2005

Crop Watch No. 2005-6, April 15, 2005

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CROP WATCH

University of Nebraska Cooperative Extension
Institute of Agriculture and Natural Resources

University of Nebraska Lincoln

No. 2005-6, April 15, 2005

Soybean aphid seed treatments not recommended

Recently there has been quite a bit of discussion about the efficacy of insecticidal seed treatments, such as imidicloprid and thiamethoxam, on soybean aphids. Some have suggested that seed treatments should be recommended for the control of soybean aphids on soybean; however, although early season aphid mortality and sublethal effects have been observed with insecticidal seed treatments, **we do not recommend seed treatments for controlling soybean aphids.**

Much of this discussion was stimulated by an insecticide efficacy trial conducted by the University of Wisconsin. In this trial a thiamethoxam seed treatment (CruiserMaxx Pak, 50g/100Kg seed) held soybean aphid populations to 250 aphids per plant until mid-August. However, the Wisconsin researchers point out that

1) this study was planted very late (June 9, up to 30+ days later than a typical planting date) to insure aphid infestation, and

2) in another study the aphid populations exceeded 250 aphids per plant in treatments with a higher rate of thiamethoxam (62.5 50g/100Kg seed) than in CruiserMaxx Pak.

Dr. David Ragsdale and Brian McCornack of the University of Minnesota have conducted soybean aphid mortality and fecundity (number of offspring) studies to investigate the questions "How long can we expect systemic activity of thiamethoxam to last in the soybean plant?" and "How successful will female soybean aphids be at reproducing on Cruiser-treated soybean leaves?"

In lab bioassays, they exposed soybean aphids to soybean leaves pulled from thiamethoxam-treated plants (50g/100Kg seed) at successively later intervals after planting. They placed aphids on treated leaves and recorded percent mortality and the number of offspring produced per female at 24 hour and 48 hour exposure/feeding times. Ragsdale and McCornack found that soybean aphid mortality was significant up to about 35 days (V3/V4 growth stages), but beyond that point, aphid mortality decreased toward zero and was no longer significant. They also found that soybean aphid fecundity was

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Focus on Soybeans Inside

Customize soybean inoculants, treatments to specific needs

This winter we saw numerous ads for soybean inoculants or seed treatments that contain inoculants along with fungicides, insecticides, growth promoters, etc. What is the difference among all of these? Does every producer need the same treatment? The short answer is "No."

Many of the products are single treatments, such as inoculants, fungicides, insecticides, etc. while others are combinations or "packs." The market for soybean seed treatments is trending toward combining differing chemistries in one "super" pack which enables the producer or retailer to apply numerous products in one application.

Although this does increase efficiency, it also increases the likelihood of applying more products than are actually needed. The key is to understand what each product is and then determine if it is really necessary for each situation.

Inoculants have been used for years to inoculate soybean with *Bradyrhizobium japonicum.* This strain of bacteria forms nodules on

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Ag briefs

John Wilson, Extension Educator in Burt County: It's been a good spring for preplant fertilizer applications -- almost everyone who's wanted to get some on has done so. A few farmers started to plant late last week, but most were waiting to start this week, weather permitting. We received 0.5-2 inches of rain over the weekend and were expecting more, which may delay planting. Nobody is complaining about the rain, however.

Pastures are starting to green up. With the rain and some warm weather, they should really take off.

Dewey Lienemann and Jennifer Rees, Extension Educators in Webster and Clay counties: There was a nice general rain of 0.4-1 inch across the county over the weekend with no storm damage reported. Wet conditions have delayed spring fertilizing and weed control on wheat -- a critical concern with wheat rapidly approaching or already at joint stage. Wheat is really coming on, but some yellow plants persist and some soil-borne wheat mosaic is being reported. Soil-borne wheat mosaic is fairly common in this area of Nebraska since the pathogen can survive in the soil and is active in soil temperatures of 50-60°F.

There is an unusual amount of henbit in lawns, pastures, wheat fields and crop ground and prostrate spurge in pastures and alfalfa fields. A lot of common mullein is in the rosette stage in pastures. Wet fields are hampering fertilizer application and planter preparations for corn and soybean fields. Pastures are greening up nicely with good cool season grass growth.

Delroy Helsath, Extension Educator in Dakota, Dixon, and Thurston counties: There was some early corn planting last week. This is an exception, however, since most farmers are putting on fertilizer and doing some ditch filling from last year's erosion. Good rains of 1-3 inches April 9-10 stopped any field work but assured weed growth as soon as it warms up. Many fields already had significant weed growth and need to be sprayed. Many producers will begin planting as soon as the soil dries. Pastures continue to green up with some bromegrass two to four inches high.

USDA's Nebraska Agricultural Statistics Service: For the week ending Sunday (April 10), beneficial showers across much of the state slowed spring fieldwork while providing moisture for germination of spring planted crops. Topsoil and subsoil moisture supplies continued above average and year ago levels.

Temperatures averaged from 4 to 11 degrees above normals. Fieldwork activities included stalk shredding, discing, and applying fertilizer, with some producers starting to plant corn.

Wheat conditions improved and rated 1% very poor, 4% poor, 28% fair, 52% good, and 15% excellent. Fields were 9% jointed, in line with last year at 8% and above the average of 3%.

Corn planting was underway in a few areas of the state as soil temperatures neared a favorable level.

Oats planted increased to 73%, ahead of last year at 60% and average at 49%. Twenty percent had emerged, ahead of last year and average at 9%.

Sugar beet planting was underway in the Panhandle with 17% completed, slightly behind last year at 21%.

Alfalfa conditions rated 1% very poor, 5% poor, 28% fair, 57% good, and 9% excellent.

Q The sales pitch on black nurse tanks says they have fewer problems with algae than other tanks. True or false?

A According to the *2005 Guide for Weed Management in Nebraska* (EC130), this is true. However, if you're got a non-black tank, to control algae, it recommends dissolving 1 oz copper sulfate in 1 pint of water in a glass jar. Add 7.5 tablespoons of the prepared solution to each 1,000 gallons of water. This solution can be used for crop spraying and livestock watering.

CROP WATCH

cropwatch.unl.edu

Crop Watch is published from March to November by Cooperative Extension and Communications and Information Technology in the University of Nebraska Institute of Agriculture and Natural Resources, PO Box 830918, 108 Agricultural Communications Bldg., UNL, Lincoln, NE 68583-0918. To order a print subcription or to change your address, write to *Crop Watch* at the above address or call (402) 472-7981. The newsletter also is available on the Web at **cropwatch.unl.edu**

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Soybean aphid seed treatment (Continued from page 51)

significantly reduced up to about 40 days after planting (V4 growth stage). However, beyond 40 days they saw no difference in the number of nymphs deposited by aphids on treated and untreated leaves.

Given this information, the Wisconsin researchers concluded that under normal planting dates they did not expect thiamethoxam or imidicloprid seed treatment efficacy to hold, particularly under high and/or late season soybean aphid pressure.

We agree with this conclusion, particularly for soybean aphids in Nebraska. To date in Nebraska, the soybean aphid has not been an early season pest; it has been a late season pest. Most of our soybeans are planted in May, and we generally don't begin to see aphids until mid to late July, well past the early vegetative stages, and in most fields soybean aphid populations peak in mid to late August. This is too long a time to expect a seed treatment to have a significant effect. Although we have seen some differences in aphid populations between seed treated and non-treated soybean, it has not been enough to protect the crop.

In addition, all soybean fields in Nebraska will not have economic populations of soybean aphids, even in northeast Nebraska where we've seen the most soybean aphid injury. Why spend money before you know if there is actually a need? With a seed treatment costing approximately $12-14 an acre, it is expensive "insurance" with a high probability of either not being needed or not being efficacious when used to manage soybean aphid.

In conclusion, we do not recommend insecticidal seed treatments for soybean aphid management in Nebraska. Manage soybean aphids by scouting and using economic thresholds. One well-timed foliar insecticide application, based on two or more field visits with soybean aphid population density at threshold and actively increasing, will adequately control soybean aphids and protect yield.

Thomas Hunt, Extension Entomologist, Haskell Ag Lab
Keith Jarvi, IPM Assistant
Both in the Northeast REC

With a seed treatment for soybean aphids costing $12-14 an acre, it's expensive "insurance" against a problem that may never develop.

Next week's *CropWatch* also will feature soybean production and pest management, including further stories on insect and disease managemen and soybean plant physiology.

Battling winter annuals

Plan now to attack them in fall

This time of year I get phone calls from many no-till producers asking how to combat winter annual weeds that are blanketing their fields. Usually we spend some time discussing what crop they are planting and what herbicides they prefer. Then I explain to them that with the weeds this far along we cannot expect the same level of control as if they were small. Of course the producer often replies that they were small last week, but he didn't have time to get to them then.

Weeds such as henbit and pennycress are winter annuals that generally emerge in the fall. In the spring these weeds will bolt and then flower. You will get some early spring emergence with these weeds, but most emergence occurs in the fall.

If you are planning to spray the weeds in the spring, you need to do it when these weeds are small, preferably before they start bolting. Often this opportunity only exists for just a few days. Typically, the weather will warm up a little and then after a few days of sunshine, warm temperatures and maybe some spring rain, these weeds start growing in the rosette form. After a few days of rosette growth bolting starts and the race is on between the producer and the weeds. The total time from weather warm-up to bolting may given the producers as little as a week to get ready and spray, and this doesn't even account for potential wet fields or rainfall.

After I talk with these producers about spring control options, I tend to shift the conversation by asking them why they would even want to plan to spray in the spring when so many factors are against them. Since the weeds emerge in the fall, why

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Soybean seed treatments *(Continued from page 51)*

soybean roots and fixes atmospheric nitrogen for the soybean plant to use throughout the season (see *When should inoculants be applied* on page 55).

New products are advertised as inoculants plus "growth promoters." These products contain both inoculants and lipochitooligosaccharides (LCOs). Nodule formation depends on several chemical signals being sent back and forth between *B. japonicum* and soybean roots. This signaling requires time and suitable environmental conditions.

One of the chemical signals required for nodules to form are LCOs which are produced by *B. japonicum*. By adding LCOs to these manufactured products, nodules form earlier since steps in the initiation process are bypassed. LCOs may contribute to an increase in overall stand and plant appearance, although Nebraska research on these characteristics is extremely limited. If a response is seen with these LCOs, it would likely result in years where there is a prolonged cool spell during early plant establishment.

When combining inoculants with **fungicides** on seed, there is a natural decline in the number of bacteria present due to the presence of the fungicide. To combat this effect, products have been developed to help increase the longevity of *B. japonicum* on the seed. These products often are termed "protectors" or "extenders." "Extenders" also are used to increase the life span of the inoculant treatment when it's applied early (typically 30 days prior to planting).

Colorants and **polymers** also are added into combination packs, largely for cosmetic purposes. Polymers, which enable the soybean seed to be planted unusually early and "sit" in the ground until the soil reaches the correct temperature, have not been consistent in performance. In reference to these treatments, an industry Web site said that they "give (the) *perception* of added value to the seed." Yet this may not equate to final yield differences!

Table 1 lists seed treatments by classification. This table is meant to give a general view of available products and is not an exhaustive source of information for these products. Due to space limitations we did not list all seed treatments; instead it is a limited representation. Reference to a certain product does not signify endorsement and exclusion of a product does not signify non-endorsement by the University of Nebraska.

Lori Abendroth, Research and Extension Associate
Roger Elmore
Extension Crops Specialist

Table 1. Soybean seed treatments and their functions.

Product	Classification	Product	Classification
Allegiance	Fungicide	Optimize	Inoculant + LCO
Allegiance FL	Fungicide		
APEX Extra	Inoculant	PBX	Extender + Protector
APEX Pro	Inoculant + Extender	PowerPack	Inoculant
		Premax Protector	Extender
ApronMAXX RTA	Fungicide	Pulse HP	Inoculant
ApronMAXX RFC	Fungicide + Colorant	Rhizo-Flo	Inoculant
		Rhizo-Liq Max	Inoculant
Apron XL	Fungicide	Rhizo-Stick	Inoculant
BioRhiz	Inoculant	Ritiram Carb	Fungicide
Cell-Tech	Inoculant	Rival	Fungicide
Cruiser	Insecticide	Rizo-Liq	Inoculant
CruiserMAXX Pak	Insecticide + Fungicide	Rizo-Pac	Inoculant + Fungicide
Guardian Soy-Pak	Fungicide	Rizoplus Super	Inoculant
Guardian T-Pak	Fungicide	Royal Peat	Inoculant
HiCoat Liquid Extender	Extender	Soil Implant +	Inoculant
HiStick	Inoculant	SoyGard	Fungicide
HiStick 2	Inoculant + Sticker + Safener	Stiletto (Combination of Vitavax, Thiram, Allegiance)	Fungicide
(HiStick N/T) or (HiStick Liquid + Subtilex)	Inoculant + Biological Fungicide	Subtilex	Biological Fungicide
Launcher	Inoculant	Thiram 75DF	Fungicide
Maxim 4FS	Fungicide	Vault	Inoculant + Biological Fungicide + Extender + Colorant + Promoter (not LCO)
Maxim XL	Fungicide		
Nitragin	Inoculant		
NitraStik-S	Inoculant		
Nitro-Fix	Inoculant		
Nod+	Inoculant		
Nod+ Liquid Extender	Extender	Vitavax 200	Fungicide
Nodulator	Inoculant	Warden RTA	Fungicide

In soybean

When should inoculants be applied?

Soybean captures atmospheric nitrogen (N_2) and converts it to ammonia (NH_3) through a process termed nitrogen fixation. Soybean inoculated with *Bradyrhiozbia japonicum* will form structures called nodules on the plant's roots. Although *B. japonicum* provide large quantities of nitrogen for the soybean to use, they do require energy from the plant. Therefore, the soybean will not support nodulation and nitrogen fixation if there is a sufficient source of nitrogen (from nitrate fertilizers, etc.) already present in the soil.

The soybean plant requires a substantial amount of nitrogen during its reproductive stages, especially during pod fill (R3 and R4), and this is supplied largely through nitrogen fixation.

When deciding whether a soybean field should be inoculated or not, first determine whether the field is "new" or "old." A "new" soybean field is one that has never produced soybean. An "old" soybean field is one that has produced a soybean crop within the past four to five years. Research conducted throughout the Midwest supports the inoculation of "new" soybean fields with *B. japonicum*. A yield increase of a few bushels (1-10 bu/ac) should be expected with inoculants on "new" ground.

There have been differing views on whether a yield increase will be achieved when inoculating ground that has previously produced soybeans (i.e. an old field). These fields can retain the bacteria from year to year.

University of Nebraska research conducted in 2003 and 2004 did not show a yield difference between any inoculation product and an untreated control. In "old" fields, a yield increase from re-inoculation will likely be found in situations where there are multiple factors deterring bacteria survival (such as extreme pH levels(i.e. less than 5 or more than 8), high sand content, high fungicide use, etc.) and not due to one lone factor.

A NebGuide covering soybean inoculation and summarizing University of Nebraska inoculant trials will be available later this summer.

Lori Abendroth
Research and Extension Associate
Roger Elmore
Extension Crops Specialist

Rhizobium inoculants for clovers, alfalfa

Often legumes like clovers and alfalfa are planted because they produce their own nitrogen, usually, that is. Legumes make their own nitrogen by forming root nodules with bacteria called rhizobium. If you dig up a legume, these nodules are the small, pinkish clusters of lumpy growths on the roots.

Many soils do not have enough rhizobium to form nodules naturally. To be sure your legumes produce nitrogen, add rhizobium bacteria to the seed.

Many top quality legume seeds are sold with a seed coating that contains these bacteria. While these are wonderful products, sometimes it may be necessary to add just a little more inoculant to ensure good nodule formation.

Remember that rhizobium are living bacteria. Pre-inoculation attaches them to seed during winter for spring planting. When this seed is held over for planting later, many of these bacteria may die due to heat during storage or to the length of time between attachment and planting.

As a result, pre-inoculated seed may contain too few live bacteria to form many nodules. And, of course, seed that has not been pre-inoculated will have no bacteria for producing nitrogen.

To avoid this problem, buy a powdery inoculant prepared specifically for your legume and add it to your seed as directed just prior to planting. This nitrogen insurance will cost less than a dollar per acre. That's a pretty cheap way to guarantee your legumes produce nitrogen every year.

Bruce Anderson
Extension Forage Specialist

Use care when burning grasslands

Prescribed burning CRP or pasture can improve stands, prepare the site for interseeding, control weeds and trees, enhance wildlife habitat, and improve forage quality. However, these fire can be dangerous if not properly conducted.

Timing is important. Burning warm-season grasses too early will open up the ground for weeds to invade, soil to erode, and moisture to evaporate. The best time to burn warm-season grasses is when they start to grow, usually late April to early May. Burning then will result in rapid greenup and thickening of desirable warm-season plants.

Never burn unless weather conditions, topography, and other factors enable you to control the fire. And make sure your burn is legal. Obtain a burn permit from your local fire chief.

Bruce Anderson
Extension Forage Specialist

Strategies for early season weed control

With corn planting just getting started, it may be hard to give any thought to soybeans right now; however, in what little spare time you have it would be good to plan weed management strategies for soybeans. Let's look at some of the factors to consider.

Conventional tillage or no-till

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

Conventional tillage 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, crabgrass, lambsquarters, and Russian thistle are removed during the tillage process, allowing the crop and any new weeds to emerge together.

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

Research at the University of Nebraska 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 approximately the beginning of pod set. This is roughly the 10th to the 40th day of crop growth. While you may save some money by going with a a single POST program in your Roundup Ready® beans, you also are hurting yields by delaying weed control. This means that you may need to consider using two applications of glyphosate or including a pre-emergent herbicide in your Roundup program to widen the application window.

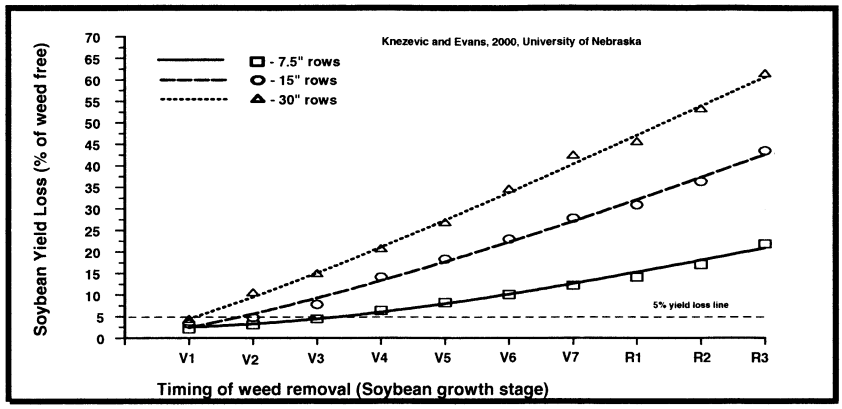

Figure 1. NU research has shown that the critical period of weed control for soybeans is from the second trifoliate to approximately the beginning of podset.

This recommendation might suggest that weeds developing before this window (10th - 40th day) don't need to be controlled; however, other factors such as reduced soil moisture and unsightly field clutter need to be taken into account. Given the recent span of dry years, controlling these early season weeds may be very important.

No-till soybeans

In dry years no-till farmers may be ahead of the game, as they are likely to conserve more soil moisture. This moisture can be a yield-limiting factor, however, in a drought year since it may allow for the germination of early summer annuals and support winter annuals that emerged last fall.

Burndown treatments will eliminate soil moisture loss from early summer annuals and existing winter 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 up front while providing the residual control needed for the early part of the season. The advantage of this strategy is that most summer annuals have not emerged yet, rendering the residual herbicide very useful.

Another advantage is that more time is given for a rainfall event to occur for herbicide incorporation and activity. Finally, depending on the weed spectrum, the early preplant may eliminate the need of an additional burndown, saving money. One disadvantage, however, is that the herbicide will lose residual activity earlier in the growing season and post treatments must be planned more carefully.

A second strategy is to apply a burndown alone ahead of planting, such as glyphosate at a 32 oz/ac equivalent rate. When combined with 1.0 pt/ac 2,4-D ester, glyphosate can be reduced to 24 oz/ac. Keep in mind that there is a seven-day interval between applica-

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Roundup Ready alfalfa offers flexible weed control

Roundup Ready® alfalfa likely will be introduced to Nebraska producers this summer. Roundup Ready alfalfa is being developed through a joint project of Forage Genetics International and Monsanto, who have said they are committed to commercialization of this new technology in a manner that will not disrupt existing alfalfa markets. Application for deregulation of Roundup Ready alfalfa has been requested from Japan, Taiwan, South Korea, Mexico and Canada. Release of Roundup Ready alfalfa in the United States will be coordinated with U.S. and Japanese approval.

Growers who want to use the Roundup Ready alfalfa technology will need to sign a technology stewardship agreement requiring that they

1) not save seed,

2) use only a Roundup brand of glyphosate,

3) pay a technology fee, and

4) allow Monsanto to review Farm Service Agency crop reporting information.

Growers also will need to take a Stewardship Course on seed trait stewardship, herbicide resistant weed management, stand takeout, control of volunteer and feral alfalfa plants, and crop rotation.

To prevent Roundup Ready alfalfa pollen flow, an isolation distance of 900 feet (forage alfalfa) and 1500 feet (seed alfalfa) will be required between Roundup Ready and conventional alfalfa. The isolation distances are based on research conducted by the University of California on Roundup Ready alfalfa pollen flow from leaf cutter and honey bees in seed-producing areas. Out crossing of Roundup Ready alfalfa plants with other food crops or weed relatives is of minimal concern with alfalfa.

What is the value of Roundup Ready alfalfa as compared to existing varieties and already approved weed control programs? Product information from Monsanto and Forage Genetics International suggests Roundup Ready alfalfa may offer several advantages over conventional alfalfa weed management programs, including:

1) control of broadleaf and grassy weeds during establishment and in following years for the life of the stand;

2) Excellent crop safety -- some alternative herbicides can cause crop injury;

3) a wider, more flexible herbicide application window which should provide improved weed control and allow the alfalfa germplasm to achieve maximum yield; and

4) a 25-year history of weed management and environmental safety compared to alternative herbicides that may carry over into succeeding crops and be leached into ground water.

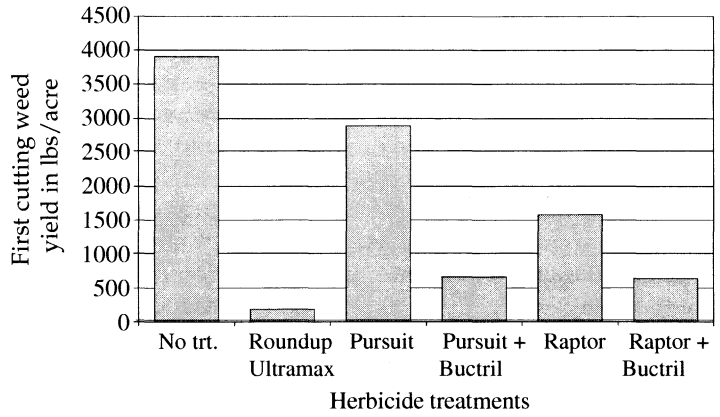

Figure 1. Early season weed control in a new seeding of Roundup Ready Alfalfa, Scottsbluff, Nebr.

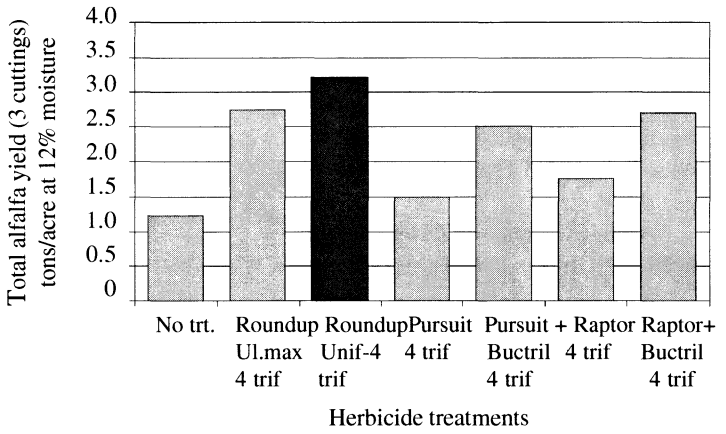

Figure 2. Influence of weed interference and weed removal on new seeding alfalfa yield at Scottsbluff, Nebr.

Nebraska research results

The Roundup Ready alfalfa system has been examined over the past three years at several Nebraska locations. Results from these studies can be used to partially evaluate Roundup Ready program benefits promoted by Monsanto and Forage Genetics International. Several studies have compared Roundup UltraMax, Pursuit, Pursuit plus Buctril, Raptor, and Raptor plus Buctril for early season weed control in new alfalfa seedings.

Roundup UltraMax provided weed control equal to or greater than alternative herbicide programs (*Figure 1*). Seedling alfalfa injury from postemergence herbicides is variable and depends on alfalfa vigor and temperatures during herbicide application. Roundup Ready alfalfa seems to have excellent tolerance to Roundup UltraMax, but may show a slight yellowing at the growing point 7 to 10 days after treatment if air temperatures are in the 40 to 50°F range during and after treatment. Alfalfa injury from Roundup UltraMax was similar to crop injury from Raptor and much less than that observed from Buctril or Pursuit plus Buctril.

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Weed control in soybean *(Continued from page 56)*

tion of 1 pt of 2,4-D and soybean planting. Any application greater than 1 pint of 2,4-D requires 30 days before planting. Dicamba should not be used before planting soybeans. 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-third's rate of residual herbicide with the burndown followed by another third residual at planting. This allows for a longer window between the burndown and planting in case planting is delayed. It also provides another dose of residual at planting to increase weed control at crop emergence by a few days.

Also, this system allows more flexibility in your postemergence herbicide applications since environmental conditions such as rainfall or wind may occur at your normal time of POST application and delay spraying operations.

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

For more information on selecting a pre-emergence herbicide for soybeans, consult the *2005 Guide for Weed Management in Nebraska.* This guide is available at your local University of Nebraska Cooperative Extension office for $3.

Brady Kappler, Extension Educator Weed Science

Winter annuals *(Continued from page 53)*

not treat them then, especially given that herbicide selection is easier then. Typically, you will only need two herbicides and maybe one: 2,4-D and glyphosate. One quart of 2,4-D (4 lb) ester will do a great job of cleaning up winter annual weeds. If you have winter annual grasses, combine 24 oz of glyphosate with 1 pint of 2,4-D for good results in the fall.

I should explain what I mean by "fall" spraying, which may be somewhat of a misnomer. Fall spraying actually occurs after harvest in November or early December. Typically we have good weather for much of November and even into December. Some of our best control of winter annuals in our University of Nebraska field trials has occurred when spraying in mid to late November. Temperatures in the upper 50s to even 70s are not uncommon that time of year. As long as it is not cold (40 or below), it can be a good day to spray.

Of course some of you may be thinking that discussing the merits of fall spraying now is like slamming the barn door after the horse is already out. What good will it do me now, you may ask?

Since these winter annuals are clearly visible now, it would be a good time to make maps of these weeds for later treatment. These weeds are very small in the fall and you won't see them without close inspection of the field. With a map you'll be ready to attack those nasty winter annual weeds in the fall. When next spring rolls around, you'll be surprised at how clean the fields are and how much more time you'll have to get ready for planting instead of spraying winter annuals.

Brady Kappler Weed Science Educator

Roundup-Ready alfalfa *(Continued from page 57)*

One of the benefits being touted is the flexibility in herbicide application. Most alternative herbicide programs require seedling alfalfa to have at least two to four trifoliate leaves before applying treatments. Removing weeds at the four-trifoliate growth stage generally has led to an increase in alfalfa stand compared to areas where weeds were not removed.

If weeds were removed with Roundup UltraMax shortly after alfalfa emergence and again in several weeks after later flushes of weeds had emerged, the alfalfa plant was protected from weed interference and stand was further enhanced. Enhancement of alfalfa stand and vigor led to an increase in alfalfa forage yield (*Figure 2*). Weed removal in a new alfalfa seeding was closely associated with alfalfa yield — the more weeds removed the more alfalfa harvested. Weed removal with Roundup UltraMax at the unifoliate and again at the four-trifoliate growth stage provided the greatest alfalfa yield.

The Roundup UltraMax label allows growers to use 26 to 52 ounces of herbicide per treatment in Roundup Ready Alfalfa. The rate should be dictated by the type and density of weeds. If weeds emerge with alfalfa, 26 ounces of Roundup UltraMax applied at the unifoliate or first trifoliate growth stage would be recommended. If further weed flushes occur, Roundup could be applied again in two to three weeks.

Roundup also can be used to control weeds after alfalfa is established. Winter annual weeds such as mustards and downy brome can be controlled in early spring as alfalfa and weeds begin growing. Perennial grasses such as bluegrass and quackgrass and broadleaves such as Canada thistle, bindweed, and curly dock also could be addressed with the Roundup Ready weed control program.

Robert Wilson Extension Weed Specialist Panhandle REC

Research update

Studies show value of SCN-resistant varieties

We recommend planting resistant soybean varieties in ANY field where SCN has been detected, regardless of the level of infestation.

The soybean cyst nematode (SCN) has been the most serious pest of soybeans in the United States, robbing farmers of hundreds of millions of dollars of production each year. Many farmers do not realize that their fields are infested with SCN until a severe problem develops. Meanwhile, significant yield losses up to 30% or more can occur without visual symptoms.

Often the first sign of an SCN infestation is when yields hit a plateau or even start to decline and the change can't be explained by drought, heat, insects, disease or other factors. For this reason, it is important to check for SCN ***before*** you think you have a problem.

SCN, once thought to be limited in Nebraska to the Missouri River Valley, is showing up in more areas in the state. It was first discovered in Nebraska in 1986 in Richardson County and since then has been identified in 26 more counties. It probably could be found in all counties in the eastern third of the state and will continue its spread westward, following the area where soybeans are grown. Buffalo County in central Nebraska currently is the most western site where SCN has been identified.

This past summer, a field sales agronomist for a seed company noticed the soybeans in a strip trial just northeast of Kearney were doing poorly. He attributed it to high pH; however, as the summer progressed, two strips in the trial appeared normal while the rest of the soybeans appeared stunted and chlorotic. In checking the plot map, he discovered that these two strips were the two SCN-resistant varieties.

At harvest, the resistant varieties yielded about 61 bushels/acre while the susceptible varieties yielded about 38 bushels/acre. The SCN level, about 2,000-3,000 eggs/100 cc soil, indicates this infestation had existed for a number of years and had continued to multiply on the susceptible soybeans that were grown there in a corn-soybeans rotation.

A variety of studies on the effectiveness of resistant versus susceptible soybeans in SCN-infested fields have been conducted in eastern Nebraska between 1999 and 2004. Each year the same varieties in these trials were planted on non-infested sites.

Table 1. Summary of eastern Nebraska research trials comparing resistant and susceptible soybeans in SCN-infested fields, 1999-2004.

Average yield from 12 infested sites	
Resistant varieties	47.4 bu/ac
Susceptible varieties	42.4 bu/ac
Average yield from 6 non-infested sites	
Resistant varieties	58.9 bu/ac
Susceptible varieties	59.5 bu/ac
Average egg count post-harvest, infested sites	
Resistant varieties	491 eggs/100 cc soil
Susceptible varieties	1,823 eggs/100 cc soil

On the 12 infested sites, there was an average advantage of five bushels per acre by using resistant varieties. The advantage ranged from no difference in yields between resistant and susceptible varieties to more than 13 bushels per acre.

The same varieties were planted each year on a non-infested site. The yield potential of the non-infested site was higher which explains the difference in yields between them and the infested sites. It was not due to the presence or absence of SCN.

There was no statistical difference in yields any year and less than a bushel difference in the average yield of the six trials at the non-infested site. In three trials, the resistant varieties had a slight yield advantage and the other three years the susceptible varieties had a slight yield advantage. This shows that you do not sacrifice yield if you plant a resistant variety on a non-infested field or in a field with a very low level of SCN infestation.

What was consistent in all infested fields was the ability of resistant varieties to reduce the level of reproduction. Spring egg counts in these studies averaged about 600 eggs per 100 cc soil for both resistant and susceptible varieties. Resistant varieties decreased levels of SCN in the fields while susceptible varieties allowed an average three-fold increase during the growing season.

These research plots show we can expect a yield advantage to planting resistant varieties on an infested site, even though we may not see a yield difference every year. What we do gain, even in years where no yield occurs, is we reduce the buildup of SCN in the soil. For these reasons, we recommend planting resistant soybean varieties in ANY field where SCN has been

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When is irrigation needed for winter wheat?

Drought still has a firm grasp on western Nebraska and as a result the irrigation season has already started for some of the region's winter wheat growers. In many areas, recent rain and snow have helped alleviate much of the early season stress on winter wheat, but in those areas that missed the rain, irrigation will be needed to prevent water stress and to get the crop off to a good start.

Winter wheat water use will increase daily from around 0.1 inch/day, currently, to approximately 0.3 inch/day in early June at the milk stage of growth. As the plant continues to mature and produce grain, water use begins to drop off. This means winter wheat's daily water use declines at a rate of approximately 0.07 inch/week from its peak level in early June to when the crop reaches maturity in early July.

We often hear that irrigation is critical during the flowering and grain development growth stages. It is more correct to say that crop water need is greatest during flowering and grain development. Irrigation application needs to be adjusted accordingly. For example, an irrigation system with a 600 gal/min well can deliver between 0.20 and 0.25 inch/day of water on a 120 acre center pivot, depending on system efficiency. Since peak consumption of water for winter wheat can be 0.30 inch/day or more, this means the irrigation system will not be able to keep up with crop demand during these critical stages of growth.

In order to avoid crop water stress if the soil profile is deficient of water, irrigation needs to be applied prior to flowering when crop water use is less. At this time, the sprinkler system can apply more water than the crop needs and the excess water can be stored in the soil profile. The water stored in the soil profile can then be used to supplement irrigation during flowering and grain fill. As a general rule, it is usually best to apply water to fill the soil profile prior to the boot stage of growth. After the boot stage, water use will be equal to or greater than the sprinkler system's capacity to deliver water and the opportunity for storing water in the soil will be lost.

Table 1. Cumulative water use in the Central High Plains from emergence in the fall to various stages of plant development for irrigated winter wheat grown under unlimited soil water conditions. (*Adapted from Kansas State University Experiment Station Bulletin 442*)

Period	Approximate dates	Cumulative water use (in.)
Emergence	Sept. 25 - Oct. 5	
Beginning spring growth	March 15 - 30	4.0
Jointing stage	April 25 - May 5	8.5
Boot Stage	May 15 - 20	11.0
Flowering Stage	May 28 - June 5	14.0
Milk stage of grain	June 7 - 12	17.0
Dough stage of grain	June 15 - 20	19.0
Complete maturity	July 1 - 5	22.0
Total		22.0

Winter wheat is a good drought-tolerant crop but if winter and spring precipitation is limited, early irrigations will be needed to establish a good root system for efficient extraction of water later in the growing season. Later in the season, irrigation prior to the boot stage is needed in order to store water and supplement irrigation during peak growth periods.

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SCN-resistant soybeans *(Continued from page 59)*

detected, regardless of the level of infestation.

Since it may be getting too late to test soil and switch varieties based on an SCN detection now, look at soybean roots about a month after emergence this summer. If you see cysts on the roots, it has SCN; however, if you don't see cysts, it may still have SCN. When populations are low, sometimes they can be very difficult to find. If you suspect you may have SCN in a field, the best thing to do would be to collect a soil sample and submit it for analysis.

For more information, see *Soybean Cyst Nematode Biology and Management* (NebGuide G99-1383), available on-line at *http://ianrpubs.unl.edu/plantdisease/g1383.htm* and at your local Cooperative Extension office.

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