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CropWatch No. 2003-8, May 2, 2003

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CROP WATCH

University of Nebraska Cooperative Extension
Institute of Agriculture and Natural Resources

No. 2003-8
May 2, 2003

Prospective acres increase

Grain sorghum production tips

Nebraska growers expect to plant 650,000 acres to sorghum in 2003, 44% more than in 2002, and the largest total in five years, according to USDA estimates released this month. If you're new to sorghum or just haven't planted it recently, check the following recommendations for achieving successful sorghum production.

Choose a top sorghum hybrid. Select a top performing hybrid from one of the seed companies that is proud to sell sorghum seed. Don't be afraid of taller hybrids. Many times these are top performers and, with today's combines, height is not a real issue. Height also doesn't appear to be closely related to stalk rot or standability. As a general guideline, I recommend planting 80,000 seeds per acre in any row spacing of dryland acres in Gage County or any southern county east of Gage. For each county west of Gage in southern Nebraska, drop the plant population by 5,000 seeds per acre.

Fertilize for top yields. Grain sorghum needs 1.1 lbs of nitrogen per bushel for top economic production. Soil test results will indicate how much nitrogen to add and the response you might expect from adding phosphorus and zinc. If the phosphorus level in the field is low, starter fertilizer is an excellent way to get the phosphorus efficiently placed for top response. Today when we rely so much on postemergent herbicides for weed control, starter fertilizer usually will help provide a larger plant sooner and aid in weed control.

Limit tillage. Grain sorghum yields have been excellent under no-till systems. If you feel you have to part the residue, avoid moving soil. Residue cover keeps the soil temperature a bit cooler and reduces stalk rot problems. This is particularly true as you move west in Nebraska to dryer and warmer summertime soil temperatures.

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Inside

Scout corn seedlings for southern corn leaf beetles

In the past few years the southern corn leaf beetle has injured seedling corn in southeastern Nebraska. This insect also has reportedly damaged corn periodically in northeast and north central Kansas and, in recent years, in Missouri, Iowa and Illinois. Given the relatively mild winter, it is expected to be a problem in parts of southeastern Nebraska again this year. As corn emerges be alert for potential damage.

The adult corn leaf beetle overwinters in sheltered areas and becomes active in April. In addition to corn it may feed on weeds, including cocklebur. The adults are about 0.20 inch long, grey to dark brown and often covered with soil particles, making them difficult to see. They hide in the soil during the day and are difficult to find. They feed on the stems of corn seedlings and the edges of leaves, producing a notched appearance. If abundant they may cause severe damage to seedling corn.

While some basic facts are known about the southern corn leaf beetle's life cycle, there has been little biological research since the early 1900s. This beetle has one generation a year. The beetle lays eggs in the soil around the base of corn plants, and

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Field reports

Gerald Hopp, Extension Educator in Richardson County: Corn planting began about 30 days ago and is vigorously moving along. Modest rains greatly improved cool-season pastures and winter wheat.

Keith Jarvi, IPM Extension Assistant in the Northeast REC: Planting has begun in the northeast with some farmers no-tilling corn into bean stubble and some disking fields in preparation for planting. As much as 10% of the corn was planted by Tuesday. Alfalfa growers should be looking for alfalfa weevil feeding on the tips of the plant.

Ron Seymour, Extension Educator in Adams County: About 10-20% of corn fields have been planted, but recent rainfall has slowed progress. The rain has helped wheat and pasture conditions. Wheat is beginning to joint and cool season grass pastures are growing well.

USDA Nebraska Agricultural Statistics Service: For the week ending April 27, overcast skies and wet soil conditions limited fieldwork activities for the third consecutive week, according to USDA's Nebraska Agricultural Statistics Service.

Significant rainfall in central, south central and southwestern districts boosted soil moisture supplies and producer outlook. However, statewide subsoil moisture supplies continue to rate well below last year and average. High grasshopper populations in parts of central Nebraska have resulted in ariel spraying for control.

Temperatures averaged one degree below normal for most districts.

Corn planting moved ahead slowly last week and was 14% complete. This is behind 29% last year and the average of 20%. Corn planting was most advanced in the southeast with over one-third of the crop planted. Statewide, 1% of the crop had emerged, equal to the multi year average but behind last year when 3% had emerged.

Wheat condition improved again last week and rated 1% very poor, 9% poor, 40% fair, 42% good, and 8% excellent. While wheat condition is better than last year, it's still below the long-term average. Thirty-five percent of the crop had jointed, ahead of 13% last year and the average of 24%.

Oat seeding moved to 87% complete, behind last year at 91% but ahead of average for this time at 85%. Fifty-one percent had emerged, equal to average.

Sugar beet planting progressed in the Panhandle and southwest districts with 60% complete, compared to 77% last year.

Alfalfa conditions improved and rated 5% very poor, 14% poor, 34% fair, 36% good, and 11% excellent.

Pasture growth continued to be slow and rated 20% very poor, 31% poor, 31% fair, 17% good, and 1% excellent, well below average and well below last year. Condition of cattle and calves rated mostly good with calving now 94% complete.

Management calendar

May 2- May 16

- **Don't forget to renew your chemigation permit by June 1.** More than 14,000 permits were issued in Nebraska in 2002. Also, check your chemical injection pump soon to ensure that it's ready.
- **Scout corn fields regularly starting at emergence for signs of cutworm injury.** Small cutworms may cause small holes in leaves; larger cutworms may cut a plant at soil level. Postemergence treatments are recommended if 5% cut plants are found.
- **Despite the rush of planting, take time to carefully record what seed was planted where,** what fertilizer and pesticides were applied, and other details which may slip away before they're recorded. Having detailed information later can be helpful in determining what worked best where. NU Cooperative Extension has published a pocket-sized aid for record-keeping: *Field Records for Restricted Use Pesticide Application and Integrated Crop Management by Private Applicators* (EC00-2540). It lists the recordkeeping requirements for restricted use pesticide applications and includes numerous record sheets. Contact your local Extension Office for a copy. Cost is $1.

CROP WATCH

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Sorghum tips

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Grass control. If you have a terrible grass or shattercane problem in the field, plant corn or soybeans rather than sorghum because of the limited herbicide choices available for grain sorghum. Early preplant herbicide applications in April are the best choice for grain sorghum. The herbicide will be in place for the later planted crop which saves moisture and gives the producer added options for both grass and broadleaf control. Spraying part of the Bicep, Bullet, Guardsman, etc. behind the planter and/or using Roundup behind the planter extends weed control and ensures a clean field at planting without using tillage to dry the soil and plant more weed seed. There are limited herbicide options for post grass control, so it's important to scout early and respond aggressively to escapes while they are small.

Scout for greenbugs. Scout fields carefully and often during July to determine the need for greenbug control. If you wait until August for treatments, the damage will already have been done.

Trifold chinch bug plan. Chinch bugs are a threat to sorghum and corn at three stages. First, in the seedling stage when chinch bugs are present because of poor or late control of grasses like volunteer wheat. Second, when wheat or oats ripen and the chinch bugs move to nearby grain sorghum or corn fields. Third, after heading when the second generation flies into the grain sorghum or corn and sets up housekeeping. Signs point to a higher population of chinch bugs this year so stay alert to the potential and be prepared to choose the best treatment option for your farm. *(See pages 74-75 for more on insect control in sorghum.)*

Timely harvest. Often sorghum is not treated as a priority crop and is left to dry while corn is harvested. This may not be the best choice for top sorghum yields.

Paul Hay
Extension Educator, Gage County

Maps courtesy of USDA Cereal Rust Bulletin

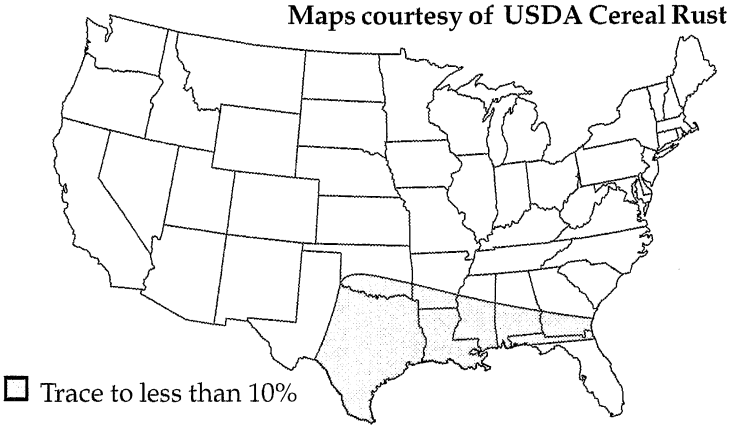

Figure 1. Leaf rust severities in wheat fields, as of April 23.

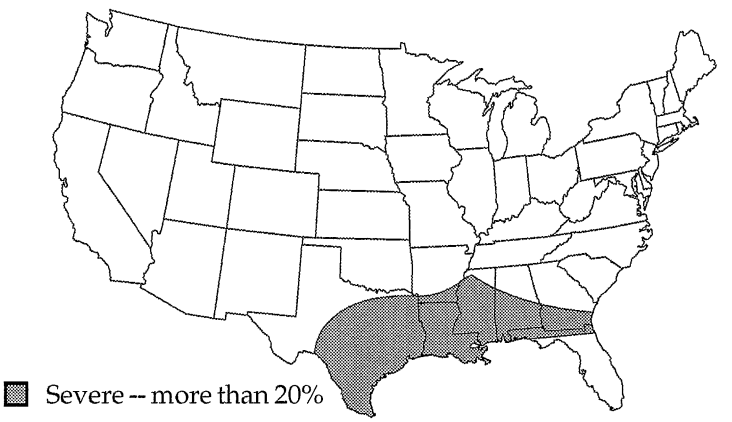

Figure 2. Stripe rust severities in wheat fields, as of April 23.

Wheat mosaic developing

Symptoms of **soil-borne wheat mosaic** are evident across eastern and south central Nebraska. The recent cool, wet weather will extend the period of symptom development and in some fields may contribute to some yield depression. In affected fields, the disease appears as irregular patches of yellow or pale green wheat. So as not to confuse it with nitrogen deficiency, examine individual plants for virus symptoms. Affected plants are stunted and the younger leaves show a yellow/pale green mosaic mottling and streaking. Affected areas in fields often are in low, wet sites or drainage paths or around old building sites or stock corrals.

Generally, yield losses to soil-borne wheat mosaic are not severe except in isolated incidences where symptoms are severe on susceptible varieties. Symptoms will become less evident when the temperature stays above 70°F

Stripe rust and **leaf rust** continue to develop in the southern plains (*see map*). By mid-April leaf rust had moved into southern Oklahoma, but severities were still low. However, with increased rainfall and warmer temperatures, the incidence and severity of leaf rust could increase rapidly.

Stripe rust was severe in central and northern Texas and southern Arkansas but had not been reported in Oklahoma by mid April. It's northward progression will be monitored as the season progresses. In the 2001outbreak, Nebraska fields planted to 2137 or Lakin were the most severely affected by stripe rust.

John Watkins
Extension Plant Pathologist

Southern corn leaf

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the larvae hatch out in 6-10 days and feed on corn roots for about 10 weeks. Larvae pupate in the soil and adults emerge from mid July to August. Adults feed for a short while and then in late summer seek overwintering sites.

Economic thresholds have not been established for this insect, but should be similar to those for cutworm injury (3-5% cut plants). The same insecticides labeled for postemergence use against cutworms would be appropriate for use on the southern corn leaf beetles. Based on efficacy trials and field reports, the pyrethroid insecticides and Lorsban 4E and Furadan 4F would be expected to provide good control. (For rates and further details, see the NU Department of Entomology Web site at *http://entomology.unl.edu/instabls/cutworms.*) Also, seed treated with Gaucho or Cruiser insecticides would provide early season suppression of damage from this insect.

Bob Wright
Extension Entomologist
South Central Ag Lab

Got a pest, but not sure what it is?

Visit Web sites for *CropWatch* or the *NU Department of Entomology* to view color photos and treatment recommendations for some of the insect pests expected in Nebraska fields this year.

For help in identifying pests, contact your local Cooperative Extension Office or the NU Plant and Pest Diagnostic Clinc. See the April 25 *CropWatch* for details on submitting samples to the clinic. Check out these sites:

NU Entomology at entomology.unl.edu

PPDC submission form at cropwatch.unl.edu/archives/2003/ppdc_form.pdf

CropWatch at cropwatch.unl.edu

Planting time options for insect control in sorghum

Planting time insecticide applications or insecticide-treated sorghum seed (Gaucho or Cruiser) are effective means of controlling many early season sorghum insect pests. These products control seed-feeding pests and seedling greenbug infestations, and can help reduce chinch bug damage, if damaging populations develop. However, if such populations don't develop, the treatments become unnecessary production expenses. Since most planting time treatments are applied before a problem can be identified, these treatments are not recommended in most situations.

Exceptions to this are when sorghum is planted next to wheat where chinch bugs are abundant and in fields with a history of severe wireworm damage (greater than 20% stand reduction). Although planting time treatments are effective in controlling early season greenbugs, our studies indicate that seedling greenbug damage is uncommon in Nebraska.

Chinch bugs

Dry weather, poor wheat stands, and planting sorghum into wheat stubble with volunteer wheat can contribute to increased damage from chinch bugs. Chinch bug numbers and damage have been increasing in southeastern Nebraska the past several years and we expect some localized, heavy damage this year, particularly in sorghum planted next to wheat. In some fields, particularly in areas that had noticeable levels of chinch bugs last year, using seed treated with Gaucho or Cruiser or applying Furadan 4F at planting to the outer rows of sorghum next to wheat could be beneficial.

The best recommendation to reduce damage from chinch bugs is to avoid planting sorghum next to wheat. When planting sorghum directly into wheat, make sure the wheat is completely destroyed before planting. The longer the interval between destruction of the wheat and planting of the sorghum, the less chance there is for chinch bug survival and damage. Consult the University of Nebraska *Guide for Weed Management in Nebraska*, EC-130, for herbicide recommendations for destroying volunteer wheat.

Planting time insecticides are effective on light to moderate populations of chinch bugs. Gaucho- and Cruiser-treated seed and seed furrow applications of Furadan 4F (2.5 oz/1000 foot of row) have provided comparable control of chinch bugs in several research trials. Nothing has worked well under heavy chinch bug pressure. In fields planted with Gaucho-treated seed, the plant-back interval (length of time before you can replant in the field) for corn and soybeans has been reduced to 30 days. The plant-back interval for fields planted with Cruiser-treated seed is 120 days. For more information on chinch bugs, refer to University of Nebraska NebGuide, *Chinch Bug Management* (G86-806).

Greenbugs

In our studies the past several years, Biotype I has been the predominate greenbug in Nebraska. Biotype I resistant sorghum hybrids have been highly effective in reducing greenbug damage. Biotype E resistant hybrids have not been consistently effective in reducing greenbug damage for several years.

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Next week:

Tips for weed control in sorghum

Sorghum insects *(Continued from page 74)*

Many factors are involved in selecting the best sorghum hybrids for your fields.

If well adapted Biotype I resistant sorghum hybrids are available for your area, carefully consider whether they can fit into your overall needs. Greenbug populations are sporadic and it is not possible to predict when damaging populations will occur. Well adapted, high yielding, greenbug resistant hybrids provide an effective, low cost means to reduce damage from a sporadic pest like the greenbug. Greenbug growth and reproduction is slower, and it takes more greenbugs to damage greenbug resistant hybrids. This allows more time for beneficial insects such as lady beetles, lacewings, and parasitic wasps to control greenbugs before economic damage occurs.

Occasionally greenbugs damage seedling sorghum in Nebraska, especially susceptible hybrids. Seedling sorghum infestations are often eliminated by adverse weather conditions such as rain and hot dry winds. If greenbugs migrate into sorghum fields early and weather conditions do not eliminate them, populations can develop quickly and severe damage may result. Sorghum fields should be examined at five- to seven-day intervals to detect greenbugs early to better prevent heavy damage.

The treatment threshold for seedling sorghum is that greenbug colonies are present on 10-20% of the plants AND yellowing or spotting of leaves is visible because of greenbug feeding. This threshold works for both greenbug resistant and susceptible sorghum because greenbug resistant sorghum can withstand more feeding before damage occurs. Although it is tempting to go ahead and treat with an insecticide when greenbugs are first detected, wait until the greenbug population and damage reaches the treatment threshold before applying an insecticide. A thundershower or hot wind may eliminate the greenbug problem before treatment is necessary.

Applying an insecticide at planting is another alternative for control of seedling infestations. We do not highly recommend planting time insecticide treatments because seedling greenbug populations do not occur each year and continued use of insecticides often leads to development of insecticide resistance. From a control standpoint, registered granular (Counter, Di-Syston, and Thimet) and liquid (Furadan 4F) planting time insecticides, and Gaucho- or Cruiser-treated seed provide effective control of greenbugs on seedling sorghum. In our tests over the past several years, Gaucho has provided 30-55 days of residual control of greenbugs with granular insecticides providing slightly shorter residual activity. In recent tests, Cruiser has provided similar efficacy to Gaucho. None of the planting time treatments provided protection from late season infestations of greenbugs.

In some years, when we did not have our normal late season migration of greenbugs into fields, early season control of greenbugs by Gaucho and some planting time insecticides resulted in fields that were relatively free of greenbugs through most of the season.

For more information on greenbug management refer to University of Nebraska NebGuide, *Management of Greenbugs in Sorghum* (G87-838) available from your local Cooperative Extension office. For more information on insecticides and management of sorghum pests, refer to the Insect Management Guide for Sorghum on the University of Nebraska, Department of Entomology Web site at *http://www.ianr.unl.edu/ianr/entomol/pmguides/sorguide.htm.*

Bob Wright
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South Central Ag Lab
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Extension Entomologist

Early alfalfa cutting offers several benefits

The first cutting of the year for alfalfa often is the most important cutting. It usually produces the most yield and its forage quality changes fastest from day to day. Many growers plan to cut soon after first blooms appear; however, weather can cause long delays and sometimes alfalfa may not bloom very aggressively during spring. Plus, waiting until alfalfa begins to bloom often results in hay that is too low quality for dairy use.

In many cases, it may be advisable to take the first cutting before buds develop. Cutting healthy, vigorously growing alfalfa after it gets about 15 inches tall has several advantages. First, the weather may be better than later in spring. Second, cutting some alfalfa early allows for staggering the work load and provides more time management options. Third, an early harvest can reduce some insect and disease problems. Most importantly, feed value from an early cutting can be very high and the second cutting probably will be ready before summer heat lowers forage quality.

With an early cut, however, yield will be lower than if the cutting were delayed, although much of the loss will be made up in later harvests. Regrowth for second harvest probably will be slower than if alfalfa had been cut at a more advanced growth stage, especially if your alfalfa experienced winter injury this year.

If you take an early cutting, be sure to allow a longer than normal recovery after either the first or the second cutting if you want to maintain long-term stands.

Bruce Anderson
Extension Forage Specialist

Test, improve pumping plant performance to reduce irrigation energy bills

Some Nebraska irrigators reported pumping double the normal amount of water to grow crops in 2002. With prospects for higher energy costs, continuing drought and increased water needs, it is important that irrigation pumping plants operate efficiently to keep costs to a minimum.

Most irrigation in Nebraska uses groundwater, which is pumped using a vertical turbine pump (*Figure 1*). The University of Nebraska has field tested hundreds of pumping plants over the years. Based on these field tests and on laboratory tests of engine efficiency, the University has developed the Nebraska Pumping Plant Performance Criteria, also known as the NPPPC or NPC. This criteria states the amount of useful work (water horsepower - hours, whp-h) to reasonably expect a pumping plant to achieve in the field for each unit of energy consumed.

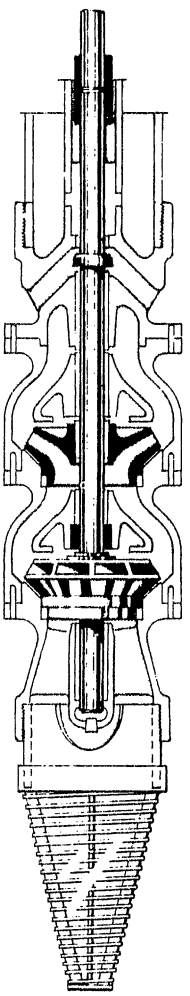

Fig. 1 Vertical pump

In a pumping plant test, the technician measures total head (lift plus system pressure), flow rate (gallons per minute), and rate of energy consumption. The performance of the pumping plant is stated in terms of whp-h per unit of fuel. The performance rating is the performance of the particular pumping plant compared to the Nebraska Performance Criteria and is expressed as a percentage of the NPC. A rating of 100% indicates the pumping plant is operating as expected. A rating below 100% indicates the pumping plant is using more energy that called for by the criteria. For example, a pumping plant operating at 70% of the NPC is only producing 70% of the useful work it should for the energy it is consuming.

The most recent NU statewide pumping plant efficiency study tested 180 pumping plants. As one might expect, the efficiency of the pumping plants varied considerably. Some achieved good efficiency, including 15% which actually exceeded the NPC. (Performance ratings over 100% of the NPC are possible when a highly efficient motor is attached to a well-designed pump that is not worn or misadjusted). The fact that some pumping plants exceed the criteria indicates that the criteria is a reasonable target for all pumping plants. The other 85% of the pumping plants were found

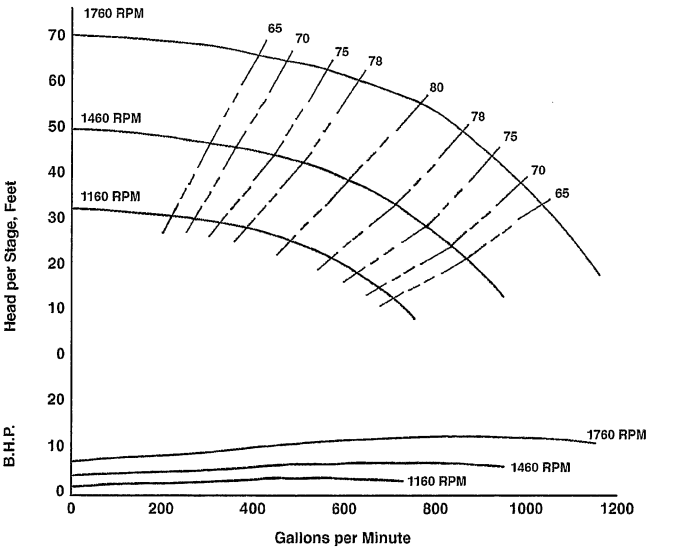

Figure 2. Vertical turbine pump performance curve.

to use more energy per unit of work than would be expected by the Nebraska Performance Criteria. The average pumping plant in Nebraska was found to be operating at only 77% of the NPC. To put it another way, the average pumping plant in the study was using 130% as much energy as it would if it were operating at the NPC (1.0 / 0.77 = 130%).

When the efficiency of a pumping plant is not what it should be, the problem may be in the power unit or in the pump or both. Internal combustion power units on irrigation pumps can have the same problems as those in cars and trucks. About the only thing that will cause poor electric motor efficiency is if the bearings are bad or the motor is far larger than is needed for the job.

Causes for poor pump performance include:

1) pump designs that are poorly matched to their current job (perhaps because the operator has switched from gated pipe to a center pivot sprinkler or from a high pressure to a lower pressure sprinkler); and

2) pumps that had worn impeller vanes and/or internal seals as a result of pumping sand, or impellers that were not properly adjusted within the pump bowls.

There are many pump manufacturers and each manufacturer's catalog can have dozens of pump designs. At a given rotational speed, a given impeller design operates on a head versus capacity curve. The greater the head (pressure) the pump is working against, the lower the capacity the impeller can produce. (See *Figure 2.*) The efficiency (work produced versus energy consumed) changes along the operational curve. Each design will have a best efficiency point at a certain head/capacity

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Irrigation

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condition. The job of the field engineer is to select an impeller design that will operate efficiently when pumping the volume of water required for the application and which will produce the total head required with a multiple number of stages.

In the recent pumping plant tests, 57% were determined to potentially benefit from adjustments. Adjustments either to the engine or pump or both resulted in 14% average savings in energy costs over the initial test results. An equally important result of the tests was that inefficient pumping plants were identified and the feasibility of more extensive repairs beyond the field adjustments were calculated. On some pumping plants, the potential savings in energy costs from major repair or even replacement of the pump would pay for itself in only a few years.

If there isn't a water meter on the system, a short-term pumping plant test can be run using one of a variety of devices to measure the flow rate. Contact a reputable well driller to see if they can run a short-term pumping plant efficiency test. At today's energy prices, identifying a pumping plant that needs adjustment or repair could result in saving hundreds or even thousands of dollars each year.

If the producer knows the total fuel used over a period of time, the total volume of water pumped (from water meter readings, usually stated in acre-inches), the system pressure measured at the discharge head, and the water level (measured while the pump is running), the performance rating can be calculated. A step by step guide for estimating long-term pumping plant performance is available on-line at *http://cropwatch.unl.edu/archives/2003/pumpingplantcalculation.pdf* If you have questions about this test or calculation, contact the author at 402-441-7180; 444 Cherrycreek Road, Lincoln, NE 68528-1507.

Tom Dorn, Extension Educator – Lancaster County

New herbicide options for sunflower in 2003

Two new herbicides are available for weed control in sunflower in 2003. Beyond™ (imazamox) herbicide is labeled for use only in Clearfield sunflower hybrids. Clearfield sunflower hybrids contain a gene that confers tolerance, not resistance, to Beyond herbicide. Some slight crop injury (leaf yellowing and plant stunting) may occur after an application of Beyond, especially where over-application occurs such as in spray overlaps or field ends. Injured plants often recover quickly. Non-Clearfield hybrids would be killed if treated with Beyond herbicide.

The Clearfield sunflower was developed using conventional breeding techniques and is not considered to be a genetically modified organism (GMO). Myocgen and Seeds 2000 are offering a limited quantity of Clearfield hybrid seed this year. The seed is expected to be more widely available next year. Beyond herbicide is applied early postemergence at a rate of 4 oz of product per acre to sunflower with two to eight leaves. Weeds should be actively growing at the time of application and broadleaf weeds should be less than 3 inches tall. Grass weeds should not have more than four to five leaves. A nonionic surfactant and nitrogen-based fertilizer must be added to the spray solution for optimum weed control.

It is recommended that a soil-applied grass herbicide, such as Prowl® or Dual Magnum®, be applied before Beyond is applied. Beyond herbicide will control many broadleaf weeds that are troublesome in Nebraska sunflower fields including pigweed, kochia, Russian thistle, and nightshade; however, Beyond is an ALS-inhibitor and will not effectively control ALS-resistant kochia or Russian thistle. There also is some concern about the risk of transferring the gene conferring tolerance to Beyond herbicide from the commercial sunflower hybrid to wild sunflower. This technology should be avoided in fields where wild sunflower is present.

The other new herbicide label in sunflower for 2003 is Dual Magnum (s-metolachlor). Dual Magnum may be applied preplant incorporated or preemeergence to sunflower to control grass weeds. Rates range from 1 to 2 pints of product per acre depending on soil texture and organic matter content. Dual Magnum provides a similar level of grass control as Prowl herbicide, but it is not as susceptible to photodegradation or volatilization. When it is applied preplant or preemergence in a no-till system, it can wait for rain longer than Prowl without losing its activity. Prowl does provide a little better control of small-seeded broadleaf weeds than Dual Magnum, but this may not be critical if broadleaf weeds are not a problem or if the field will also be treated with Spartan® or Beyond herbicide.

Spartan herbicide has provided excellent control of troublesome broadleaf weeds, such as kochia, Russian thistle, and pigweed in no-till sunflower. Spartan should be tank-mixed with Prowl or Dual Magnum herbicide at labeled rates for control of many grass weeds. If grass weeds are not a concern, an alternative strategy to tank mixing Prowl or Dual Magnum with Spartan is to plan on a postemergence treatment of either Poast® or Select® herbicides if grasses become a problem. The disadvantage to this strategy is higher costs.

Some crop injury has been reported from using Spartan. The injury, which has typically been restricted to high pH, low organic matter soils on hilltops, consisted of leaf chlorosis, plant stunting, and occasionally plant death. Injured

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Begin scouting alfalfa for weevils, pest activity

While we have been spared alfalfa weevil damage in much of Nebraska over the past few years, the potential for damage always exists. While things will be getting very busy in the next few weeks as row crops are to be planted, those of you growing high quality alfalfa hay should take the time to monitor fields for weevils over the next month.

Clover leaf weevils are occasionally problems but are very vulnerable to fungus disease and haven't been pests since the late 80s and early 90s when spring rains were rare. Clover leaf weevil larvae will be in the debris around the crowns during day.

To determine the degree of clover leaf weevil infestation, scratch in the soil around the crowns and count the number of larvae found per crown. Their brown heads will help distinguish them from the black headed alfalfa weevil. The table compares some of the distinguishing characteristics between the alfalfa and clover leaf weevils.

Both the alfalfa and clover leaf weevils feed on first cutting alfalfa as larvae, and on regrowth of the first cutting as adults. While research conducted in northeast Nebraska indicates that clover leaf weevil larvae feeding does not cause yield reduction to first cutting alfalfa, alfalfa weevil feeding can cause severe losses to yield and quality of the first cutting.

Alfalfa weevil development in the Panhandle tends to lag behind the rest of the state. In many years, weevil larvae will survive the first cutting and feed on the regrowth. This phenomena also has been observed occasionally in northern Nebraska, as far east as Boyd County. While most regrowth problems will be caused by adult weevils, growers in the Panhandle and northern Nebraska need to be aware that either larvae or adults may hold back regrowth after the first cutting.

It is essential that fields be monitored for alfalfa weevil feeding now. Damage consists of small holes and interveinal feeding on the newest leaflets near the stem tips. The larvae are small (1/16 to 3/8 inch in length), pale yellowish green, becoming a darker green when larger. These legless worms have black heads and a white stripe the length of the back. The alfalfa weevil

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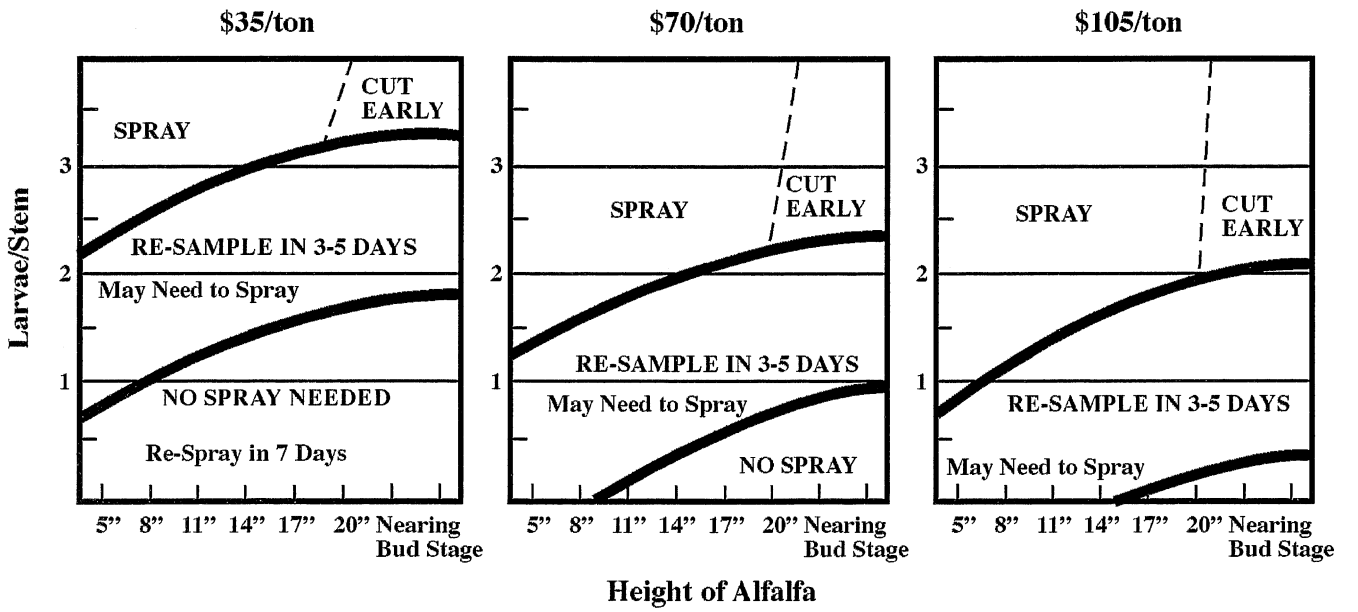
Comparison of alfalfa weevil to clover leaf weevil

Alfalfa weevil	Clover leaf weevil
Overwinter primarily as adults	Over winter primarily as larvae.
Adults brown with dark brown stripe halfway down back, 3/16 inch long.	Adults dark brown, pitted light brown underneath, over 1/4 inch long.
Larvae prefer to feed on tips.	Larvae feed anywhere on plant.
Larvae remain on plant most of the time.	Many larvae in soil or debris during daytime hours.
Larvae have black heads.	Larvae have brown heads.
Adults leave fields in June.	Adults may remain in fields.

Figure 1. Treatment thresholds for the alfalfa weevil at three alfalfa price levels.



Pre-inoculated soybean products available

Soybeans can fix up to 75% of their own nitrogen, provided the correct strain of *Bradyrhizobia japonicum* is available in the soil or is supplied by the producer at planting.

We discussed some of the general principles of inoculating soybeans in the April 12, 2002 *Crop Watch* (archived on-line at *http://cropwatch.unl.edu/archives/2002/crop02-5.htm*). Two of the recommendations I made last year for inoculating soybeans need updating. They were: 1) plant seed within four hours after inoculating. The new pre-inoculated seed discussed in this article allows several weeks of shelf-life for treated seed; and 2) investigate fungicide-inoculant compatibilities with inoculant manufacturer. Read and follow product labels. If in doubt, use in-furrow inoculant applications.

Several new products allow pre-inoculation of seed and provide for a shelf-life of up to three to four weeks. They also allow for an extended shelf life for pre-plant inoculated seed with certain fungicides. These inoculant products have extenders that apparently enhance the survival of *B. japonicum* following treatment for 21 to 30 days without fungicides and 5 to 7 days with certain fungicides. These materials are designed and labeled for application by approved dealers which may include many cooperatives, seed companies, etc. Seed is treated before it is delivered and none of these products are intended for on-farm application. They are a convenience to soybean growers because they reduce inoculation procedures at planting. The products offer convenience to soybean growers who have a longer window from application to planting and some economic advantages to retailers.

Several reputable inoculant companies market these new products and provide data on their effectiveness. One company indicates that colony forming units (cfu) per seed are reduced logarithmically following application to a point where they may be as low as 100,000 cfu/seed after 21 days. Previous recommendations were to have 2×10^5 or 2×10^6 cells per seed at planting, considerably more than these products may deliver after 21 days on the shelf.

In addition to these concerns, there is limited field information from the public on their effectiveness. A University researcher in Canada compared on virgin soil a pre-inoculated seed material with other inoculants applied at planting and found that the pre-inoculant did as well as the other products. Yields with inoculants were about 50% greater than those from the uninoculated control.

Until further public field research has been conducted on these products, caution is recommended with their use.

Tips for using soil inoculants

If you're planning to use an inoculant, review the following tips which were revised from the 2002 *Crop Watch* article:

- Always follow product label information
- Always inoculate fields that have never had a well-nodulated soybean crop (virgin soils). A well-nodulated soybean plant should have five to seven nodules on the primary root two weeks after emergence or 12 nodules per inch of tap root at flowering. If you plan to use the new pre-inoculated seed products, introduce them on only a small portion of the field and provide check strips. I don't want to risk an inoculation failure on virgin soils.
- Maintain soil pH in the 6.0 to 7.0 range for optimum N-fixation.
- Inoculation is not essential in soils that have had nodulated soybeans within the last five years. The new, pre-inoculated products may provide some degree of insurance for nodulation failures. Again, I would try them on a portion of the field and leave check strips.
- Investigate fungicide-inoculant compatibilities with the inoculant manufacturer. Read and follow product labels. If in doubt, use in-furrow inoculant applications.
- Always inoculate after fields are flooded and on sandy soils.

We intend to conduct research on these pre-inoculants this year at the South Central Ag Lab and at one or two off-site locations where soybeans were grown previously. I assume colleagues in other states also will be testing these products. We will present the results of this research in a future *CropWatch.*

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Weevil scouting

(Continued from page 78)

larvae spend nearly all their time on the plant and curl into a C-shape when disturbed.

Once the alfalfa is 4-6 inches or so in height, take a bucket, carefully cut some stems at ground level (30 to 50 per field, from various spots in the field) and shake the stems against the side of the bucket. Average the number of weevil larvae per stem. Use the following charts to help determine whether control measures are necessary. Each chart has been developed for a different alfalfa value. To treat or re-sample depends on the average number of weevils per stem, the stem length, and the value of the alfalfa. When alfalfa reaches a certain height, it may be more profitable to cut the alfalfa early rather than to treat.

Insecticides registered to control alfalfa weevil larvae include Ambush, Baythroid, Cythion, Furadan, Guthion, Imidan, Lannate, Lorsban, Mustang Max, Penncap M, Pounce, Sevin, and Warrior. Visit the NU Department of Entomology Web site at *http://entomology.unl.edu/instabls/instabls.htm* to check for use rates.

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Field patterns can signal herbicide carryover problems

Following last year's dry summer there is some concern about herbicide carryover damage to crops planted this year. Carryover damage occurs when herbicide residues persist in the soil at levels that injure the crop. Understanding the potential causes of damaging herbicide residues and the patterns they create in the field can be useful in scouting/diagnosing a field problem. These patterns may be caused by variations in the environment or in the original herbicide application.

Normally herbicide carryover damage is not uniform over a field but rather occurs in a pattern. Sometimes this pattern appears to be random because we aren't familiar with the underlying cause. There is no question that we see carryover when there is too much herbicide residue present for the crop in question to tolerate. The question is why do we have too much herbicide residue in certain areas and not others? The explanation lies in three broad categories:

1. the original application rate was not uniform,
2. there is increased herbicide residue remaining in certain areas because of variation in the herbicide degradation rate across the field, and
3. the activity of the remaining herbicide residue is greater in certain areas than others.

Application rate

Variations in herbicide application rate can sometimes be observed in a pattern that matches the swath width of the application equipment. Spray pattern overlap results in carryover strips reoccurring at intervals that match the sprayer swath. Carryover at the ends of fields can result from overlap when the field ends are sprayed twice, once in each direction. Changes in travel speed with a sprayer not equipped with a rate controller will result in changes in application rate. Over-application can occur at the ends of a field if a sprayer not equipped with a rate controller slows, resulting in an increased application rate. Other speed variations such as from slowing for obstacles, uphill versus downhill speed, etc, also will affect the application rate.

Herbicide degradation

Variation in herbicide degradation rate across the field results from variation in the soil environment. One obvious variation in most sprinkler irrigated fields is that the corners are not irrigated and therefore herbicide degradation would be slower and carryover potential greater than in the irrigated portion of the field. Soil pH also can influence the degradation rate of certain herbicides. Soil pH levels can vary within a field and cause carryover patterns related to the variances. These variations within a field often go unnoticed unless the field has been grid sampled.

Herbicide activity

The biological activity of most soil active herbicides is affected by soil properties including organic matter content, clay, and pH. Often more than one of these factors varies across a field. Soil organic matter, and to a lesser extent clay, adsorb herbicides making them unavailable for plant uptake. More herbicide is required for equal biological activity in field areas high in organic matter and clay. This means carryover damage likely will be reduced in areas of the field high in organic matter and clay or correspondingly, carryover will be greater in low organic matter areas. Soil pH can influence the bioavailability of some soil-applied herbicides. With the same amount of herbicide present, crop injury could vary based on soil pH.

Summary

The pattern of crop response across a field is useful in diagnosing potential herbicide carryover. The distribution of crop injury may be due to variations in the environment, variations in the original herbicide application, or both, and understanding the cause can help you avoid crop injury in future years.

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Sunflower herbicides *(Continued from page 77)*

plants generally grew out of the injury within a few weeks and yield differences were minimal at harvest.

Spartan use rates range from 2.0 oz of product per acre on coarse soils with less than 1.5% organic matter to 5.33 oz of product per acre on medium or fine textured soils with organic matter content greater than 3%. Consider applying Spartan, with or without a soil-applied grass herbicide, two to four weeks before planting to allow ample time for rainfall to activate the herbicide. Follow up with glyphosate at planting to control any emerged weeds.

Supplemental labels for Beyond or Dual Magnum use in sunflower must be in the possession of the applicator at the time of application. See page 62 of the *2003 Guide for Weed Management in Nebraska* for additional information on recommended herbicide treatments for sunflower.

Always carefully read and follow label directions.

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