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CROP WATCH

University of Nebraska Cooperative Extension
Institute of Agriculture and Natural Resources

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No. 2004-12, June 11, 2004

Western Nebraska wheat crop deteriorating

Report from the Panhandle

The winter wheat crop in the Nebraska Panhandle is highly variable, but several general trends are evident. Dryland winter wheat that was planted following a summer crop harvested in 2003 is in very poor condition. Some of these fields have already been destroyed. With very limited soil water to support it through the long periods without rainfall, wheat following a summer crop has little yield potential even if significant rainfall is received soon. The plants are short and have lost all or most of their leaves. Many of the heads are blank or have very small seed.

Winter wheat planted following summer fallow in 2003 is faring much better, although even here drought stress is evident. Fields are developing mosaic patterns where highly stressed wheat is interspersed with less stressed wheat. These patterns are typically the result of diverse soils, snow drifts, and water runoff patterns. Wheat plants growing on light textured soils, with lower water holding capacity, are more likely to exhibit stress symptoms that include the loss of most or all of their leaves. Even the less stressed plants have lost all but the flag and penultimate leaves. Some wheat is still flowering while other wheat plants are quickly moving from the milk stage of grain development to the soft dough stage.

The wheat planted after summer fallow could still benefit from rainfall in the next several days. If temperatures can remain below 85°F for a couple of weeks, much of this wheat still has a reasonable chance of producing near average yields. However, a return in the next two weeks to the 90+ degree weather of this past weekend would be devastating to crop yield.

Drew Lyon, Extension Dryland Crops Specialist, Panhandle REC

Report from the west central area

As this area enters its fifth year of drought with little precipitation and soil moisture, prospects in many wheat fields are diminishing daily. In addition a late spring freeze also damaged many fields. Cooler temperatures, precipitation, and windless days would certainly be beneficial as the heads fill, but for many fields, too much damage has already occurred. A report of general wheat conditions follows.

Some continuous wheat and that planted in coarse-grained or sandy soil has already been cut or is being grazed. With pastures also in trouble, this may extend their use, however, it also will limit residue and soil moisture protection for next season.

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Inside

N.P. Valley irrigation water limited

North Platte Valley irrigators in western Nebraska are facing one of their toughest seasons yet when it comes to the drought. Snow pack was limited and water for irrigation will be approximately half what irrigators usually see.

Last year the supply was similar, but timely spring rains were the norm which allowed delivery of the limited water supply to be delayed with irrigation continuing until late August. This year, spring rains have been limited or nonexistent.

Irrigation districts, hoping to delay start up until late June, may be forced to start within the next few days because of the extreme conditions that are beginning to desicate plants.

The water that is available will provide only 45-50 days of water and this is only to a portion of the crop land. This means irrigation water will run out at the end of July or first of August and thousands of acres will be dependent on rain to finish out the crops.

C. Dean Yonts
Extension Irrigation Specialist
Panhandle REC, Scottsbluff

Ag briefs

Doug Anderson, Extension Educator in Fillmore, Nuckolls and Thayer counties: Thayer County crops look good. Corn is growing well, beans are up and getting started (and a few still need to be planted), and milo is getting started. Wheat is heading, but is short and there's not much hope of a stellar harvest. Moisture levels are low -- we've been getting enough to get by but have no reserve and may start irrigating this week.

Del Hemsath, Extension Educator in Dakota, Dixon, and Thurston counties: Alfalfa is being harvested, some without rain and more with a shower of rain. Most soybeans have been planted and are now in the first or second trifoliate stage. Corn is taking advantage of the warm temperatures, getting to that foot tall stage with five to six leaves. Weed control is a key since it has been windy for several days leading into weeks and unsuitable for herbicide applications. I have had several calls and seen damage in reference to herbicide drift to sensitive plants, primarily from vapors.

Bob Wright, Extension Entomologist: Insect counts and reports from black light traps operated by UNL faculty are available online at *http://entomology.unl.edu/fldcrops/index.htm*. Reports from Aurora and Clay Center are currently online and additional sites will be added as they become available.

Karen DeBoer, Extension Educator in Cheyenne County: The wheat in the Southern Panhandle is developing rapidly. In eastern Deuel County they are predicting harvest to begin the end of June which will be several days early. Wheat fields are showing signs of stress from lack of moisture. Freeze damage is evident in some fields.

Mormon crickets

Jerry Volesky, Extension Range and Forage Specialist, Jack Campbell, Extension Entomology Specialist; and Dave Boxler, Entomology, all at the West Central REC: A significant population of Mormon crickets has been discovered in southern Lincoln County. This is unusual because populations of this species are usually limited to the western Panhandle.

Mormon crickets are of economic importance because of their impact on rangeland, pasture, alfalfa, row crops, and vegetable gardens. After hatching in the spring, Mormon crickets will undergo seven in-star stages before becoming adults in 60 to 90 days.

After about the fourth in-star stage through the adult stage, Mormon crickets become ravenous and start banding together. These bands will ground-migrate considerable distances in search of food. The most effective way to reduce Mormon cricket populations is to use carbaryl (Sevin) bait. Most often, this is applied to areas in front of migrating bands.

Twisted whorls in corn

Roger Elmore, Extension Field Crop Specialist: Yellow corn leaves and twisted whorls were evident in some central Nebraska corn fields this week. The crop was at about the 6th leaf stage.

In one field I visited near Fairmont, 16% of the corn had twisted whorls. There and in other fields, a yellow corn leaf appeared in sharp contrast to the deeper green of the rest of the plants. The yellow leaves were held in the twisted whorl longer than usual and are now emerging and should green up quickly.

Over the years, this development has been described as buggy whipping, rapid growth syndrome, accelerated growth syndrome, roping, wrapped whorls, and twisted whorls.

Bob Nielsen, Purdue University agronomist, noted this week that he was seeing similar but more extensive levels in some Indiana fields. He described the unusual nature of these plants: "The lowermost six leaves were normal appearance, although the sixth leaf showed some crinkled (accordion-like) tissue near the base of the leaf blade. Beginning with the seventh leaf, the whorl was tightly wrapped and often bent over at right angles to the ground."

While the appearance of the twisted whorls and large yellow leaves is a little disconcerting, the

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

Prime time for treating grasshoppers nears

Ranchers should be scouting for grasshoppers to determine their potential impact and whether treatment is necessary.

As predicted, high populations of newly hatched grasshoppers are showing up in grasslands across central and western Nebraska. Increasing populations in many of these areas during the past two weeks indicate that grasshopper hatch is underway and will continue well into June.

Recent rains and cool weather in some areas will affect grasshoppers that are in the early stages -- just after hatching; however, conditions across most of western Nebraska remain dry and have been beneficial for survival of young hoppers. It is important for ranchers to evaluate grasshopper populations in their areas to determine the potential impact that the grasshoppers will have on grass production to determine if treatment is warranted in some area.

Estimating grasshopper densities is difficult and can only be done accurately with some practice. The best method for determining grasshopper density in field borders or hatching areas is to use the "square-foot" method. With practice, this approach can provide good estimates of hopper density.

To use this method, randomly select an area several feet away and visualize a one-square foot area around that spot. Walk toward this area while watching it and count the number of grasshoppers in or jumping out of the area. Repeat this procedure 18 times and divide the total number of grasshoppers by two. This will give you the number of grasshoppers per square yard (nine square feet).

Choose counting sites at random. Just after hatching, when grasshoppers are small, they will be difficult to see and you likely will underestimate the true hopper density. When sampling, vary the vegetation in the count area, and sample both north and south facing slopes.

Determining the grasshopper density at which economic damage will exceed the cost of control is very difficult. Estimates of this threshold density range from 10 up to perhaps 20 or more grasshoppers per square yard. This figure varies depending on cost of control and value of the rangeland grass. The reduced cost of current treatments put thresholds in the range of 10-15 per square yard.

The only practical time to control rangeland grasshoppers is well before the grasshoppers become adults – before mid to late June. Only three insecticides are labeled for control of grasshoppers in rangeland, and none of them will be effective after the grasshoppers have reached the adult stage.

The two traditional insecticides that have been used for grasshopper control in rangeland are malathion and carbaryl. A newer product that has shown good efficacy is Dimilin. This chemical is a growth regulator that inhibits the molting process in grasshoppers. It will have little effect on adult grasshoppers, but likewise, will not impact adult natural enemies. The label states that it should be used while most hoppers are in the 2nd and 3rd instars (about 1/4-1/2 inch), but its extended residual activity will provide control for up to 28 days. Mortality will be delayed until the treated insects begin to molt, so the effects may not be seen until 14 days or more after treatment.

These three products do not have grazing restrictions for rangeland treatments and can be applied while cattle are still grazing.

The University of Wyoming has developed low-cost treatments using these products in a program called Reduced Agent and Area Treatments (RAATs). Nearly 500,000 acres of rangeland were treated in Nebraska in 2003 using Dimilin in a RAATs program and by nearly all estimates control was very good. The RAATs program has significantly reduced the cost of treating rangeland. Treatment costs of rangeland applications last year ranged from $1.35 to just over $2.00 per protected acre.

The cost savings of the RAATs program comes from the application of insecticide to only 50% of the area by treating every other swath width. Grasshoppers are controlled over time when they move from the untreated areas to the treated areas.

The economic advantages of this program are great, but timing and application details are critical to the success of this program. (For more information about the program, visit the University of Wyoming Web site listed below.)

The following Web sites contain extensive information on grasshoppers and grasshopper management:

- University of Nebraska: *http://entomology.unl.edu/grasshoppers/index.htm*
- University of Wyoming: *http://www.sdvc.uwyo.edu/grasshopper/*
- USDA-ARS: *http://www.sidney.ars.usda.gov/grasshopper/index.htm*

Gary Hein, Extension Entomologist
Panhandle REC
John Campbell, Extension Entomologist, West Central REC

Tips on righting irrigation system damage

Tornadoes, high winds, hail and rains in late May in central and eastern Nebraska wreaked havoc on fields and farm equipment. More than 100 irrigation systems in a one- to two-county area of central Nebraska were damaged May 22 with another 20-40 more damaged the next weekend.

In many cases, irrigation systems were visibly damaged or destroyed, while in other cases the damage may be less apparent. When contacted by phone this week, irrigation industry representatives said dealers were doing everything they could to get most or all of their clients up and running in time for irrigation season. In some cases, that means replacing a slew of irrigation systems quickly and in others it means uprighting and repairing the damaged systems. In either case, it often means that Nebraska dealers are calling in favors from other dealers throughout the Midwest to bring in teams of skilled technicians. Similarly, Nebraska manufacturers are gearing up production to respond to the event.

Doug Soderquist, engineering manager for T-L Irrigation Company in Hastings, said they've added employees and shifts this month.

"If Mother Nature cooperates, we should be able to get the damaged systems up and running in time," he said.

For those readers who may yet encounter system damage this year, representatives of irrigation manufacturers and university specialists shared several recommendations:

1. If damage is apparent, call your system dealer (and your insurance agent) so a trained technician can evaluate damage and disconnect electricity or electrical components. Technicians are trained to safely deal with electrical problems and to assess the system, said Al Kuta, product manager for Zimmatic Irrigation, a product of Lindsay Manufacturing.

2. Walk the entire length of the system, looking for damage. Lightning is often a part of these storms and can damage electrical components, said Gene Hansen, director of the Product Support Group at Valmont Irrigation in Valley. Look for burnt spots on electrical boxes, tower lines or the power source and call a trained technician to fix electrical damage. Also look to see that the crowns are uniform, none of the spans are out of line, and that drive units look straight and true, Hansen said. Especially with an older system, doublecheck welds and attachment points on drive units to make sure they haven't cracked. Also check tower boxes and lids to ensure they're still tightly sealed.

3. Start the system and examine it and the watering pattern carefully to discern possible problems.

4. Conduct a thorough preseason check (*page 111*), using your operator's manual as a guide, and perform routine maintenance.

5. After rapairs, test the system.

While you can't control Mother Nature, you can take steps to ensure that your system is ready for what may be a long irrigation system.

Shifting strategies to irrigate pastures

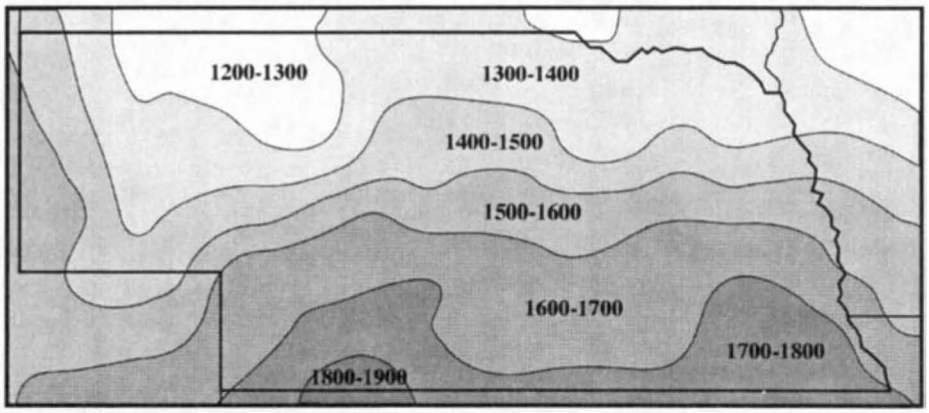
Hundreds of pivots have been added to pastures in recent years. Lack of profit from row crops plus improved livestock prospects have led to many producers converting pivots from row crops to irrigated pastures. It's not unusual to produce 1,000 lbs of gain per acre with yearling steers or carrying 200 or more cow/calf pairs for five months on a single 130-acre circle.

Success with irrigated pasture, though, requires a different management strategy than that used with row crops. With row crops, irrigation generally is used to supply moisture to a four-foot root zone. Many plants in irrigated pastures, though, tend to be shallow rooted. They may have over 95% of their roots in the top two or three feet of soil. As a result, they become moisture stressed more quickly. Water use will average about a quarter inch per day, but use starts much earlier in the season than with row crops. Thus, if rains don't occur, irrigation will need to start sooner and continue longer.

Pastures also need to be watered more frequently if they are to produce up to their potential. Ideally, it would be nice to apply 0.50 to 0.75 inch of water a couple times each week. To minimize compaction, avoid irrigating where animals are grazing or will graze before the soil surface drys.

Pasture irrigation may require a shift in management, but when done correctly, the results are well worth it.

Bruce Anderson
Extension Forage Specialist



Estimating stalk borer development

Accumulated growing degree days as of May 21, using a 41° F base. Producers should determine the need for treatment when 1,400-1,700 growing degree days have accumulated. (*Map courtesy Al Dutcher, NU State Climatologist*)

Test irrigation system now; avoid untimely delays

With hot, dry temperatures the norm this week, irrigation season can't be far behind. If you haven't already done it or if your fields were in the path of recent storms, now would be a good time to perform a preseason check of your irrigation system.

In storm damaged areas, if the system isn't twisted or lying on its side, damage may not be readily apparent. Systems that appear unharmed still need to be carefully checked to avoid unnecessary and costly delays later in the season. Electrical systems may have been struck or damaged by lightning or trusses may have been weakened.

Similarly, high or tornadic winds may have forced plant material, dirt or sand into electrical boxes, connectors, nozzles, air intakes, radiators or filters, creating potential problems once the system is in use. Low-pressure systems with nozzles with long drop tubes may have smacked the truss rods and been cracked.

These checks are in addition to the regular preseason maintenance to improve system performance and efficiency. Component wear results in less uniform water application and increased energy use. To reduce the risk that wear and tear will result in untimely breakdowns, worn components should be identified and replaced now.

Probably the best way to identify worn components such as sprinklers, pumps or irrigation systems is to keep good records. Recording the static and pumping water levels, output pressure, flow rate and energy use at least once per month provides an excellent means of evaluating pump and motor performance.

Each irrigation system will have many areas to lubricate or parts to replace prior to the first irrigation. It is impossible to list them all, but this checklist can be used as a guide.

Preseason checklist

- ☐ Change the engine oil and filter.
- ☐ Clean and replace the air filter.
- ☐ Check drive belts (if any).
- ☐ Grease all drive shafts on pump and motor.
- ☐ Clean, gap or replace spark plugs on gas or propane engines.
- ☐ Replace fuel filters.
- ☐ Check and clean the battery power cables.
- ☐ Drain, flush and refill the cooling system.
- ☐ Drain and replace the lubricating oil in the pump gear drive.
- ☐ Refill the drip oil reservoir and allow approximately 1/2 gallon of oil to drain into the drip line.
- ☐ Check the gear drive to be sure it is free moving and clean the nonreverse pins with an emery cloth; lubricate each pin.
- ☐ Make sure all safety shields are in place.
- ☐ Start the motor and allow it to run at 1000 rpm for 30-60 minutes to distribute the oil and check for leaks in the oil or cooling systems.
- ☐ Check the operation of the chemigation safety equipment.
- ☐ Check the owner's manual for your system for other components of the pump or motor that may need to be lubricated, repaired, or replaced.
- ☐ Insure that the gear drive is free moving and clean and lubricate non-reverse pins,
- ☐ Run the motor at 1000 rpm for 45 minutes.

Each system is equipped with a number of safety switches to shut the system down in case of failure. Now is the best time to insure that all these controls function properly. Run the system through a set of conditions that would cause each of the system safety controls to function. A walkby inspection of the system can identify sprinklers/nozzles that are not operating properly. Replace nozzles with those recommended by the system manufacturer. Nozzle wear depends on the quality of the water and the system operating pressure. As a rule of thumb, sprinkler replacement should be considered after approximately 10,000 hours of operation.

Check nozzle wear by inserting a drill bit into the nozzle that corresponds to the initial size of the nozzle opening.

Bill Kranz, Extension Irrigation Specialist
Haskell Ag Lab, NEREC

Ag briefs *(Continued from page 108)*

corn is expected to grow out of this phenomenon without threatening yield. While scientists aren't sure what causes this, it may be related to the storms with hail and high winds that passed through this area earlier. It also has been aassociated with herbicides and sharp transitions between slow and rapdi growth periods.

For photos and more information visit Nielsen's Corny News Network Web site at *http://www.agry.purdue.edu/ext/corn/news/articles.04/TwistedWhorl-0607-Gallery.html*

Controlling volunteer corn in soybean

It is not surprising to see volunteer corn in soybean since the two crops are used in rotation; however, volunteer corn is a weed and should be treated accordingly. It reduces light interception to soybean, uses soil moisture, and interferes with harvest. Corn growth is generally "faster" than that of soybean, therefore, if it's not controlled early it can overtop the soybean canopy.

Control can be achieved by mechanical means and herbicides. Timing of inter-row cultivation should depend on the weed pressure. If volunteer corn is a predominant "weed", cultivation should occur at about the 5th-6th leaf stage of corn. The growing point of corn remains in the ground until the 6th leaf stage, so any cultivation before that stage may not kill the plant and a second cultivation may be necessary. This is even more likely with shallow cultivation.

If you have Roundup Ready soybean, Roundup will control volunteer corn, unless it's Roundup Ready corn.

Herbicides also can be used to effectively control volunteer corn. Several grass herbicides (graminicides) can be used at their lower rates postemergence in both conventional and Roundup Ready soybean. The herbicides and their lower rates (per acre) include: 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 3rd-4th leaf stage of corn. When used at full rates, these herbicides also will control many grassy species, including barnyardgrass, green and yellow foxtail, fall panicum and sandbur.

Stevan Knezevic, Integrated Weed Management Specialist Haskell Ag Lab, NEREC

Crop tours in the Panhandle

Grass seed production

Producers interested in learning more about the growing grass seed industry in western Nebraska will want to check out two June tours.

The first tour will be part of the Box Butte County Miscellaneous Crops Tour on Thursday, June 17. This tour will start at 10:30 a.m. at the Mark Watson farm 4 miles east of Berea on Jefferson Road and 0.5 miles north. The tour will consist of several stops, including grass seed plots at the Dan Laursen farm at approximately 4 p.m.

The second tour will begin at 4:30 p.m. Thursday, June 24 at the Carl Thomas farm, located 2.5 miles north of Highway 26 on County Road 10 between Morrill and Mitchell. This tour will highlight a broad range of grass seed production, including Kentucky bluegrass, intermediate ryegrass, intermediate wheatgrass, Indian ricegrass, and others.

Chickpea and pea

Chickpea and pea production continue to be a growing part of crop diversification in the Nebraska Panhandle. Tours of irrigated and dryland production in Box Butte County will be held June 17, beginning at 10:30 a.m. at the Mark Watson farm, located 4 miles east of Berea on Jefferson road and 0.5 miles north. This tour will include both forage and grain peas and will look at mixtures of forage peas with several spring cereals.

Chickpea weed control options, management practices, and drought concerns also will be discussed. With local delivery available for chickpeas and the high feed value of peas for livestock, both crops look promising for the region.

Brown mustard & canola

The first tour will start at the Huntsman elevator at 4 p.m. June 14. This tour will cover several production fields in the southern Panhandle, as well as weed control research at the University of Nebraska High Plains Ag Lab. A second tour, part of the Box Butte County Miscellaneous Crops Tour, will start at 10:30 a.m. at the Mark Watson farm, 4 miles east of Berea on Jefferson road and 0.5 miles north. Brown mustard and canola production will be featured at the Dan Laursen farm at 2:30 p.m.

Brown mustard and canola research also will be featured on a June 29 tour beginning at 8:30 a.m. at the High Plains Ag Lab, located 6 miles north of Sidney on highway 385 and 2.5 miles west, 0.5 miles north, and 0.25 miles east. The final tour will be held at the Panhandle Research and Extension Center on July 6 at 9 a.m. This tour will feature the crop under irrigation and look at several experimental lines.

Tour information

For a map and directions to each site, contact Debra Underhill at the University of Nebraska Panhandle Research and Extension Center at 308-632-1230 or check on the Web at: *http://www.panhandle.unl.edu.*

Wheat

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Wheat planted last fall following other crops is faltering, due to the lack of soil moisture at planting and since. Yields may be in the range of 10 to 20 bushels per acre. Summer fallow wheat on fine textured soils is still trying to hang on but needs precipitation and cooler temperatures for grain fill. Wheat will shrivel up quickly with a return to temperatures in the upper 90s.

On Monday, the USDA Nebraska Agricultural Statistics Service reported that statewide wheat condition declined and rated 21% very poor, 27% poor, 32% fair, 19% good, and 1% excellent, below last year and average.

Bob Klein, Extension Crops Specialist, West Central REC

Post-emergence corn

Timing weed control for impact and efficiency

As the crop season progresses, weeds are also developing, competing with the crop for light, water and nutrients. The longer weeds compete with the corn, the greater the yield loss. 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.

To determine whether weed control is feasible, you need to know whether a given weed infestation is likely to reduce yield if left uncontrolled. To determine this, it's helpful to understand the critical period of weed control -- a period in the crop growth cycle when weeds must be controlled to prevent yield losses. Weeds that emerge before or after this period may not threaten crop yields.

Research at the University of Nebraska has shown that each crop has a critical period when weeds must be controlled to maintain maximum yields. Research also indicated that the length of this period can be influenced by cropping practices, for example, by the nitrogen level in corn.

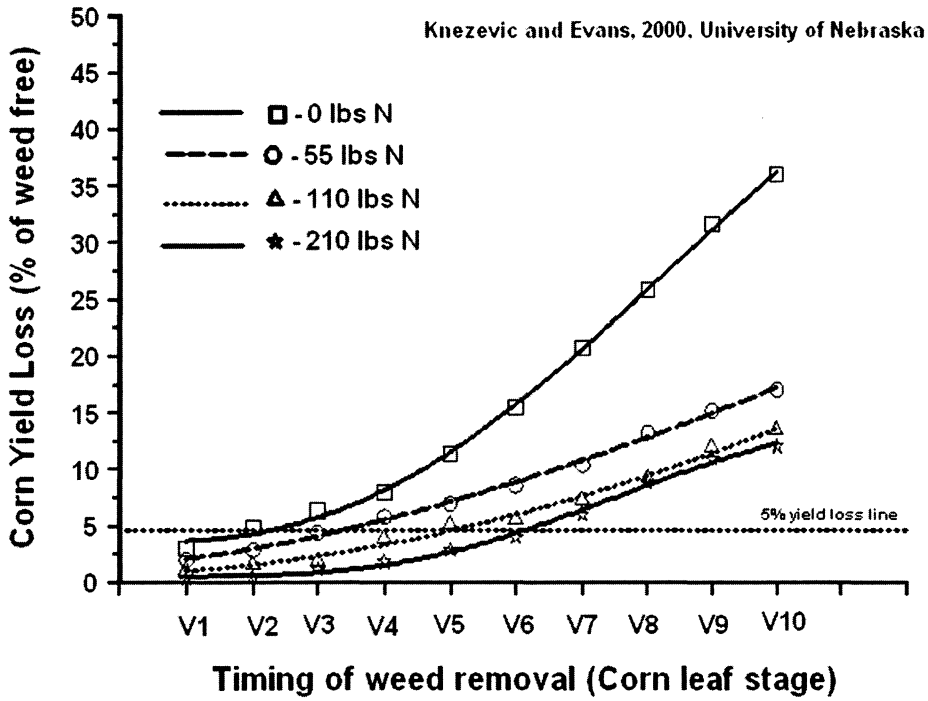

Figure 1: Corn yield loss and beginning of CPWC as influenced by the timing of weed removal and N-rate

How nitrogen affects the CWPC

To study this, research was conducted in 1999 and 2000 at Mead and Concord. Predominant weed species at both locations and years were velvetleaf, common waterhemp and green foxtail, with 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

The critical period of weed control in corn was affected by the level of nitrogen fertilizer. Generally, reducing nitrogen fertilizer resulted in a longer weed control period thus corn was the less tolerant crop to weed presence. For example, with no added nitrogen, the critical period ranged from approximately the 1st to 11th leaf stage of corn, based on a 5% acceptable yield loss (*Table 1*). This suggests that when no nitrogen fertilizer is applied, weed control should start early in the season (at the 1st leaf stage of corn) and needs to be maintained through the 11th leaf stage, approximately when the canopy closes.

This data implies that an increase in nitrogen fertilization delayed the timing of weed control and increased corn's tolerance to weeds. From a practical standpoint, insufficient nitrogen can reduce corn tolerance to weeds and widen the window for weed control. Thus, from a restricted use and regulatory perspective, restrictions on nitrogen applications in corn may indicate more intensive weed management.

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 lbs / acre	*Time to control weeds Corn leaf stage*	*Time to control weeds Approximate 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

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Postemergence weeds in soybean

Timing of control measures key to success

With advances in herbicide tolerant soybean (e.g. Roundup Ready), the timing of postemergence weed control is an issue. To decide whether weed control is economically worthwhile, first determine whether a given weed infestation is likely to reduce yield if left uncontrolled. There is a **critical period of weed control** during the crop growth cycle when weeds must be controlled or yields will be affected. Weeds that emerge before or after this period may not affect crop yield. Understanding this critical period is essential in determining the need for and timing of weed control and the most efficient use of herbicides. Researchers also found that the length of this period is influenced by cropping practices, for example, row spacing in soybean.

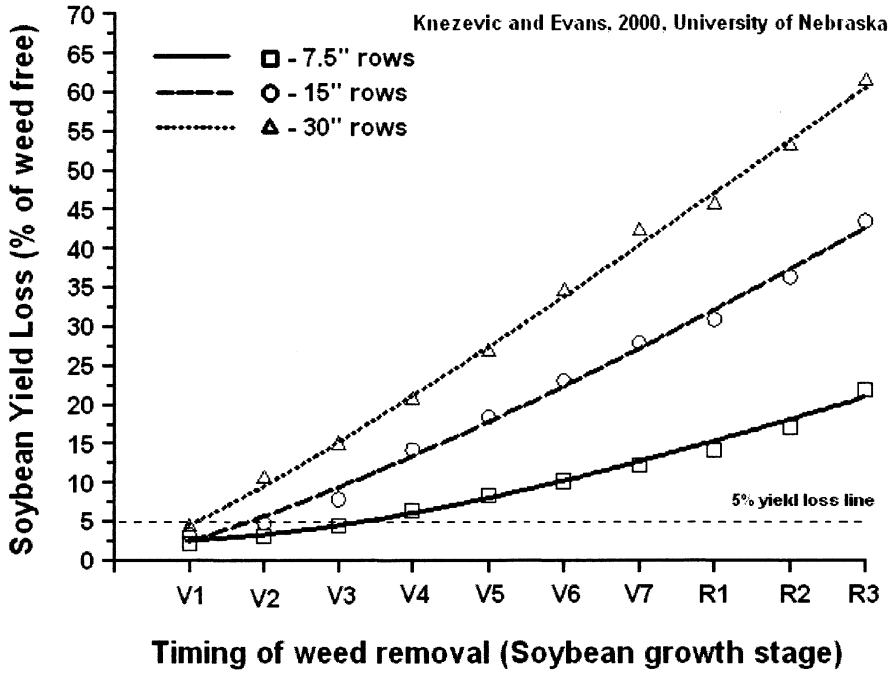

Figure 1. Soybean yield loss and beginning of the critical period of weed control as influenced by the timing of weed removal and row spacing.

Effect of row-spacing

Studies were conducted in 1999 at Mead and 2000 and 2001 at Mead and Concord on the effect of soybean row spacing on the critical period of weed control. Predominant weed species at both locations and years were velvetleaf, common waterhemp and green foxtail, with densities ranging from 70-100 plants per square yard.

In this study the critical period of weed removal was significantly influenced by row spacing. Generally, an increase in row spacing resulted in a less competitive crop, and thus, a need for earlier weed removal. For example, with wide-row, 30-inch soybeans the critical period of weed control began at approximately the 1st trifoliate stage, based on a 5% acceptable yield loss level (*Table 1*). This suggests that in wide-row soybeans control measures should start early in the season. With 15-inch row soybeans, the critical period was delayed until approximately the 2nd trifoliate stage and with 7.5-inch rows, the critical period began at the 3rd trifoliate stage (*Table 1*).

This data implies that reducing row spacing delays the timing of weed control and increases the tolerance of soybean to weed presence. The mechanism of soybean tolerance needs to be determined, although we believe it is related to the crop shading effect. The speculation is that even though weeds are present in narrow row soybeans, they are not growing as vigorously and they are not as competitive against the crop, due to crop shading. Furthermore, from a practical standpoint, these results indicate that less intensive weed management may be needed with narrower rows (weed control measure applied just once or twice).

Cost of delay

To help determine the potential cost of delaying weed control, yield loss data from these studies were pooled among years and locations and graphed against the crop growth

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Table 1: The beginning of CPWC in soybean based on 5% yield loss expressed as crop leaf stage (e.g.V1) and days after crop emergence (DAE) as affected by the row spacing, at two locations in 1999, 2000 and 2001.

Row spacing inches	*Time to control weeds Soybean leaf stage*	*Time to control weeds Days after crop emergence*
7.5	V3	19
15	V2	15
30	V1	9

Post-emergence soybean (Continued from page 114)

stage at the time of weed removal in corn and soybean (*Figure 1*).

It was estimated that for every leaf stage treatment is delayed past the CPWC, yield would be reduced by 2%. For example, the time to control weeds in 7.5-inch row soybean is the V3 stage (Table 1), if weed control is delayed until the V4 (fourth trifoliate), it will cost a producer approximately 2% in yield losses due to prolonged weed competition. The same is true if weed control is delayed past the recommended critical time in other soybean row spacings (*Table 1*). This recommendation is applicable up to the R3 stage in soybean (beginning pod). If weed control is delayed further than these stages, yield losses will be much higher than suggested.

In terms of actual economic losses in soybean, it will be about $5 per acre for every soybean leaf stage of delay, assuming a price of $5 per bushel and a yield goal of 40 bushels.

Weed size

Weed size at the time of weed control is another concern. If weeds emerge four to five days before the crop or are taller than the crop, they will shade the crop. Control should be initiated four to five days before the critical period of weed control. If weeds emerge 5-10 days after the crop, they will not shade the crop and control can be initiated 5-10 days after the critical period begins.

The size of weed species will affect herbicide use rates too, especially with Roundup or any generic glyphosate used in Roundup Ready soybeans. It is well known that Roundup has much better activity on grassy weeds compared to broad leaf species. A rate of 16 to 24 ounces should control most common annual grassy species (foxtails, barnyard grass, field sandbur, woolly cupgrass, panicums) that are 3-8 inches tall. The same rate should control annual broadleaves (velvetleaf, lambs quarters, pigweeds, mustards) less than 6 inches tall.

For taller grasses and broadleaf species a full rate (32 ounces) will be required. Higher rates of Roundup (40-60 ounces) will be needed to control species such as ivy-leaf morning-glory, sweet clover, field bindweed, Venice mellow and various smartweed species (lady's thumb, Pennsylvania smartweed, wild buckwheat, etc).

Timing for the critical period

The concept of the critical period of weed control is an important element in determining if and when to apply postemergence herbicides. A generally sound strategy with Roundup Ready soybeans is to apply Roundup tank-mixed with a residual herbicide at the beginning of the critical period. This should provide adequate weed control throughout the critical period.

Stevan Knezevic
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For herbicide info

For help in selecting appropriate herbicide mixtures for the weed spectrum at your farm, check the herbicide efficacy tables in the University of Nebraska Cooperative Extension publication, *Guide for Weed Management in Nebraska* (EC-130). It is available from Cooperative Extension offices or online at *http://ianrpubs.unl.edu/weeds/ec04-130.pdf*

Post-emergence corn

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Cost of delaying weed control

A common question among producers is "How much is it going to cost me if I delay weed control?" To answer this 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 you to adjust the critical period, depending on the risk you're willing to take. In our study, an arbitrary level of 5% yield loss was used to determine the beginning of the critical period of weed control in corn and soybean (*Figure 1*).

In order to determine the cost of delaying weed control, use the curve above the arbitrarily selected point (the beginning of the critical period of weed control). For example, if an arbitrarily selected point 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. A similar trend is observed for the later leaf stages at each of the four curves (*Figure 1*). Therefore, we conclude that delaying weed removal until after the start of the critical period 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 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

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Western Nebraska wheat variety tours

Mark your calendars now to attend one of the upcoming University of Nebraska Panhandle wheat plot tours. The plots include comparisons of varieties, cropping systems and pest management practices.

Tour schedule

June 25, 9 a.m., Keith County Wheat Tour at Ogallala. *Location:* 3 miles north, 8 miles west on Hwy 26.

June 28, 6 p.m.: Duel and Garden County Dryland Winter Wheat Tour. *Location:* from junction of U.S. 30 and Wheatland Dr. (Rd 165) west of Chappell, drive 8.75 miles north on Road 165; farm on east side of road.

June 29, 8:30 a.m. High Plains Agricultural Laboratory Wheat Field Day. *Location:* from Sidney 6 miles north on U.S. 385, west at Huntsman elevator, 2.5 miles west, 0.5 mile north; from Gurley, 7 miles south on U.S. 385, west at Huntsman elevator, 2.5 miles west and 0.5 mile north.

June 29, 3 p.m. Cheyene County Irrigated Winter Wheat. *Location:* from Sidney, drive 8 miles east on U.S. 30, 1.5 miles south n Road 131, 1 mile west on field road, south into field edge, and west to end of circle.

June 29, 6 p.m. Organic Winter Wheat Tour. *Location:* 8 miles east on U.S. 30, 1.5 miles south on Road 131, 1 mile west on field road, south into field edge; at the west end of the circle.

June 30, 10 a.m. Morrill County Dryland Winter Wheat Tour. *Location:* from Dalton, drive 10 miles north on U.S. 385, 0.7 miles west on Road 78; on the south side of the road.

June 30, 2 p.m. Box Butte County Winter Wheat Tour. *Location:* from Hemingford, drive south on Hwy. 2, west 0.5 miles on Hall Road, just west of CR67 and Hall Road intersection, south side of the road.

June 30, 6 p.m. Dawes County Dryland Winter Wheat Tour. *Location:* from Chadron, drive 8 miles west on U.S. 20, 0.9 miles north on Airport Road and it's on the west side of the road.

July 1, 10 a.m. Goshen/Scotts Bluff County State Line Winter Wheat Tour followed by a barbecue at the Wheatland School. Cosponsored by the University of Nebraska and University of Wyoming.

Location: from Lyman, drive 9 miles south on Stateline Road, west 0.75 miles, south side of road; from Hawk Springs, Wyoming, drive 10.25 miles east and the site will be on the south side of the road.

Regional wheat plot tours

June 16, 8 a.m. Colorado State University Washington County Winter Wheat Tour. *Location:* 4 miles east of Akron on Hwy 34.

June 16, 4 p.m. CSU Yuma County Winter Wheat Tour. *Location:* 4 miles north of Yuma on Hwy 59, 3 miles east on Road 43 to Road J

June 17, 9 a.m. CSU Sedgwick County Winter Wheat Tour. *Location:* 12 miles south of Julesburg on Hwy 385 to County Road 8.

June 17, noon CSU Phillips County Irrigated Winter Wheat Tour. *Location:* 1.5 miles north of Haxtun on Hwy 59, 1 mile east on Road 34, 1/8 mile south on Road 7.

July 1, 4 p.m. University of Wyoming Pine Bluffs Dryland Wheat

July 1, 6 p.m. University of Wyoming, Albin Irrigated Winter Wheat

Location: from Albin, Wyoming, drive 2.5 miles west on Hwy 216, 2 miles south on Road 159, 0.3 miles west on Road 227; 2 miles south on Road 159, 3 miles west on 225, north 0.7 on Road 156, and it's on the east edge of the north pivot.

Post weed control in corn *(Continued from page 115)*

stage of delay, assuming a price of $2 per bushel for corn.

Weed size

Another issue is the effect of weed size at the time of control. In the corn study, the weeds were about the same size as the crop at the time of removal, except for the Mead site in 2000. If the weeds are taller than corn they will shade the crop so control should be initiated four to five days (one to two leaves) prior to the beginning of the critical period. If the weeds emerge 5-8 days after the crop they will not shade the crop that early in the season so control can be initiated 5-10 days (two to three leaves) after the beginning of the critical period.

Weed size also will affect herbicide use rates, especially the rates of Roundup or generic glyphosates. It is well known that Roundup has much better activity on grassy weeds than on broad leaf species. Therefore a rate of 16 to 24 ounces 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, lambs-quarters, pigweeds, mustards) that are less than 6 inches tall.

For taller grasses and broadleaf species a full rate (32 ounces) will be required. Higher rates of Roundup (40-60 ounces) 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

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.

Stevan Knezevic, Extension Weeds Specialist, Integrated Weed Management, Haskell Ag Lab