VOL. 24 #7 June 2, 2004

Weed Related Field Tour Dates

June 15, Leafy spurge and purple loosestrife control, registration starting at 9:30 Newcastle Fire Hall.

June 24, Weed Tour, 1pm, Haskell Ag Lab-UNL, Concord

Week of July 5th, exact date is not set yet for these 3 studies: Pasture Weed Control (by Bassett), Buckbrush control in pasture (by Niobrara State Park), and Sandbur control in corn (by Brunswick).

Soybean Aphid 101

The soybean aphid (*Aphis glycines*) is Nebraska's newest soybean insect pest, and although it is early in the growing season (soybeans are still being planted), we have been getting quite a few questions about this insect. Although we don't expect to see many aphids until July, and few problems until mid-late July, it is a good idea that farmers be aware of the insect and start watching their fields beginning in June. It is still very new to Nebraska and could surprise us.

Soybean Aphid Description: The aphid is light green to pale yellow, less than 1/16th inch long, and has two black-tipped cornicles (cornicles look like tailpipes) on the rear of the abdomen. It has piercing-sucking mouthparts and typically feeds on new tissue near the top of soybean plants on the undersides of leaves. Later in the season the aphids can be found on all parts of the plant. It is the only aphid in North America that forms colonies on soybean.

Life Cycle and Injury to Soybean: The seasonal life cycle of the soybean aphid is complex with up to 18 generations a year. It requires two different species of host plant to complete its life cycle, common buckthorn and soybean. Buckthorn is a woody shrub or tree and is the overwintering host plant of the aphid. Soybean aphids lay eggs on buckthorn in the fall. These eggs overwinter and hatch in the spring, giving rise to wingless females. These females reproduce without mating, producing more females. After two or three generations on buckthorn, winged females are produced that migrate to soybean. Multiple generations of wingless female aphids are produced on soybeans until late summer/fall, when winged females

and males are produced that migrate back to buckthorn, where they mate. The females then lay eggs on buckthorn, which overwinter, thus completing the seasonal cycle. Although a few aphids have been found this spring on a buckthorn plant in Lincoln, Tom Hunt has not found any on the buckthorn plants he has been monitoring in northeast Nebraska. It remains to be seen how successful the aphid will be at overwintering and colonizing soybean in Nebraska.

Soybean aphid populations can grow to extremely high levels under favorable environmental conditions. Reproduction and development is fastest when temperatures are between 70-80 degrees F. Aphids die when temperatures reach 95 degrees F. When populations reach high levels during the summer, 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. We believe summer migrants from the northeast (Minnesota and Iowa) were the major source of infestations in Nebraska during the last two years.

Soybean aphids injure soybeans by removing plant sap with their needle-like mouthparts. Symptoms of soybeans infested by soybean aphid may include yellowed, distorted leaves and stunted plants. A charcoal-colored residue also may be present on the plants. This is sooty mold that grows on the honeydew that aphids excrete. Honeydew in itself makes leaves appear shiny. 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.

Soybean Aphid Management: The aphid is very new to North America and experience with the insect is limited. As we gain more experience with the aphid, recommendations will be refined and developed to manage the aphid under Nebraska conditions. Here is the latest information for northeast Nebraska.

1. Begin scouting soybean fields once or twice a week in late June - early July. Check 20 to 30 plants per field. Aphids are most likely to concentrate at the very top of the plant, although they will move onto stems and within the canopy as populations grow and/or the plant reaches mid to late reproductive stages. As the season progresses, aphid numbers can change rapidly (populations can double in 2-3 days).
2. The current threshold for late vegetative to R4 stage beans with actively increasing aphid populations is 250 aphids/plant on most plants (over 50%). This gives you about seven days to schedule treatment (if populations do not increase during these seven days, you may be able to eliminate or delay treatment). Determining if the aphid population is actively increasing requires several visits to the field. Factors favorable for aphid increase are relatively cool temps, plant stress (particularly drought), and lack of natural enemies. Thresholds for R5-R6 have yet to be determined, but are likely in the 500-1000 aphids/plant range. Yield response to treatment has been documented during R5 and early R6, but not as consistently as when treatment occurs during R4 or earlier. Treatment after R6 has not been documented to increase yield in the field.
3. Look for the presence of aphid natural enemies such as lady beetles, green lacewings, and other insect predators. Aphid “mummies” (light brown, swollen aphids) indicate the presence of parasitoids. These predators and parasitoids may keep low or moderate aphid populations in check. One can often find soybean aphids by examining plants where lady beetles are observed. The presence of “fuzzy” aphid carcasses indicates fungal pathogens are present, which can lead to dramatic reductions of aphid populations.
4. Look for the presence of winged aphids. If the majority of aphids are winged or developing wings, the aphids may soon leave the field and treatment can be avoided.

5. If the plants are covered with honeydew or sooty mold, or stunted, an insecticide treatment may still be of value but the optimum time of treatment is past.
6. If fields are treated, leave an untreated test strip to compare against sprayed sections. This also provides a refuge for beneficial insects.
7. Good insecticide coverage and penetration is required for optimal control of soybean aphid, as aphids feed on the undersides of the leaves and within the canopy. Use high water volume and pressure. Aerial application works best when high water volume is used (5 gallons of water per acres recommended). Chemigation should provide excellent coverage.
8. Several insecticides are labeled for the soybean aphid (Chinese aphid on some labels). A list of registered insecticides, rates, preharvest intervals, etc. can be found at http://entomology.unl.edu/instabls/soyaphid.htm. Pyrethroids have a relatively long residual, and work best at temperatures below 90 degrees F. Organophosphates (i.e. Lorsban) have a fuming action, and may work well in heavy canopies or high temperatures. Spraying flowering soybean poses a threat to honey bees. Inform treatment plans to nearby beekeepers and follow precautions to minimize honey bee kills. When there is concern about honey bees, pyrethroids are the better insecticide choice.

More information concerning the soybean aphid will appear in future issues. Additional sources of information can be accessed through the UNL Entomology Website at entomology.unl.edu, or the North Central Soybean Research Program Plant Health Initiative at www.planthealth.info/soyaphid.htm. (TH&KJ)

Control of Volunteer Corn in Soybean

It is not surprising to see volunteer corn in soybeans since the two crops are used in rotation. However, volunteer corn is a weed and should be treated accordingly. It reduces light interception to the soybeans, interferes with harvesting procedure and makes the field look 'messy'. Growth of corn is generally 'faster' than soybeans, therefore if it is left uncontrolled, soon it will overtop the soybean canopy. Control can be achieved by mechanical means (e.g. inter-row cultivation) and herbicides.

Timing of inter-row cultivation should depend on the weed pressure. If volunteer corn is a predominant "weed", the timing of cultivation should be around the 5-6 leaf stage of corn. The growing point of corn remains in the ground until the 6^{th} leaf stage. Therefore any cultivation done prior to that leaf stage may result in regrowth of the plants and it will require second cultivation. It is especially true with shallow cultivation.

If you have Roundup-Ready soybeans, Roundup will control volunteer corn, unless you have had Roundup Ready corn in the previous year. Roundup will not control volunteer RR-corn in RR-soybeans.

Herbicides can also be used to effectively control volunteer corn. There are several grass type herbicides (graminicides) that can be used at their lower rates postemergence in both conventional- and RR-soybean. The list of herbicides and their lower rates per acre includes: Assure (4 oz), Fusilade (4 oz), Fusion (2 oz), Poast-Plus (10-16 oz), and Select (4 oz). Best control is achieved when herbicides are applied by the 3-4th leaf stage of corn. These herbicides used at full label rates will also control many grassy species, including barnyardgrass, green and yellow foxtail, fall panicum and sandbur. (SK)

Timing Post-Emergent Weed Control In Corn

As the season progresses, not only does your corn grow, the weeds grow as well, competing with the crop for light, water and nutrients. The longer the weeds compete with the corn the greater yield losses are to be expected. The level of crop yield loss will depend on environmental variables and (a) weed species composition within a given field, (b) weed density and (c) time of weed emergence relative to the crop growth stage.

In addition, to decide whether or not weed control is economically worthwhile, there is a need to understand if a given weed infestation is likely to reduce yield if left uncontrolled. This establishes the rationale for introduction of the concept of **critical period of weed control (CPWC)**. The CPWC is a period in the crop growth cycle during which weeds must be controlled to prevent yield losses. Weeds that emerge before or after this period may not present a threat to crop yields. This information is essential in making decisions on the need for and timing of weed control and in achieving an efficient use of herbicides.

Research at the University of Nebraska has shown that each crop has a CPWC during which weeds must be controlled to maintain maximum yields. However, we also concluded that the length of such critical period is influenced by the cropping practices, for example by the nitrogen level in corn.

CPWC in dry-land corn as affected by nitrogen: Studies were conducted in 1999 and 2000 at Mead and Concord. Predominant weed species at both locations/years were velvetleaf, common waterhemp and green foxtail, with the densities ranging from 80-120 plants per square yard. Nitrogen was applied immediately prior to planting as 46-0-0 and incorporated within one hour after application.

CPWC in corn was affected by the level of nitrogen fertilizer. Generally, a reduction in nitrogen fertilizer resulted in a longer CPWC, thus corn was the less tolerant crop to weed presence. For example, at zero N level, CPWC ranged from approximately 1st to 11th leaf stage of corn, based on a 5% acceptable yield loss (Table 1). This suggests that when no N-fertilizer is applied, the timing of weed control measure should start early in the season (at the 1st leaf stage of corn) and needs to be maintained through the 11th leaf stage, approximately the time of crop canopy closure.

Table 1: Critical period of weed control in corn based on 5% yield loss expressed as crop leaf stage (eg.V1) and days after crop emergence as affected by the level of nitrogen fertilizer.

Nitrogen-Level	Time to Control Weeds	Time to Control Weeds
lbs / acre	Corn leaf stage	Approximated Days After Crop Emergence
N = 0	V1 - V11	8-45
N = 55	V3 - V10	10-42
N = 110	V4 - V9	15-39
N = 210	V6 - V9	20-39

This data implies that an increase in N fertilizer delayed the timing of weed control and increased the corn tolerance to weed presence. From a practical standpoint, an insufficient N can reduce corn tolerance to weeds and it can widen the window of a CPWC. Furthermore, from a nitrogen restriction-use and a regulatory perspective, anticipated restrictions on the level of N use in corn may require more intensive weed management programs.

Cost of delaying weed control in corn: A common question among producers is "how much is it going to cost me if I delay weed control". In order to answer such question we graphed the yield loss data against the crop growth stage at the time of weed removal (Figure 1). In a practical situation one may decide to select, for example, 2%, 5% or 10% yield loss to signify the beginning of the critical period (time of weed removal). This range will allow adjustment of CPWC depending on the risk one is willing to take. In our study, an arbitrary level of 5% yield loss was used to determine the beginning of CPWC in both crops (see the 5% yield-loss-line in Figure 1).

In order to determine the cost of delaying weed control, the curve above the arbitrarily selected point (the beginning of CPWC) should be used. For example, if an arbitrarily selected point of CPWC is 5%, the 5% yield loss will occur if the weeds are removed at the 2nd leaf stage in 0-N-level (Figure 1). Delaying weed control to the 3rd leaf stage will cause about 7% yield loss, in essence costing producers a 2% yield loss. Similar trend is observed for the later leaf stages at each of the four curves (Figure 1).

Therefore, we conclude that delaying the time of weed removal, after the starting point of CPWC will cost a producer an average of 2% in yield loss per every leaf stage of delay. This recommendation is applicable up to canopy closure in corn (about 11 fully developed leaves).

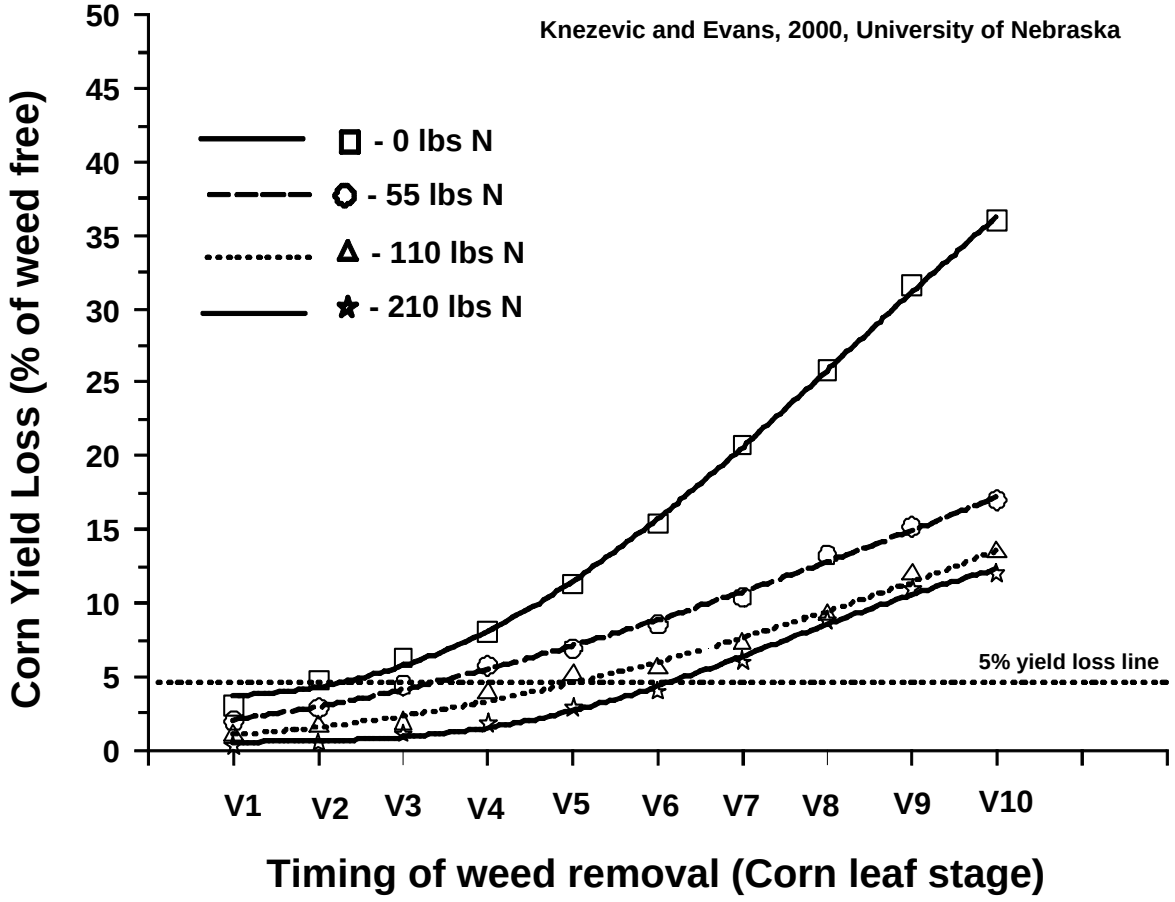
To determine the actual economics of the cost of delayed control, the producer will have to convert the percentage yield loss of the actual target yield on his farm. For example, if a target yield for corn is 100 bushels per acre, delaying weed control for every leaf stage of crop will cost producers about 2 bushels per acre of yield (thus 2% of 100 bushels per acre). In terms of actual economic loss, it will be about $4 per acre for every crop leaf stage of delay, assuming a price of $2 a bushel for corn.

Weed Size: Weed size at the time of weed control measure is another concern. In the corn study, the weeds were about the same size as the crop at the time of their removal except for the Mead site in 2000. If the weeds are taller than corn they will shade the crop so the control should be initiated 4-5 days (1-2 leaves) prior to the beginning of CPWC. If the weeds emerge 5-8 days after the crop they will not shade the crop that early in the season so the control can be initiated 5-10 days (2-3 leaves) after the beginning of critical period, as it is shown with the later start of the CPWC at Mead in 2000.

The size of weed species will effect the herbicide use rates too, especially the rates of Roundup or various generic glyphosates in Roundup-Ready soybeans. It is well known that Roundup has much better activity on grassy than broad leaf species. Therefore the rates of 16 to 24 oz should provide control of most common annual grassy species (foxtails, barnyardgrass, field sandbur, woolly cupgrass, panicums) that are 3-8 inches tall. The same rates should control annual broadleaves (velvetleaf, lambsquarters, pigweeds, mustards) that are less than 6 inches tall. For taller grasses and broadleaf species a full rate (32 oz) will be required. Higher rates of Roundup (40 oz - 60 oz) will be needed to control species such as ivy-leaf morning-glory, sweet clover, field bindweed, Venice mellow and various smartweeds (lady's thumb, Pennsylvania smartweed, wild buckwheat, etc).

Practical use of the CPWC and timing of weed control in herbicide tolerant crops: A generally sound strategy, for example in Roundup-Ready corn will be to apply Roundup tank-mixed with a residual herbicide at the beginning of the critical period, which will provide adequate weed control the entire critical period. In order to select appropriate herbicide mixtures for the weed spectrum at your farm, we suggest to consult the herbicide efficacy tables from the, "Guide for Weed Management in Nebraska." (Extension Publication, EC-130). (SK)

Figure 1: Corn yield loss and beginning of CPWC as influenced by the timing of weed removal and N-rate.



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