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Lisa Brown Jasa
University of Nebraska-Lincoln, ljasa@unlnotes.unl.edu

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Scouting tips

Field records provide clues to diagnosing crop mysteries

When preparing to scout for and diagnose problems in a field, consider the field's history. Records of past and recent weather, cropping history of the field, soil conditions, timing of crop growth stages, cultural practices, herbicide and fertilizer use, field topography, crop variety characteristics, stand age for perennial crops, previous disease outbreaks and current insect infestations all help in diagnosing current problems.

Compare this information with field symptoms. Look for symptoms on all plant parts and examine several plants to see how symptoms change. Often it's necessary to observe several symptoms to identify disease, environmental or herbicide injury accurately because different diseases produce similar symptoms.

As the field scout, it will be your responsibility to diagnose the problem. The accuracy of your field diagnosis will definitely influence your ability to correct the problem if it is correctable.

Field symptoms alone may not be sufficient to identify a problem. If you need to send the sample to a professional laboratory, a good set of field notes can help confirm an identification.

Being a plant problem detective

(Continued on page 69)

Army cutworm and pea aphid numbers high in the Panhandle

Growers in the Panhandle should be watching for army cutworm activity as sugarbeets emerge and become established. We are seeing continued feeding by army cutworms in sugarbeets, particularly where cereal cover crops were used through the winter and along grassy field margins.

Spotty areas of yellowing in alfalfa fields has been due to pea aphids. In these areas aphids numbers have been well over the threshold of 10 pea aphids per stem and causing substantial stunting. The damage potential for these insects is closely related to drought stress so significant recovery may occur after recent rains. In addition, with warmer temperatures natural enemies will become more active.

Gary L. Hein, Extension Entomologist Panhandle REC
Keith Glewen, Extension educator in Saunders County: As I drive around eastern Nebraska I notice again that growers are investing in labor, equipment and diesel fuel hoping they will receive a premium for aesthetically appealing fields. As a result many fields are not in compliance regarding crop residue. Approximately 30% of the corn acres are planted in Saunders County with frequency of rainfall being more of a problem than quantity. Cool days and nights are stressing corn planted three weeks ago. If this weather continues, I’m worried about the potential for stress and injury from soil applied herbicides on corn. A week ago I saw a field of soybeans being planted in Butler County. That will be an interesting field to watch!

From Noel Mues, Extension educator in Furnas County: Continuous wet weather and soil conditions have delayed field work activities. With the adequate moisture supply, pastures and winter wheat prospects are looking good. We’ve had strong evidence and confirmation of soil-borne mosaic virus in southwest Nebraska. Spindle streak mosaic virus was also found in some of the samples. Resistant or tolerant varieties are the only method of control.

Gary Zoubek, Extension educator in York County: Compared to a lot of areas, planting has progressed rapidly until the past couple of days. Probably about 75%-80% of the corn has been planted here. Several producers are done and many are at least 50% complete. Some are waiting to plant their seed corn acres. A few acres of soybeans have been planted.

Dave Stenberg, Extension educator in Dawson County: The wet weather has put our farmers about two weeks behind in planting corn. About 35% of the corn was planted as of May 6. Because there is considerable acreage planted to white and yellow food grade corn, which needs more time to mature than regular dent corn, farmers are becoming concerned. The early seeded alfalfa is up and stands look excellent. Pastures needed the moisture and are in good condition. A few dry-sunny days would be welcome.

Steve Gramlich, Extension educator in Lincoln County: Planting moved ahead rapidly this past week when fields dried enough for farmers to get in. Lincoln County had variable rains over the past week allowing field work in some areas.

Doug Anderson, Extension educator in Valley County: Most fields will not be planted for awhile.

With recent cold temperatures and excess moisture, pastures are slow in responding; alfalfa is developing well. Warmer temperatures are needed.

Gary Hall, Extension educator in Phelps and Gosper counties: Planting has been slowed by the rains. Cool temperatures are preventing seeds previously planted from emerging and the fear is that some of the early planted corn will have to be replanted. Planting this year has been very slow overall. The wheat crop will be very good, with very little disease at that time.

(Continued on page 69)
in the field is a challenge. First, it's tough to communicate with the patient, and second, the events that caused the problem may have occurred weeks before the onset of symptoms. Let's examine some of these factors and see how they can affect our ability to diagnose a crop problem in the field.

Weather

It is a critical factor in disease development, environmental injury and even, in some situations, herbicide injury. Disease outbreaks in field crops are often brought on by wet weather two weeks prior to the onset of symptoms. When you suspect a disease problem, consider what the weather was like a couple weeks ago. Freeze injury also can cause a delayed reaction. In wheat freeze injury may occur in April when the wheat was jointing but symptoms may not appear until June when the crop heads.

Cropping history

Continuous cropping without rotation often increases the level of root pathogens and other diseases such as corn lethal necrosis and gray leaf spot in corn and sclerotinia stem rot of soybean. Knowing the cropping history sometimes can help explain the severity of the problem.

Crop growth stage

Symptoms of crazy top in corn occur during mid-growing season; however, the actual infection of the plant likely occurred during the three- to four-leaf stage when the plants were in standing water. Now we're combining two factors in our approach to diagnosis — weather/standing water and crop growth stage.

Soil conditions

Nematodes prefer sandy soils and Phytophthora root rots thrive in wet, heavy clay soils. Knowing the soil type can help with the diagnosis of these diseases. Application rates for certain herbicides are based on soil pH of the field. Herbicide injury can occur because an applicator fails to consider soil pH in determining application rate. Putting together the injury symptoms with the soil pH and then checking the product label should help diagnose the cause.

Cultural practices

Many pathogens of field crops survive on crop residue. Those that cause tan spot and Cephalosporium stripe in wheat and gray leaf spot and Goss's wilt in corn are examples. With wheat often you can determine whether the problem is caused by tan spot or Septoria leaf blotch by examining the residue of the previous wheat crop. The tan spot fungus produces raised structures on the stubble while Septoria does not.

Field topography

Low areas that tend to collect water and stay wet are prime sites for Phytophthora root rots of alfalfa and soybean. Combining this information with field and individual plant symptoms can make diagnosing these diseases fairly straightforward.

Crop variety

Knowing the resistance or susceptibility of a variety to the more common and damaging diseases will help the field scouts assess the potential seriousness of a disease.

Stand age

In alfalfa stands, the primary cause for stand decline is the buildup of crown and root rots over time. Stands over five years old will probably be in the early stages of decline. As the stand ages and the crowns become more diseased, they become more susceptible to winter injury. When troubleshooting a stand decline in alfalfa, consider the age of the stand. Also split the crowns and tap roots to determine the extent of rot in these tissues.

Previous disease outbreaks

Gray leaf spot of corn is a good example of this point. The disease has become well established in Nebraska and survives through the winter on plant residue. Combine these elements with continuous corn, and if you had gray leaf spot last year, you'll probably have it next year. Knowing the past disease history of a field helps determine effective crop rotations.

Current insect infestations

If insects are present, usually their symptoms will not be confused with disease symptoms; however, this is not always true. For example, when wheat seedlings die in the spring, it could be due to crown and root rot or to an infestation of Hessian fly. This necessitates looking for both causes in the field. Also, in corn, heavy insect damage to the ears may lead to a higher incidence of ear molds and ultimately a mycotoxin problem in the grain.

To become a good field problem diagnostician, it takes knowledge, experience, an inquisitive mind and good record keeping.

John E. Watkins
Extension Plant Pathologist

Updates

(Continued from page 68)

Karen deBoer, Extension educator in Cheyenne County: A few days ago, the rain was slowing field work; now the wind is. The last few days we've had wind gusts of 50 mph which have hampered field spraying. We are now about 1 inch ahead of normal for moisture. Some fields are still too muddy to farm. However, some are able to plant corn on the sandier ground.
University Diagnostic Clinic aids in identifying field pest problems

For assistance in diagnosing plant and pest problems, remember that the University of Nebraska Plant and Pest Diagnostic Clinic is available. As has been the policy in the past, the charges for services are $5 for visual inspections, $10 for lab analysis, culturing, and research, and $20 for advanced lab analysis and assays including ELISA tests.

Please direct all samples and inquiries to the Plant and Pest Diagnostic Clinic and we will direct the question and sample to the appropriate specialist or diagnostician. Also, if you have digital imaging equipment, please send them to the clinic via e-mail until our web site is available. Send images and information to Loren J. Giesler at Path017@unlvm.unl.edu. There is no charge for image diagnosis at this time.

Samples should be sent to:
Plant and Pest Diagnostic Clinic
448 Plant Sciences Hall
P.O. Box 830722
Lincoln, NE 68583-0722
(402) 472-2559

Entry level scout training May 27

A one-day introductory course for entry level scouts will be held 8:30 a.m. to 5 p.m. May 27 at the Agricultural Research and Development Center near Mead. Cost is $50 per person.

Topics will include insect, weed and disease identification, scouting and sampling variation, plant growth and plant water requirements and customer relations, among others. For more information, call NU Cooperative Extension Educators Barb Ogg (441-7180) or Keith Glewen (624-8030).

When submitting a sample, please include basic information, including:

- History of the problem area (i.e. planting date, location, cultural practices, chemical history, and when symptoms occurred);
- Name and variety / hybrid (if known) of the host plant; and
- Other pertinent information that might be useful in diagnosing the problem. (Include a photograph if available.)

A fresh plant or insect sample of good quality and representative of the problem usually makes diagnosis easier and quicker. Follow these tips on preparing and sending your sample:

- Please don't just send dead plant material. Often a single symptomatic tree branch is sufficient to provide both healthy and problematic tissues, but crop problems may require that several plants be submitted.
- Package your sample carefully to ensure that it arrives in good condition. Always place plant samples in plastic bags to keep them from drying out. Do not add extra water to the bag.
- Ship samples early in the week (no later than Thursday morning) so they don't spend the weekend in the post office. We can do without these “special treats” on Monday mornings. Send priority samples via express mail.
- Add paper towels to remove excess moisture if leaves are wet.
- Send the entire plant whenever possible. The symptoms may be above ground but the cause may be below ground.
- When sending plant leaves, send several. (One is not enough.)
- Place field samples in a cooler with ice until you can place them in a refrigerator or ship them.

Loren J. Giesler, Coordinator
Plant and Pest Diagnostic Clinic

New Compendium of Corn Diseases to be available from APS Press in July

APS Press recently announced pending publication of the Compendium of Corn Diseases, third edition. APS Press is taking orders now for the book, which will be available in July. This popular disease compendium has been out-of-print for several years and the third edition will be a most welcome addition to the series of plant disease compendia. The third edition is the most current resource available for identifying and controlling diseases and disorders of corn. It contains 177 color photographs.

If ordered before June 30 cost is $33 plus $5 for shipping and handling. To place orders, call Customer Service, APS Press Headquarters at 1-800-328-7560. The item number for this compendium is 42341.

John Watkins
Extension Plant Pathologist
Grasshopper hatch beginning early

Grasshoppers are hatching early in western Nebraska again this year. Last week small grasshoppers were reported to be out in large numbers and actively feeding. The recent extended cool and wet weather will help reduce the numbers from this early hatch; however, the potential for this to develop into an extensive problem is still unknown.

In early May the last two years, these tiny grasshoppers have caused serious damage in some areas. Growers should be monitoring their sugarbeets and other early emerging crops (corn, newly seeded alfalfa) over the next few weeks. In sugarbeets, close inspection is necessary as the tiny hoppers are hard to see, and often, the only sign of damage is the ‘disappearance’ of the small seedlings.

Grasshopper egg pods are present in the soil during winter and hatch once they have been exposed to enough warming in the spring. Historically, hatch begins in late May; however, we have seen a string of mild winters, which in the last three years has resulted in early hatching. This has been a serious problem where extremely large numbers of small hoppers have moved out from hatching beds in ditch banks and other untilled areas into fields of sugarbeets and other crops with limited foliage.

Rangeland grasshoppers also will be a concern this year. Estimates from last year’s Nebraska rangeland survey by USDA-APHIS indicate a high potential for serious grasshopper populations throughout the Sandhills and the Panhandle’s other grassland areas. The major rangeland species will be hatching over the next one to two months and will be feeding and maturing in early summer. A major determining factor in the severity of the grasshopper buildup is the weather. Extended cool and wet conditions during the hatching period severely impacts grasshopper survival, and will reduce the potential for extreme populations. If the weather is warm and dry during this period, grasshopper survival will be good and populations will likely be very high. Ranchers need to be thinking about their strategies for dealing with high grasshopper populations, if they develop.

It will be important to use some creative control options to reduce control costs in cropping and in rangeland areas. Grasshoppers are best controlled when they are in the nymphal (immature) stages. This means that the most effective controls must be applied in late June or early July before the grasshoppers become adults! At this time hoppers will be more concentrated in hatching beds and lower insecticide rates can be used. Identifying these hatching beds and directing early treatments only in these areas may help limit local populations and reduce costs. Strips of alfalfa can be left to attract grasshoppers into small areas where they can be more economically controlled. Alternate strip spraying has proven effective in both alfalfa and in rangeland. Grasshoppers move at a high enough rate that they will move from unsprayed swaths into the sprayed swaths and contact the insecticide within 24-48 hours of spraying. This program termed RAATs (Reduced Agent and Area Treatments) has been evaluated and shown to be much more economical than any previous rangeland hopper control program.

Movement of grasshoppers into cropland will increase later in the summer when they become adults and are more mobile and when their food sources decrease (e.g. grasses mature, winter wheat harvest). For cropland areas, monitor grasshopper movements and use border treatments to stay ahead of the damage.


Gary L. Hein,
Extension Entomologist
Panhandle REC, Scottsbluff
John Campbell
Extension Entomologist
West Central REC, North Platte

ECB software not Y2K compatible

All computer software programs released by the University of Nebraska are being reviewed to see whether they are Y2K compliant. The Nebraska European Corn Borer Phenology and Management Program (CP5) was found not to be Y2K compliant. The University will no longer sell or support this program. This program uses a DOS operating system and there are no plans to update or convert this program to Windows.

If you are currently using this program, don’t toss it. In reviewing the source code, the main problem occurs when the current date is requested early in the program. Only dates from 1985-1999 are accepted. This date is only used when a report is printed. In my limited testing, as long as a date from 1985-1999 is entered, the program will function normally. Elsewhere in the program, dates are requested, but only month/date, not year, information is entered.

Bob Wright
Extension Entomologist
South Central REC, Clay Center
Spartan herbicide receives crisis exemption

Spartan herbicide by FMC has been granted a Section 18, crisis exemption, for use in sunflowers grown in conservation tillage systems in Nebraska. Spartan herbicide has provided excellent control of troublesome broadleaf weeds, such as Kochia, Russian thistle, pigweed species, and wild buckwheat, in no-till sunflower research plots for the past three years.

It has been difficult to consistently achieve a high level of broadleaf weed control in sunflower without herbicide incorporation. Spartan herbicide will change that. It has a much greater water solubility than Prowl and requires much less precipitation to move the herbicide into the soil. Spartan herbicide does not photodegrade at the soil surface, so it can wait longer than Prowl for an incorporating rain.

The crisis exemption allows for the use of Spartan in conservation-tillage sunflowers from May 1 through May 15. The Section 18 emergency exemption for Spartan herbicide use in sunflowers is expected from the EPA in time to allow continued use of Spartan through July 15.

One application of Spartan herbicide may be made up to 14 days prior to, or three days after, sunflower planting. While Spartan herbicide provides excellent broadleaf weed control, and it has some activity on grass weeds, Spartan should be tank-mixed with Prowl herbicide at labeled rates for control of many of the grass weeds.

Spartan use rates are dependent on soil type (see table). Some early season crop injury was observed in experimental plots at some sites in some years. The injury consisted of leaf chlorosis and plant stunting, but plants grew out of the injury in a week or two and yield differences were never detected at harvest.

<table>
<thead>
<tr>
<th>Organic matter</th>
<th>Coarse</th>
<th>Medium</th>
<th>Fine</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2%</td>
<td>2.67</td>
<td>4.0</td>
<td>4.25</td>
</tr>
<tr>
<td>Over 2%</td>
<td>2.67</td>
<td>4.25</td>
<td>5.33</td>
</tr>
</tbody>
</table>

Recropping intervals include: anytime for soybeans; four months for wheat, barley, rye, oats and triticale; 10 months for field corn and sorghum; 12 months for proso and pearl millet; and 18 months for sweet corn. Spartan herbicide provides conservation-tillage sunflower growers with a new and effective tool for broadleaf weed control. Be sure to follow all labeled directions stated on the Section 18 label. Applicators must have a permit issued by the Nebraska Department of Agriculture and must possess a copy of the Section 18 label at the time of application. Two major restrictions on the label are:

1) no use is allowed on sand with less than 1% organic matter, and

2) “conservation tillage” is defined as minimum-till or no-till planted fields.

Drew Lyon
Extension Dryland Cropping Systems Specialist
Panhandle REC, Scottsbluff
Tim Creger, Nebraska Department of Agriculture

Biotechnology meeting to explore world food security, sustainability

Nationally known speakers will discuss implications of agricultural biotechnology and industrial consolidation for world food security and sustainability at a national meeting here in June.

The University of Nebraska-Lincoln will host the National Agricultural Biotechnology Council’s (NABC) 11th annual meeting, “World Food Security and Sustainability: The Impacts of Biotechnology and Industrial Consolidation.”

The meeting is June 6-8 at Lincoln’s Cornhusker Hotel. Registration is $200 and the conference is open to anyone who’s interested, including farmers, consumers, academics, public interest groups, government representatives and others.

Speakers and workshops will examine new developments in agricultural biotechnology and trends toward industrial consolidation and vertical coordination.

Don Weeks, a UNL biochemist, is chair of the university’s conference organizing committee.

Darrell Nelson, dean of UNL’s Agricultural Research Division and chair-elect of the NABC, said “The commercialization of biotechnology and industrial consolidation are major emerging factors that, individually and collectively, are chang-
Estimating European corn borer development with GDD accumulations

When responding to last year’s annual readership survey, several subscribers said they would like more advance warning on when European corn borer developments would occur.

Degree-days are helpful in predicting many biological events, including insect development. Research on European corn borer development has shown that the most accurate predictions occur when accumulation of degree-days starts from the first moth flight in the spring, rather than based on a calendar date. We will be reporting dates of first moth capture from locations in Nebraska with black light traps operated by UNL staff. If you have an interest in monitoring corn borer development in your area, make note of when you first see corn borer moths.

The table below summarizes events in first and second generation corn borer life cycles in relation to degree days after first moth flight. Use this information as a guideline. Many factors can affect the accuracies of degree day predictions in specific fields, including the biological variability of insects and differences between temperatures recorded at weather stations and those experienced by insects in the field.

Bob Wright
Extension Entomologist
South Central REC, Clay Center

Accumulated degree-days (developmental threshold of 50°F) from initial capture of moths in the spring for first occurrence of life stages and general activity of European corn borer (adapted from NCR Publication 327: European Corn Borer Ecology and Management).

<table>
<thead>
<tr>
<th>Degree days</th>
<th>1st occurrence of stage or event</th>
<th>Days to first occurrence</th>
<th>Mean daily temperature</th>
<th>General activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>First spring moth</td>
<td></td>
<td></td>
<td>Mating and egg laying</td>
</tr>
<tr>
<td>212a</td>
<td>Egg hatch (first instar larvae)</td>
<td>16.3</td>
<td>63</td>
<td>Pin hole leaf feeding</td>
</tr>
<tr>
<td>318</td>
<td>second instar</td>
<td>6.6</td>
<td>66</td>
<td>Shot hole leaf feeding</td>
</tr>
<tr>
<td>435</td>
<td>third instar</td>
<td>6.5</td>
<td>68</td>
<td>Midrib and stalk boring</td>
</tr>
<tr>
<td>567</td>
<td>fourth instar</td>
<td>6.6</td>
<td>70</td>
<td>Stalk boring</td>
</tr>
<tr>
<td>792</td>
<td>fifth instar</td>
<td>10.2</td>
<td>72</td>
<td>Stalk boring</td>
</tr>
<tr>
<td>1,002</td>
<td>Pupa</td>
<td>8.8</td>
<td>74</td>
<td>Changing to adult</td>
</tr>
<tr>
<td>1,192</td>
<td>Adult moths</td>
<td>7.6</td>
<td>75</td>
<td>Mating and egg laying</td>
</tr>
</tbody>
</table>

Second generation

<table>
<thead>
<tr>
<th>Degree days</th>
<th>1st occurrence of stage or event</th>
<th>Days to first occurrence</th>
<th>Mean daily temperature</th>
<th>General activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,404a</td>
<td>Egg hatch (first instar larvae)</td>
<td>8.2</td>
<td>76</td>
<td>Pollen and leaf axil feeding</td>
</tr>
<tr>
<td>1,510</td>
<td>second instar</td>
<td>4.1</td>
<td>76</td>
<td>Leaf axil feeding</td>
</tr>
<tr>
<td>1,627</td>
<td>third instar</td>
<td>4.3</td>
<td>77</td>
<td>Sheath, collar, and midrib boring</td>
</tr>
<tr>
<td>1,759</td>
<td>fourth instar</td>
<td>5.1</td>
<td>76</td>
<td>Stalk boring</td>
</tr>
<tr>
<td>1,984</td>
<td>fifth instar</td>
<td>9.0</td>
<td>75</td>
<td>Stalk boring</td>
</tr>
</tbody>
</table>

*Peak egg hatch occurs ~200-250 degree-days after first hatch
Controlling noxious weeds challenges even the best

Each year Nebraska landowners take on the task of identifying and controlling noxious and hard to control weeds including musk, plumeless and Canada thistle and leafy spurge. Noxious weeds pose a special problem because they are exotic invaders. While poor land management is usually the cause for weed problems, exotic invaders can enter and proliferate a given site regardless of management. Understanding the biology of each species, or at least their life cycles, will aid in their control.

Musk thistle *Carduus nutans*

When introduced to the United States in the early part of the century, musk thistle escaped its natural control predators that had kept it in check in western Asia. In 1932 the first documented plant was identified in Nebraska and by 1959 musk thistle was declared a noxious weed.

Because musk thistle is a biennial (occasionally acting as a winter annual), it germinates in the spring, forming a rosette of leaves that overwinter and flower in May the second year. Identification of musk thistle in the rosette stage is verified by lanceolate blades which are deeply serrated and lack hair. Veins extend past margins as spines. At the rosette stage, musk thistle can be separated from plumeless thistle, another noxious biennial weed, as plumeless is deeply serrated to the midvein and has hairs. Both have fleshy taproots. Both species are very similar in biology and control.

The key to good control of musk thistle is to control young plants in late April to mid May while in the rosette stage and before elongation of flower stems or bolting. Control after bolting is possible, although once seed heads have formed, seeds may still mature even after treatment.

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Rate per acre</th>
<th>Timing</th>
<th>Percent control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ally</td>
<td>0.3 oz</td>
<td>Rosette, pre bolting</td>
<td>83-87</td>
</tr>
<tr>
<td>2,4-D amine</td>
<td>2 qt</td>
<td>Rosette, pre bolting</td>
<td>92-96</td>
</tr>
<tr>
<td>2,4-D</td>
<td>1 qt + 0.5 pt</td>
<td>Rosette, pre bolting</td>
<td>92-95</td>
</tr>
<tr>
<td>+ Banvel</td>
<td>5.5 oz</td>
<td>Rosette, pre bolting</td>
<td>97-99</td>
</tr>
<tr>
<td>Stinger</td>
<td>8 oz</td>
<td>Rosette, pre bolting</td>
<td>96-98</td>
</tr>
<tr>
<td>Curtail</td>
<td>2 pt</td>
<td>Rosette, pre bolting</td>
<td>88-95</td>
</tr>
</tbody>
</table>

*From *Musk Thistle*, University of Nebraska, NebGuide, G92-1109.*

Because each plant can produce up to 100 heads, with as many as 20,000 seeds, uncontrolled plants result in rapid infestation growth. Formed seed heads should be removed from the field after treatment.

Many herbicides offer good control of musk thistle. A chemical treatment must suppress the plant and prevent it from producing seed. Make applications before bolting to reduce the amount of viable seed produced for next year. Good control can be had with 2,4-D + Banvel (*Table 1*) at the rosette stage or before bolting, resulting in suppressed growth and dramatic reduction in seed production. Tordon at 8 ounces per acre also has provided consistent control of musk thistle (*Table 1*).

Canada thistle *Cirsium arvense*

Canada thistle is an aggressive perennial and has been classified as a noxious weed in Nebraska since 1873. It is estimated to infest well over 800,000 acres in northern and western Nebraska. Its extensive root system and ability to produce over 5,000 seeds per plant make it difficult to control. Much like leafy spurge, nearly all parts of the root system can produce buds that can eventually form new vegetative shoots.

Canada thistle is identified by shallow lobed leaves with short spines on the margins. Leaves are greenish on both sides, often lighter on the lower side. The flower heads are small and numerous compared to other thistles and the roots are extensive and creeping. Because the plant is dioecious (staminate and pistillate flowers found on different plants), it may be found in large patches that do not produce seed.

Canada thistle can be controlled with several herbicides. Banvel at 1 qt/A in the fall will provide 85-90% control. Better control is available with either Roundup at 2 qt/A, Stinger at 1.3 pt/A, or Tordon at 1-2 pt/A.

Because Canada thistle is a perennial, fall is the best time for herbicide applications. Herbicide applications in the spring when Canada thistle is in the bud stage also provide good control. One application will not provide sufficient control, as new seedlings will need to be treated for several

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Noxious weeds (Continued from page 74)

years. A good Canada thistle control program will call for spring and fall applications for two or three years.

Leafy Spurge *Euphorbia esula*

Leafy spurge has quickly become one of the most problematic weeds in Nebraska. Its extensive root system, ability to quickly spread and survive considerable vegetative damage, along with its extended flowering season, make it one of the most difficult weeds to control. This deep-rooted, perennial is a noxious weed in Nebraska and will require a well-planned management strategy.

Fall herbicide applications have shown the best results with respect to controlling leafy spurge. In pastures, effective control can be had with Tordon at 2-4 qt/A, 2,4-D at 1 qt/A + Tordon at 1 pt/A, 2,4-D at 4 qt/A or Roundup + 2,4-D at 1 qt/A each. Remember that control requires multiple applications of all but high rates of Tordon. In non-grazed sites, Plateau at 8-12 oz has been very effective when applied in the fall. Chemical applications should be made based on the infestation. Small isolated patches are best controlled with either Plateau or Tordon. With larger infestations several applications of 2,4-D may be more feasible.

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Rate per acre</th>
<th>Timing</th>
<th>Percent control 1 year after treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banvel</td>
<td>1 qt</td>
<td>Fall</td>
<td>86</td>
</tr>
<tr>
<td>Roundup</td>
<td>2 qt</td>
<td>Fall</td>
<td>80</td>
</tr>
<tr>
<td>Stinger</td>
<td>1.3 pt</td>
<td>Fall</td>
<td>92</td>
</tr>
<tr>
<td>Tordon</td>
<td>1 pt</td>
<td>Fall</td>
<td>93</td>
</tr>
</tbody>
</table>

*From *Canada Thistle*, a University of Nebraska, NebGuide, G80-509.

**Table 3: Response of leafy spurge to herbicides**

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Rate per acre</th>
<th>Timing</th>
<th>Percent control 1 year after treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4-D Ester</td>
<td>2 qt</td>
<td>Spring (bud stage)</td>
<td>&lt;20</td>
</tr>
<tr>
<td>2,4-D + Tordon</td>
<td>1 qt + 1pt</td>
<td>Spring (bud stage)</td>
<td>40-60</td>
</tr>
<tr>
<td>Plateau</td>
<td>8-12 oz</td>
<td>Fall</td>
<td>&gt;70</td>
</tr>
<tr>
<td>Tordon 22K</td>
<td>2-4 qt</td>
<td>Fall/spring</td>
<td>100</td>
</tr>
<tr>
<td>Roundup Ultra + 2,4-D Amine</td>
<td>32 oz + 1 qt</td>
<td>Fall/spring</td>
<td>&lt;40</td>
</tr>
</tbody>
</table>

Biotechnology (Continued from page 72)

"It's an unusual opportunity for farmers, ranchers, agribusiness people and consumer groups to discuss these issues face-to-face and try to find common ground," Weeks said.

Conference participants will discuss key issues during workshops, identify concerns and develop recommendations about what current trends and developments may mean to agriculture’s structure and sustainability. These recommendations will be shared with policy-makers nationwide.

For more information call the NU Center for Biotechnology at (402) 472-2635.

Detecting alfalfa weevils

Base 48 growing degree days accumulated Jan. 1-April 26. Spring hatching weevil larvae usually cause noticeable damage at about 300-375 growing degree days. Producers throughout the state should be scouting.
Check for substantiated, research data when weighing new product claims

Each year new herbicides enter the agricultural marketplace. Sometimes these products have been well tested and are worthy of a farmer’s hard-earned dollars. Information for these “well tested” products from reliable companies is available along with a label detailing pertinent product details.

Unfortunately, other products which have not been as thoroughly tested by private and public institutions also are available. These products take advantage of the trust and reliability that major chemical manufacturers have worked hard to build. For many producers separating the good from the “bad” products can be a nightmare.

Watch out for marketing tactics that promise results too good to be true. Some may claim to bio-remediate the soils, while others may outline a few simple steps to success while others advocate the use of vegetable oil to aid herbicide activity.

Basically these products sound too good to pass up for many producers because they promise what the current industry can not deliver. Remember that the University of Nebraska does not dispute the claims of most of these products, but because of the lack of scientific data to support their claims, the University of Nebraska cautions producers from rushing into buying a “miracle product.”

There are specific questions producers should ask when contemplating buying one of these products.

1. Is the product registered with the Nebraska Department of Agriculture? If not, the product is not legal to sell within the state. There may be good reasons for this. Possibly the product may not have been tested enough to substantially conclude its safety and ecological impact. Of course, if the product has not been registered through the Environmental Protection Agency (EPA) it certainly is not legal to sell within Nebraska, nor would it be registered within Nebraska.

2. What data is available to support claims of the products’ abilities? Most products should have extensive data from both private and public institutions such as the University of Nebraska. A major university can provide independent and non-biased research on the product for a nominal fee. Producers should question research that was not properly conducted under scientifically accepted conditions.

3. If the product sounds too good to be true, why haven’t the other chemical manufactures embraced such technology? The University certainly does not dismiss the claims of small chemical companies — some of our largest, most dependable companies started out small. But, if the product sounds like a “miracle chemical”, a questioning of the products’ validity may be warranted.

4. Always check the product’s active ingredients and request a label before any purchase is made. Several Nebraska producers spent more than $100/gal on a miracle herbicide only to find out the product was simply a formulation of 2,4-D. If not familiar with the product’s active ingredients, request more information from extension personnel. Many producers, who have talked with sales personnel via phone, have not been able to obtain product labels before making purchases. If the sales representative is reluctant to send any information on paper, especially the basic product label, red lights should be flashing!

5. Finally, many products make claims that need to be judged with common sense. If a product is new and you are curious about it, consider testing it for a few years on a few acres. Select weedy corners and assess how the product performs under changing environmental conditions. Be sure to leave an untreated control area for comparison.

These guidelines are for pesticides. Adjuvants and other chemicals not listed as pesticides do not fall under federal or state regulation. They can contain many compounds that may or may not perform as stated. Producers should treat these products like they would any new product and try limited amounts before buying a large quantity.

The bottom line is there are many products the producer needs to sift through each year to separate the “good” or legitimate from the “bad”. We caution every producer to think before buying something that is presented without scientific evidence. For the most part, many products will perform exactly as claimed. Following a few simple guidelines will keep you from making a costly mistake.

Steve Knezevic
Extension Weed Specialist
Jeff Rawlinson
Extension Weed Science
Alex Martin
Extension Weed Specialist