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CROP WATCH

University of Nebraska Cooperative Extension
Institute of Agriculture and Natural Resources

No. 2003-6
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Bean pod mottle virus in soybean --

Can you control it by managing bean leaf beetle?

In the 2002 production season, the most common soybean disease again was *Bean pod mottle virus.* We continue to see this disease in soybean fields where there are sufficient bean leaf beetle populations to vector the disease. It requires a lot of bean leaf beetles to taxi the virus from infected to healthy plants. Also, the earlier the virus is introduced to the plant, the more impact there will be on yield.

Recent research from Iowa State University on managing bean leaf beetles to control *Bean pod mottle virus* was presented in the mid-March *Soybean Digest.* The article points out that by applying two sprays (one at soybean emergence and one when the F1 beetle population emerges in early July), impact of the *Bean pod mottle virus* was significantly reduced. The article also points out that planting date should be used as the first course of action in managing this disease in problem prone areas.

Soybean plant damaged by *Bean pod bottle virus.*

Our research at Nebraska supports the planting date information presented in this article. We have observed, as many of you have, that earlier planted soybean fields will have more bean leaf beetles, and in return, more *Bean pod mottle virus.* However, in the fist year that we conducted studies similar to those at Iowa State, we did

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Focus on soybeans

Inside

Timing is critical to controlling broadleaf weeds in wheat

Winter wheat development this year varies widely across the state and even across the road. Wheat plants on one side of the road may be well-tillered and jointing and on the other side plants may be just producing their first tillers. However, one thing many of these fields share in common is that the warm season broadleaf weeds, such as kochia, Russian thistle, and lambsquarters, are beginning to emerge.

For best control, these weeds need to be sprayed when they are small and actively growing and when the wheat is at the proper growth stage for the herbicide used.

Control broadleaves in wheat now when they are young and actively growing.

Herbicides recommended for broadleaf weed control in winter wheat include 2,4-D, Aim, Ally, Amber, Banvel, Clarity, Buctril, Curtail, Express, Finesse, Harmony Extra, Peak, Rave, and Starane. Some of these products should be combined to control a wider spec-

(Continued on page 54)

Novice field scout training May 12

A May 12 University of Nebraska Field Scout Training Course will provide scouts an opportunity to enhance their skills. The course is designed for entry level scouts who will be working for crop consultants, industry agronomists and farm service centers in Nebraska and neighboring states, said Keith Glewen, program co-coordinator and NU extension educator in eastern Nebraska.

The one-day training session will include trainers from the University of Nebraska Institute of Agriculture and Natural Resources and private industry. It will be held at the University of Nebraska Agricultural Research and Development Center near Mead on Monday, May 12, from 8:30 a.m. to 5 p.m. Topics will include: how to stage corn and soybean growth and the importance of correct staging on pest management; corn and soybean insect pests – identification, damage, and life cycles; natural enemies – predators, parasites and pathogens; weed identification; crop diseases; nutrient deficiencies; and sampling methods – scouting do's and don'ts.

Past program participants have given the training high marks. In fact, 100% of last year's participants rated the program as above average or one of the best programs of its type available. Program participants said it provided improved confidence in scouting and working with growers and improved identification skills. Participants also said they appreciated the hands-on, practical format.

Registration is $65 before May 5 and $75 afterward. A total of 5.5 CCA credits is expected to be available in the areas of integrated pest management, 4; crop production, 1; and soil fertility, 0.5. Detailed information and registration is available on the Web at *http://ardc.unl.edu/training.htm.* Registrants who sign up for the e-mail list can save an additional $10 on the registration fee.

This training is part of the NU Cooperative Extension Crop Management Diagnostic Clinics. Three other clinics are currently planned: a mid-summer diagnostic clinic on July 10, a late season clinic on August 20 and a precision farming management and technologies clinic September 3. These clinics provide unbiased, research-based information from highly skilled trainers from the University of Nebraska and the agricultural industry.

NU Cooperative Extension sponsors the training. To register, call (402) 624-8030, fax (402) 624-8010, e-mail cdunbar2@unl.edu, or write to NU ARDC, CMDC Programs, 1071 County Road G, Ithaca, Neb. 68033.

Focus on soybeans

In 2002, Nebraska ranked fifth nationally in soybean production with 176,330,000 bushels of beans. For more information on how soybean checkoff dollars are used in Nebraska, visit the Nebraska Soybean Board Web site at *http://nesoybeans.unl.edu/*

Management calendar

• **Jointed goatgrass is growing rapidly in wheat fields that weren't sprayed with a herbicide last fall.** These plants could be heading by May 1. If these fields are to be planted to winter wheat this fall, they should be sprayed with glyphosate before the jointed goatgrass heads. If they are to be planted to corn or sorghum, a mixture of paraquat and atrazine is a good choice. With the recent rains tillage probably may not kill all the jointed goatgrass. If planted to corn or sorghum, an insecticide should be used to control army cutworms. A seed treatment won't protect the corn or sorghum from the cutworm

-- Gail Wicks, Extension Weeds Specialist at the West Central REC.

• **Results from all of the Department of Entomology's 2002 insecticide screening trials are now avalable on the internet at** *http://nerec.unl.edu/ipm/entomology/reports.htm.* More than 20 reports are available to provide farmers research-based information to use when selecting insecticides.

-- Keith Jarvi, Extension Assistant, Integrated Pest Management, Northeast REC

CROP WATCH

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Lisa Jasa, Editor; Email: ljasa1@unl.edu

Bean pod mottle virus (Continued from page 51)

not observe a yield effect with an insecticide treatment.

So why do the results differ? First, the Iowa studies were conducted in fields with a history of *Bean pod mottle virus* causing significant yield loss. Our research fields in Nebraska have tested positive for *Bean pod mottle virus*, but the impact does not appear as severe as in Iowa. We should point out that we have only one year of data on this trial, but have done attempts in other settings without showing an impact on yield with one early-spring insecticide application. Second, we did not include two insecticide applications in several of our studies because we did not feel the economics of soybean would support this strategy. Using the Iowa strategy (two sprays of Warrior), one would spend $5-$6 an acre on chemical and about $5 an acre in application costs for each treatment, for a total of $20-$22 per acre. This is a lot to spend on soybeans when the incidence and potential impact of this disease in your field is unknown.

There are several other points that make us uncomfortable with recommending treating soybeans with insecticides. First, we do not know the potential impact of *Bean pod mottle virus* in Nebraska soybean fields. Although numerous fields have tested positive for this disease, many exhibit few if any disease symptoms. Before producers implement a chemical control strategy, they should know that they are likely to incur an economic loss from the pest or resulting disease. Second, we know that treatment timing is critical to control. Any bean leaf beetle feeding will potentially result in some vectoring of the disease. It is essential that the overwintered bean leaf beetles be kept out to minimize introduction of the virus. This means that the first application needs to be applied right at soybean emergence. Also, timing of the F1 population treatment will be critical as these beetles can pick up and transmit the virus quickly. Being just a few days late for either treatment would significantly reduce its effectiveness.

Things to consider

Although yield reductions have been documented as high as 52%, this does not mean that we are seeing this kind of yield reduction in Nebraska. In Iowa, 10-20 bu/acre yield loss has been observed in some areas. However, it should be noted that several factors can affect the amount of yield loss, including:

- **Time of infection** (inection early in development will cause maximum yield impact)
- **Soybean variety:** varieties tend to respond differently to *Bean pod mottle virus.*
- **Percentage of plants infected:** research in Louisiana in the early 70s showed that there needed to be at least a 20-40% infection for a significant yield impact.
- **Virus strain:** there are differences in virus strain and strains can recombine to result in higher impacting strains.
- **Other stresses:** additional stresses, such as drought may further increase the yield impact.

Symptoms of *Bean pod mottle virus* are green to yellow mottling (blotchiness) of younger leaves in the upper canopy. In severe cases leaves may show puckering and distortion and plants can be stunted. The only way to confirm the presence of this disease is with serological testing (Elisa). Additional indicators are harvesting seed with bleeding hila and having green stem at harvest. Both of these indicators can be caused by other viruses and stresses, so they should be viewed with caution.

Summary

At this time we cannot recommend treating soybean with insecticide to control the bean leaf beetle and thus the *Bean pod mottle virus.* The possible exception would be if you know that *Bean pod mottle virus* is causing economic loss on your farm. We will continue to evaluate the effectiveness of this strategy in Nebraska.

In the *Soybean Digest* article a producer who uses the two-treatment strategy with good results indicated that on farms 35 miles away there was not enough virus for this to pay a return. If you do try an insecticide strategy, please leave a few check strips in the field and let us know how it worked for you.

Loren J. Giesler
Extension Plant Pathologist
Thomas E. Hunt
Extension Entomologist
Haskell Ag Lab

Avoid burning grasslands

Prescribed burning of grasslands can improve stands, control weeds and trees, enhance wildlife habitat, and improve animal gains; however, in a dry spring, it can be dangerous and counterproductive.

Whenever pastures are burned, about one inch of effective soil moisture is lost. Not only do you lose potential growth for the grass this year, you also lose the carryover feed value from last year's residue.

Green-up and rate of growth right after the fire also is much slower when soils are dry at time of burning. This increases the chance of wind and water erosion, and delays when these pastures will be ready for grazing.

Burning still might be appropriate on CRP, though. The loss of production isn't nearly as important as improving stands. In this dry weather, be extremely careful. Fire is valuable tool. But like any other tool, in the wrong hands it can be dangerous.

Bruce Anderson
Extension Forage Specialist

Check for army cutworms in alfalfa

Army cutworms caught many alfalfa growers by surprise the last few springs, delaying green-up in many fields. This year's conditions also are beneficial to the pest so begin monitoring fields soon.

Cutworms feed on newly emerging leaves near the crown of alfalfa, slowing or delaying green-up. If your alfalfa seems slow to get started this spring, examine fields closely for cutworms. Alfalfa can die if enough cutworms are present and they are allowed to feed too long.

Look for army cutworms near the crowns of alfalfa plants. During daylight they often are found in the loose soil surrounding the plant, so scratch around a little to find them if you don't see them right away.

Count the number of cutworm larvae per square foot in several areas. The economic threshold for spraying is four or more army cutworms per square foot on established alfalfa, but just two larvae per square foot in fields seeded last year. Once your alfalfa gets four to six inches tall, spraying is unlikely to be beneficial unless you see a lot of active leaf feeding.

The best insecticides for controlling army cutworms in alfalfa are the synthetic pyrethroids such as Ambush, Pounce, Baythroid, and Warrior. Lorsban also works well. Before spraying, read and follow label directions to safely apply the correct rate.

Most alfalfa fields should start greening up soon. If yours doesn't, check for army cutworms..

Bruce Anderson
Extension Forage Specialist

Broadleaves *(Continued from page 51)*

trum of broadleaf weeds in winter wheat. See pages 59-61 in the *2003 Guide for Weed Management* (EC130) for more information on recommended herbicides and herbicide combinations for winter wheat. (This publication is available at your local Cooperative Extension office or on-line at *www.ianr.unl.edu/pubs/fieldcrops/ec130.htm.*

Herbicide combinations also are recommended to help manage the potential development of herbicide resistance in weeds. For example, recent screening work in the Nebraska Panhandle identified numerous kochia populations that were resistant to dicamba (Banvel or Clarity). This is in addition to known populations of kochia and Russian thistle that are resistant to ALS-inhibitor herbicides such as Ally, Amber, Finesse, and Peak. Chemical control of these weeds will require herbicide combinations involving products with different modes of action such as Aim, Buctril, or Starane.

Many broadleaf weeds commonly found in Nebraska winter wheat fields can be controlled at a modest price with amine or ester formulations of 2,4-D. Generally, ester formulations of 2,4-D are used at lower rates and provide better broadleaf weed control than amine formulations because they are oil soluble and readily penetrate plant foliage. Winter wheat must be between four tillers and joint stage when growth regulator herbicides such as 2,4-D, Banvel, Clarity, Curtail, or Rave are applied. In Nebraska, winter wheat generally is in the proper growth stage for these products in March to early May, depending on the planting date, season, and location. Wheat injury and yield loss can be significant if growth regulator herbicides are misapplied. The risk of wheat injury also increases with the addition of liquid nitrogen fertilizers (UAN) with herbicide mixtures. Do not add surfactant to the liquid fertilizer-herbicide mixture.

Drew Lyon, Dryland Cropping Systems Specialist
Panhandle REC
Bob Klein
Cropping Systems Specialist
West Central REC

Wheat update

David Baltensperger, Extension Crops Specialist at the Panhandle REC: Wheat conditions across the Panhandle were quite variable this week. Higher elevation, lighter soil, and drier areas with thin stands continue to be impacted negatively by high winds, moving soil, and a general lack of thriftiness. However, wheat in the Panhandle that has been well established and received moisture has really started to improve in condition. Wheat growth stage ranges from jointing to essentially just greening up. Management of the areas with thin and late stands will need to include spring weed control as normal suppression of weeds from canopy coverage will not occur before weed germination.

Paul Hay, Extension Educator in Gage County in southeast Nebraska: The wheat in southeast Nebraska looks quite good. This includes several fields I examined that were planted in 15-inch row spacings. It is nearing joint stage in many fields. We were later than desired in applying fertilizer and weed control due to winter frost damage which browned the leaves of wheat and winter annual weeds. Most fields were fertilized by April 10.

Bob Klein, Extension Crops Specialist, West Central REC: Most wheat stands look pretty good in the west central area, but the critical factor for this year's production will be moisture. On fallow wheat in the Ogallala region, some areas have up to four feet of subsoil moisture while southwest areas have as little as fifteen inches. Before last week's rain, wheat planted after corn, sorghum or sunflowers last fall had as little as six inches of soil moisture and now has a foot.

We're finding wheat streak mosaic, mostly in areas where summer rains and/or hail caused volunteer wheat to emerge. It serves as an overwintering host for the disease and the vector, the

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Soybean insects: what to expect in 2003

Predicting insect infestations and population trends is notoriously difficult, however, I'll take a stab at it with one perennial soybean pest, the bean leaf beetle, and two possible pests, the soybean aphid and grasshopper.

Bean leaf beetle

Each year at least some areas will have a problem with the bean leaf beetle. Because bean leaf beetles can be a pest of seedling soybean, I'll discuss it in some detail.

Bean leaf beetle

Bean leaf beetles have two generations a year in Nebraska; however, since they overwinter as adults, three periods of beetle activity occur in the growing season. These are the overwintering colonizers, the F1 generation (offspring of the colonizers and the true first generation), and the F2 generation.

Bean leaf beetles overwinter as adults in leaf litter (woodlots) and soybean residue. They become active fairly early in the year (April-May) and often are 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 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.

These beetles vary in color, but are usually reddish to yellowish-tan. They are about ¼ 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% to 60% defoliation of seedling soybeans, it is unlikely that treatment would be economically justified. *Tables 1 and 2* show economic thresholds for bean leaf beetle on seedling soybean. Be aware that these thresholds are for defoliation of beans at the VC - V1 growth stages. 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 1.5 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.

Another reason some producers treat bean leaf beetle on seedling soybeans is to reduce the pod-damaging F2 generation that emerges in August; however, NU Cooperative 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 published in *CropWatch* later this summer.

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

Table 2. V1 Economic thresholds (beetles per plant)

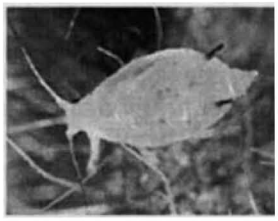
Crop value, $/bu	*Pest management cost, $/acre*			
	$6	*$8*	*$10*	*$12*
$5	4	5	7	8
$6	3	4	6	7
$7	3	4	5	6
$8	3	3	4	5

Insect forecast *(Continued from page 55)*

Bean leaf beetles also vector bean pod mottle virus (BPMV). This aspect is discussed in greater detail in the cover story, *Bean Pod Mottle Virus in Soybean.*

Soybean aphid

The soybean aphid is an Asian soybean pest that was first discovered in the United States in the summer of 2000 in Wisconsin. Since then it has spread throughout the north central United States and parts of Canada. We expect the aphid to spread to all soybean-producing areas of Nebraska.



Soybean aphid

The soybean aphid was found in 13 eastern Nebraska counties in 2002, starting in midsummer. Almost all of the soybean aphid infested fields in Nebraska during 2002 had low numbers of aphids and did not cause economic damage. I expect to see soybean aphids this year, but I am not willing to predict their impact because they are so new to North America.

Heavy infestations of this insect can cause significant damage and yield loss. Yield losses exceeding 25% were observed in Minnesota and Iowa in 2000. In addition, soybean aphids can transmit viral diseases, such as alfalfa mosaic, soybean mosaic, bean yellow mosaic, peanut mottle, peanut smut, and peanut stripe.

Soybean aphid populations can grow to extremely high levels under favorable environmental conditions. Reproduction is fastest when temperatures are 72-77°F. Developmental time slows when temperatures exceed 81°F. When populations reach high levels during the summer (there were reports of up to 13,000 aphids per plant in Michigan), winged females are produced that migrate to other soybean fields. Like a number of other insect species (e.g. potato leafhoppers), these migrants can be caught up in weather patterns, moved great distances, and end up infesting fields far from their origin.

Soybean aphids injure soybeans by removing plant sap with their needle-like mouthparts. Plant symptoms may include yellowed, distorted leaves and stunted plants. A charcoal-colored residue also may be present. This is sooty mold that grows on the honeydew that aphids excrete. Soybean plants appear to be most vulnerable to aphid injury during the early reproductive stages. Heavy aphid infestations during these stages can cause reduced pod and seed counts.

Grasshoppers

Grasshoppers were a major concern to Nebraska farmers last year and are likely to be a problem this year, particularly if we have a warm and relatively dry spring. Droughty weather favors the grasshopper, whose development stages are influenced by weather.

Grasshopper

There are over 100 grasshopper species in Nebraska, but only a few are of major importance in soybean: the migratory, differential, two-striped, and red-legged grasshoppers. These grasshopper species prefer habitats with a variety of host plants, including both grasses and broadleaf weeds. As a result, they prefer cropland settings with nearby undisturbed areas such as roadside ditches, crop borders, abandoned cropland, and over-grazed pastures or rangeland.

The primary injury caused by grasshoppers is defoliation, but they also feed on soybean pods. They consume and clip foliage from the plant as they feed. With favorable, warm-dry climatic conditions, grasshoppers can hatch and mature two to four weeks earlier than normal. The key to effective grasshopper management is to understand their life cycle and if chemical treatment becomes necessary, to treat them before they become adults.

More information concerning bean leaf beetles, grasshoppers, and soybean aphids and their management will be presented in subsequent issues of *Crop Watch* and also can be found at the Department of Entomology web site at *http://entomology.unl.edu/.*

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

Wheat update

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wheat curl mite. In some fields, the disease level is high. With the long fall and wheat growing through much of the winter, there was a longer period during which infection could occur.

The USDA Nebraska Agricultural Statistics Service reported Monday that wheat condition had improved and was rated 5% very poor, 15% poor, 37% fair, 40% good, and 3% excellent. Plants have begun to joint in fields in the east, southwest, and southeast districts.

No-tilling early soybeans spreads workload

Producers have long realized that when planting after a certain date, yield potential declines. With the traditional corn/soybean rotation, producers usually plant corn before soybeans to provide for maximum corn yield. However, late planted soybeans may not have adequate rainfall or soil moisture during late August for the important pod fill period, the main determinate of yield. In addition, an early fall frost can hurt late planted soybean yields by not allowing the later pods to fill.

As a machinery management decision and to spread production risks, some producers are no-till planting some of their soybeans before planting corn. While there are concerns about cold soils with early planting, producers report that soybeans can actually handle cold soil stress better than corn. These producers start their planting season a week or two earlier than normal and no-till plant some of their soybeans before planting corn on their normal planting dates. Then they finish planting the rest of their soybeans after their corn. This allows them to get the soybeans in the ground before the yield potential declines because of late planting.

Planting too early, however, has risks involved with late spring frosts and seedling diseases because of slow crop emergence. By using no-till and seed-applied fungicides, these risks can be minimized. The soybeans are no-till planted into cool, wet soil with plenty of residue cover. Planting takes place without residue movers so as to leave as much residue protecting the seed as possible. The seed is planted about 1 3/4 to 2 inches deep so it won't germinate as readily if there is an early warm spell. Tilled soils tend to warm up too fast early in the spring, allowing early planted soybeans to emerge too quickly, increasing the risk of being killed by frost. Under no-till conditions, when the soil warms up enough for the seeds to germinate, the threat of a killing frost is usually past. The residue acts as insulation and provides some protection if there is a frost. In addition, the soil moisture conserved with no-till increases the "thermal mass" of the soil, holding heat to reduce the chances of frost injury.

Research was conducted from 1999 to 2002 at the University of Nebraska Rogers Memorial Farm east of Lincoln to evaluate the potential of early planting soybeans. (See the *Crop Watch* archives on-line at *cropwatch.unl.edu/archives/* for the 1999 to 2001 results; 2002 results are below.) These dryland trials were in no-till and used a seed-applied four-way fungicide to protect the seedlings. Usually, the highest yields were with April-planted soybeans and the lowest yields were from those planted in June, about a 15 bu/ac difference. It's interesting to note that in 2001 at the Rogers Memorial Farm and on several other related trials, some early planted plots without fungicides had reduced stands yet still had yields similar to normal planted plots with full stands *(see soybean growth discussion, page 58).*

In 2002, the plots explored the interaction of population and early planting dates. A mid-season soybean variety for the area (2.7 relative maturity) and a full season variety (3.4 maturity), both with a four-way fungicide treatment, were planted at two populations (100,000 and 177,000 seed drop per acre). The rainfall pattern for the area was wet in May and September, and droughty in June, July, and the first half of August. The last planting date of the mid-season variety had a yield response to the late season rains at the higher populations, reinforcing why population should be increased with late planting *(see table)*. However, notice for both maturities that the lower population tended to yield more on the early planting dates and the higher population did more on the later planting dates.

While yields from early planting dates look good, producers need to improve their crop scouting to ensure success. Careful scouting for bean leaf beetles and properly timed spraying may be necessary as later planting dates are a cultural practice to avoid seedling damage. Also, the bean leaf beetle has been identified as the vector for the bean pod mottle virus; beetle control may be needed even if beetle populations are not above economic threshholds for feeding damage. Also, the choice of herbicides and the timing of applications may have to change as the relative growth stage of the soybeans versus the weeds will change with different planting dates.

Even considering the risks, for machinery management purposes,

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Yields for various planting dates for two varieties and two plant populations at the Rogers Memorial Farm near Lincoln, 2002.

Planting dates	2002 Soybean Yields, bu/ac			
Maturity	2.7	2.7	3.4	3.4
Seeds dropped	100K	177K	100K	177K
March 14	26.3	23.1	31.7	28.5
April 9	25.9	16.4	33.9	35.5
May 2	28.6	21.5	36.4	35.2
May 31	31.7	32.3	31.2	35.2
June 20	13.7	36.0	*	15.9

* Treatment not included due to limited plot space available

How planting dates affect plant growth

Soybeans are a photo-period dependent plant, which means that once the day length begins to shorten (after June 21), the plant shifts from vegetative to reproductive growth. Some vegetative growth still occurs, but the plant uses most of its energy to reproduce, a natural selection process to make sure that seeds are produced so the species can propagate. Seed production is determined by how much vegetative "factory" is available and whether there are sufficient inputs. For self survival when inputs are limited, some pods are aborted and others may not be filled. Under these conditions, higher populations rarely result in higher yields.

Knowing this aspect of soybean growth helps producers select maturities and adjust planting populations with respect to planting date. Early planting allows more vegetative growth, a larger "factory" to produce seeds. Depending on available inputs for pod formation and pod fill, more seeds can be produced. Conversely, late planting may not produce a very large plant so more plants may be needed to produce the same yield. Adjusting population is a common practice for those double-cropping soybeans after wheat. They may drop 200,000 to 300,000 seeds because of the shortened growing season, compared to 125,000 to 175,000 for full season production. Even with full season production, some producers increase plant populations with later planting dates to maintain yields.

Harvest time plant measurements taken in 2000 at the University of Nebraska Rogers Memorial Farm east of Lincoln show the differences in the seed-producing "factory" resulting from different planting dates *(see table)*. (This study was reported in the October 27, 2000 issue of *Crop Watch http://cropwatch.unl.edu/archives/2000/crop00-25.htm*.) While the results from these dryland plots represent just one year of data, they provide some insight into the effect of planting date.

Even with the reduced stand, the early planted soybeans in the foreground (planted March 19) yielded the same as the full stand of soybeans on the right (planted April 10), both at 41 bu/A in 2001.

The planting population was the same for all planting dates. The soybeans from the June 21 planting date only experienced shortening day lengths. The plant measurement showed that the later planting dates had fewer nodes and pods compared to the earlier planting dates. Thus, for the same set of inputs, fewer plants would be required with earlier planting to achieve the same yield. This was also observed in 2001 when an early planted treatment had a reduced stand (because of no fungicide treatment) yet still had a comparable yield to the full stand *(see photo)*.

Producers may be able to reduce seeding rates with early planting while still maintaining yields. However, the planting equipment must be set properly to make sure that all of the seeds have a chance to grow and become seed-producing plants. For instance, in the early days of drilling soybeans and using no-till systems, producers typically overseeded by 20% to 50% to make up for a lack of seed placement and seed-to-soil contact. When current drills and no-till planting equipment are properly set and operated, producers are dropping the same number of seeds as conventional tillers and in many cases even less because of the improved soil moisture at planting time in no-till.

Paul J. Jasa
Extension Engineer

Plant growth measurements and yield in bu/ac for a planting date study conducted at the NU Rogers Memorial Farm near Lincoln in 2000.

Maturity	*2.4*			*3.2*		
	Nodes	*Pods*	*Yield*	*Nodes*	*Pods*	*Yield*
March 6	13	57	42	15	75	38
March 29	12	34	43	15	59	35
April 19	12	42	38	15	47	37
May 10	12	42	39	15	59	37
May 31	11	35	36	13	43	37
June 21	9	24	28	10	26	27

No-till soybeans

(Continued from page 57)

properly managing and planting some soybeans a week or two before corn makes sense for producers who typically finish planting soybeans in June or for those who want to spread their planting workload and risks. By spreading out the planting dates, harvest dates are also spread, allowing producers to combine their soybeans at more favorable grain moisture contents, reducing losses from harvesting and marketing over-dried beans.

Paul J. Jasa
Extension Engineer

Making the Most of the 2003 Crop is the current broadcast topic featured on NU's **Market Journal.** View the show on-line at *http://marketjournal.unl.edu* and watch for new shows to be announced.

Wheat disease

Soil-borne wheat mosaic is starting to show up in eastern and central Nebraska. Field symptoms are yellow patterns often associated with low areas. Leaves of infected plants show a mosaic pattern of light and dark green. The disease will probably not be too severe this year, if temperatures consistently remain above 70°F.

The stripe rust situation in Texas is worsening with fields in central and southern Texas showing high rust severities. The severity in northern Texas was light as of early April. We will watch the development of stripe rust in the southern plains closely and forewarn our growers if it is likely to be a problem in Nebraska.

Leaf rust, as of early April, was found only in trace amounts; however, it could increase rapidly with rain and warmer weather.

John E. Watkins
Extension Plant Pathologist

Western NE pesticide and PCB disposal in April and May

Nebraskans can safely dispose of unwanted pesticides and electrical transformers from irrigation systems free at any of seven locations in western Nebraska from April 29 to May 7. (A similar program was held in eastern Nebraska earlier this year.)

Pesticides that can be turned in include all types of herbicides, insecticides and fungicides; and all types of agricultural, livestock, home, lawn and garden, structural and commercial pesticides (including those in aerosol containers).

Farmers also can dispose of old electrical transformers from irrigation system renovations. These transformers can contain PCBs, which have been linked to certain cancers and other health problems.

Items such as oil, antifreeze, paint, varnish, thinners, cleaners and solvents are *not* accepted. Neither are pesticide products in pressurized cylinders.

Preregistration is not necessary and there are no fees for quantities of pesticides up to 1,000 pounds. If you're planning to turn in more than a half ton of waste products, notify Rich Reiman at the NDA, in advance, by phoning (402) 471-2394. Products totaling over 1,000 pounds require a $1 fee for each pound over 1,000 pounds.

Persons turning in pesticides or transformers are encouraged to:

-- Leave pesticide labels on containers.

-- Handle containers with chemical resistant gloves and in a way to prevent them from spilling.

-- Wash hands with soap and water after handling.

-- Take pesticide materials in for identification and disposal if containers' labels have been removed or are not legible.

-- Transport smaller quantities of pesticides in fragile containers in a plastic bucket or other container that will contain the pesticide if it begins leaking.

-- Do not transport pesticides in the passenger compartment of vehicles.

The collection program is organized by the NDA, with help from Cooperative Extension, which is a part of NU's Institute of Agriculture and Natural Resources.

Funding is provided by the U.S. Environmental Protection Agency through the Nebraska Department of Environmental Quality and the Nebraska Environmental Trust through the Nebraska Agri-Business Association.

For more information contact your local NU extension office, the NDA at (402) 471-2394 or NU Pesticide Education Office at (402) 472-1632. On-line information is available at *http://pested.unl.edu/pat/*

Collection dates and sites (all sites open 8 a.m. to noon):

April 29: NU West Central Research and Extension Center, South Highway 83, East entrance, North Platte.

April 30: FEC Sidney Fertilizer Department., 1433 Illinois, Sidney.

May 1: NU Panhandle Research and Extension Center, 4502 Ave. I, Scottsbluff.

May 2: West Co., 724 W. Third St., Alliance.

May 5: Swann Transfer Station, 1010 E. Niobrara, Chadron.

May 6: Ainsworth Transfer station, RR 2, Ainsworth.

May 7: Knox County Roads Dept., 101 Main St., Center.

Steven Ress
Communications Coordinator
UNL Water Center

Daily soil temperature updates are available at *http://cropwatch.unl.edu/weather.htm*

Soybean rust: exotic threat or marketing friend

Not often does a plant pathologist get the chance to argue that a disease could potentially help our Nebraska market. However, soybean rust could, depending on the weather and how the disease spreads and overwinters in the United States.

Soybean rust, also referred to as Australasian soybean rust, is caused by the fungus *Phakopsora pachyrhizi*. This disease has been of high interest since it started moving around the world the last few years. Soybean rust is native to eastern Australia, eastern Asia, Japan, Taiwan, and the Philippines. The disease was not found in Africa until 1997 and by 2001 it had spread through most of the continent. In 2001, soybean rust was found in Paraguay, and by 2002 it had spread to Argentina and Brazil, causing field losses for our main global competitors.

It is believed that soybean rust will spread to the United States in the next few years. This is based on the rapid movement of the fungus throughout Africa and South America. Generally, it is believed that the natural spread of the fungus would be to the southeastern United States with airborne spores. It also might be unintentionally introduced into the United States via a producer who farms land on both continents creating a natural bridge when traveling between them. While the spores are not extremely long lived, they could survive this form of movement.

Because of the potential devastation from this disease, soybean rust is on the U.S. Homeland Security "Select Agent List". It's not clearly defined as to what action Homeland Security may take if this disease is detected in the United States, but there has been no mention of implementing quarantine measures since it is thought within the scientific community that soybean rust could not be contained. Symptoms and diagnosis of soybean rust will be discussed in a future article.

Why this disease is so potentially devastating

In other countries this disease has reduced yield by 10%-80%. For example, in Brazil soybean rust caused 10%-60% yield loss. Several aspects of the life cycle make it a threat to our soybean crop. Many rust diseases are very specialized and have just one or two hosts. Soybean rust has 35 leguminous hosts and is known to infect 95 plant species. This diverse host range is the reason scientists believe the fungus will not have a problem surviving once it reaches the United States. Of the known hosts, 20 are in the United States.

Current thought is that this disease will overwinter on kudzu. This is the vine you commonly see covering trees in southern roadsides and as far north as southern Iowa. Kudzu is not severely affected by soybean rust, but produces spores that are infective to soybean. It is essential that the overwintering plant have foliage for the disease to overwinter. Therefore, it is thought that the disease will overwinter each year in the southern United States where kudzu does not defoliate in the winter months. Then each year, the spores will be airborne and spread into the North Central states. This will be very similar to wheat rust, which spreads up the air stream in the Great Plains each year.

Managing soybean rust

Management will be critical when this disease appears if it arrives early in the crop development stages. If conditions are favorable and management actions are not taken, the damage could be devastating. By the time you know you have soybean rust, it likely will have been there for a while and many infections would be present. Currently, fungicides have been labeled for soybean rust to make it easier to respond when the disease arrives. Both Bravo and Quadris (Syngenta products) are labeled for soybean rust and other products will be available soon. Long-term management of this disease will be through the development of plant resistance, with short-term management achieved through fungicide treatments.

For Nebraska, I am optimistic that this may be a benefit if it is managed effectively. The soybean rust pathogen requires moderate temperatures with high moisture levels (long dew periods) to develop. In Nebraska, we might not see this disease until later in the season, limiting the number of fungicide applications needed. Also, our temperatures may be too warm for this pathogen to develop significant disease levels.

If this disease does develop in the United States, southern soybean production may be reduced if as many as three fungicide applications are needed for control. This could result in Nebraska producers finding more demand for their soybeans while incurring fewer production costs than their counterparts. So, in the end, my view is that soybean rust may end up being a marketing friend of Nebraska soybean producers. We will have to wait and see what happens.

Loren J. Giesler
Extension Plant Pathologist