



# PEST MANAGEMENT & CROP DEVELOPMENT

## BULLETIN

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### How Do Your Records Stack Up?

Although most applicators keep pesticide records because it makes good agronomic sense to do so, there are legal reasons to keep these records as well. The type of information you are legally required to keep depends on your type of business and the type of pesticide you use.

According to the Illinois Pesticide Act, *pesticide dealers* must retain a record of each individual restricted use pesticide (RUP) sale for 2 years. The record must include the following information: (1) purchaser's name, address, and certification number and type of certification; (2) quantity and kind of pesticide sold; and (3) date of sale.

According to the same Illinois law, all *commercial applicators* must maintain records of RUP applications they make. The following information must be recorded and retained for 2 years from the date of application. In addition, federal regulations require all commercial applicators to furnish a copy of either the state- or federally required records to the customer within 30 days of the RUP application (note below that the Worker Protection Standard notification requirements are more strict): (1) pesticide product name and its U.S. EPA registration number; (2) amount of chemical concentrate applied per unit (for example, pounds or ounces per acre); (3) date of application (M/D/Y); and (4) use site(s).

According to federal law, all *private applicators* (those who apply pesticides to their own land) must maintain records of RUP applications. The following information must be recorded within 14 days of the RUP application (note later in this article that the WPS notification requirements are more strict) and maintained for 2 years: (1) certified applicator's name and certification number; (2) date of application (M/D/Y); (3) pesticide product name and its U.S. EPA registration number; (4) amount of chemical concentrate applied (for example, pints, quarts, gallons, pounds); (5) crop, commodity, stored product, or site treated; (6) size of the area treated (acres, bushels, animals, etc.); and (7) location of application (any system that accurately identifies the location of the application). For a spot application, simply enter "spot application" and a short description of the location.

Many view pesticide records as a good "insurance policy" against false accusations. Although not required in Illinois, it is a good idea to record (on-site) wind direction and speed during the application, should you find yourself the subject of a drift complaint.

### What About WPS Record Keeping?

Record keeping is also an important part of complying with the federal Worker Protection Standard (WPS). If you must comply with the WPS, you will need to keep records of *all*—restricted and general use—pesticide applications and provide this information at a central location. Private applicators who maintain RUP application records are already recording most of what is needed for WPS record keeping. However, there are three additional pieces of information that you need to document: (1) time of application, (2) active ingredients used, and (3) restricted entry interval (REI).

### Other Key Items for WPS Employers

- To protect WPS employees (farmworkers, scouts, and applicators) who might enter treated areas, it is critical that all WPS employers communicate information about planned pesticide applications and those already made. Decide beforehand how such messages will be delivered (for example, by phone or a note in mailbox). When a custom application will not be or was not applied as scheduled, the producer must be informed of the corrected time and date before the application takes place or as soon as practicable thereafter (within 24 hours).
- Records for *all* pesticide applications, including general use pesticides, must remain available to employees for 30 days beyond the REI.
- The WPS requires more than just record keeping!

### Record-Keeping Resources

Because no standard forms are required for any of the records listed here, you can use any system you like—as long as the required information is included, and it is legible and accessible to those who have a legal right to see it.

Many pesticide companies, suppliers of personal protective equipment, and other organizations offer record-keeping sheets or notebooks. In addition, many companies offer software (some for free) for computerized record keeping. The University of Nebraska Web site lists several software packages (<http://ianrwww.unl.edu/ianr/pat/pestbkmk.htm>).

If you have not heard of the USDA publication *Recordkeeping Manual for Private Pesticide Applicators*, I encourage you to take a look. The publication is free, but don't let the price fool you. This 8.5-by-11-inch, spiral-bound notebook provides ample guidance and room for notes. Moreover, it streamlines the RUP and WPS record-keeping requirements and allows flexibility. Due to popular demand (Illinois leads the pack!), the USDA is working on a third printing, which is expected to be available later this spring. Because of this delay, I obtained permission to scan and make the manual available online ([www.pesticidesafety.uiuc.edu/facts/facts.html](http://www.pesticidesafety.uiuc.edu/facts/facts.html)). Feel free to print these documents and create your own three-ring record-keeping binder(s).

For further information about these laws, contact the Illinois Department of Agriculture (217-785-2427) or your local University of Illinois Extension office. In addition, you can find a good deal of information about record keeping, the Worker Protection Standards, and other items of interest at our Pesticide Safety Education Web site ([www.pesticidesafety.uiuc.edu/facts/facts.html](http://www.pesticidesafety.uiuc.edu/facts/facts.html)).—Bruce Paulsrud

## INSECTS

### An Oversight Regarding Herculex

In the article "What Is Bt Corn?" in issue no. 4 (April 16, 2004) of *the Bulletin*, I indicated that Herculex I Insect Protection originated from Dow

AgroSciences. That is only half true. Herculex I Insect Protection was developed in a research collaboration between Dow AgroSciences and its affiliate Mycogen Seeds, and Pioneer Hi-Bred International, Inc. I apologize for the oversight.—Kevin Steffey

### Insect Resistance Management Learning Center

An article by Eileen Cullen, extension entomologist at the University of Wisconsin, in the most recent issue of *Wisconsin Crop Manager* (vol. 11, no. 6, April 15, 2004) reminded me that I should make you aware of a very good resource on insect resistance management. The National Corn Growers Association, working with several land-grant university and industry entomologists, has launched the Insect Resistance Management Learning Center on their Web site at <http://ncga.com.biotechnology/IPMCenter/index.htm>. This Web-based tool addresses the need for standardized, comprehensive training on the principles of insect resistance management. The training focuses on insect resistance management, compliance assurance program, integrated pest management, corn borers, and corn rootworms.

The Insect Resistance Management Learning Center includes voice-over instruction, slides, and some animation, and users occasionally get an opportunity to answer questions. Accessing the lessons requires Acrobat Reader 5.0 or higher, Windows Media Player 6.0 or higher, and Macromedia Flash Player 6 or higher. The courses included are very well done, and I applaud the National Corn Growers Association for developing such an instructional Web tool. The more resources that emphasize the importance of insect resistance management for Bt corn, the more likely it is for insect resistance management to become ingrained within our mindset in the Corn Belt.—Kevin Steffey

## Let's Keep Our Eyes on Armyworms

Articles about captures of black cutworm moths are commonplace in newsletters throughout the Midwest in the spring. Consequently, armyworm moths often are overlooked. We don't have to search our collective memories very far to remember the major armyworm outbreak that occurred in 2001. The outbreak, of course, was preceded by captures of armyworm moths in pheromone traps. We still do not have a lot of information relating the development of armyworm outbreaks to captures of armyworm moths, but the appearance of the moths in traps should at least keep us on our toes.

Ron Hines, senior research specialist at the University of Illinois Dixon Springs Agricultural Center, reported his first capture of an armyworm moth in Massac County during the week preceding March 16. Since then, he has reported captures of armyworm moths in Jefferson County (week preceding April 20), Pope County (weeks preceding March 30 and April 13 and 20), Pulaski County (week preceding March 30), and St. Clair County (weeks preceding March 30 and April 6, 13, and 20). The largest numbers of armyworm moths captured have been in St. Clair County. Check out "The Hines Report" ([http://www.ipm.uiuc.edu/pubs/hines\\_report/index.html](http://www.ipm.uiuc.edu/pubs/hines_report/index.html)) for moth-capture records thus far in 2004.

Are the numbers of armyworm moths captured alarming? Quite honestly, we don't really know. A lot of factors have to fall into place for significant armyworm infestations to develop. However, it's not too soon to encourage people to keep armyworms on the radar screen. Early scouting forays, especially in wheat fields, might give us some clues about the possibility for large infestations to develop in both wheat fields and cornfields a few weeks into the future. In 2001, reports

of armyworm infestations in wheat and corn began to accumulate during the first couple of weeks of May. By mid-May, the outbreak was at full roar.

Armyworm moths migrate into Illinois on the same prevailing winds and storm fronts that are used by black cutworm moths. Moths seek rank grass on which to deposit eggs, so wheat fields and corn planted into a grass cover crop or into grassy weeds are prime candidates for armyworm infestations. Corn planted no-till into a rye cover crop is especially prone to severe armyworm problems.

When you get an opportunity, check wheat fields for small armyworm larvae. Armyworms are not easy to find when they are young, but diligent searching might be fruitful. Young larvae are pale green in color, although longitudinal stripes are apparent, and the head is yellow-brown. They move in a looping motion. Older larvae are green-brown and more prominently striped. You can usually see a narrow, broken stripe along the center of the back and three stripes along each side of the body, at least one of which appears pale orange. The tan head is mottled with dark brown. Each proleg (the false, peglike legs on the abdomen of a caterpillar) has a dark band.

Growers will be very busy planting corn and soybeans over the next few weeks, so those of us who work with growers will have to help them out by keeping our eyes open for the development of insect problems. Let us know if you begin to find any signs of armyworm injury in wheat, grass pastures, or corn.—*Kevin Steffey and Mike Gray*

## Degree-Day Accumulations and Economic Thresholds for Alfalfa Weevil

Though we've had few reports of alfalfa weevil feeding this year, degree-day accumulations for much of the state are nearing 300 degree-days. Light tip feeding may be occurring in much of the state. As degree-day accumulations approach 400, larval tip feeding may become more severe as development of alfalfa weevils approaches third and fourth instars (Table 1). For a map of degree-day accumulations and projections in Illinois, visit our degree-day calculator (<http://www.ipm.uiuc.edu/degreedays/>).

Continue to scout for alfalfa weevil larvae to determine whether economically damaging levels are present. Economic thresholds can be determined by the percentage of tip feeding or number of alfalfa weevils per stem. When 25% to 50% of the tips are being skeletonized and there are three or more larvae per stem, treat immediately. Do not apply insecticides when alfalfa is in bloom; instead, cut and remove the hay. Control may be warranted after a cutting when larvae and adults are feeding on more than 50% of the crowns and regrowth is prevented for 3 to 6 days. Table 2 shows some economic thresholds based on numbers of alfalfa weevil larvae per stem at different alfalfa heights and values of alfalfa hay. These thresholds are published in *Pest Management of Alfalfa Insects in the Upper Midwest*, (1999, Leopold Center for Sustainable Agriculture, Iowa State University, Ames).

**Table 1. Relationship between accumulated degree-days and alfalfa weevil development.**

<i>Accumulated degree days</i>	<i>Stage</i>	<i>Activity</i>
300	Egg hatch	
301–438	1st–2nd instar	Light leaf feeding
439–595	3rd–4th instar	Major leaf feeding
596–810	Pupa–adult	Mating and egg laying

**Table 2. Economic thresholds based on numbers of alfalfa weevil larvae per stem (adapted from *Pest Management of Alfalfa Insects in the Upper Midwest, 1999*, Leopold Center for Sustainable Agriculture, Iowa State University, Ames.)**

Plant height	\$40 per ton	\$70 per ton	\$100 per ton	Management decision
4 in.	1.8–2.8	0.8–1.3	0.6–0.8	Reevaluate in 4 days. If damage and larval numbers are increasing, a long-residual insecticide is recommended to prevent severe yield loss.
6 in.	2.0–3.0	0.8–1.5	0.6–1.0	
8 in.	2.2–3.2	0.9–1.7	0.7–1.2	
10 in.	2.3–3.5	0.9–1.9	0.8–1.4	If alfalfa is in vegetative stages, a short-residual insecticide should be used. If fields are harvested, closely evaluate stubble damage and larval densities.
12 in.	2.4–3.8	1.0–2.2	0.9–1.6	
14 in.	2.5–4.2	1.2–2.5	1.0–1.8	
16 in.	2.6–4.6	1.5–2.8	1.1–2.0	If more than 60% of alfalfa is in the bud stage, harvest is recommended. If not scheduled to be cut in 7–10 days, a short-residual insecticide is recommended.
18 in.	2.7–5.0	1.7–3.1	1.2–2.3	
20 in.	2.8–5.8	2.0–3.4	1.4–2.6	
>20 in.	3.0–7.0	2.4–4.0	1.6–3.0	

Use lower density (number of alfalfa weevil larvae per stem) if alfalfa is drought-stressed and/or if control costs are relatively low (\$7–10 per acre).

Use higher density (number of alfalfa weevil larvae per stem) if rainfall is abundant, diseased larvae are present, or control costs are relatively high (\$11–14 per acre).

**Table 3. Insecticides recommended for control of alfalfa weevil larvae, summarized from the 2004 *Illinois Agricultural Pest Management Handbook*.**

Insecticide	Amount of product per acre
Ambush*	12.8 oz
Baythroid 2*	1.6 to 2.8 oz
Furadan 4F*	1/2 to 2 pt
Imidan 70W	1 to 1-1/3 lb
Lorsban 4E*	1 to 2 pt
Mustang Max*	2.24 to 4 oz
Pounce 3.2EC*	8 oz
Warrior*	2.56 to 3.84 oz

\* Restricted use pesticide.

Suggested insecticides for alfalfa weevil control are summarized from the 2004 *Illinois Pest Management Handbook* and listed in Table 3.—  
*Kelly Cook*

### Few Cutworms Caught in Traps

Once again, there is little to report in regard to intense captures of black cutworm moths. Warm southerly winds did bring a few black cutworm moths north to some areas such as Knox, Lee, and Stephenson counties, but traps in other areas of the state remained empty. St. Clair was the lone county reporting an intense capture this past week (April 17 and 18). Visit the Insect Monitoring Network (<http://www.ipm.uiuc.edu/fieldcrops/imm/index.html>) to keep up to date on

trap counts in the weeks to come.—  
*Kelly Cook*

## PLANT DISEASES

### Fusarium Head Blight (Scab) of Wheat

By many reports, the wheat crop is doing well in Illinois at this date. Various problems are being reported, but overall the wheat came through the winter well and shows promise for good yields again this year. We all know, however, that much can happen to damage the wheat crop between now and harvest. Several viral disease problems of wheat were described in an article in *the Bulletin* last week. This article covers basic characteristics and management of Fusarium head blight, one of the most important diseases of wheat in Illinois.

Fusarium head blight (FHB), also called head scab, was a major problem that affected the wheat crop in the southern half of Illinois last year. Although this disease causes its major problems when wheat begins to head, it is important to understand this problem and the options for disease management. FHB can be a destructive disease of wheat anywhere in Illinois. The disease can reduce yields and market grade and can reduce quality through production of the mycotoxin deoxynivalinol (also called DON, or

vomitoxin) in the grain. Last year, by some estimates, the greatest effect of FHB in Illinois was on reducing grain prices from many fields in southern Illinois due to excessive amounts of DON.

FHB is caused by the fungal pathogen *Fusarium graminearum*. Another form of the same pathogen causes Gibberella stalk and ear rot of corn. This fungus, which overwinters on wheat, corn, and grass residues, is favored by large amounts of corn or wheat residue on the soil surface. Spores from these sources are spread by wind and rain to wheat heads, where infection occurs during flowering when weather is wet and warm. Symptoms can develop within 3 to 4 days after infection, when temperatures are favorable for infection (70°–85°F).

FHB thus has a narrow time frame for infection only at flowering, and only when conditions are warm, humid, and wet. The symptom of FHB that is easiest to recognize is premature bleaching of several or all spikelets on a head of wheat. Orange masses of spores or small black specks may also develop at the base of infected spikelets. The fungus can produce high levels of DON in heads that do not appear to be heavily infected. Fusarium head blight can be managed in part by rotating away from corn and wheat for at least 1 year and choosing cultivars with tolerance to the disease.

In 2004, the fungicide Folicur has also been temporarily approved for restricted use to manage FHB of wheat in Illinois. (See the following article for more information on Folicur and how it can be used as part of an integrated system to manage FHB if weather conditions become favorable for development of this disease.)—  
*Dean Malvick*

### **Folicur Fungicide Temporarily Available in Illinois to Control Fusarium Head Blight**

In the previous article, general information on Fusarium head blight (FHB) (scab) of wheat was presented. In addition to crop rotation and tolerant varieties for FHB management, the foliar fungicide Folicur 3.6F is available in 2004 for FHB management of wheat in Illinois. The U.S. EPA approved a temporary exemption on April 15, 2004, for the use of Folicur fungicide (tebuconazole), manufactured by Bayer Crop Science, to manage FHB on wheat in Illinois. Folicur has not previously been registered for FHB management in Illinois. This temporary use exception expires on May 31, 2004, and requires that specific guidelines be followed for use of the product.

Results from numerous trials indicate that Folicur can suppress, but does not eliminate, FHB disease and the accumulation of the mycotoxin deoxynivalenol (DON) in wheat. Data from multiple years and multiple states suggest that on average Folicur may suppress FHB severity and DON about 30%. Greater and lesser effects on disease severity and DON concentrations have been reported. A key point is that, based on available data, Folicur can be expected to suppress disease incidence and DON mycotoxin levels, but it will not eliminate the disease or mycotoxin.

Folicur is authorized to be used only when weather conditions are favorable for disease development, and it should be used in combination with other management tactics. Only one applica-

tion may be made using ground or aerial equipment, at a rate of 4 fluid ounces of formulated product per acre per year. Folicur may be applied up to the beginning of flowering only (Feeke's growth stage 10.51). Application may not be made within 30 days of harvest. Those who use the product must have the Section 18 labeling in their possession at the time of pesticide application. The label and more specific guidelines for the use of Folicur are available through Bayer Crop Science representatives.

Application timing is critical for effective use of Folicur to manage FHB. Fields of wheat should be closely monitored for flowers daily, 1 to 3 days after heads begin to emerge, to determine when to apply Folicur. The flowers (anthers) are about 1/8 inch long and pale yellow-green. If weather conditions favor disease development, Folicur should be applied at early flowering, when about 25% of the primary heads have started to flower. Applications will not be legal and will be much less effective if made after 50% flowering.

A forecasting system has been developed for predicting the likelihood of FHB in wheat. The system was just put into place for Illinois by plant pathologists from Pennsylvania State University and Ohio State University. The forecasting system has been tested in other states, and initial results suggest that it can predict the probability of FHB severity greater than 10% with about 80% accuracy. This system may be extremely valuable in helping to determine whether and when Folicur should be applied. *However, it is important to emphasize that the forecasting system is still experimental and is being tested for the first time in Illinois this year.* The FHB prediction is based on rainfall, temperature, and relative humidity. The system uses NOAA weather data that are collected on a 20-kilometer grid. If you are interested in learning more, feel free to go to <http://www.wheatscab.psu.edu/> and check out the results for your area to compare them to your local weather conditions,

especially when the crop is within about 10 days of flowering.

The forecasting system and Folicur together provide producers with a potentially excellent set of tools for management of FHB and should allow producers to make economically sound, data-based management decisions. Combining the information from the forecasting system with the option to spray Folicur when the risk of FHB is high may improve producers' ability to control FHB, thus reducing DON levels in grain and increasing yields to enhance the economic return to producers and the milling industry.—*Dean Malvick*

## **WEEDS**

### **Soil-Applied Herbicides**

Soil-applied herbicides remain an important part of weed control programs in corn and, to a lesser extent, soybean production systems. Early preplant (EPP), preplant incorporated (PPI), and preemergence (PRE) surface are the most common types of herbicide applications to soil. EPP applications are typically made several weeks prior to planting and are more common in corn fields than soybean fields. PPI applications were once very common but have declined in recent years with the adoption of conservation tillage systems. PRE applications are generally made within 1 week of crop planting. Regardless of when or how a herbicide is applied to the soil, the effectiveness of soil-applied herbicides is influenced by several factors.

For a soil-applied herbicide to be effective, the herbicide needs to be available for uptake by the weed seedling (usually before the seedling emerges, but some soil-applied herbicides can control small emerged weeds under certain conditions). Processes such as herbicide adsorption to soil colloids or organic matter can reduce the amount of herbicide available for weed absorption. Soil-applied

herbicides do not prevent weed seed germination; rather, they are first absorbed by the root or shoot of the seedling and then exert their phytotoxic effect. Generally, this happens before the seedling emerges from the soil. For a herbicide to be absorbed by weed seedlings, the herbicide must be in the soil solution or vapor phase (i.e., an available form). How is this achieved? The most common methods for herbicides to become dissolved into the soil solution are by mechanical incorporation and precipitation. EPP applications in no-till systems attempt to increase the likelihood that sufficient precipitation will be received before planting to incorporate the herbicide. If, however, no precipitation is received between application and planting, mechanical incorporation, where feasible, will in most instances adequately move the herbicide into the soil solution. Herbicide that remains on the soil surface following application will usually not provide much effective weed control and is subject to various dissipation processes, some of which are described in subsequent paragraphs.

Many weed species, in particular small-seeded species, germinate from fairly shallow depths in the soil. The top 1 to 2 inches of soil is the primary zone of weed seed germination and should thus be the target area for herbicide placement. Shallow incorporation can be achieved by mechanical methods or precipitation. Which of these two methods is more consistent? Rainfall provides for a fairly uniform incorporation, but mechanical incorporation reduces the absolute dependence on receiving timely precipitation. How much precipitation is needed and how soon after application the precipitation should be received for optimal herbicide performance depend on many factors, but generally 1/2 to 1 inch of precipitation within 7 to 10 days after application is sufficient.

Herbicides remaining on the soil surface or those placed too deeply in the soil may not be intercepted by the

emerging weed seedlings. Herbicides on the soil surface are subjected to several processes that reduce their availability. Volatility (the change from a liquid to gaseous state) and photolysis (degradation due to absorption of sunlight) are two common processes that can reduce the availability of herbicides remaining on the soil surface. Volatility potential is determined by several soil properties and properties of the herbicide formulation. For example, the thiocarbamate herbicides are relatively volatile, and most should be incorporated into the soil soon after application in order to minimize loss. Photolysis is primarily dependent on herbicide properties.

Dry soil conditions may be conducive for planting but may also reduce the effectiveness of soil-applied herbicides. If herbicide applications are made prior to planting and no precipitation is received between application and planting, a shallow mechanical incorporation may help preserve much of the herbicide's effectiveness.—

*Aaron Hager and Dawn Nordby*

### **Dry Soils and Soil-Applied Herbicides**

In many areas of Illinois, preplant and preemergence corn herbicides have been on the ground anywhere from a few days to several weeks without adequate precipitation to move the herbicides into the soil solution. Herbicide effectiveness can be significantly reduced when a soil-applied herbicide is sprayed on a dry soil surface with no incorporation (mechanical or by precipitation) for several days following application. How much rainfall is required to move the herbicide into the soil and how soon after application is precipitation needed? While there is no absolutely defined amount, surface-applied herbicides generally require 1/2 to 1 inch of precipitation within 7 to 10 days after application for activation. Factors such as soil condition, residue cover, and the chemical properties of the herbicide influence how

much rain is needed and how soon after application it is necessary. If weeds have begun to emerge before the herbicide has been moved into the soil solution, it may be time to consider additional management options. Rotary hoeing can control small emerging weeds and give surface-applied herbicides some incorporation. Several postemergence herbicides for grass control in corn are described in the following paragraphs.

*Basis 75WDG* (rimsulfuron + thifensulfuron) can be applied at 1/3 ounce per acre to field corn in the spike to 4-leaf (2 leaf collars) stage for control of 1- to 2-inch barnyardgrass, foxtails, and fall panicum. Do not apply to corn having three fully emerged collars or over 6 inches in height. Applications of Basis must include a crop oil concentrate (COC; petroleum or methylated seed oil) or a nonionic surfactant (NIS). An ammonium nitrogen fertilizer must also be added with the COC or NIS. The Basis label includes precautionary statements about making applications to corn previously treated with certain soil insecticides.

*Basis Gold 89.46WDG* (nicosulfuron + rimsulfuron + atrazine) can be applied at 14 ounces per acre to control foxtails, barnyardgrass, and fall panicum up to 3 inches in height; shattercane up to 6 inches in height; and up to 8-inch-tall quackgrass and seedling johnsongrass. Several other grass and broad-leaf weed species are listed on the label. Applications of Basis Gold must include a COC (petroleum or vegetable based) or an NIS. An ammonium nitrogen fertilizer must be included with the COC or NIS. Basis Gold may be applied to corn up to 12 inches in height or exhibiting up to six leaf collars. Do not apply to corn taller than 12 inches or exhibiting more than six leaf collars, whichever is more restrictive. The Basis Gold label includes precautionary statements about making applications to corn previously treated with certain soil insecticides.

*Accent Gold 83.8WDG* (clopypalid + flumetsulam + nicosulfuron + rimsul-

furon) can be applied at 2.9 ounces per acre to control foxtails, barnyardgrass, and fall panicum up to 3 inches in height; shattercane up to 6 inches in height; and quackgrass and seedling johnsongrass up to 8 inches in height. Several other grass and broadleaf weed species are listed on the label. Applications of Accent Gold must include a COC (petroleum or vegetable based), and addition of an ammonium fertilizer is recommended. Accent Gold may be applied to corn up to 12 inches in height. Do not apply to corn taller than 12 inches or exhibiting six leaf collars, whichever is more restrictive. The Accent Gold label includes precautionary statements about making applications to corn previously treated with certain soil insecticides.

*Steadfast 75WDG* (nicosulfuron + rimsulfuron) can be applied at 3/4 ounce per acre to control foxtails, barnyardgrass, and fall panicum up to 4 inches in height; shattercane up to 6 inches in height; quackgrass up to 8 inches in height; and 8- to 12-inch-tall johnsongrass. Apply Steadfast to corn up to 20 inches tall or exhibiting up to six leaf collars, whichever is more restrictive. Applications must include a COC or an NIS, as well as an ammonium nitrogen fertilizer. The Steadfast label includes precautionary statements about making applications to corn previously treated with certain soil insecticides. Grass species controlled by *Steadfast ATZ* (nicosulfuron + rimsulfuron + atrazine) are similar to those listed on the Steadfast label. However, Steadfast ATZ can be applied to corn only up to 12 inches in height or that is exhibiting up to six leaf collars.

*Option 35WDG* (foramsulfuron) can be applied broadcast at 1.5 to 1.75 ounces per acre when corn is in the V1 through V6 growth stages. Methylated seed oil in combination with nitrogen fertilizer is the preferred additive system. Option controls many annual (generally 2- to 8-inch-height range) and some perennial grass species. The label contains precautionary statements regarding the use of Option on corn

previously treated with certain insecticides. The label of *Equip 32WDG* (foramsulfuron + iodosulfuron) lists many of the same grass species as the Option label, but grass heights are generally reduced.

*Accent 75WDG* (nicosulfuron) can be applied broadcast to corn up to 20 inches in height or that has six or fewer leaf collars, whichever is more restrictive. Similar to other ALS-inhibiting corn herbicides, the Accent label cautions about applications to corn previously treated with certain soil insecticides. *Celebrity Plus 70WDG* is a premix containing nicosulfuron and controls many of the same grass weed species as Accent.

*Beacon 75WDG* (primisulfuron) can be applied broadcast to corn between 4 and 20 inches in height. Corn plants less than 4 inches in height may be more susceptible to injury. Applications should include a COC or an NIS; a liquid nitrogen fertilizer may also be included. Beacon is effective on shattercane, johnsongrass, and quackgrass but is weaker than Accent on other annual grass weed species. *NorthStar 47.4WDG* and *Spirit 57WDG* are premixes containing the active ingredient of Beacon, and dicamba or prosulfuron, respectively. While primarily used for broadleaf weed control, these herbicides can also provide control of certain annual and perennial grass weed species. These herbicide labels also carry precautionary statements regarding applications to corn previously treated with certain soil insecticides.

*Atrazine* can be used as a postemergence treatment before corn exceeds 12 inches in height to control certain annual grasses (not fall panicum) up to 1.5 inches in height. Include a COC with postemergence atrazine applications.

Other postemergence corn herbicides that will control grass weed species, including glyphosate, Liberty, and Lightning, require the use of herbicide resistant/tolerant corn hybrids.—

Aaron Hager

## CROP DEVELOPMENT

### Corn Planting and Soybean Seeding Rate

The news this week is that an astounding 40% of the corn in Illinois was planted by April 18. Given that April 19 (Monday) was a good planting day over virtually the entire state and that many people report being finished with planting corn, it is likely that more than 50% was planted before rain on Tuesday, April 20 slowed progress in some (but not all) areas.

One of the recurring questions is whether or not to rework fields before planting if rainfall prevents planting after a field was tilled and ready to plant. We don't have current research on this, but we expect that the answer is difficult to know with certainty, even if research results were available. If the soil was in good shape and the rainfall was such that the surface structure of the soil is more or less unchanged, then tilling again before planting is probably not necessary. One of the main problems with this is that many people want to plant after the surface has dried but before the soil beneath the surface is dry enough to plant into. The result can be a lot of soil compaction, and even poor seed-soil contact if the soil doesn't "flow" well enough back into the planting furrow. In fact, the impulse to till soils before planting is often to aid in surface drying, but even in such cases, driving on soil that is too wet can damage the soil structure and may disguise seed placement problems more than prevent them. Whether you till or not, be sure to plant only when you can do a good job of seed placement, without excessive sidewall smearing and with good seed coverage. Tilled soils often dry more slowly because tillage breaks capillarity, making it harder to move water to the surface for evaporation.

Soybean planting has gotten under way in some areas, with 1% listed as having been planted by April 18. If current weather patterns hold, we should be

able to finish up by mid-May in most areas. This is an improvement over the late planting of recent years; with the recent fall in soybean prices, the market seems to see this as a positive for production. As I indicated last week, our recent data show no dropoff in soybean yields until planting is delayed past mid-May. We also saw that later-maturing varieties were not favored by earlier planting in most cases. Given the photoperiod response in soybean, planting early does not translate directly into earlier maturity at the end of the season, but it does contribute; planting 10 days later delays maturity by about 3 days or so, though this varies some by actual planting date and by maturity of the variety.

The growing conditions of 2003 resulted in variable, but often small, soybean seed size for the 2004 growing season. While newer planters may allow better calibration of seeding rate by seed number rather than weight per acre, setting exact seed drop rates is still a challenge. The percentage of emergence and plant establishment also varies considerably with different planting conditions, crop residue amounts, soil temperature, and seed quality. Using 80% plant establishment for row units and 70% for drill units has worked for some people. Our research usually shows higher establishment percentages than this, so it may be helpful to view these as “safe” numbers, appropriate when emergence conditions are not very good. I would suggest that individual producers start to assess this a little closer for individual planters, and perhaps to raise these percentages if plant counts versus dropped seed numbers justify that.

Though seed number per pound listed on bags tends to be somewhat approximate, it should be accurate enough to establish dropped seed number per acre; simply multiply seeds per pound times pounds of seed used per acre. Take plant counts after emergence (waiting until about the 2-leaf stage to allow for loss of small, emerging plants); then divide plants per acre by number of seeds dropped per acre, and

multiply by 100 to give emergence percentage. It is helpful to record general emergence conditions and days to emergence, as things that might influence emergence percentage. If you find that plant counts are higher than you really need, even under less than ideal emergence conditions, you might consider “dialing back” seeding rates in the future, especially when planting conditions are good. In fact, it can be useful to adjust dropped seed numbers based on current planting conditions. For example, if the soil temperature is above 60 and soil moisture is ideal, it may be appropriate to use 90%, as the expected establishment percentage, and to drop seeding rate accordingly.

How many soybean plants do we need per acre? This is an area where research findings often seem to make little sense in production fields, but that’s mostly due to differences in approach to risk. That is, the researcher may have an inadequate concept of establishment risk and so might feel free to say that research shows that 100,000 plants per acre is adequate for maximum yields, then wonder why the producer still plants 180,000. Part of the problem is also that the 100,000 plants that the researcher establishes are usually distributed uniformly, often in small plots, while the producer has to plant whole, and often variable, fields. In addition, low plant stands usually look bad early in the season, only to expand out with extra space and yield as much as higher stands. That’s especially true of drilled soybean plants, where looking down the row early in the season gives the “feel” of inadequate stands compared to looking down rows with higher plant counts per foot of row. We also have a tendency to worry about low plant counts and more weed problems, though glyphosate use has (or should have) diminished this concern.

Regardless of planting method or what the early stand looks like, it is clear that stand counts are often higher than they need to be. Given the fact that yield usually does not decrease until soybean plant stands exceed 250,000

or more plants per acre, especially in row widths less than 20 inches, it is doubtful that most stands are high enough to actually reduce yields. The unneeded plants do represent extra seed cost, however, and can increase lodging in some cases. In general, aiming for 150,000 established plants is a “generous” goal and one that should provide adequate stands even if emergence suffers, regardless of row spacing. That means dropping 150,000 divided by expected emergence percentage, including an adjustment for germination percentage. So, if we expect 85% establishment and 92% germination, we need to drop 150,000 divided by  $(0.85 \text{ times } 0.92) = 192,000$  seeds. Data show that 100,000 or even fewer plants will often maximize yields, so those who consider themselves “lucky” can drop seeding rates. On the other hand, dropping more than 225,000 seeds per acre is probably never justified; if seed quality or planting conditions are that poor, then planting ought to be delayed or different seed located.

For a handy soybean seed drop calculator, go to the “Soybean Seed Drop” decision aid at <http://www.ag.uiuc.edu/iah/index.php?ch=ch3/> in the online *Illinois Agronomy Handbook*. This calculator asks the user to consider some of what we’ve talked about here, and also provides cost and number of units needed to plant individual fields.—*Emerson D. Nafziger*

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### **Nitrogen Loss Associated with Surface Application of Urea and Urea-Containing Fertilizers**

A portion of the nitrogen in urea-containing fertilizers, either granular urea or urea-ammonium nitrate solutions (28 or 32% N), which were surface applied and not incorporated, was likely lost during the extended dry, abnormally warm period of the last 2 weeks. Factors that influence the rate of loss include amount of residue cover, time between fertilizer application and rain, rate of application, and form of N applied. If the field was

**Table 4. Nitrogen loss associated with surface application of urea-containing fertilizers on land with greater than 20% residue.**

Days between application and rain	% of total nitrogen lost with urea	% of total nitrogen with lost UAN solution (28 & 32% N)
<3	<5	<5
3–8	10–20	5–10
>8	30–40	15–20

clean-tilled, the amount of loss, irrespective of these factors, will be very low—less than 5%. However, if there was substantial residue cover (greater than 20% residue), the losses could range from 5% to 40% of the urea N applied (Table 4). The amount of N loss from surface-applied urea is related to the rate of N application. Losses are very minimal at N rates of less than 100 pounds per acre.

If the urease inhibitor Agrotain was included with the fertilizer, loss of surface-applied urea would be negligible. Laboratory research conducted at North Dakota State University suggested that ammonium thio-sulfate (ATS) would markedly reduce ammonia volatility from urea. Unfortunately, research conducted by several universities has not confirmed that ATS will reduce N loss under field conditions from surface application of urea-containing materials.—*Robert G. Hoelt*

## REGIONAL REPORT

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.

### West-Central Illinois

Before the recent rain, which covered most of the region, corn planting continued at a rapid pace, with many farmers finished. Some farmers had stopped planting because of dry soil conditions and will finish as soon as they can get back into the field. One dealer indicated he had never seen so much corn planted so early.

The earliest-planted corn is emerged, with good stands, and the later plantings needed rain for uniform emergence. Herbicide application had been delayed in some areas because of windy conditions.

No major pest problems have been reported. Black cutworm moth catches have been fairly light except in some areas near Quincy. Begin scouting for soil insects as corn emerges.

Soybean planting began to a limited extent before the rain. Most farmers were waiting to plant later or for a rain.

In general, wheat looks good, with most of it in growth stages V6–V8. There have been reports of soilborne mosaic and other viral diseases in some fields. Affected plants will appear light green to golden yellow in color, with patchy, uneven stands. Hopefully, the plants will recover when the weather turns warmer.

Alfalfa is growing rapidly, with plant height in some areas approaching 16 to 20 inches. Check the PEAQ Web site for crop development and recommendations for first harvest in the region. Alfalfa weevil feeding is just now being reported in the region, so begin scouting for it.

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