

PEST MANAGEMENT & CROP DEVELOPMENT



BULLETIN

No. 7 / May 8, 2009

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**Available on the Web at
<http://www.ipm.uiuc.edu/bulletin>
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My Last Article

Over the past 30 years, I have authored or co-authored countless articles for this newsletter, starting way back when it was titled the *Insect, Weed & Plant Disease Survey Bulletin* (through 1989, with no bylines), through the years of the *Pest Management & Crop Development Bulletin* (1990 to date for the printed version), and more recently (2004–present) the electronic version of *the Bulletin*. On many occasions, I struggled with writing articles, whether from temporary writer's block or wrestling with a reasonable approach for addressing a sensitive issue or merely trying to communicate when not much was happening insect-wise. But in many ways, this is the most difficult article I have ever written.

On May 15, I will retire from the University of Illinois, and shortly thereafter I will take a new position with Dow AgroSciences (DAS) in Indianapolis. Although I made this decision rather quickly (I first became aware of the opportunity with DAS in early March), I did not make the decision lightly. I will miss many aspects of my University of Illinois position very much, particularly the continual interactions with people involved in Illinois agriculture and the many collaborations and friendships that have developed over the course of my career. I will miss the camaraderie with my U of I Extension colleagues as well as the team attitude exemplified by our numerous multidisciplinary efforts. I will also miss the applied research that has been the very foundation of our entomology extension program, as well as the people associated with the program. All of these efforts will continue, of course, but without my direct involvement.

Fortunately, my new position with DAS will be as the insect management technology transfer specialist in the R&D organization, which will provide opportunities for continuing interactions with many people involved in agriculture, in Illinois and elsewhere. So don't be surprised if we happen to cross paths in the future. And with the likelihood of emeritus status in the Department of Crop Sciences, I won't completely cut my ties with the university that has fostered and supported my career growth and development and has allowed me the freedom to blaze my own trail.

In January, while talking with a broadcast radio journalist before an interview, I told her that I had worked at the U of I for nearly 30 years. She surprised me with her first question: "What has been your most memorable accomplishment?" The question caught me off guard momentarily, but I responded that my most memorable accomplishments were all associated with my educational efforts (both oral and written) and my belief that I have helped people in some small way. I will leave my position with a great sense of satisfaction.

The Bulletin has been particularly near and dear to me throughout my career. It has been a constant, efficient vehicle for sharing information and educating about insects and their management. Leaving it behind will be tough. But its future will be bright in new hands with new ideas, as long as you continue to value its purpose. Expect some exciting changes in the future.

Thank you all very much for allowing me to be a part of the Illinois agricultural family for so many years and for your support and encouragement along the way. I sincerely hope that we have opportunities to interact in the future.—*Kevin Steffey*

INSECTS

Time to Scout for Wheat Insects: Pests and Predators Are Present

Insect pests of wheat, along with their predators, are evident in many wheat fields, particularly in southern Illinois. Robert Bellm, crop systems extension educator, Edwardsville Extension Center, has surveyed some wheat fields in southwestern Illinois and observed bird cherry-oat aphids, cereal leaf beetles, predators (lady beetle larvae), and parasitoids (parasitic wasps). The good news is that economic thresholds have not been reached for either aphids or cereal leaf beetles. Thus far, the natural enemies appear to be taking their toll on these pest species. Now is a good time to take a look in your wheat fields and familiarize yourself with some economic thresholds. Any insecticide treatments that are applied should be based on thorough scouting efforts and only after the economic threshold has been reached. Unnecessary treatments would not only reduce the natural enemy densities but also may not pencil out from an economic vantage point.

Robert observed both adults and larvae of the cereal leaf beetle. This insect is native to Europe and Asia; it made its first appearance in the north-central U.S. in Michigan in 1962 and has since spread to many states. The cereal leaf beetle completes one generation per year. The adult is an attractive beetle (3/16 inch long) with metallic bluish-black wing covers (elytra) and reddish-orange legs and thorax. However, the adults are not the primary concern; nearly all of the economic damage is caused by larval injury to the upper leaves of wheat plants. The “sluglike” larvae

remove epidermal tissue in elongate strips from leaves over about a 10-day feeding period. Wheat fields with extensive injury may appear “frosted.” The sluglike appearance of the larvae is caused by their encapsulation with moist fecal material, which is believed to deter predators and parasites. The current economic threshold for this insect pest suggests that a treatment may be warranted when a combination of eggs and larvae averages 3 or more per stem. The eggs (1/32 inch long) are elliptical and yellow to burnt yellowish-orange. The eggs can be located along the midvein of the upper leaf surfaces and are laid either singly or in short chains.

Robert also found bird cherry-oat aphids relatively easily. These aphids are olive green to blue-black with reddish patches at the base of their cornicles (tail pipes). These aphids do not inject toxins into plants; however, they can vector the barley yellow dwarf virus, which can lead to yield loss. The economic threshold suggests that treatment is warranted when densities exceed 30 aphids per stem during the seedling to boot stage of development. Lady beetle larvae were evident in many of the wheat fields, and they are voracious aphid predators. When considering the need for an insecticide treatment, pay attention to densities of these beneficial insects. Are predator densities increasing or decreasing over time? If lady beetle densities are increasing, you can usually save the expense of an insecticide application.

We thank Robert Bellm for sharing these observations and look forward to other reports from our readers.—*Mike Gray and Kevin Steffey*

WEEDS

Large Weeds + Wet Fields = Challenging Conditions

The wet field conditions that have delayed planting have conversely been a boon to the growth of both winter and summer annual weed species. The purple coloration present in fields two

to three weeks ago has been largely replaced by yellow from the flowering of certain mustard species and butterweed. White-flowered mustard species, such as field pennycress and shepherd’s purse, are close to reaching maturity. Several species of summer annual weeds have emerged and are making significant growth. Many fields where no herbicide or tillage operation has occurred currently can be described as “woolly.”

Preplant tillage operations can effectively control existing vegetation while a seedbed is being prepared. However, as weeds become larger the effectiveness of tillage to control weeds before planting can be reduced. Dense stands of certain winter annual weeds, such as common chickweed, can “ball up” in a field cultivator. Stems of larger common lambsquarters plants bent over but not completely severed from the roots during tillage may spring back upright in a C-shaped or S-shaped configuration. While the winter annual weeds not completely controlled by preplant tillage eventually will complete their life cycles, summer annual weeds that survive preplant tillage are often much more difficult to control with herbicides applied after crop emergence.

Reduced weed control may also occur when fields are a bit wet during the preplant tillage operation. Soil disturbance may not be as extensive when soils are retaining moisture, and clods are more likely to form. Weeds are also more likely to take root again after tillage when soil disturbance is inadequate but soil moisture is abundant.

Would applying a burndown herbicide before preplant tillage improve control of larger weeds? This would likely provide improved control in many situations, but several points should be considered:

1. If you are applying a translocated herbicide such as glyphosate, it would be advisable to wait 24 to 48 hours between application and tillage to pro-

vide adequate time for the herbicide to translocate in the target vegetation. Generally, the longer the interval, the more complete the control of existing vegetation ultimately will be.

2. Growth regulator herbicides may not be the best choice if tillage will be done soon after application. Tillage soon after application may incorporate some of the growth regulator herbicide into the upper soil profile, placing it in the crop seeding zone and subsequently increasing the likelihood of crop injury.

3. Contact herbicides, such as paraquat, may not be as effective as translocated herbicides against larger weeds, but they can begin to desiccate existing vegetation much more quickly than translocated herbicides.

4. Soil-residual herbicides can be included with the burndown herbicide, but keep in mind that the subsequent tillage operation may not provide the most desirable distribution of the residual herbicide in the soil profile. Issues of physical incompatibility and antagonism should also be considered when combining one or more soil-residual herbicides with glyphosate.—
Aaron Hager

PLANT DISEASES

Wheat Scab Alert and Results of 2008 Illinois Wheat Fungicide Trials

According to the Fusarium Head Blight Risk Assessment Tool (www.wheatcab.psu.edu/) on May 5, wheat fields in portions of southern and central Illinois are under high and medium risk of Fusarium head blight (scab). Some fields in southern Illinois should be at or near heading and flowering. Wheat is susceptible to scab from flowering through kernel development, but it is important to make any fungicide applications for protection against scab at early flowering (Feekes growth stage 10.5.1). Only triazole-type fungicides (Folicur, Prosaro, Caramba, and others) should

be applied for control of scab. It is important to follow manufacturer's instructions regarding rates, timing, and spray volume. Products that contain a strobilurin-type fungicide (Headline, Quadris, Quilt, Stratego, Twinline, and others) should **never** be applied for control of scab. Strobilurin fungicides applied at heading or flowering can actually increase the deoxynivalenol (DON) contamination in grain. DON is a toxin that the scab fungus (*Fusarium graminearum*) produces (see "Management of Fusarium Head

Blight of Wheat" in issue 5 of *the Bulletin*, April 24, 2009).

When applied correctly and at the appropriate timing (Feekes 10.5.1), foliar fungicides can reduce scab and DON. Fungicides applied with this timing can also protect against late infections of foliar pathogens that can cause foliar blights and rust. Wheat fungicide trials were conducted at five locations in Illinois in 2008 (Table 1), with a range of diseases and disease pressure found. In general, when

Table 1. Results of 2008 wheat fungicide trials conducted in Illinois.

Treatment	Scab severity (%)	Rust severity (%)	Foliar blight severity (%)	Test weight (lb/bu)	Yield (bu/A)	DON (ppm)
Dixon Springs						
Untreated	10	35	25	59.9	52	0.19
Folicur 4 fl oz	3	2	4	60.5	58	0.06
Proline 5 fl oz	1	1	13	60.4	64	0.02
Prosaro 6.5 fl oz	0	2	6	60.3	60	0.00
Caramba 14 fl oz	0	0	8	60.3	59	0.00
LSD 0.05 ^a	4	7	8	NS ^b	7	0.10
Brownstown						
Untreated	8	6	11	54.2	69	0.41
Folicur 4 fl oz	2	0	3	54.5	68	0.22
Proline 5 fl oz	2	0	3	54.1	73	0.12
Prosaro 6.5 fl oz	2	0	4	54.4	72	0.13
Caramba 14 fl oz	2	0	4	54.3	68	0.16
LSD 0.05	3	3	4	NS	NS	0.13
Urbana						
Untreated	29	21	8	56.4	62	4.7
Folicur 4 fl oz	14	0	10	53.9	68	3.2
Proline 5 fl oz	16	3	8	54.2	65	2.9
Prosaro 6.5 fl oz	18	0	9	55.2	74	2.0
Caramba 14 fl oz	19	0	6	55.1	73	2.7
LSD 0.05	13	6	NS	NS	7	1.3
Carbondale						
Untreated	12	0	72	50.6	77	1.93
Folicur 4 fl oz	6	0	50	53.5	84	1.69
Proline 5 fl oz	5	0	44	53.6	83	1.31
Prosaro 6.5 fl oz	3	0	47	54.4	89	0.99
Caramba 14 fl oz	3	0	47	53.8	88	1.20
LSD 0.05	4	NS	NS	NS	NS	0.73
Monmouth						
Untreated	18	0	30	53.3	64	4.00
Folicur 4 fl oz	15	0	21	53.1	73	2.40
Proline 5 fl oz	23	0	24	53.2	68	2.75
Prosaro 6.5 fl oz	14	0	20	53.4	68	3.23
Caramba 14 fl oz	13	0	35	53.1	73	2.33
LSD 0.05	NS	0	NS	NS	6	NS

All treatments were applied at Feekes growth stage 10.5.1 (early anthesis). Cooperators included Steve Ebelhar (Dixon Springs, Brownstown), Bryan Young (SIU-Carbondale), and Eric Adee (Monmouth). Funding was provided by the U.S. Wheat and Barley Scab Initiative. ^aLSD 0.05: least significant difference. Use this number to compare results within a location and column.

^bNS: no significant effect of the treatment when data were analyzed statistically.

disease pressure was high, the foliar fungicides applied did a good job of reducing disease and preserving yield. When disease pressure was low, fungicides had little effect on yield.—*Carl Bradley*

CROP DEVELOPMENT

Is It Too Late for Spring Forage Seedings?

Wet soil conditions and delayed field work have prompted questions on how late alfalfa seedings can be made. As is commonly known, spring seedings tend to be more successful in the northern half of Illinois than in the southern half.

The typical spring planting window is March through mid-April for central Illinois and March through late April for northern Illinois. Mid-May is considered to be the deadline for spring seeding. The degree of root and seedling development into early summer is the determining factor for setting the end point for spring seeding. Root systems should be actively growing in the top 3 inches by 3 to 4 weeks after germination.

As spring seedings are delayed past mid-May, the likelihood of consistent, successful stand establishment is low due to high soil temperature, lack of soil moisture, and increased weed pressure. Irrigation provides the opportunity to extend the seeding period later into the spring.

If oats are used as a companion crop, their rate of seeding should be reduced to half of normal (or even eliminated) with May seedings.—*Jim Morrison*

Time for Alfalfa Watch

Alfalfa producers, consultants, and dealers across Illinois can benefit now from the **Alfalfa Watch** project, which helps predict optimum date for the first cutting by monitoring plant development and quality. Alfalfa plant growth and nutrient quality indicators are

reported twice weekly at peaq.traill.uiuc.edu.

Alfalfa Watch estimates preharvest quality in the field using the Predictive Equations for Alfalfa Quality (PEAQ) technique, which predicts fiber and relative feed value (RFV) based on the height of the tallest stem and stage of plant maturity in a sampling area. The method, developed at the University of Wisconsin, has been used in Illinois for many years and is a reliable guide for determining the optimum harvest date for first cutting.

At the PEAQ website, you can calculate PEAQ, enter and track your own PEAQ values, and view PEAQ values by county and region in Illinois.

Because approximately 15 to 20 RFV units are lost during harvest and storage, alfalfa needs to be cut at 165 to 170 RFV using PEAQ to have 150 RFV of harvested forage. Some fields in the southern third of Illinois are at this point or rapidly approaching it.

A change in RFV of 3 to 5 points per day in the standing forage has been noted, so adjustments need to be made for total harvesting time. This adjustment means that alfalfa may have to be harvested prior to 165 to 170 RFV as indicated by PEAQ.

PEAQ is not designed to balance rations, and it does not account for quality changes due to wilting, harvesting, and storage. The procedure is most accurate for good, healthy stands of pure alfalfa.

Many alfalfa seed companies have PEAQ measuring sticks that indicate the RFV of standing alfalfa based on height and stage of maturity. A PEAQ stick is also available through the Illinois Forage and Grassland Council for \$10 by writing IFGC, P.O. Box 233, Greenville, IL 62246 or e-mailing Matt Bunger (mbbunger@yahoo.com).

Lastly, producers need to balance the PEAQ technique with short-term weather forecasts.—*Jim Morrison*

Have You Considered Reducing Your Soybean Seeding Rate This Year?

Every year soybean producers make major decisions about the planting process. The first decision is variety selection (see issue 4 of *the Bulletin*, April 17, 2009.) Second is planting date (issue 6, May 1, 2009), which is taking on added importance this year as corn planting progress remains slow. A third important decision is seeding rate. Seeding rate has become more economically critical as soybean seed prices have increased with improved varieties, the addition of biotechnology traits, and the increasing popularity of more costly soybean seed treatments.

Soybean seeding rates in Illinois typically range from 150% to 200% of the number of plants needed at harvest (75,000 to 100,000 plants per acre) to maximize yield under most conditions. High seeding rates are used to provide insurance against conditions that reduce soybean emergence. At the same time, soybean plants compensate well to low stands by adjusting yield components (pod and seed number per plant) and expanding plant growth for more complete canopy closure to suppress weed competition. Historically, the cost of soybean seed has been a relatively minor expense in the cropping operation, so it made sense to plant far more seeds than the number of plants needed. Today's higher seed costs have increased interest in lowering seeding rates in order to maximize economic return.

Several of my colleagues in surrounding states have looked at the relationship between soybean seeding rates and yield and have promoted lowering seeding rate recommendations in their states. In the past decade, there have been a couple of large multiyear studies investigating desired soybean seeding rates in Illinois, and I was privileged to get these data to analyze.

I will discuss two different studies here. Before I do, I want to give credit—for the first study to the University of Illinois Department of Crop Sciences and research farm superintendents Eric Adee (Monmouth), Lyle Paul (DeKalb), and Bob Dunker (Urbana), and for the second study to the Department of Crop Sciences Variety Testing Program and Emerson Nafziger. Also, let me make clear that I will be discussing soybean seeding rates and **not** soybean plant populations. Data related to plant populations are also critical, but it is the seeding rate that you have the most control of. Second, the data from all of the field trials I will be discussing were from “normal” conditions, and general plant population counts in these trials would indicate that plant stands were uniform and generally between 85% and 95% of the number of seeds planted.

My first thought about data from these trials was that even though we know soybeans can yield very well with plant populations of less than 100,000 plants per acre, the risk of reduced yields would be higher when starting with lower seeding rates. As I analyzed the data I paid particular attention to the magnitude of changes in the group variances, not just to the changes in mean yield while accounting for the group variances. From these two datasets, a reduction in variance did not occur in relation to seeding rates. Therefore, reducing risk by increasing seeding rate does not intuitively appear to be logical, but I will discuss this further.

The first study examined 125,000, 175,000, and 225,000 seeds per acre planted in row spacings of 7.5, 15, and 30 inches at Monmouth, DeKalb, and Urbana, Illinois, in 1998 through 2000. There was no yield difference between the 7.5-inch rows (53.6 bushels per acre) and 15-inch rows (53.0 bushels per acre); however, 30-inch rows yielded 2.1 and 2.7 bushels per acre less than the narrower row spacings, respectively. An increase in seeding rate produced a modest, albeit

significant, increase in yield. The rate of 125,000 seeds per acre yielded 51.6 bushels per acre. An increase of 50,000 seeds per acre increased yield 1.2 bushels per acre, while increasing another 50,000 seeds per acre (175,000 to 225,000) increased yield only 0.2 bushels per acre (**Figure 1**).

In the second study, yields from 50,000 seeds per acre averaged 55.8 bushels per acre; successive increments of 50,000 seeds per acre in-

creased yields by 5.2, 1.1, and 0.3 bushels per acre, again showing a rapidly diminishing return to added seed (**Figure 2**).

Remember, however, that before I made many conclusions from these data I also wanted to look at the change in magnitude of variance as an indication that risk could be decreased as seeding rate increased. I hypothesized that average yields would be more stable when a higher seeding

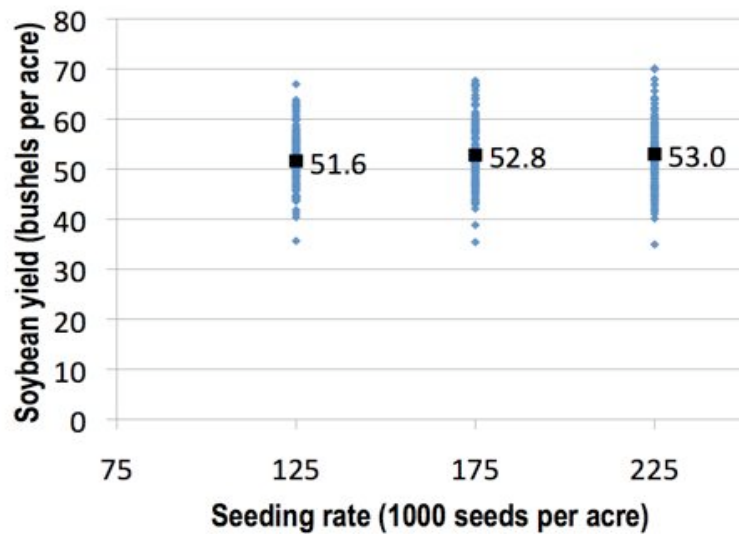


Figure 1. Soybean yield data from three seeding rates pooled over drilled, 15-inch and 30-inch row spacings planted at Monmouth, DeKalb, and Urbana, Illinois, in 1998 through 2000.

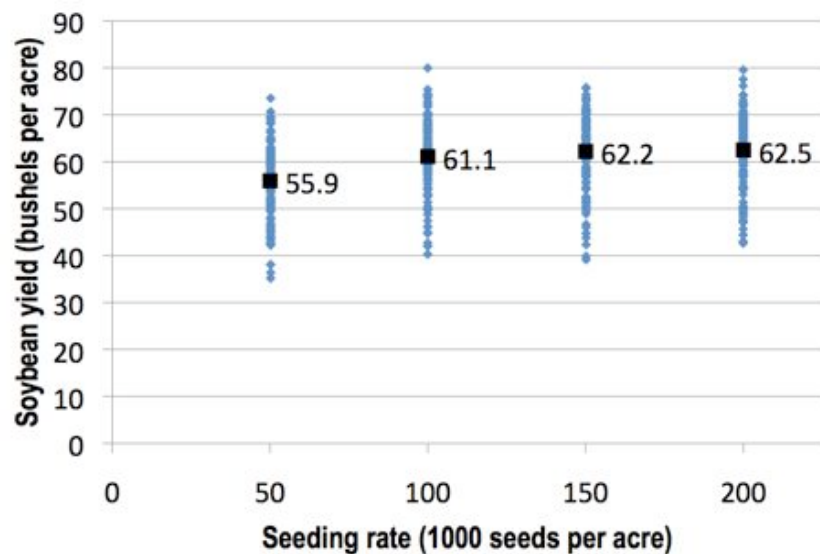


Figure 2. Soybean yield data from four seeding rates examined at 33 field locations throughout Illinois from 2005 to 2008.

rate was used. By visual inspection of the data range (high yields minus low yields) in both studies, we see the variation was similar. The coefficient of variation (CV), which is the standard deviation divided by the group mean multiplied by 100, ranged from 10% to 14% for these studies and was relatively constant. Variance between the seeding rates in both trials was thus uniform. This means that under normal conditions, you are just as likely to end up with below-average yields when you plant at higher seeding rates. I guess a higher rate may still “save” you under catastrophic conditions that greatly and selectively reduce plant stands—soil crusting, frost, bird feeding, hail (to name a few)—but as seed costs increase, so does the cost of protection against these often-isolated occurrences. So the question is how much you are willing to pay for insurance against isolated stand reduction events.

Economic considerations. Data from these trials would indicate that effects of changing seeding rates occur uniformly regardless of the soybean row widths of your operation. In the first trial, if you were paying 25 cents per 1,000 seeds (\$35 for a bag with 140,000 seeds), the increase of 1.2 bushels per acre between 125,000 and 175,000 would probably have been just enough to break even with modest economic gains or losses, depending on the value of your soybean crop. However, an increase from 175,000 to 225,000 seeds per acre would have been economically negative, with possible losses of \$10 an acre with a soybean price of \$10 per bushel. The second study, which was conducted a little more recently, had very similar yield response for the addition of 50,000 seeds per acre between 100,000 and 150,000, but economic losses would have occurred above 150,000.

Data from the second study were also fit to a regression model to calculate the economic optimum seeding rate. To account for extremes, the model was used to estimate the economically

optimum seeding rates for a range of seed input costs (5 cents to 65 cents per 1,000 seeds and soybeans at \$7 to \$16 a bushel). Fifteen years ago seed input costs were close to the price of 10 cents per 1,000 seeds. In that price range, the optimum seeding rate fluctuated under 4,000 seeds per acre from an increasing soybean value of \$7 to \$16 a bushel. Today, however, with various biotechnology trait fees and seed treatment options, the value of seed input is much wider and likely between 15 and 45 cents per 1,000 seeds for most farmers. Economically optimum seeding rates fluctuated by 26,000 seeds per acre in that seed price range. From this research trial, optimum rates in the range of 25 to 45 cents per 1,000 seeds would have been between 100,000 and 129,000 seeds per acre. This is much lower than current recommendations for 30-inch rows in Illinois, and a little lower than I would be comfortable recommending.

More work may be needed to fine-tune these recommendations, but I present the data as an indication that seed input costs have a much larger impact on optimum seeding rates today than they did over a decade ago. I would suggest that most operations may benefit from modest decreases in seeding rates, provided the seed used has good viability and is planted under normal conditions. Really high seeding rates are likely to provide a negative return on your seed investment.

Seed costs are likely to continue to increase, so seeding rates may need continuing adjustments to reflect the price of both seed and soybeans. If you currently plant at much higher rates than were found to be optimal, you might as a first step lower your rates some to levels you still feel comfortable with. Another suggestion would be to plant as you intended but to also plant some test strips with lower seeding rates and see how harvest plant populations and yields compare on your farm. This would be very easy for those with yield monitors, but remember that the more strips separated in space with your normal seeding rate (a creation

of replications), the better. — *Vince M. Davis*

Have I Lost My Nitrogen This Spring?

Wet soil conditions this spring are a reason for concern that some of the nitrogen (N) applied last fall for the 2009 corn crop might be lost. When soils become saturated, the potential for N loss is directly related to the amount of N present in the nitrate (NO₃⁻) form. When soil temperatures start to increase and water-saturated conditions exist, nitrate is most likely to be lost through denitrification in fine-textured soils. In coarse-textured soils, leaching below the root zone is the biggest concern. Most of the fall-applied N is either ammonium (NH₄⁺) or a form that transforms rapidly into ammonium. Nitrification, or the conversion of ammonium to nitrate, is a bacteria-mediated transformation. The bacterium *Nitrosomonas* converts NH₄⁺ into nitrite (NO₂⁻), while the bacterium *Nitrobacter* converts NO₂⁻ to NO₃⁻. The activity of these bacteria is minimal at temperatures below 50 °F. The bacteria also need aerobic (unsaturated soil water) conditions to nitrify ammonium. Thus, the amount of nitrification that occurs in the soil depends largely on soil temperature and the time elapsed from application until the soil becomes saturated with water. Further, the nitrification process can be reduced with the use of inhibitors that will lower the activity of these bacteria and allow N to stay in the ammonium form for a longer period. Since the time elapsed between application and crop uptake is short for spring applications, the use of inhibitors is most useful in fall.

What is important to remember is that only the portion of the applied N that is in nitrate form is subject to denitrification or leaching. The fact that N is in the nitrate form does not mean that N is lost; it means rather that is susceptible to loss. **Table 2** shows the percentage of ammonium that was transformed to nitrate by the end of

May in three Illinois locations depending on whether and when a nitrification inhibitor was used. Once you determine how much of your N is in the nitrate form, you can estimate how much N is potentially lost through denitrification by taking into account soil temperature and the number of days the soil has been saturated. Research has shown that for each day the soil is saturated with water, 4% to 5% of the N in the nitrate form is lost via denitrification when temperatures are above 65 to 70 °F. When temperatures are between 55 and 65 °F the loss is 2% to 3%, and when temperatures are below 55 °F losses are estimated to be 1% to 2%. Soil temperatures at the 4-inch depth can be found at www.sws.uiuc.edu/warm. Again, these losses are not for the total N applied, but rather for the portion that is in the nitrate form. Losses will vary depending on various factors, but these values offer an estimate.

The following calculation is a hypothetical situation given as an example using the data in Table 2:

Let's assume that 180 pounds N per acre were applied in early November with a nitrification inhibitor in a silty clay loam soil in DeKalb, and soils were saturated for the last 5 days in April.

First, calculate N present as nitrate:
N applied x % in nitrate form

$$180 \text{ lb N/acre} \times 0.55 = 99 \text{ lb N/acre}$$

Second, calculate N denitrified:
N in nitrate form x % denitrified

$$99 \times .20 \text{ (5 days} \times 4\%/ \text{day)} = 20 \text{ lb N/acre lost}$$

At this point it might be too early to decide if additional N is really necessary. However, if you determined that you lost nitrogen you will need to decide whether it will be economically advantageous to apply more. If the yield potential is reduced because of late planting or poor stands, there might not be need to apply additional N. If in the calculation you find that you will be around 40 to 80 pounds of N per acre below what you need for the crop, it would be appropriate to apply an additional 50 to 60 pounds per acre; if you are more than 100 pounds per acre below what is needed, an additional 90 pounds per acre can be applied. If the field is already planted, the best way to apply the additional N would be—in order of preference—injected anhydrous ammonia or UAN solutions, broadcast ammoniated products (ammonium nitrate or ammonium sulfate), broadcast urea, UAN solution dribbled between rows, and broadcast UAN solution. If you have not planted your field yet, plant now and apply the additional N later so planting is not delayed further.

Another way to determine if additional N will be needed is to establish a couple strips with supplemental N across the field at a rate between 60 and 80 pounds acre and to compare the crop colors as the season progresses. If you find that those strips are substantially greener than the rest of the field, you can apply 60 pounds of N per acre to the rest of the field, as long as you do it before tasseling. Potential drawbacks to this approach are that color differences could develop too late for a timely application or there might not be sufficient rain to move the late-applied N into the root zone.

Another way to determine the need for additional N is to use the pre-sidedress nitrate test (PSNT). However, the test reliability is heavily influenced by the field and by the way samples are collected. Typically the test works best in fields with high potential for N mineralization, such as fields that have been manured in the last 2 to 3 years. A sample to 12 inches deep is collected when corn plants are 6 to 12 inches tall (V4 to V6 development stage), or in late May to early June when planting is delayed. If the field had a history of broadcast applications, randomly collect 20 to 25 samples from an area no greater than 10 acres. If band applications of fertilizer or manure were used to fertilize the previous crops, collect at least 10 sets of three cores each from two corn rows.

Collect the first core 3 inches to the right of the right-hand row, the second core between the two rows, and the third core 3 inches to the left of the left-hand row. In all cases, place all the cores in a bucket and obtain a subsample after the cores have been thoroughly mixed. If mixing the entire sample to produce a representative subsample is too difficult, it is better to use a large sample bag and keep the entire sample. Collecting a sample less than the full 12 inches or not collecting all the cores will produce unreliable results. If the samples cannot be delivered to the laboratory the same day, either freeze or air-dry the soil. If you air-dry samples, dry them as fast as possible by spreading them out on a paper, crushing the cores, and blowing air with a fan. Since drying can be difficult without proper facilities, freezing samples is likely the best option for most people. Make sure to tell the laboratory that you want to measure NO₃- nitrogen. If the entire sample is sent, request that the whole sample be dried and ground before a subsample is taken. If the test results come back above 25 parts per million, no additional nitrogen will be necessary for the 2009 crop.—*Fabián G. Fernández*

Table 2. Percent of ammonium converted to nitrate from date of application until the end of May at three locations in Illinois.

Date of ammonia application	% of ammonium nitrified (present as nitrate at end of period)					
	Ammonia without N-Serve			Ammonia with N-Serve		
	DeKalb	Bondville	Browns-town	DeKalb	Bondville	Browns-town
November 1	85	90	100	55	65	88
December 1	60	65	100	45	55	70
March 15	50	60	100	20	30	53
April 1	35	40	48	15	20	48

Some Nitrogen Placements Can Cause Plant Injury

While we all recognize the need to apply nitrogen (N) to increase crop production, it must be applied correctly to avoid or minimize plant injury. The most important point to remember is to keep anhydrous ammonia and urea-containing fertilizers away from the seed and the immediate rooting zone of the seedling. While it is possible to apply fertilizers directly below the seed zone when using strip-tillage or auto-guiding systems, anhydrous ammonia and urea should not be applied in this way. These fertilizers have or produce ammonia that can inhibit germination or severely damage young roots. While some people do this without a problem, it is a high-risk practice, and luck is the only reason those producers have not experienced difficulties.

Applying urea or UAN in contact with the seed not only is risky because of the potential for ammonia injury (urea transforms to ammonia when applied in the soil), the free ammonia will inhibit phosphorus uptake, and the impurity biuret in urea is toxic to seedlings. Safe ways to apply urea-containing fertilizers are to broadcast and incorporate or to apply at planting if you have a starter attachment that puts the fertilizer at least 2 inches to the side of the seed. At this time in the season, it is more important to plant and then worry about applying any needed N. However, if you must apply anhydrous ammonia before planting I recommend applying it at an angle to the row and waiting three to five days before planting. If you have auto-steering, then you can apply between the positions of the future crop rows and plant immediately after. Finally, do not apply if soils are wet; this can cause N loss, or escaping ammonia can injure plants as the soil cracks along the knife track when drying. If the corn has emerged, make sure liquid N fertilizers are not sprayed on the emerging seedling. — *Fabián G. Fernández*

Planting Delays: Considering the Switch from Corn to Soybean

I have written in *the Bulletin* about effects of planting delays in both corn (issue 3, April 10, 2009) and soybean (issue 6, May 1, 2009). In the soybean article I suggested that people look at the relative declines in yield of the two crops to assess when a change from corn to soybean might be considered. Here I will address this question in more detail.

Producers take a range of approaches to the question of switching from corn to soybean, from those unlikely to ever switch to those who have lined up seed for both crops and have held off on applying N and herbicide, leaving open the option to switch from corn to soybean depending on how the planting season progresses. There might be some carryover effect on this decision from last year's unusual weather that resulted in little loss from late planting of both crops, especially corn. While we can't rule out that this could happen in 2009, it's not very likely. Recently, soybean prices have shown more strength than corn prices, though of course this could change.

For these calculations we will use the yield loss functions that I presented in the earlier articles. The "quadratic" curves that define planting date responses for both crops decrease at an accelerating rate. To keep it simple, we will use the curves from the corn planting date response in the northern part of the state (this was very similar to the response in the southern part of Illinois) but will use separate soybean planting date response curves for northern and southern Illinois. We converted bushel yield losses to gross dollar losses, using prices of \$4 per bushel for corn and \$11 per bushel for soybean.

By May 10, gross income from corn is being lost at the rate of \$4.93 per acre for each day of delay, while soybean is losing only \$1.80 (northern Illinois)

and 16 cents (southern Illinois) per acre per day of delay. By May 30, corn is losing about \$9.15 per day of planting delay while soybeans lose \$4.78 and \$3.92 in northern and southern Illinois, respectively. As expected, the loss in gross income as soybean planting is delayed stays well behind that of corn throughout May, and this difference widens in June.

If we start out by expecting a similar net income from corn and soybeans planted on time, it would make sense to plant soybean instead of corn even if planting is delayed only to early May. Cumulative losses from planting delays in corn total about \$94 and \$208 by May 15 and May 30, respectively. These losses total about \$25 and \$80 by these two dates for soybean in northern Illinois, and only about \$4 and \$43 by these same dates in southern Illinois. So corn planted in mid-May has lost \$70 to \$90 more gross per acre than soybeans planted at the same time, and corn planted at the end of May has lost about \$130 to \$165 more gross than soybean planted at the same time, with the difference in gross larger in southern than in northern Illinois.

While planting delays mean faster loss of yield and gross income from corn compared to soybean, the date at which planting soybean will be more profitable than planting corn depends on expected net incomes for the two crops. Based on our data, the gross income for corn planted on time is about \$370 per acre higher than the gross from planting soybean on time in northern Illinois, and this difference shrinks to about \$240 per acre by the end of May in northern Illinois. Corn yields were very high (maximum of about 230 bushels per acre) in this study in northern Illinois, so if lower corn yields are expected, this difference would be smaller.

Both actual and expected corn yields are lower in southern Illinois, and corn planted on time would be expected to produce a gross income only about \$80 higher than for soybean planted

on time in southern Illinois. By the middle of May, both crops would be expected to gross about the same amount per acre, so we would expect soybean to produce a higher net per acre than corn if soybean costs less to produce. With both crops planted at the end of May, the gross from soybean would exceed that from corn by about \$70 per acre.

As a caution, while these estimates are based on the best data we have, it is likely that actual planting date responses and yield levels in 2009 will be different than the average over several years that make up our data. As the weight-loss ads say, "Individual results will vary." But these numbers do provide some perspective on what we can expect, even while we hope for 2009 to beat the odds after the slow start that we're experiencing now. —
Emerson Nafziger

REGIONAL REPORTS

Extension center educators, unit educators, and unit assistants in northern, west-central, east-central, and southern Illinois prepare regional reports to provide more localized insight into pest situations and crop conditions in Illinois. The reports will keep you up to date on situations in field and forage crops as they develop throughout the season. The regions have been defined broadly to include the agricultural statistics districts as designated by the Illinois Agricultural Statistics Service, with slight modifications:

- North (Northwest and Northeast districts, plus Stark and Marshall counties)
- West-central (West and West Southwest districts, and Peoria, Woodford, Tazewell, Mason, Menard, and Logan counties from the Central district)
- East-central (East and East Southeast districts [except Marion, Clay, Richland, and Lawrence counties], McLean, DeWitt, and Macon counties from the Central district)

- South (Southwest and Southeast districts, and Marion, Clay, Richland, and Lawrence counties from the East Southeast district)

We hope these reports will provide additional benefits for staying current as the season progresses.

East-Central Illinois

No progress on field work was made this last week; fields are still too wet for activity. Corn planted 2-1/2 weeks ago has finally started to emerge but looks very pale.

Regarding winter annuals, yellow blossoms are starting to overshadow the purple. Butterweed is starting to really take off.

Northern Illinois

Some field work and corn planting started last weekend (May 1-3) but on a very limited basis throughout the region. Activity was more widespread by Monday, May 4, as producers were able to pick and choose drier fields in which to get started. Field conditions vary throughout the region; reports from DeKalb County indicate activity began to pick up on May 5, but Ogle County field activity was more prominent on Friday, May 1.

According to the USDA National Agricultural Statistics Service, as of May 3, 6% and 1% of corn was planted in the northwest and northeast Illinois crop reporting districts, respectively. For comparison purposes, NASS reported corn planting progress on May 4, 2008, as 14% (northwest Illinois) and 19% (northeast Illinois). It was a late year in 2008 for planting progress, and to date, 2009 is farther behind.

Extension educators continue to catch black cutworm moths, with "intense captures" reported on May 5 in Ogle and Winnebago counties.

Southern Illinois

Soils in the majority of the region remain wet, with ponded water present.

A small area along the northwestern side of the region has remained somewhat drier, and some field work and planting continue on better drained soils. In that area, corn planted earlier has now emerged and stands appear uniform.

Wheat growth stages range from Feekes 10 (boot) to 10.5.1 (first anther visible). Most fields are at or beyond the cutoff point for application of strobilurin fungicides. Bird cherry-oat aphids are present in most fields, but predators and parasitoids are also present. Rather than panic, growers should continue to scout fields to see if the natural enemies can keep aphid populations under control. Cereal leaf beetle larvae can also be easily observed, but populations are still far below threshold levels. As wheat approaches flowering, wet and humid conditions increase the potential for Fusarium head scab infection. Growers wishing to monitor head scab risk should check out the Fusarium Head Blight Prediction Center.

Alfalfa is at 28 to 30 inches of growth, and plants are in full bud stage. The weather and field conditions are not conducive for harvest, so those needing dairy quality forage may end up harvesting poorer quality than they would like.

West-Central Illinois

The last week has seen more rainfall along with cloudy days. No field work has been completed beyond a location or two in the southern and southwest areas of the region the past day or so. Those few early-planted (mid-April) corn fields have emerged. Fields planted April 24-26 are beginning to emerge. Very few, if any, of the fields planted late in April have had herbicides applied. A few weeds are beginning to make their presence known; for fields of non-GMO corn, producers need to scout to determine what weeds are present before herbicide application.

We had an intense capture of black cutworm moths the weekend of May 2–3 southeast of Quincy.

Wheat stage is ranging from Feekes 4 to Feekes 6, dependent on planting date.

Alfalfa and grass growth have really accelerated over the past two weeks. Some alfalfa is at the maturity that it should be harvested for dairy quality hay.

As if mushroom hunters didn't have enough to worry about with ticks (which are at the highest populations reported in a number of years), there was a report early in the week that Buffalo gnats are back.

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1917 S. Wright St. Ext., MC-710
Champaign, IL 61820

Published by University of Illinois Extension and
Information Technology and Communication Services,
College of Agricultural, Consumer
and Environmental Sciences,
University of Illinois.

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