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CROP WATCH

University of Nebraska Cooperative Extension
Institute of Agriculture and Natural Resources

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No. 2005-7, April 22, 2005

Research shows early planting of soybeans crucial to optimizing soybean nodes and yield

In soybeans, the number of nodes per plant is a critical yield component, since a node is where flowers and pods are produced. To optimize yields, producers should use management practices that allow for the most nodes to develop while not eliminating any potential node development. The best way to do this is with earlier planting.

The importance of node number was demonstrated in a two-year soybean trial funded by the Nebraska Soybean Board. The planting dates were early, mid, and late May and mid-June in 2003 (see *Figure 1*) and 2004 (similar results, so 2004 data not shown). The number of nodes on soybean main stems for each planting date was recorded twice a week.

For each planting date, there was a lag between the day of planting and the V1 (unifoliolate leaf) stage that encompassed germination, seedling emergence (VE) and cotyledon (VC) stages. This lag was mainly a function of soil temperature (i.e., cool temperatures after planting extended this period; warm temperatures shortened it). However, on or after V1, all newly produced nodes appeared at a linear rate of about 0.26 node per day. This translates into one new node being produced every 3.85 days.

Note that the May 1 planted soybeans took longer to germinate and emerge than the May 15 planted soybeans (see *Figure 1*). Still, the May 1 planted seedlings started outputting a new node almost every four days well before the May 15 planted seedlings did. Also note that the node production trend lines for each planting date are parallel to each other. This means that late-planted soybean plants cannot produce nodes faster than the early planted soybean plants, and thus cannot "catch up" with the early-planted soybeans. All the soybeans in this research produced one new node every four days, no matter the planting date or cultivar. Results in 2004 were similar.

So what about the impact of planting date on seed yield, given that early planting generates more nodes? In 2003, each day planting was delayed after May 1 resulted in a 0.24 bu/ac yield loss, which translates into one bu/ac yield loss for every four days of planting delay. In 2004, each day of planting delay

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Focus on soybean

With all the news about rust, don't forget about seedling diseases

Every year soybean producers in some part of the state struggle with damage from seedling disease. The amount of damage varies with year, but most producers whose fields have a history of stand problems know they are at risk.

Each year producers struggle with what fungicides they might put on their soybean seed prior to planting. Assessing the situation and potential need for a seed treatment is critical since this is the only time you get to make this decision. There are no curative applications for seedling diseases. Therefore, especially given the wet conditions this week, I recommend a seed treatment fungicide if you have any of the following conditions:

♦ **History of seedling / emergence problems.** If you have a field with a history of stand problems, this year you will want to treat the seed with a good combination product.

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Control winter annuals to conserve moisture

Winter annuals are weeds that germinate in the fall, overwinter and then continue growing in early spring. Once soil temperatures reach about 50-55°F in the spring, they can grow rapidly, using large amounts of moisture which might otherwise go toward crop seed germination and early growth.

Watch for such common winter annuals as field pennycress, shepherds purse, henbit, blue mustard and treacle mustard (bushy wallflower). They create the "green patches" often seen in the fall (October, November) and early spring (March-April). In addition, dandelion and curly dock, which are not winter annuals, can often be found when corn and soybean are being planted.

In no-till fields, winter annuals can be effectively controlled with herbicides. In corn and soybean they can be controlled 0-45 days before crop planting, depending on the herbicide, or after crop planting but before crop emergence. The same is true for fields planted with herbicide-tolerant crops (e.g. Roundup Ready or Liberty Link). Using pre-plant or pre-emergence herbicides with residual activity in Roundup Ready crops also provides a comfort zone in which to apply glyphosate products. Control winter annuals before they become too large for herbicides to efficiently control them.

Burndown herbicides that can be used in corn and grain sorghum and their per acre rates are: Aim (0.3 oz), 2-4-D Ester (1.0 pt); 2,4-D Ester + Banvel (0.5 pt + 0.5 pt); Banvel [atrazine (2 qt); atrazine + Banvel (2 qt + 0.5 pt), atrazine + 2,4-D (2.0 qt +1.0 pt); Field Master (4 qt), Gramoxone Extra (1.5 pt); Gramoxone Extra + atrazine (1.5 pt + 2.0 qt); Roundup Ultra Max (18-26 oz), Touchdown (24-32 oz) and one of many generic glyphosate products (24-32 oz). Pre-emergence herbicides for corn include: atrazine, Axiom, Balance, Bladex, and Prowl.

Examples of burndown herbicides in soybean that can be used 0-30 days before crop planting include: Aim (0.3 oz), Canopy (5-7 oz), Command 3E (1.5 pt); Gramoxone Extra (1.5 pt); Extreme (3 pts), Gauntlet (co-pack, 5.33 + 0.6 oz), Pursuit (4 oz), Pursuit Plus (2.5 pt), Sencor/Lexone DF (16/13 oz), Roundup Ultra Max (18-26 oz), Touchdown (24-32oz) and one of many generic

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Ag briefs

Gary Hein, Extension Entomologist at the Panhandle Research and Extension Center: We had some reports a few weeks ago of army cutworms being numerous, but there have been few reports of economic infestations. We are seeing some Russian wheat aphid activity in wheat, but also have not received reports of economic levels yet. A rather dramatic number of painted lady butterflies have been reported here as well as throughout Colorado, Wyoming and the Nebraska Panhandle. These butterflies will lay eggs soon and the result will likely be a heavy infestation of thistle caterpillars in Canada thistle in two to four weeks. The insect is not a pest species of any of our early crops, but the next generation could be a problem in sunflowers.

Doug Anderson, Extension Educator in Nuckolls and Thayer counties: Pastures are slow this year which means annual and cool season grasses are feeling the effects of last year. Wheat is in good condition and has benefitted from recent moisture and now needs a little sun. Corn has been planted under pivots in both counties, but at the beginning of the week, I hadn't seen any plants emerging yet.

Ron Seymour, Extension Educator in Adams County: Soil conditions are fairly wet, but most farmers are ready to plant corn when it dries some. Wheat is starting to joint and looks good. Alfalfa has greened up and is growing well.

Gary Zoubek, Extension Educator in York County: Many producers in the York area started corn planting early this week. Depending on the weather, we'll see a lot get planted the next few days. The moisture we received last week was sure welcome!

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Early planting

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resulted in a 0.64 bu/ac yield loss. This means 2.6 bu/ac yield was lost with every four days of planting delay after May 1.

This research indicates that soybean producers need to plant early to optimize yield potential, but how early? Two factors should be considered:

1. **The risk of late spring freeze that could destroy early planted seedlings.** Keep in mind that late April or early May planted soybean seed does not germinate or emerge as fast as late May planted seed because of the cooler soil temperatures. Germination and emergence may take as long as 14 days, so one rule of thumb is to plant no earlier than 14 days before the historical last spring freeze date in your area (i.e., if that date happens to be May 11, don't plant before April 28 to keep your freeze risk low).

To learn more about the timing and probability of late spring freezes, see the NebGuide, *Spring Freeze Probabilities* (G1281), available on-line at *http://ianrpubs.unl.edu/fieldcrops/g1281.htm* or from your local Cooperative Extension office. Spring freeze probabilities also are available on the High Plains Regional Climate Center Web site at *http://www.hprcc.unl.edu/* (Under *Climate Products*, click on *Historical;* choose *Nebraska* from the drop-down box; select the weather station in your area, then select *Spring Freeze Probabilities.*).

2. Abnormal early flowering in early June, which can lead to short unproductive plants. Abnormal early flowering occurs in years with very warm April temperatures, which speed up emergence and the production of unifoliolate leaves. These leaves sense the short photoperiods of late April and the result is an early conversion of vegetative meristems to reproductive meristems. Developing seeds compete with the cells in the stem apex for photosynthate to the extent that stem elongation may cease. This phenomenon was common in 2004 for those producers planting in early April and then because of warm temperatures seeing seedling emergence well before the end of April.

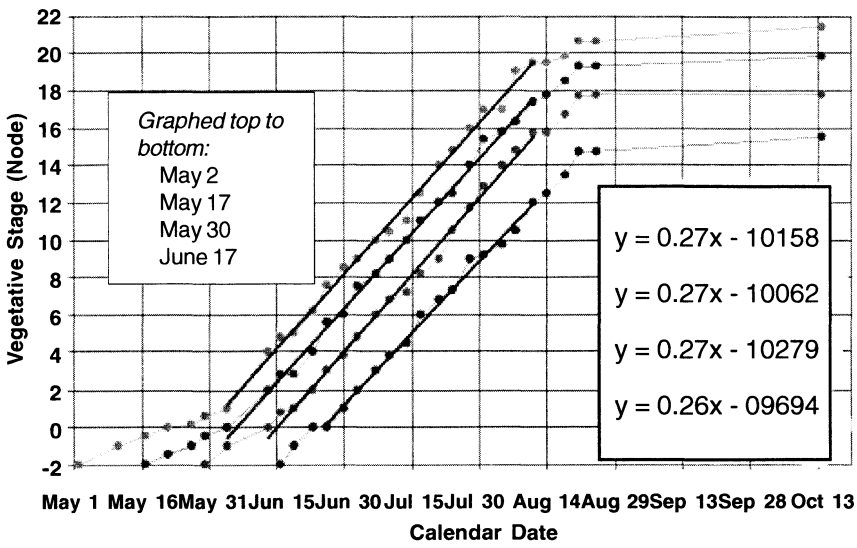

Figure 1. The V-stage (node) number of plants growing in the four 2003 planting dates is plotted here on the vertical axis versus calendar date on the horizontal axis.. The final number of nodes per stem in each planting date is shown at the Oct. 13 date.. The linear equation for each planting date reflects the rate of node formation per day. Note that the values range from 0.26 to 0.27.

Keep in mind that early-planted soybeans will be slow to germinate and emerge, and once emerged, will also be attractive to over-wintered bean leaf beetles, which can infect soybeans with bean pod mottle virus. Consider treating your seed with a systemic insecticide and use only high quality seed. Ask your seed dealer to provide cold germination test results in addition to the standard warm germination percentage. Since a late April or early May planting usually involves cold soil temperatures that will greatly slow germination and emergence, a seed-applied fungicide may be a good management option. *(See page 61)*

(Data used in this story is from Master's Thesis research of Angela Bastidas.)

James E. Specht
Professor of Agronomy
Angela Bastidas
Graduate Research Assistant

Winter annuals

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glyphosates (24-32 oz). The list of pre-emergence herbicides in soybean includes: Axiom, Pursuit, Prowl, and Sencor/Lexone.

If spring temperatures are cool, glyphosate-based products used alone may not provide good control of winter annuals. Weeds need to be actively growing to move such systemic products throughout the plant. During a cold spring avoid using Roundup or other glyphosate-based products. Mixtures with atrazine, 2,4-D or other modes of action can improve weed control.

When buying glyphosate products, compare prices. UNL studies conducted over three years and six locations clearly showed that generic glyphosates provide control equal to the more costly products.

Also, consult the label directions for additives and pre-plant and post-plant intervals. For example, corn should not be planted five days before or after application of 2,4-D. Also 2,4-D can be used for burndown in soybean but at least seven days prior to crop planting.

Stevan Knezevic, Extension Weeds Specialist, Northeast REC

Seedling diseases

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♦ **Early planting.** If you're considering early planting, fungicide seed treatments are a necessity. Cool, wet soils are conducive to poor stands without treatment. No-till fields will have cool soils later in the season than fields receiving some tillage. These will more commonly have seedling disease problems.

♦ **Phytophthora history.** Fields with a history of Phytophthora will need additional metalaxyl or mefenoxam treatment. Even with resistant varieties I recommend a treatment since fields with Phytophthora generally also favor Pythium.

The most common fungi involved in seedling diseases in Nebraska are species of *Fusarium, Phytophthora, Pythium,* and *Rhizoctonia.* All four are capable of killing soybean seedlings or at least causing damage sufficient enough that it affects the ability of the plant to achieve full yield potential. Fields with a history of Phytophthora should be planted to a resistant variety. Fields with a long-term history of Phytophthora may require a different resistance gene if you notice Phytophthora-killed plants when you grow resistant varieties. In addition, fields with a history of Phytophthora will require additional levels of mefenoxam or metalaxyl chemistry above the standard rate. See the University of Nebraska Cooperative Extension NebFact, *Management of Phytophthora Diseases of Soybean* (NF02-518).

Not all seed treatment fungicides are compatible with Rhizobium inoculants. Always check the label for compatibility. Some products require that seed be planted within as little as four hours from the time of inoculation. For more information on soybean seed treatment fungicides see *Seed Treatment Fungicides for Soybean* (NF00-411).

Loren J. Giesler
Extension Plant Pathologist

Check emerging soybeans for bean leaf beetle damage

The soybean aphid has taken most of the attention of soybean producers lately, but don't forget about other soybean insect pests. Although bean leaf beetles have not been a big problem the last couple of years, we usually have at least some areas each year that have problems with them and early planted soybean fields always attract some beetles.

Bean leaf beetles have two generations a year in Nebraska; however, since they overwinter 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 overwinter as adults in leaf litter (woodlots) and soybean residue. They become active in April and May 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 overwintered 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 to late August.

Bean leaf beetles vary in color, but are usually reddish to yellowish-tan. They are about 0.25 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. This has become more of a problem in recent years because planting dates seem to be getting earlier each year. 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 50-60% defoliation of seedling soybeans, it is unlikely that treatment

Table 1. VC Economic thresholds (beetles per plant)

Crop value, $/bu	*Pest management cost, $/acre*			
	$6	*$8*	*$10*	*$12*
$5	3	4	4	6
$6	2	3	4	5
$7	2	3	3	5
$8	2	2	3	4
$9	2	2	3	3
$10	1	2	2	3

Table 2. V1 Economic thresholds (beetles per plant)

Crop value, $/bu	*Pest management cost, $/acre*			
	$6	*$8*	*$10*	*$12*
$5	4	5	7	8
$6	3	4	6	7
$7	3	4	5	6
$8	3	3	4	5
$9	2	3	4	4
$10	2	3	3	4

Low soybean pod heights increase harvest losses

Soybean seed prices have increased about $1.18 per acre per year since 1991 (Nebraska Farm Business Association data), creating lots of interest among growers in reducing seeding rates. Many are wondering how low is too low?

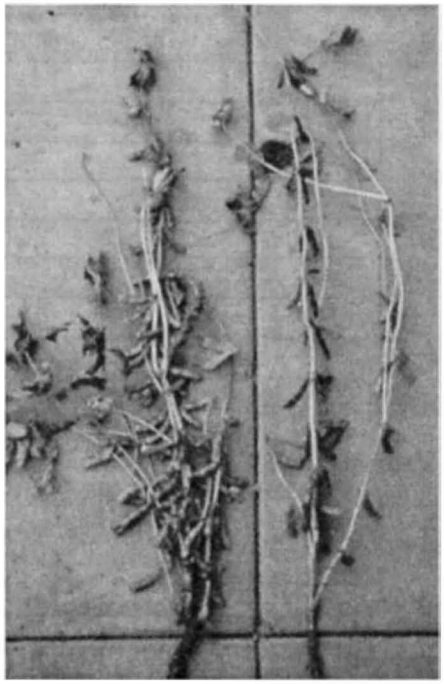
Overall, research from across the Midwest still points to an optimum planting rate of 150,000 seed per acre. (Increase this rate to compensate for actual germination rates on the seed tag.) This rate equates to about nine seeds per linear foot of row in 30-inch rows. Given that soybean stands are reduced anywhere from 15% to 30% from planting through harvest, planting 150,000 seeds per acre should result in optimum harvest stands.

During a discussion of seeding rate at one of this year's Cooperative Extension programs on *10 Ways to Save $20,* a participant asked about the effect lower stands would have on pod heights. The standard answer is that *reducing planting rates will lead to an increase in the number of low pods.* Low pod heights can result in increased harvest losses since some combine heads are not able to pick up the lowest pods without bringing in significant amounts of soil or residue.

Factors affecting low pod height

We compiled *Table 1* from research conducted in northern soybean production areas in the United States and Canada from the late 1970s through the early 1990s. (More recent information wasn't available.) It shows how various management factors were found to affect lowest pod height and other plant characteristics.

Figure 1 shows the effects of narrow rows and increased planting rate on low pod height. Average low pod height in this study for the indeterminate variety decreased as row space increased with 6.9-, 6.7-, and 6.1-inch pod height for the 10-, 20-, and 30-inch rows, respectively. This figure also shows the effect of increased plant populations on low pod height. As populations increased in 50,000 increments from 100,000 to 250,000 plants per acre, the pod heights increased from 6.0 to



Soybean plants showing the effect of plant density on lowest pod height, plant height, and branching patterns. Left: 34,000 plants per acre; Right: 137,000 plants per acre.

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Table 1. Effects of various management practices on lowest pod height and other plant charactieristcs.

Management factor	*Effect on lowest pod heights*	*Effect on other characteristics*
Cultivar	Determinate varieties < Indeterminate varieties	Plant heights: Determinate < Indeterminate varieties
Cultivar	Early varieties < Late varieties	Harvest losses: Late varieties < Early varieties
Wheat stubble height (double crop situations)	No effect on lowest pod height of soybeans	
Row Width	Wide rows < Narrow rows (See *Figure 1*)	Plant heights: Wide rows < Narrow rows
Plant densities	Low densities < High densities (See *Figure 1*)	Plant heights, internode lengths: Low densities < High densities; Branch numbers, portion of yield in lower canopy: High densities < Low densities
Planting date	Late planting < Standard planting date (See *Figure 2*)	

Pod height *(Continued from page 65)*

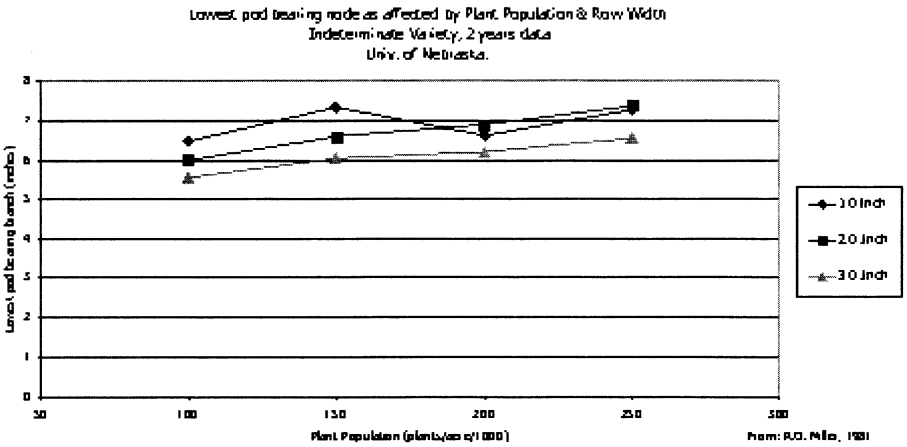

Figure 1. Effect of narrow rows and increased planting rate on low pod height. (R.O. Miller. 1981. Masters Thesis, University of Nebraska)

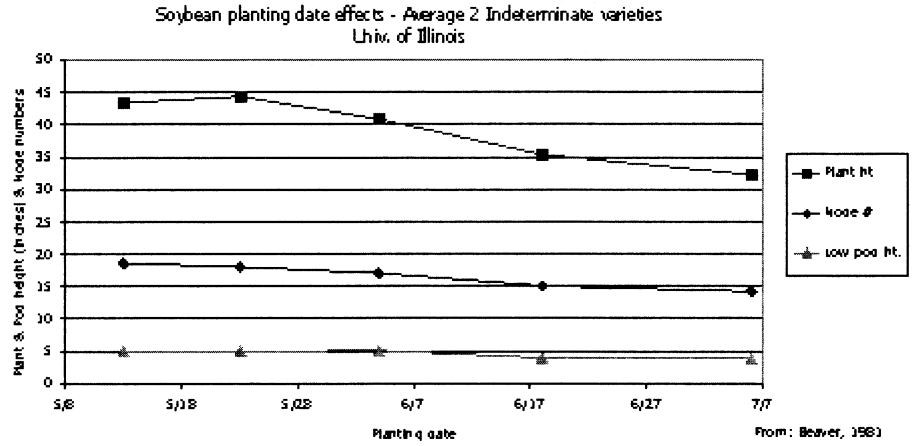

Figure 2. Effect of delayed planting on plant height, lowest pod height, and node number. (Beaver and Johnson. 1981. Agronomy Journal)

7.0 inches. (The averages were: 6.0, 6.7, 6. 6 , and 7.0 inches for 100, 150, 200, and 250 thousand plants per acre, respectively.). The indeterminate variety in this study was Williams, a relatively tall, lanky variety. The shorter determinate variety in the study responded in the same way. Thus, the pod heights shown for Williams are most likely higher than we'd find in modern varieties, yet similar trends would still be expected today.

Figure 2 shows the effect of delayed planting on plant height, lowest pod height, and node number. Plant heights and node numbers were closely related and were reduced as planting date was delayed. Lowest pod heights were also related to plant height and were reduced with delayed planting date. These again were taller indeterminate varieties than we grow now but a similar trend occurred with short determinates in the study and thus would be expected with modern varieties.

Should there still be concern about low pod heights? If planting rates are maintained at 150,000 or more seed per acre, pod heights are optimized (see *Figure 1*). If seeding rates are reduced, consider using a combination of some of the management factors listed in the *Table 1*. These may help to increase or at least stabilize low pod heights, resulting in fewer harvest losses.

New research on management options in relation to low pod height is important and needed.

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Extension Crops Specialist
Lori Abendroth
Research and Extension Associate

Bean leaf beetles

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would be economically justified. The following table presents economic thresholds for bean leaf beetle on seedling soybean. Be aware that these thresholds are for defoliation of beans at VC - V1. If beetles enter the field right at or during seedling emergence, the thresholds will likely be lower because the beetles do not have leaf tissue to eat and will feed on the growing point, stem, and cotyledons. We do not have a good research base for bean leaf beetle injury to newly emerging soybean, but the thresholds are probably about 1 to 1.5 beetles lower than the VC thresholds.

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. If you plant early and regularly have economic levels of colonizing bean leaf beetles and/or bean pod mottle virus, insecticide seed treatments such as thiamethoxam may be warranted.

We are also finding that early season defoliation can affect weed management. In a collaborative project between the weed science and entomology programs at the Haskell Agricultural Laboratory Travis Gustafson, a UNL graduate student, found that seedling defoliation resulted in a need for earlier weed management. For example, with no defoliation, weeds could remain in the crop up to the V4 stage (third trifoliate) without significantly affecting yields. However, at 30% to 60% defoliation, weeds required removal by the V3 and V1 stages, respectively. This suggests that defoliation from bean leaf beetle feeding affects not only the final yield but also the timing of weed control.

Another reason some producers treat bean leaf beetle on seedling

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Choosing a PRE herbicide for soybeans

In last week's *CropWatch* we talked about the importance of early season weed control in soybeans. A pre-emergence herbicide is a great way to control weeds early in the season.

While soybean does not have as many options as corn, there are still quite a few products available. A pre-emergence herbicide makes sense in both Roundup Ready® and conventional soybean systems because it eliminates most early weed competition and provides more opportunities for postemergence spray application.

When choosing a pre-emergence herbicide in soybeans, it's important to know what weeds you expect to be facing in the field this year. Some pre-emergence products are great on grasses, some are great on broadleaves, and others have activity on both grass and broadleaf weeds. Table 1 shows 10 of the more common PRE herbicides used in soybeans and their activity on grass and broadleaf weeds.

Keep in mind that preemergence herbicides will typically last for about six weeks after application. With early planted beans and/or late emerging weeds species, such as sandbur and waterhemp, this can mean there will be weed escapes. A timely post application targeting these late emerging weeds will be a crucial part of your weed management plan.

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Table 1. Pre-emergence herbicides for use in soybean.

	Grass		*Broadleaf*	
Herbicide	*Strengths*	*Weaknesses*	*Strengths**	*Weaknesses**
Boundary	Foxtails, crabgrass, barnyardgrass	Shattercane, woolly cupgrass	Lambsquarter, pigweed, nightshade common ragweed; fair on velvetleaf, waterhemp	Cocklebur, morningglory
Canopy XL	Limited activity on foxtails, crabgrass	Not particularly strong on grasses	Cocklebur, lambsquarter, morningglory, nightshade, pigweed, velvetleaf, waterhemp	
Command/ Commit	Foxtails, crabgrass, barnyardrass, sandbur	Shattercane	Velvetleaf, lambsquarter,	Morningglory, nightshade, pigweed, sunflower
Domain	Foxtails, crabgrass, barnyardgrass	Shattercane, woolly cupgrass,	Lambsquarter, pigweed, common ragweed, waterhemp	Cocklebur, morningglory
Gangster	Limited activity on foxtails, crabgrass	Not particularly strong on grasses	Lambsquarter, nightshade, pigweed, common. ragweed, sunflower, velvetleaf, waterhemp	
IntRRo	Foxtails, crabgrass, barnyardgrass	Shattercane, woolly cupgrass	Lambsquarter, nightshade, pigweed, waterhemp	Morningglory, common ragweed, sunflower, velvetleaf
Prowl/ Pendimax	Foxtails, crabgrass, barnyardgrass, sandbur, woolly cupgrass		Lambsquarter, pigweed, waterhemp	Morningglory, nightshade, common ragweed, sunflower, velvetleaf
Pursuit Plus	Foxtails, crabgrass, barnyardgrass, sandbur, woolly cupgrass		Lambsquarter, nightshade, pigweed, sunflower, velvetleaf, waterhemp	Morningglory
Treflan	Foxtails, crabgrass, barnyardgrass, sandbur, woolly cupgrass		Lambsquarter, pigweed, waterhemp	Morningglory, nightshade, com. ragweed, sunflower, velvetleaf
Valor	Limited activity on foxtail and crabgrass	Sandbur, woolly cupgrass	Lambsquarter, nightshade, pigweed, com. ragweed, waterhemp	Sunflower, cocklebur

Tips for successful sunflower planting

Sunflower initial contract prices are at or near record highs and planting intentions indicate nearly a 100% increase in Nebraska acres. Sunflower offers many opportunities with conventional, mid oleic and high oleic oils and those that can be consumed whole (confection), as kernels (oil or confection), as a feed supplement (generally oils) or crushed (oil). With all these opportunities and producer water availability ranging from dryland or rainfed to limited or full irrigation, it offers many options. Choices are usually led by dealers/contractors, but many growers have found markets on their own. Once the type of sunflower and market potential are identified, the producer should make the following preparations.

Planter preparations

1) Be sure your planter is in top shape because uniform emergence is important for top quality and yield. Uniform emergence:

a. prevents later emerging plants from competing like a weed by using nutrients and eventually affecting yield (pounds and quality);

b. simplifies insect control because most plants are at the appropriate stage for control measures at the same time, limiting the need for additional spraying;

c. expedites harvest – no waiting on uneven ripening; and

d. improves seed quality (uniformity and seed size). This is more of a concern for confection sunflowers -- nonuniformity has less impact on oils. Oils for hulling, however, would warrant confection concerns.

2) Many of the concerns listed would not be of concern if water were available early. Consider your specific conditions.

Seed preparation

1) Be aware of seed size impact:

a. Size two oils and the larger threes can be planted with corn plates or fingers

Proper planter preparation can pay big dividends with uniform emergence and better yields.

b. Size three and smaller will require special plates or fingers.

c. Medium and larger confections can also be planted with corn set ups.

2) Obtain a seed size that makes it easy to plant and fits your situation. While it is important to get all seed into moisture, remember that the larger seed requires more moisture for proper germination.

3) Seed treated with systemic insecticides have shown yield increases. Data presented by the National Sunflower Association from 11 plots in four states showed a 236-pound yield increase with systemic seed treatments. They control secondary insects and eliminate most planting concerns except cutworm.

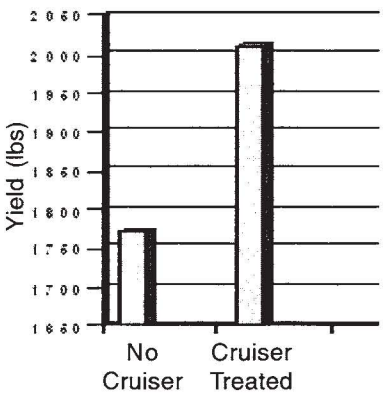

Figure 1. Data provided by the National Sunflower Association shows the impact of seed treatments on yield.

Seed bed preparations

1) Sunflower emerges best from a firm moist seed bed.

2) As a rule, you should have at least two or more feet of soil moisture profile for dryland situations. This reduces the risk of relying totally on rainfed precipitation.

3) Of course, a full moisture profile will increase the chance of crop success. If that would be the limited irrigation scenario (prewatering), it could do quite well. Yields over 3,000 lb have been obtained when the field started with a full profile and was rainfed after that.

4) Check for compacted soil layers or pans – these are the silent killers of high yields. Full development of the root mass is necessary to reach yield goals and support the plant.

Fertilizer preparations

1) Soil sampling should include data from a three-foot sample. The sunflower root system is deep and fibrous, allowing it to use nutrients other crops have left behind. Take credit for all residual nutrients.

2) The rule of thumb is 50 lbs nitrogen and 20 lbs phosphorus for each 1000 pounds of yield. This is what you should start with and take

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Sunflower *(Continued from page 67)*

credit for nutrients in the soil test.

3) Yield goals for full irrigation could be 3000 lb or more. A circle of oils made over 4000 lb in the High Plains Growing area.

4) Yields with limited irrigation would be somewhat less, depending on rainfall. The rule of thumb is 7 inches of moisture to make seed and 150 pounds of yield per inch of moisture after that.

Planting date preparations

1) Research has shown that planting early -- in mid May in the primary sunflower regions of Nebraska -- produces higher yields that more than pay for the extra insect spraying that may be required. Plant when you can – immediately after corn and before beans is fine. Group 4 or 5 should be planted in May or the first days of June in the Panhandle. Planting earlier than mid May did not show any additional response.

2) Group 3 can be planted in mid May to mid June. Group 3 generally would be the best fit for the Panhandle.

3) Group 2 can be planted from mid May through June, if necessary. July plantings have done OK in special situations, but are more likely to face reduced yield from the shorter season or early freeze. Group 2 used for early harvest and planted in May have not shown the yield of Group 3 or Group 4.

4) Confection sunflower are usually Group 4 or Group 5 so plan ahead and plant prior to June 1.

Planting preparations

Suggested planting populations can vary and may depend on personal experience and/or the wishes of the processor/contractor. Recommended seeding rates per acre for sunflower type are:

Oil: dryland, 17,000, and irrigated, 23,000

Confection: dryland, 14,000, and irrigated, 20,000.

The following recommendations were followed in those fields achieving the 4000 lb yields:

1) Planting depth should be 1.5 to 2.5 inches, but should be at least 0.5 to 1 inch into moisture, then firmly packed and covered with 0.5 inch of dry soil for insulation.

2) Ripping can remove compacted layers and improve yields; however, without irrigation, plan on hotter, drier windier days as we proceed through the wide sunflower planting window into June and July. Consider the risk that ripping will further dry out the soil.

3) In good conditions plants should emerge in a week

4) Crusting rain will delay emergence about a week – treat like any other crop at this point.

5) Planting north to south is preferable to planting east to west to prevent plants from rubbing on each other and birds from standing on sunflower and eating on the head of another

This is the first of several articles about sunflower production to be featured in this year's *CropWatch.*

For more information, see UNL Cooperative Extension NebGuide *Sunflower Production in Nebraska* (G91-1026) or the regional Extension publication, *High Plains Sunflower Production Handbook.*

Bill Booker, Extension Educator in Box Butte County

PRE herbicides *(Contined from page 67)*

One of the main obstacles producers often face with using a pre-emergence herbicide is the cost. Originally when producers adopted Roundup Ready soybeans, they moved away from using pre-emergence herbicides; however, after using these systems for several years, we have seen weeds shift from the ideal mid post-emergence timing for the one-shot glyphosate application to earlier and later emerging weeds. To cover the early season shift, producers may consider adding a pre-emergence herbicide although the added $10 to $15 cost per acre may make it less appealing. If you are in a Roundup Ready® system, you can save some cost by reducing the pre-emergence rate to 2/3 to 3/4 of the standard rate. This may provide enough weed control to hold back competition and allow you to apply your postemergence application. Normally it is not advisable to go below the 2/3 rate due to the potential for poor initial and residual control. In conventional systems a full rate of pre-emergence herbicide is recommended to put less reliance on your postemergence herbicides.

In most cases the net gain from using a pre-emergence herbicide will far outweigh its cost due to the reduction in early season competition and the time it allows for post-emergence applications in soybean.

Brady Kappler
Weed Science Educator

Bean leaf beetles

(Continued from page 66)

soybeans is to reduce the subsequent F1 and F2 generations; however, UNL 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. Late-season economic thresholds will be included in *CropWatch* later this summer.

Thomas Hunt, Extension Entomologist, Haskell Ag Lab
Keith Jarvi, IPM Extension Assistant
Both at the NEREC

Late aphids can cause up to 20% yield loss

Although just arriving in 2002, the soybean aphid is now well known across Nebraska. During the last couple of years various studies were initiated to examine the effects of the aphid on soybean growth and yield, aphid ecology, etc. We are finding that the relationship between the aphid and soybean are different in Nebraska than in other areas where it's found.

In much of the soybean aphid's range, aphid infestation occurs during the vegetative stages and populations peak during the flowering stages. During the last three years in Nebraska, however, very few aphids have been found during the vegetative stages. It is usually mid-July before we begin to regularly find aphids. Although some fields in Nebraska reach economically damaging populations in late July, during 2003 and 2004 most aphid populations in Nebraska reached economically damaging populations in mid to late August. The question is, "Can these late populations cause significant yield loss?" Yes, data from 2004 indicates they can.

In 2004 a soybean aphid study was funded by the Nebraska Soybean Board as part of a North Central Soybean Research Program Project. In this study soybeans were infested with very low numbers of soybean aphids on July 23 and allowed to increase in population. Additional plots were kept aphid free for comparison.

The major aphid population growth occurred in just two weeks during the seed fill stage (R5), and population peaked about August 30, just prior to full pod (R6). The peak aphid population in infested plots ranged from 952 aphids per plant to 3,634 aphids per plant. Aphid-free plots averaged about 58 bu/ac while aphid infested plot yields ranged from about 47 to 55 bu/ac. The bottom line is: Aphid populations can increase very quickly and late season infestations can result in up to a 20% yield loss.

We will discuss this and other studies as the season progresses, but in the meantime following are the basics of soybean aphid management in Nebraska:

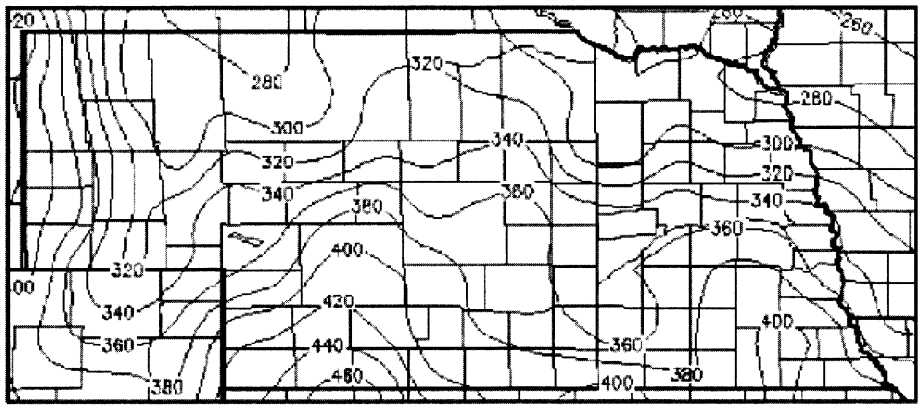
Begin scouting soybean fields once a week in late June to early July, increasing to twice a week as the season progresses. Remember, aphid numbers can change rapidly.

The current recommended threshold for late vegetative through R5 stage soybeans is 250 aphids per plant (field average) with 80% of the plants infested and populations increasing. This gives you about a week to schedule treatment. Remember, determining if the aphid population is increasing requires several visits to the field.

Good insecticide coverage and penetration is critical for optimal control of soybean aphid, as aphids feed on the undersides of the leaves and within the canopy. Use sufficient water volume and pressure to reach well into the canopy.

Additional information, including a list of registered insecticides, is available at *http://entomology.unl.edu.*

Thomas Hunt, Extension Entomologist, Haskell Ag Lab
Keith Jarvi, Extension Assistant Integrated Pest Management
Both at the NEREC



Accumulated growing degree days (GDD), using a base of 48 degrees, can be used to help predict alfalfa weevil activity. Feeding begins at about 250 GDD. *(Map developed by Al Dutcher, State Meteorologist, High Plains Climate Center.)*

Alfalfa weevil egg hatch begins

Sampling last week near Beatrice and at the University of Nebraska Agricultural Research and Development Center near Ithaca indicated that alfalfa weevil egg hatch has begun in the southern half of eastern Nebraska. Recommendations on sampling and economic thresholds will be in the next issue of *Crop Watch.*

A graduate student in entomology, Abby Stilwell, is beginning research on a two-year study documenting the seasonal occurrence of alfalfa weevil larvae in eastern Nebraska. She will have additional field sites in northeast Nebraska.

The goal of her research is to have better defined degree-day predictions for alfalfa weevil management in eastern Nebraska. She is working with Drs. Tom Hunt and Bob Wright on her Master's thesis research.

Bob Wright
Extension Entomologist