2000

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While plantings of glyphosate-tolerant (GT) soybeans continue to increase, questions of potential yield penalties persist. Data from university soybean cultivar performance trials in several states now suggest a yield penalty may exist.

Yield penalties may result from either yield drag, yield lag, or a combination of the two. Yield lag represents yield depression due to the genetics of the cultivar or line in which the GT gene is inserted. Yield drag can result from either the GT gene insertion or the insertion process (GT effect) or the application of the glyphosate (herbicide effect). Yield drag is a greater potential problem than yield lag since yield lag can be overcome by

(Continued on page 50)
Gary Zoubek, Extension educator in York County: Several producers started corn planting. Last weekend we received about .70 inch of rain, delaying a major start to spring planting by a day or two.

Gary Hall, Extension educator in Phelps County: Corn planting has begun. Some corn was planted last week before the weekend storms. You can find many planters just waiting to hit the fields. At this time there have been very few insect or disease problems in the fields.

Ralph Anderson, Extension educator in Buffalo County: Corn planting has started in Buffalo County. Ground conditions are not bad, but any ground that was worked very much is certainly short of topsoil moisture. A lot of anhydrous was applied the last two weeks. Some alfalfa in the north and west part of the county has been treated for army cutworms.

Wheat either looks very good or very poor, generally with more good than poor acres. Pastures are starting to green up but could certainly use more moisture.

Jim Peterson, Extension educator in Washington County: Recent rains totalling about 1.40 inches have been beneficial to Washington County producers. Corn planting is just beginning with producers going full speed ahead in the Missouri River Valley. Planting in the uplands had not begun as of Monday, but will begin in the next week. It is still very dry in this area, but farmers are encouraged by the recent rains.

Terry Gompert, Extension educator in Knox County: The 1.3 inches of rain was very timely. Many acres of turnips were planted this year for grazing. The alfalfa and brome are just starting to grow. Disking corn stock ground was a common practice last week. Tillage and planting will become more aggressive.

Ray Weed, Extension educator in Kimball and Banner counties: We have at least one report of a field in Banner County with Russian wheat aphids at economic levels. Winter wheat here was affected by very cold temperatures (about 15°F in some cases).

Nebraska Agricultural Statistics Service Crops Update: The winter wheat crop is rated 4% very poor, 12% poor, 31% fair, 49% good, and 4% excellent. As of Monday, 14% of the crop had jointed, well ahead of last year at 2% and the five-year average of 2%.

Oat planting was 91% complete by week's end, well ahead of 69% last year and 46% for the five-year average. Fields were 39% emerged, but dry topsoil conditions have slowed the process. Condition of the emerged stands declined and rated 2% very poor, 24% poor, 57% fair, 16% good, and 1% excellent. The degree of any long-term damage remains to be seen.

Nebraska producers plan to increase their soybean, sorghum and oat acres, while decreasing their corn acres, according to a report of prospective plantings. Soybean producers expect to plant a record 4.6 million acres, up 300,000 acres or 7% over last year. This is well above the previous record high of 4.3 million acres planted in 1999.

Nebraska corn growers expect to plant 8.3 million acres in 2000, down 3% from last year and 6% below 1998.
Glyphosate-tolerant soybeans  (Continued from page 49)

Producers should consider the 6-11% yield differentials when they assess profitability.

Inserting the GT gene in high yielding parent lines.

Two experiments were planted at each of four Nebraska locations in 1998 and 1999 to determine if either component of yield drag is present in GT soybeans. The first was intended to measure the glyphosate herbicide effect and the second to measure the GT gene effect.

In the first study we compared 13 GT cultivars planted in three side-by-side subplots. One subplot was sprayed with glyphosate and AMS, a second subplot was sprayed with AMS only, and the third subplot was sprayed with water only. Glyphosate applications were made at standard rates and timing for soybean production. All three subplots were initially sprayed with a conventional herbicide. The plots were maintained weed-free by hand weeding. Crop phenology was monitored frequently.

Spray treatments did not affect most of the soybean growth and development characteristics we measured. Grain yield of GT soybean was not affected by the spray treatments at any location or when averaged over locations (Figure 1). The use of RU with AMS did not not affect yield or contribute to a yield drag and a concomitant yield penalty.

In the second study we compared five GT cultivars, their sister lines, and high-yielding non-GT cultivars. Weeds were controlled with conventional herbicides combined with hand weeding.

Non-glyphosate-tolerant sister lines yielded 6% (about 3 bu/acre) more than the GT sisters (Figure 2). A yield drag is evident. The high-yield, non-herbicide tolerant cultivars included as controls in the trial yielded 5% more than the non-GTS sisters. This is evidence of a yield lag among the GT cultivars we tested. The GT gene insertion process in the GT sisters reduced soybean yield 6% compared to the non-GT sisters and 11% when compared to high-yield, non-herbicide resistant checks.

Yield penalties exist with GT soybeans. The work reported here demonstrates that this penalty is partly due to the gene insertion process, a yield drag, and partly due to the cultivars the gene is inserted in, a yield lag. Producers should consider the 6-11% yield differentials between glyphosate-tolerant and non-tolerant cultivars as they evaluate the overall profitability of producing soybean.

Researchers cooperating on this project included: Roger Elmore, Extension cropping systems specialist, South Central REC; Fred Roeth, Extension weeds specialist, South Central REC; Robert Klein, Extension dryland crops specialist, West Central REC; Stevan Knezevic, Extension weeds specialist, Northeast REC, Alex Martin, Extension weeds specialist; Lenis Nelson, Extension crop variety specialist; and Charles A. Shapiro, Extension Soils Specialist, Haskell Ag Lab.

The Nebraska Soybean Checkoff Board provided financial support for this project.

Roger Elmore, Extension Crops Specialist, South Central REC
Defining drought (Continued from page 49)

period helps to recharge depleted soil water reserves and provide a water bank that crops can use to mitigate the effects of extended dry periods during the growing season.

Up to March 31, precipitation totals ranged from four to eight inches across the state. Typically, the eastern third of Nebraska should have received 10-12 inches of moisture while the central third should have received 8-10 inches. The recharge season from September 1 to March 31 has averaged 40%-80% of normal over the eastern two-thirds of the state.

As planting progresses, we will begin to focus on year-to-date and short-term (last 30 days) precipitation. It is possible to offset recharge deficits with normal to above normal precipitation during the growing season. Year to date precipitation is used to signal a possible end to long-term precipitation deficits.

As of March 31, short-term and year-to-date precipitation trends have been slightly wetter than the last four months of 1999; however, percent of normal precipitation has remained below normal for most of eastern Nebraska since Jan. 1.

Remember, it is the accumulated deficits over time that indicate drought conditions. One precipitation event may put us above normal for the last 7-14 days, but can quickly move to below normal if dry conditions reestablish themselves. During the last three months there has been a consistent pattern of inclement weather lasting for two weeks, followed by two to four weeks of below normal precipitation.

As mentioned earlier, we rely on preceding evidence of drought conditions. These include:
- top soil moisture,
- sub-soil moisture,
- stream and river levels,
- vegetation health, and
- numerical weather model forecasts.

Precipitation affects each of these criteria.

Top soil moisture, that in the top 1 foot of the profile, will react swiftly to favorable precipitation events. At the end of March, well over 70% of the top soil was rated short to very short across the state. During the last two weeks, we have seen an alleviation of these conditions. However, above normal temperatures, high wind speeds, and low relative humidity levels can quickly counteract some of benefits of recent rains. These conditions have plagued the state during the last three months and have resulted in above normal surface evaporation.

Sub-soil moisture, that in the 1-5 foot range, is seriously deficient as we enter the planting season. High surface evaporation reduced the amount of deep moisture percolation that we should have experienced with recent rains. Every one of our soil moisture monitoring sites indicates that moisture levels are at or below wilting point below 30 inches. It would take monsoon conditions to get moisture down to 60 inches, which means significant planting delays would have to occur in order to adequately recharge sub-soil moisture reserves.

Streamflow conditions have just begun to react to long-term precipitation deficits. Those streams and rivers which rely on groundwater recharge have dropped into the below to much below normal range. This indicates that deep soil moisture is either deficient or nonexistent, since it is surplus moisture from deep soil profiles that maintain steady stream flows. Northeast, southwest, and southeast Nebraska have all experienced significant streamflow declines during the last 30 days.

Vegetation health is not being watched at this moment. As we enter into the cropping season, this will be a key component for understanding short-term reactions to precipitation or lack of precipitation. Plant stress can be indicated by using satellite imagery to determine leaf temperatures. Leaf temperatures warmer than their surrounding environment often indicate that plants can't provide sufficient evaporative cooling due to the lack of adequate moisture. With this method, developing stress conditions can be identified earlier than by visual inspection alone.

Finally, numerical prediction models give us an indication of future trends. This year the trends indicated for Nebraska include below normal precipitation and above normal temperatures for the entire growing season. Our basic criteria for drought classification does not include forecasts. The forecasts are only used to determine whether current conditions have the potential for further deterioration.

If current models are correct, we expect drought conditions to intensify, with portions of the state developing extreme drought conditions (1 in 50 year event) within the next 45 days. Most of the eastern two-thirds of Nebraska is identified as being in a severe drought (1 in 25 year event).

If forecast models are not correct and favorable precipitation continues into the growing season, we will gradually relax drought designations within the state. Just as it took time for this current drought to develop, it will take time for it to relinquish its grip.

Al Dutcher, State Climatologist
Agricultural Meteorology

The drought evolved over an extended time and will not dissipate with one or two rains.
Testing for quality soybean seed

Starting with high quality soybean seed can have a significant impact on your overall field stand, but how can you be sure of your seed?

Several tests are available to determine quality. Based on their results, fungicide seed treatments may be needed. These tests are helpful for producers who hold seed from previous crops and risk increasing seed-transmitted diseases, which can lead to poor germination results.

Seed lots are indexed by means of a standard warm-germination test, cold-soil test, and a seedborne Phomopsis sp. test. Of these, the Nebraska Crop Improvement Association (NCIA) performs the warm germination test and assesses purity for certification. Seed lots with warm germination test results at or below 85% should be treated with a fungicide seed treatment. Seed lots with warm germination test results below 75% should not be used or should be re-cleaned. If a cold germination test indicates germination below 70%, the seed should be treated with a fungicide seed treatment. Cold-tested germination below 60% should not be used.

Phomopsis is a fungus commonly found in Nebraska and is usually more of a problem in food grade soybean production. Infected seed often will appear shriveled, elongated, cracked, and have a chalky white appearance. Sometimes, however, seeds lacking symptoms will also have the fungus. Seed infection can cause both pre- and postemergence damping-off. If you have a seed lot with a low germination test due to Phomopsis, use a fungicide seed treatment for infection levels above 15%. Long-term storage can help reduce the viability of the fungus and may lead to seed that is relatively free of Phomopsis.

Physical or mechanical damage to the seed also will affect germination. Cracked seed coats and split seeds will not produce as good a stand as non-damaged seed. Cracked seed coats will leak nutrients out of the seed area (spermosphere) which can attract many seed decaying fungi. Mechanical damage is usually a problem when seed lots have moisture contents below 10%.

Dark discolored seeds with irregular or withered shapes are another problem you may observe in your seed lots. Some seeds will have dark, irregular, spreading, sunken areas on the seed coat. For most of the seeds with these symptoms, Alternaria pod and seed decay is the problem. Seeds infected by Alternaria generally do not germinate or produce seedlings that germinate in the soil but do not emerge. Alternaria pod and seed decay is associated with injury caused by bean leaf beetle feeding on the pods. Alternaria is an opportunistic fungus that infects and decays the seeds by using the beetle feeding site as a doorway into the pod. As bean leaf beetle populations appear to be on the rise, this problem is likely to increase in the 2000 growing season.

Loren J. Giesler
Extension Plant Pathologist

Mark your calendars for upcoming crop diagnostic clinics

Intensive crop management and diagnostic training will be available this summer through three clinics to be hosted by the University of Nebraska Cooperative Extension. The clinics, which are designed to provide in-depth information and hands-on training for agribusiness professionals and crop producers, will be held at the NU Agricultural Research and Development Center near Ithaca. CCA credits are expected to be available for each clinic.

May 23, Field Scout Training for Interns, 8:30 a.m.-4:30 p.m.
Geared toward entry-level crop scouts, topics will include: how corn and soybeans grow, insect pests of corn and some of soybeans, weed growth and identification; identifying diseased and nutrient-deficient plants, and tips from a veteran scout. Cost is $65 if registering before May 17 and $75 after that date.

July 13, Crop Management Diagnostic Clinic, 7:45 a.m. to 5 p.m.
Topics to include: causes of incomplete corn pollination; trends in corn rootworm resistant hybrids; compaction and its effect on root system development; herbicide injury/crop disease field diagnostics; early growing season stresses related to corn and soybean production; gray leaf spot management; and one company’s mobile soils lab. Cost is $115 if registering before July 6, and $165 if registering after that date.

September 6, Precision Farming Management and Technologies Clinic, 7:45 a.m. to 4:30 p.m.
Topics to include in-field calibration of a yield monitor; computer systems need for GPS/GIS software; understanding using digital soil surveys as part of a site

(Continued on page 55)
Recommended soybean seeding rates

Seeding rate is the most easily managed yield component for optimum soybean performance. Farmers have little direct control over the other components — pods/plant, seeds/pod, and seed weight — but they can control how many seeds are sown.

Results from numerous seeding rate experiments conducted across Nebraska over the years have consistently shown that seeding around 150,000 viable seed per acre will optimize yield. Figure 1 shows data from one of those studies which included both irrigated and rain-dependent environments. The data shown are averaged over 10-, 20-, and 30-inch rows. Responses to seeding rates were the same for all three row spacings. Figure 1 also reflects findings from other Nebraska studies including those with both indeterminate and determinate varieties, and both conventional and no-till treatments.

Seeding rates over 150,000 seeds/acre will neither increase nor decrease yield if plant lodging does not occur. This planting rate with normal plant losses during emergence and the remaining growing season will result in 100,000 or more harvestable plants. Plants in fields with harvest stands less than 100,000 plants per acre will be short, have thick stems, be particularly heavy branched at the lower nodes, and will have many pods close to the ground making harvesting difficult. Furthermore, weed control is more difficult with poor soybean stands. On the other hand, plants in fields with seeding rates above 150,000 seeds/acre will be tall, spindly, and more susceptible to lodging. Yields may decrease because not only does lodging make harvest difficult resulting in greater harvest losses, but also lodging causes canopy disruption. Canopy disruption negatively impacts crop development and yield.

Nebraska fifth in soybeans

Nebraska ranked fifth nationally in soybean production in 1999. In the last 20 years Nebraska farmers have doubled their statewide average for yield. In 1999, they planted more than eight times as many acres to soybeans as they did in 1970, according to information by Norm Husa, chair of the Nebraska Soybean Board, in the group's 1999 annual report.

On its Web site at http://www.ag.uiuc.edu/~ne-qssb/ the Nebraska Soybean Board offers a variety of links and resources including, Marketing Strategies for Soybean Farmers by Nebraska farmer Roy Smith. It also links to StratSoy — strategic tools and resources for the soybean industry, a Web site developed by the University of Illinois College of Agricultural, Consumer and Environmental Sciences.

Alfalfa weevil predictor

Growing degree day accumulations as of April 17 using a 48° base. Alfalfa weevils usually begin causing noticeable damage at 375 GDD.
Planting soybeans to moisture: recommended planting depths for various soils

Soybeans require 51% seed moisture on a fresh weight basis before they will germinate. This is 10% more than with wheat (41%) and 19% more than with corn (32%). Since soybean seeds are relatively large and take up a considerable amount of moisture to reach 51% moisture, they must be planted in moist soil.

Planting too shallow or too deep can cause poor stands. One study produced the following results:

<table>
<thead>
<tr>
<th>Planting depth (inches)</th>
<th>% Relative germination</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4</td>
<td>85.5</td>
</tr>
<tr>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>1 1/2</td>
<td>99.5</td>
</tr>
<tr>
<td>2</td>
<td>95.5</td>
</tr>
<tr>
<td>2 1/2</td>
<td>55.2</td>
</tr>
</tbody>
</table>

To promote germination and plant establishment, plant the seed deep enough to be in moist soil. In fine textured soils the depth of planting is usually 1 1/4 to 1 1/2 inches. In dry years it will be necessary to plant at a 1 1/2- to 2-inch depth. Planting the seed deeper than necessary places the seed in cooler soil, increases the time of emergence and the possibility of silting in from rain and crusting, resulting in emergence problems. In sandy soils, planting depth needs to increase to 2 to 2 1/2 inches unless sprinkler irrigation is available to protect the soil and seed from drying out during germination and plant establishment. Again, when soil moisture is limited, it will probably be necessary to plant deeper although avoid planting deeper than 2 inches unless necessary in coarse textured soil.

To reduce harvest losses, the cutter bar should be run as close to the soil surface as possible. Soybeans should be planted on the surface or on a ridge, not in a furrow. With cultivation be careful not to create a ridge of soil around the plant base. This could result in a higher cutter bar setting and result in missed lower pods and pod shattering.

Soybean varieties differ in their ability to emerge from various depths at different soil temperatures. (See Figure 1.)

If the soil is very dry and it is not possible to plant to moisture within or close to the recommended planting depth, you have two options. The first is to wait for rain and then plant; the second is to plant at the recommended depth and wait for rain. The disadvantages of planting and waiting for rain is that some seeds will germinate and you’ll have uneven emergence. Also, a rain may move additional soil over the row and the seeds will be deeper yet or a hard rain may cause crusting of the soil surface. Many of these conditions also can occur when planting to moisture. You also may consider planting earlier than normal while moisture is still available, but if planting too early the possibility of damage from frost increases. No-till and ridge-till systems increase the likelihood of having moisture if weeds control is timely with herbicides.

Bob Klein
Extension Cropping Systems Specialist

Diagnostic clinics (Continued from page 53)

specific management system; how to transform data from a yield monitor to a map; interpreting a yield map; and use of remote sensing in crop production. Cost is $115 if registering before Aug. 30 and $165 afterward.

Clinic costs include training, lunch and reference materials. Space is limited for these clinics and will not be guaranteed without a registration payment. For more information, check out the class web site at: http://ianrewww.unl.edu/ianr/arcd/CMDC.htm To register for these programs, contact:

NU ARDC
CMDC Programs
1071 County Road G
Ithaca, NE 68033
Phone: (402) 624-8030
Fax: (402) 624-8010
Email: cdunbar2@unl.edu

Keith Glewen, Extension Educator
Planning early season weed control in soybean

When you're busy planting corn, it may be hard to focus on soybeans, but this is a good time to begin planning your early season weed management strategies. Let's look at some of the factors to consider.

Conventional vs no-till

Depending on how you look at it, weed management strategies for these two tillage types will either be very similar or worlds apart. Of course, the concepts are still the same, but the goals are somewhat different. Management strategies for each still need to focus on the bottom line and that is yield.

Conventional soybeans

Under a conventional tillage operation, a good portion of weed management is removed from the equation. Many of the early emerging summer annuals, including giant ragweed, kochia, lambsquarters, and Russian thistle are removed during tillage, allowing the crop and any new weeds to emerge together.

Under this system, a preemergence herbicide can work well for producers. A preemergence treatment can remove a lot of the weeds that would emerge with the crop and compete heavily with it. This gives the crop an advantage by several weeks, removing competition during the first portion of the critical weed control period.

Research in Ontario, Canada, has shown that each crop has a critical period during which weeds must be controlled to maintain maximum yields (Figure 1). For soybeans, this period is from the second trifoliate to the beginning pod. This is roughly from the 10th to the 40th day of crop growth.

Weeds emerging prior to this window may not need to be controlled. Others factors to consider are reduced soil moisture and unsightly field clutter. In a drought year, controlling these early season weeds may be very important.

No-till soybeans

This year no-till farmers may be ahead of the game since no-till will conserve more soil moisture, which may be a yield limiting factor this year. Because of the lack of tillage, early summer annuals are likely to cause problems unless controlled.

Burndown treatments will eliminate soil moisture loss from early summer annuals. Many herbicide strategies exist to accomplish this while still providing some residual control before the crop is planted.

One strategy is to apply an early preplant treatment with the burndown 10 to 30 days before planting. This removes weed competition while providing the residual control needed for the early part of the season. The advantages of this strategy is that most summer annuals have not emerged yet, rendering the residual herbicide very useful. Another advantage is that there is more time for the rainfall necessary to incorporate and activate the herbicide. Finally, depending on the weed spectrum, the early preplant may eliminate the need for an additional burndown, saving money. One disadvantage, however, is that the herbicide will lose residual activity earlier in the growing season.

A second strategy is to apply a burndown ahead of planting. Roundup Ultra/Touchdown at 32/26 oz/a or the latter at 24/19 oz/a plus 1.0 pt/a 2,4-D might be used. Remember that the preplant interval after using 2,4-D is 7 days for 1 pint and 30 days for anything over 1 pint. A disadvantage to this strategy is the window between the burndown treatment and the treatment applied at planting. The bigger the gap, the more likely it is for additional weeds to emerge ahead of planting.

Another technique is to apply a two-thirds rate of residual herbicide with the burndown followed by one-third at planting. This allows for a longer window between the burndown and planting should planting get delayed, plus it provides another dose of residual at planting, extending your weed control period.

With each management strategy, producers should consider two things. First, early season weed competition can reduce yield, especially in a dry year. Second, use a strategy that will provide the most flexibility according to your management style. Each strategy will have its own shortcomings, so be able to recognize them and adjust as need be.

Jeff Rawlinson, Extension Technologist
Alex Martin, Extension Weed Specialist
Steve Knezevic, Extension Weed Specialist
Mild winter = more bean leaf beetles

Generally, winter mortality is relatively high for many insects, including the bean leaf beetle. Mild conditions like we experienced this winter, however, are conducive to higher than normal insect survival. This spring we expect to see high numbers of bean leaf beetles in Nebraska. Because seedling plants are small, the beetles and the defoliation they produce are easily seen, leading to questions about how many beetles or how much damage justifies treatment.

Bean leaf beetles have two generations a year in Nebraska; however, since they over-winter as adults, three periods of beetle activity are seen in the growing season: overwintering colonizers, F1 generation (offspring of the colonizers, the true first generation) and the F2 generation. Bean leaf beetles over-winter as adults in protected sites such as grassy field edges, leaf litter, and crop residue. They become active fairly early in the year and often can be found in alfalfa prior to soybean emergence. As soybeans emerge, the beetles quickly move to the seedling plants, feeding on cotyledons and expanding leaf tissue. These over-wintered beetles, called colonizers, mate and begin laying eggs. Females live about forty days and lay from 125 to 250 eggs. After egg laying is complete the colonizing population dwindles as the beetles die. A new generation of beetles (F1) will begin to emerge in late June to early July. The F1 beetles mate and produce a second generation of beetles (F2) that begin to emerge in mid August and feed on leaf and pod tissues. The pod-feeding F2 beetles are most likely to cause economic damage.

Bean leaf beetles vary in color, but are usually reddish to yellowish-tan. They are about 1/4 inch long and commonly have two black spots and a black border on the outside of each wing cover. These spots may be missing, but in all cases there is a small black triangle at the base of the wings near the thorax.

Because they move to soybean fields so soon after seedling emergence, early-planted fields will usually have more beetles and suffer the most injury. Although the defoliation the beetles cause can appear quite severe, research in Nebraska and elsewhere has shown that it usually does not result in economic damage. Soybean plants can compensate for a large amount of early tissue loss, so it takes a considerable amount of beetle feeding to impact yield. Generally, unless insect populations are large enough to cause more than 50% to 60% defoliation, it is unlikely that treatment would be economically justified. This point is illustrated by the economic thresholds for bean leaf beetle on seedling soybean given in Tables 1 and 2. For example, if the value of soybeans is $5/bushel and the management costs are $6/

<table>
<thead>
<tr>
<th>Crop value</th>
<th>Pest management cost</th>
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<tbody>
<tr>
<td>$5</td>
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<td>$6</td>
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<tr>
<td>$7</td>
<td>2 3 4 5</td>
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<tr>
<td>$8</td>
<td>2 3 4 5</td>
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</tbody>
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Table 2. Soybean seedling (VC) economic thresholds (beetles per plant)

<table>
<thead>
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<td>$6</td>
<td>4 5 7 8</td>
</tr>
<tr>
<td>$7</td>
<td>3 4 6 7</td>
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<tr>
<td>$8</td>
<td>2 3 4 5</td>
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Table 2. V1 Economic thresholds (beetles per plant)

- It takes three beetles per soybean seedling (stage VC) before treatment is justified. It is rare to see beetle numbers this high.

Although we seldom experience economic damaging populations of bean leaf beetles early in the season, they can occur. Remember that early-planted soybeans are the most susceptible. If economic thresholds are reached, many insecticides are available for bean leaf beetle control. All will do an adequate job if applied according to label directions.

Another reason some producers treat bean leaf beetle on seedling soybeans is to reduce the pod damaging F2 generation that emerges in August. NU Extension does not recommend this practice. There are many environmental factors that can impact beetle populations throughout the growing season, making it impractical to use spring beetle numbers to accurately predict if beetle populations will reach economically damaging levels in August.

Regular scouting and the use of the appropriate economic thresholds are the best way to manage late season bean leaf beetle in soybean. Recent findings by Wai-ki (Frankie) Lam and Larry Pedigo of the Iowa State University Entomology Department are providing additional late-season bean leaf beetle management tools for soybean producers.

While the researchers did not find a high correlation between spring colonizing beetles and the F2 population, they did find that the F1 and F2 populations are highly correlated. They are developing economic thresholds for late season damage that use F1 beetle counts. If F1 beetle numbers reach an economic threshold, the producer will have two options:

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Field results confirm NU nitrogen rates

Testing soils for nitrogen and adjusting application rates accordingly was one aspect of a demonstration project with six northeast Nebraska farmers in 1998. The Lower Elkhorn Water Quality Education Project included six plots, five of which were irrigated and one of which was dryland. Manure was applied to three of the sites.

At each site three nitrogen rates were applied at sidedress time to plot that were 1/4 to 3/4 mile long, with four randomized replications of each treatment. The three rates were: the UNL recommended nitrogen rate, 50 lb/ac less, and 50 lb/ac more than the recommended rate.

Chlorophyll meter readings were taken late season. A stalk nitrate test was used to evaluate a grower's nitrogen program at the end of the season.

For the three manured demonstrations, the most profitable rate was the UNL recommended rate (see table). Grain yields and chlorophyll meter readings were nearly identical among the treatments.

The manured sites had average stalk nitrate-N tests that were at least 2.4 times the excessive threshold. If stalk nitrate-N is excessive, then more nitrogen was available to the crop than that needed for optimum yield. These yield and test results indicate that more nitrogen credit should have been given to the manure.

For the non-manured corn plots, the recommended nitrogen rate was slightly more profitable than the plus 50 lb N/ac rate, even with a seven bushel per acre yield increase at the higher nitrogen rate.

Chlorophyll meter readings taken late in the season were borderline. Current UNL chlorophyll meter recommendations for corn before tasseling are to apply more nitrogen if the leaf reading is less than 95 percent of the well fertilized nitrogen strip.

Stalk nitrates in the recommended rate plots at the non-manured sites were in the optimal stalk nitrate-N range. The plus 50 nitrogen rate plots were in the excessive range, and the minus 50 rate plots were in the marginal range.

These demonstrations generally support UNL recommendations for farmers to take soil nitrate-N tests for corn after corn, and to give nitrogen credit to manure, irrigation water, and legumes, as well as organic matter nitrogen release. They also support the use of the chlorophyll meter for monitoring nitrogen status during the season, and the corn stalk nitrate-N test for after maturity.

Where yield varied from that expected by soil or plant test results, we found either damaging levels of nematodes or that the nitrogen test sampling could have been better.

Tom Hunt, Extension Entomologist
NEREC, Haskell Agricultural Laboratory, Concord
Keith Jarvi, Extension Assistant
Integrated Pest Management, NEREC, Norfolk

Bean leaf beetles
(Continued from page 57)

1) treat the F1 population, reducing the economically damaging F2 population, or
2) schedule to treat the F2 generation. This will provide the producer with some flexibility.

Later this summer we will present the F1 economic thresholds and additional information in Crop Watch.

Dick DeLoughery, Project Coordinator
Charles Shapiro, Extension Soils Specialist

<table>
<thead>
<tr>
<th>Summary of the 1998 corn nitrogen rate demonstration plots.</th>
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</thead>
<tbody>
<tr>
<td><strong>Manured plots (3)</strong></td>
</tr>
<tr>
<td>Nitrogen rate:</td>
</tr>
<tr>
<td>Yield (bu/ac): 166</td>
</tr>
<tr>
<td>Profits ($/ac): --</td>
</tr>
<tr>
<td>Chlorophyll (% of Plus 100): 100</td>
</tr>
<tr>
<td>Stalk Nitrates (ppm): 4878</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Non-manured plots (3)</strong></td>
</tr>
<tr>
<td>Nitrogen rate:</td>
</tr>
<tr>
<td>Yield (bu/ac): 155</td>
</tr>
<tr>
<td>Profits ($/ac): ($17.13)</td>
</tr>
<tr>
<td>Chlorophyll (% of plus 50): 95.2</td>
</tr>
<tr>
<td>Stalk nitrates (ppm): 393</td>
</tr>
</tbody>
</table>

| a Two of the manured sites had received excess nitrogen before sidedressing. |
| b Parentheses represent a loss, or negative value. The economic loss values shown are the difference from that of the recommended rate using $1.90 /bu of corn, $0.24 / lb N in UAN solution, and $0.14 / lb N in anhydrous ammonia. Application and other costs are excluded. |
| d At one of the sites the 'plus 50' rate includes just two border strips with 73 extra lb N/A. |

(see table footnote C), then more nitrogen was available to the crop than that needed for optimum yield. These yield and test results indicate that more nitrogen credit should have been given to the manure.

These demonstrations generally support UNL recommendations for farmers to take soil nitrate-N tests for corn after corn, and to give nitrogen credit to manure, irrigation water, and legumes, as well as organic matter nitrogen release. They also support the use of the chlorophyll meter for monitoring nitrogen status during the season, and the corn stalk nitrate-N test for after maturity.