil larvae were dying in some alfalfa fields in Christian County. He indicated that the larvae were brown and that the population was "crashing." It's probable that the larvae Doug found were infected by the fungus *Zoophthora phytonomi,* which I discussed in last week's issue (no. 5, April 26, 2002) of the *Bulletin*. Although I have not received other, similar reports about *Z. phytonomi,* I encourage you to keep your eyes peeled. The cool, wet weather is ideal for this pathogen, and an epizootic can overcome alfalfa weevil populations very quickly.

Scouting tips, thresholds, and suggested insecticides have been discussed thoroughly in previous issues of the *Bulletin*. However, I haven't mentioned that an alternative to applying insecticides is early harvest, which is almost as effective at reducing numbers of alfalfa weevil larvae as some insecticides. If a producer intends to harvest early to avoid using an insecticide, make certain that yield and quality of the alfalfa are not compromised.—*Kevin Steffey*

Don't Confuse Clover Leaf Weevils with Alfalfa Weevils

Matt Montgomery, Sangamon/Menard Extension unit educator in crop systems, has reported finding clover leaf weevils in some alfalfa fields in southern Sangamon County. Kevin Black, with Growmark, also has found clover leaf weevils in some fields of alfalfa and red clover. Although clover leaf weevils rarely cause economic damage in alfalfa in Illinois, their presence should be noted because they can be confused with alfalfa weevils.

Although somewhat similar in appearance to both larvae and adults, clover leaf weevils and alfalfa weevils have distinctly different characteristics:

- The larvae of both species are green with a white stripe along the center of the back. However, the white stripe on the clover leaf weevil is bordered with smudges of pink or red.
- The head of a clover leaf weevil larva is tan; the head of an alfalfa weevil larva is dark brown.
- A fully grown clover leaf weevil larva is about 1/2 inch long; a fully grown alfalfa weevil larva is about 3/8 inch long.
- An adult clover leaf weevil (5/16 inch long) is about two times larger than an adult alfalfa weevil (3/16 inch long).
- An adult clover leaf weevil is light brown on the sides with a wide, dark brown stripe on the back. An adult alfalfa weevil is brown with a narrow dark stripe along the center of the wing covers.

Comparative photographs of these two species can be found in the April 27, 1997, issue of Iowa State University's *Integrated Crop Management* (http://www.ipm.iastate.edu/ipm/icm/1997/4-21-1997/aflweevil97.html).

Clover leaf weevils and alfalfa weevils also feed and behave differently. Clover leaf weevil larvae feed at night, usually on lower leaves. They can be found on the ground around the crowns during the day. Alfalfa weevil larvae feed actively on alfalfa foliage, starting near the tips, during the day.

Don't confuse the two species. Including counts of clover leaf weevils with counts of alfalfa weevils could inflate the estimate of the alfalfa weevil population.—*Kevin Steffey*

A Few Insect "Thumbnail" Reports

Following are a few brief reports of occurrences of a few insects in Illinois or elsewhere in the Midwest. More detailed articles about some of these insects will be provided in forthcoming issues of the *Bulletin*.

- Ron Hines, senior research specialist at the University of Illinois Dixon Springs Agricultural Center, captured the first European corn borer moth of the year in Pulaski County during the week of April 23–30. The first capture of a European corn borer moth in 2001 was on May 1.
- Leellen Solter, insect pathologist with the Illinois Natural History Survey, evaluated samples of overwintering European corn borer larvae for disease organisms. The samples from DeKalb and Ford counties were gathered by Kevin Black, with Growmark. The results from DeKalb County—67% disease free, 16% infected with the microsporidum *Nosema pyrausta,* 11% with symptoms of infection by *Beauveria bassiana*. The results from Ford County—74% disease free, 15% infected with the microsporidum *Nosema pyrausta,* 11% with symptoms of infection by *Beauveria bassiana*. *Nosema pyrausta* does not kill overwintering borers; rather, the infection passes to the emerging adults, and infected females lay fewer eggs. *Beauveria bassiana* is a fungus organism that infects many insects, including European corn borers. Entomologists at Iowa State University found a large percentage of overwintering European corn borers killed by *B. bassiana*.
- Southern corn leaf beetles have been found feeding in cornfields in western and southwestern Missouri. After many years of silence, this pest has become more common in Illinois, Kansas, Missouri, and elsewhere in recent years. I'll write an article about this pest in next week's issue of the *Bulletin*.
- Dale Burmester, crop specialist with Gateway FS at Redbud, found wheat curl mites in wheat in Randoph County. These mites

vector wheat streak mosaic virus. Although not commonly problematic, this disease has caused significant injury in southern counties in the recent past.

- Large densities of bird-cherry oat aphids have been found in orchardgrass in west-central and southwestern Missouri. Refer to last week's *Bulletin* (issue no. 5, April 26, 2002) for more information about the bird cherry-oat aphid.

Keep looking and reporting. I'll include your information in the *Bulletin* so that others can benefit from your observations.—*Kevin Steffey*

PLANT DISEASES

Now Is the Time to Sample for Plant-Parasitic Nematodes

Q. *Who should take soil samples?*

A. Every crop grown in Illinois may be affected by some species of plant-parasitic nematodes (PPNs). PPNs should not be the last thing on your list of things to check if you aren't getting the yields you want or expect from your crop. The most damaging PPNs in Illinois are, of course, the soybean cyst nematode and certain species of corn nematodes, but that's mostly because there are so many acres of those two crops. Even homeowners, with their crops of lawn and landscape plants, are subject to the depredations of PPNs on their high-value plants. The best time to take detection samples (those we use to detect whether a problem with PPNs might exist) is in the spring.

Q. *What are the symptoms of PPN infestation?*

A. If plant-parasitic nematode populations are high enough to reduce plant growth or yield, most plants will show nonspecific symptoms, meaning that you can't tell exactly what's wrong with the plants by looking at them. Soybeans, corn, vegetables, and other annual crops may show stunting or chlorosis. Perennials and trees may have an unthrifty appearance. It is important to note that these symptoms may not be obvious unless there are unaffected plants (resistant or uninfected) nearby for comparison. PPNs are often referred to as "the hidden enemy" because they are difficult or impossible to diagnose in the field. The only way to tell if they're present in high enough numbers to cause damage is to submit a soil sample for microscopic analysis. If you had a mysterious problem with growth or yield last year or the year before, take samples this spring to see if the problem might be PPNs.

Q. *Where should soil samples be taken?*

A. For annual or perennial field crops, a soil sample should be taken in a zigzag pattern across a field. Most nematologists agree that one sample can adequately represent a 5-acre area; some say as high as 20 acres. So, what do you do if you have 300 acres? Collect samples from two or more arbitrarily selected 5-acre sections that represent similar soil types and crop histories. There's no need to sample the entire field for detection purposes. For individual plants, collect samples from the drip line of the plant, angling diagonally down into the root zone.

Q. *How should soil samples be collected?*

A. You'll need the following items: a soil coring tube (you can use any soil sampling device such as a trowel or shovel if a soil coring tube is not available); a bucket; sandwich-size, resealable plastic bags, one for each sample; a permanent marker; and a cooler. Collect about 20 soil cores (or scoops) from the sample area to a depth of 8 to 10 inches (see the previous paragraph for a description). Put each core into the bucket, and mix the cores thoroughly after all cores have been collected. Remove enough of the mixed sample to fill a plastic bag. Seal the bag and mark it with the permanent marker so that you'll know where the sample came from when the results come back. Place the sample in the cooler and keep it cool until you can pack it and ship it to a lab for analysis. Allowing the samples to heat up will effectively cook the nematodes in the soil and make it impossible for you to get a good analysis. If you're going to keep the samples for more than a day, put them in a refrigerator.

Q. *Why should you sample in the spring?*

A. Although it's true that the PPN populations will be highest in the fall, the damage they do depends on the number present in the spring when root growth begins. We can better predict the possibility of PPN injury if we know which ones and how many are present at the beginning of the growing season. You can, of course, take a sample any time. Once PPNs are established in a field, they're not going to go away. But they can be managed in most situations, if you know what and how many they are. We can help!

Q. *Where should you send the samples for analysis?*

A. Illinois has a number of soil testing labs that can do nematode analyses, especially for the soybean cyst nematode. The University of Illinois Plant Clinic can provide nematode analyses for any crop or home landscape plant (see http://www.cropsci.uiuc.edu/research/clinic/spe_frames.html).

For further information, call Terry Niblack at (217)244-5940 or e-mail tniblack@uiuc.edu.—*Terry Niblack*

The Conditions Are Right for Foliar Diseases of Alfalfa in Illinois

The recent wet and cool weather in Illinois, along with frost in parts of the state, following a period of rapid growth of alfalfa, is creating favorable conditions for foliar diseases. Alfalfa foliar diseases are often common at this time of the year, especially in the lower part of the plant. Spring black

stem and leaf spot was recently reported by Matt Montgomery of the Sangamon/Menard Extension unit. This disease is common in Illinois. Omar Koester, from the Monroe/Randolph Extension offices, reports major problems with alfalfa weevil but minimal problems with alfalfa foliar diseases. However, foliar diseases can develop quickly during favorable conditions.

Many of the foliar diseases appear similar at first look (i.e., as small brown spots, but they often can be distinguished with a closer look). A few scattered spots on the leaves and stems are not something to be concerned about, but these diseases can develop to the point where they cause severe defoliation, leading to yield loss, reduced quality, and plant stress. The fungi that cause most foliar diseases overwinter on old leaves and stems, then produce spores in the spring that spread to the new growth. Here is a short summary of some common fungal leaf spot diseases of alfalfa.

Spring leaf spot and black stem (caused by the fungus *Phoma medicaginis*) is a very common disease at this time of the year (and in the fall). This disease often starts on the lower leaves, petioles, and stems and moves upward. Dark brown to black spots develop and may form into large spots. Lesions on the stems can become severe and may girdle the stems. This disease can cause defoliation when weather is cool and wet, and is usually most severe in the lower part of the canopy. *Phoma* is also one of several different pathogens that can cause crown and root rot.

Lepto leaf spot (sometimes called "pepper spot") can also occur at this time of the year and can be a problem throughout cool, wet summers. Symptoms of Lepto leaf spot (caused by the fungus *Leptosphaerulina briosiana*) are light brown spots, about 1/32 inch or slightly larger on leaflets, and often are surrounded by chlorotic halos. When this disease is severe, it can cause severe defoliation.

Common leaf spot may also be widespread in parts of Illinois throughout the summer. Like most foliar diseases, it doesn't kill plants but can cause defoliation. This disease (caused by the fungus *Pseudopeziza medicaginis*) causes small brown spots, about 1/32 inch in diameter, that usually remain as separate lesions without a chlorotic halo. It usually starts on the lower foliage and moves up the plant, and is more severe after the first cutting of the season.

Although the name is similar, the disease *"summer" leaf spot and black stem* is distinctly different from *"spring" leaf spot and black stem*. Summer leaf spot and black stem usually is not seen on the first cutting and begins later on the second and following cuttings. It is caused by the fungus *Cercospora medicaginis*. Lesions on leaves and stems are typically chocolate brown at first and often are fairly large (1/8 to 1/4 inch in diameter). The lesions develop and turn to a silvery tint and often have a yellow halo around them.

Management of foliar diseases of alfalfa is based primarily on cutting to reduce yield and quality losses due to defoliation. Stands should be harvested as soon as possible if foliar diseases are severe, even if it is before the optimal harvest time based on the growth stage of the alfalfa. Good management and fertilization (especially potassium) practices may also help to reduce losses from foliar diseases. Choose well-adapted, high-yielding alfalfa varieties. Unfortunately there are no alfalfa cultivars available with high levels of resistance to foliar diseases; however, many of the new cultivars suffer less damage from these diseases than older varieties.—*Dean Malvick*

WEEDS

Weeds on the Horizon

This past winter, at Extension meetings throughout the state, we conducted a survey titled "The Illinois Invasive Weeds Survey." This survey was designed to determine what weeds are thought to be the most prevalent throughout the state and to give us a head start on what may be some of the emerging weed problems in the future. It has been a number of years since a survey of this nature has been conducted in Illinois, and it is very interesting to look back and compare the results from past years.

The first question of the survey asked the participants to *rank the top six weed species* that they encountered most frequently in their cornfields and soybean fields. This question generated a list of 76 different species in corn and 68 different species in soybeans. Not surprisingly, waterhemp, giant foxtail, and giant ragweed were among the top three weeds that were ranked as the number one most common in both corn and soybeans. These results are very different compared with results from a survey conducted in 1995 that ranked velvetleaf, common cocklebur, and giant ragweed as the most common weeds in corn and velvetleaf, common lambsquarters, common cocklebur, and giant ragweed as the most common weeds in soybeans. Table 1 lists the weeds that growers, retailers, consultants, and Extension educators ranked as the top six broadleaf weeds in corn and soybeans. This table also provides percentages of how many times that weed appeared as the number one most common weed on the survey. In this survey, annual grasses as a group were ranked number one in corn and number two in soybeans. More than 50% of the annual grass weeds were accounted for by foxtail species, followed by fall panicum, shattercane, and woolly cupgrass (Table 2).

Table 1. Top six broadleaf weeds in corn and soybeans in Illinois.

	Top six weeds in corn	*Percent ranked #1*	*Top six weeds in soybean*	*Percent ranked #1*
1.	*Amaranthus* spp.[a]	32	*Amaranthus* spp.[c]	44
2.	ragweed spp.[b]	31	ragweed spp.[d]	22
3.	velvetleaf	18	velvetleaf	15
4.	c. cocklebur	8	c. lambsquarters	4
5.	c. lambsquarters	2	c. cocklebur	6
6.	morningglory	3	morningglory/ nightshade	1/2

[a] Not all *Amaranthus* species were specified; over 75% were specifically listed as waterhemp.
[b] Type of ragweed species was not always designated; over 80% were listed as giant ragweed.
[c] Over 80% were specifically listed as waterhemp.
[d] Over 70% were specifically listed as giant ragweed.

Table 2. Most common annual grass species in Illinois corn and soybean fields.

	Annual grasses in corn	*Percent in corn*	*Annual grasses in soybean*	*Percent in soybean*
1.	foxtail spp.[a]	54	foxtail spp.[a]	65
2.	fall panicum	20	fall panicum	12
3.	shattercane	12	woolly cupgrass	11
4.	woolly cupgrass	10	shattercane	8
5.	others	4	other	4

[a] Majority of species listed were giant foxtail.

The next question asked the participants to *rank the top three weed escapes* that they most frequently encounter in their cornfields and soybean fields, and whether they were escapes due to "late emergence" or "hard to control." The top three escapes in corn were ragweed, waterhemp, and giant foxtail; in soybeans, waterhemp topped the list, followed by giant ragweed, with velvetleaf and common lambsquarters tying for third (Table 3).

The next question asked what herbicide-resistant weed species are being encountered in their fields. This topic will be covered in the next issue of the *Bulletin* in an article reviewing herbicide resistance. The final question asked what weed species are becoming more frequent or invasive in fields, ditches, and wooded areas. The top three weeds that are becoming more *invasive in fields* are waterhemp, giant ragweed, and common pokeweed. Even though waterhemp and giant ragweed ranked extremely high in the previous questions, many growers are just beginning to see these weeds move into their fields. Giant ragweed, common pokeweed, and poison hemlock were ranked the *top three weeds in ditches,* and in *wooded areas* common pokeweed, multiflora rose, and giant ragweed topped the list. Knowing which weeds are becoming more prevalent in these areas should give us an idea of what the problem weeds of the future will be.—*Christy Sprague and Aaron Hager*

Weed Control Options in Corn After the Preemergence Application Window

With the recent rains and forecasts of more to come, getting corn planted has been a challenge. In many cases this mad rush to plant and the extreme winds that have been plaguing us over the past few weeks have put us in the situation again where it is going to be very difficult to get soil-applied herbicides sprayed in a timely fashion. This will leave many growers and applicators with the decision of what to do for weed management strategies on those acres that won't be treated until the corn crop has emerged. There are essentially two different approaches that can be taken in this situation. The first option is to use the soil-applied herbicide program that was initially planned, and the second option is to switch to a total postemergence strategy.

The option of using a delayed application of a soil-applied herbicide requires consideration of several factors. Many, but not all, soil-applied corn herbicides can be applied after corn emergence. Keep in mind that not all of these herbicides will control emerged weeds. Additionally, there are a number of soil-applied herbicides that can cause significant crop injury if they are applied after corn emergence. So in some instances, additional management strategies may need to be implemented to control existing vegetation. These strategies could include the use of a rotary hoe

Table 3. Top three weed escapes in corn and soybeans and whether they are "hard to control" or missed due to "late emergence."

	Escapes in corn	*Hard to control*	*Late emergence*	*Both*
1.	ragweed	30%	44%	36%
2.	waterhemp	4%	68%	28%
3.	giant foxtail	34%	59%	7%
	Escapes in soybeans			
1.	waterhemp	7%	59%	34%
2.	ragweed	30%	38%	32%
3.	velvetleaf/lambsquarters	45%/61%	48%/25%	7%/14%

or the addition of a herbicide that has postemergence activity. Table 4 contains information about which "traditional" soil-applied corn herbicides can be applied postemergence and some considerations to remember if these herbicides are applied to emerged corn. For additional information, consult the respective product labels.

If you are considering the option of switching to a total postemergence herbicide program, there are also some points that should be addressed. First, there are a number of good postemergence corn herbicide options available to growers, and information on these products can be found in Chapter 2 of the *Illinois Agricultural Pest Management Handbook*. However, a number of these herbicides do not provide any soil residual control, and often the timing of herbicide application is critical for providing season-long weed control. Another point to consider is that, while we often stress a maximum corn height or developmental stage for postemergence herbicide applications, some postemergence corn herbicide labels indicate a *minimum* size or developmental stage the corn should be at before an application is made. This is a particularly important consideration when deciding on a postemergence herbicide program when corn is in its early developmental stages. Table 5 lists the postemergence corn herbicides that have minimum corn size label restrictions. So, remember, there are a number of considerations that need to be made when deciding on weed management strategies for early-season corn.—*Christy Sprague and Aaron Hager*

Table 5. Postemergence corn herbicides with minimum corn size restrictions.

Herbicide	*Minimum corn size*
Beacon (primisulfuron)	4 inches
Distinct (diflufenzopyr + dicamba)	4 inches
Celebrity Plus (Distinct + nicosulfuron)	4 inches
Northstar (primisulfuron + dicamba)	4 inches
Resource (flumiclorac)	2-leaf
Spirit (primisulfuron + prosulfuron)	4 inches

Table 4. Maximum corn sizes for postemergence applications of soil-applied herbicides.

Herbicide	*Maximum corn size for broadcast applications*	*Comments*
Axiom	Before corn emergence	• Applications to emerged corn may cause injury.
Balance, Epic	Before corn emergence	• Applications to emerged corn will cause injury.
Define	Before corn emergence	• Do not apply to emerged corn.
Princep	Before corn emergence	• Do not apply to emerged corn.
Lasso	Before corn emergence	• Do not apply to emerged corn.
Hornet WDG	2 inches (soil-applied)	• Hornet is also labeled for postemergence applications up to 20 inches (V6).
Micro-Tech	5 inches	• Will not control emerged weeds.
Bullet	5 inches	• Will provide control or partial control of small (<2 lf) broadleaf and grass weed species.
Bicep II Magnum, Bicep Lite II Magnum[a]	5 inches	• Will provide control or partial of small (<2 lf) broadleaf grass weed species.
Frontier, Outlook[b], Guardsman Max	12 inches	• Frontier and Outlook will not control emerged weeds.
Surpass, TopNotch, FulTime, Harness, Harness Xtra, Degree, Degree Xtra	11 inches	• Surpass, TopNotch, Harness, and Degree will not control emerged weeds.
atrazine	12 inches	• Add crop oil concentrate if weeds have emerged.
Python WDG	20 inches (V6)	• Use water only as a carrier.
Callisto	30 inches (V8)	• Can be applied postemergence at 3 fl oz/A.
Prowl	30 inches (V8)	• Will not control emerged weeds.
Dual II Magnum	up to 40 inches	• Will not control emerged weeds.

[a] Bicep II Magnum and Bicep Lite II Magnum are labeled for directed applications up to 12-inch-tall corn.

[b] Frontier and Outlook are labeled for layby applications up to 36-inch-tall corn.

CROP DEVELOPMENT

Corn Planting Delays

The official estimates have the Illinois corn crop 25% planted by April 28, compared to a 5-year average of 32% and the 2001 number of 46% planted by this date. The United States had about 25% of the corn crop planted at the end of last week, with a wide range among states; Missouri had about 62% planted and Iowa 33%, but Indiana had only 4% of its corn crop planted. While these numbers are not record setting, this planting season is shaping up as one of the more difficult ones of recent years, at least in Illinois and states east of here.

Besides the slow progress to date, many fields are quite wet; drying rates have been slow due to cool temperatures; and the planting progress has been very uneven, with some areas mostly planted and others yet to start. There is clearly a lot of stress building, as producers watch fronts continue to march across the state, and with the "problem" date—that after which yields will decline with each day's delay in planting—rapidly approaching. Data that we use to predict effects of planting delays on yield in fact show a slightly slower rate of yield loss with planting date delays than most people think, but recent springs have allowed timely planting, and many of us start to worry by the time the calendar turns over to May, if not before. We certainly worry about when we will finish, even with a modest delay in when we start.

The data we use to predict planting delays are from research we did in the northern half of the state in the late 1980s. Such studies are very difficult, given that we can rarely plant whenever we want to in April and May. They can also be compromised by planting when the soil's not fit to plant, thus poorly representing what producers will do. But the work we did went fairly well due to dry springs (1988 and 1989, which were followed by very dry summers also), and we think the numbers are reasonably predictive over much of Illinois. I am not aware of similar data from studies in southern Illinois, but I think it's reasonable to expect similar responses there. Avoiding dry weather later in the season may be more important in those soils, but the growing degree-day accumulation is faster in May and June, and the frost date is later, which helps to compensate for soil effects. It's only an anecdote, but some of the highest yields we have had at Brownstown were in 1993, when planting was in early June, but it rained all summer long.

The results of the planting date study, including information needed to make replant decisions, are in the *Illinois Agronomy Handbook*. With a full stand, we found the following yields as planting was delayed:

Planting date	Yield, % of maximum
April 30	100
May 4	99
May 9	97
May 14	95
May 19	91
May 24	86
May 29	81

Although yield loss accelerates with planting delays, to about 1% (1 1/2 bushels) per day of delay by the end of May, it starts more gradually, with a total loss of only about 5% (7 to 8 bushels) by mid-May. It is important to recognize that, while these numbers may represent average losses we can expect, they will almost never represent losses that might be experienced within a given field in a given year.

Some of the variability in response to planting date is due to continuing weather factors (for example, the recent weather has been cool with very slow-growing degree-day accumulation, meaning that the development of corn whose planting is delayed is not falling very quickly behind that of planted corn, as it would be if the weather were warm and corn planted in mid-April were up and growing). In contrast, April 2001 was very warm, and late-planted corn (which in 2001 meant corn planted later than early May) never caught up; yields suffered as a result, especially in areas that had low rainfall later in the summer. In contrast, we accumulated only about 247 GDD in April this year at Urbana, and more than 60% of that was accumulated during the warm stretch from April 11 to 19, by which time very little corn had been planted. Rainfall in July and August will, as always, be the most important factor affecting yield of corn in Illinois. Once it warms up in May (providing we get the crop mostly planted by then), differences in development between corn planted in mid-April compared to that planted in mid-May will not be large.

Management decisions we make can and will affect how the crop responds to delayed planting. During the rather gradual declines in yield potential during the first half of May, we can in most fields do more damage by working and planting when soils are too wet than we can even gain by planting 3 or 4 days earlier. Of course, there is no guarantee that the weather will turn warm and dry any time soon. But the time to take desperate measures—such as planting as soon as "I can get through without getting stuck"—is certainly not here yet. Compaction before and during planting, which makes root growth more difficult, has the same practical effect as late planting—it makes good yields more dependent on good weather later in the season than we would like the case to be.

In most cases, we probably want planting to be the first operation done as soon as soil conditions allow, with nitrogen and herbicide application done afterward so that planting is not further delayed. But we also need to

be reasonable in our approach to difficult weather conditions, recognizing that very good yields are possible even when corn is planted in May.—*Emerson D. Nafziger*

Nitrogen Loss for 2002

The warmer-than-normal winter, coupled with a wet spring, has many wondering whether nitrogen loss is or will be greater than normal for the 2002 crop year. Fortunately, research conducted at the University of Illinois over a number of years has provided a data base on which to make an informed decision about the amount of N loss that has occurred or that might occur in the next few weeks.

Nitrogen loss associated with excessively wet soils will occur only from that portion of the fertilizer that is in the nitrate form when soils become saturated. Because most fertilizers are applied as ammonium or a form that quickly converts to ammonium, you must first determine how much of the applied nitrogen has been converted to nitrate. This rate of conversion of ammonium to nitrate—a process called *nitrification*—is primarily dependent on soil temperature. Nitrification does not occur when soils are frozen, but it does occur at temperatures above freezing and is faster the warmer soils are. Equations that define the relationship between soil temperature and nitrification have been developed for two Illinois soils, a Drummer silty clay loam and a Cisne silt loam. These equations, using daily soil temperature data provided by the Illinois State Water Survey for the Drummer at DeKalb and Bondville and the Cisne at Brownstown were used to estimate the amount of fall-applied nitrogen that had been converted to nitrate during the winter and spring of 2001–2002 (Table 6).

As expected, there were significant differences in the rate of nitrification, dependent on location, with higher values the farther south in the state. Addition of a nitrification inhibitor, N-Serve, substantially reduced the rate of conversion of ammonium to nitrate.

The conversion of ammonium to nitrate does not mean that it has been lost from the soil system but rather that it is susceptible to loss in fields that have been or may become saturated with water for several days. When soils are excessively wet, nitrogen will be lost through the process of denitrification or leaching. As of April 1, the amount of nitrate–nitrogen lost from tile lines was less than 6% of the equivalent of the total fertilizer nitrogen applied without a nitrification inhibitor in a central Illinois experiment.

Denitrification is the major nitrogen loss mechanism in most Illinois soils, particularly in medium to heavy textured soils. Illinois research has shown that 4 to 5% of the amount of nitrate–nitrogen present (note that this is not 4 to 5% of the total nitrogen applied) will be lost via denitrification for each day that soils are saturated when soil temperature is above 65 to 70ºF. At temperatures less than 55ºF, it is estimated that denitrification will be closer to 1 to 2% of the nitrogen that is in the nitrate form. Prior to April 25, soil temperatures were less than 55ºF all but 8 days in central and northern Illinois and 15 days in southern Illinois.

Assuming 7 days of saturated soils in late April and 160 pounds of nitrogen applied without a nitrification inhibitor on November 1, 2001, the loss potential would be 160 lb N/acre x 59% [.59] (nitrification rate) x 19% [.19] (7 days saturated at 2% denitrification per day + 5% leaching) = 18 lb N/acre loss for a central Illinois location. If a nitrification inhibitor had been used, the loss potential would be reduced to 160 x .23 x .19 = 7 lb N/acre. For a southern Illinois location, the comparable situation would be 160 x 100% x .19 = 30 lb N/acre without an inhibitor, or 20 lb N/acre with an inhibitor.

The bottom line of this analysis is that most producers need not worry about N loss up to this time. They can save that worry for later in the season if soils become saturated.

This information will be updated as the season progresses. Additional nitrogen is not being recommended at this time to compensate for loss. Producers should wait until late May when additional information will be available to better predict the need for additional nitrogen.—*Robert Hoeft*

Plant, Then Sidedress

Wet soils this spring have delayed most field activities, particularly corn planting. Don't delay planting to wait until nitrogen fertilizer has been applied. Plant, then sidedress. Sidedressing can start as soon as the corn is planted, even before the corn is

Table 6. Rate of conversion of ammonium to nitrate during the 2001–2002 winter–spring season.

	Fertilizer application					
	Ammonia without N-Serve			*Ammonia with N-Serve*		
Nitrification period	*DeKalb*	*Bondville*	*Brownstown*	*DeKalb*	*Bondville*	*Brownstown*
	Percent of ammonia nitrified (present as nitrate at end of period)					
Nov.1–Apr.1	30	39	100	12	15	41
Dec. 1–Apr. 1	14	20	61	5	8	22
Apr. 1–Apr. 25	17	20		7	8	25

up if you can see the planter tracks to ensure that the nitrogen will be placed between the rows. There will be no danger of ammonia burn if the material is injected between the rows. If you are sidedressing, consider using injector knives every other row instead of every row. Research has shown that alternate-row nitrogen application is equally as effective as every-row application. Both ammonia and urea-ammonium nitrate solutions can be applied with the alternate-row technique. For more details on the use of alternate-row application, see the *Illinois Agronomy Handbook* at http://web.aces.uiuc.edu/iah/.

If you use preplant ammonia, be sure to wait at least 5 days before planting. The greatest risk of ammonia damage occurs when ammonia is applied to a wet soil that dries rapidly. Insertion of a knife into wet soil creates a compaction zone along the knife track. The ammonia is then held in this zone, reducing the rate of conversion of ammonia to ammonium. When soils dry, the ammonia moves up the crack that is formed along the injection knife track. If the corn row is directly over the knife track, ammonia damage will occur.—*Robert Hoeft*

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

Field activity was very limited during the past week, as most of northern Illinois received rainfall on April 24 and 27. Total precipitation ranged from 0.5 inch to 1.5 inches. Some corn planting did occur but on a limited basis. Generally over the past few weeks as fields approached being dry enough to plant, another storm front entered the area. There have been a few reports of corn emergence, but very few reports north of Interstate 80.

Black cutworm moths were caught in a trap located in Lee County, but to date there have been no reports of an intense moth capture.

West-Central Illinois

Wet soil conditions continue to exist throughout the region, with little, if any, planting this past week. Since weather and soil conditions are not promising for the next few days, planting will likely be delayed even more.

Many cornfields planted the week of April 15 are emerged, with seemingly good populations, except for the ponded areas. Those spots will be evaluated when it dries up, with replanting a definite possibility. A light green to yellow plant color indicates a nutrient availability problem at this time. That condition will probably improve as soon as growing conditions become more ideal.

No pest problems have been reported in corn at this time.

Alfalfa weevils are a major problem in most fields. Fields in the southern part of the region are well beyond the threshold levels of three or more per stem and 25% plant skeletonization. Insecticide applications are being made in those fields; be sure to check for the preharvest interval when using any insecticide.

Wheat fields have progressed rapidly, with many fields in the GS 8 stage and flag leaf visible. So far this is little evidence of disease, but that could change quickly if wet weather continues.

Fields with fall-applied herbicides have remained fairly weed free, while others with no herbicide are greening up and will probably require more tillage when it dries up.

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