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Timing essential to control

Western bean cutworm eggs in corn

Western bean cutworm moths are now flying across the state and egg masses have been reported in several corn fields. In recent years, this insect has been a problem in many counties that have not traditionally seen economic infestations.

It is important to begin scouting now since damage can be significant if control is late or nonexistent. The western bean cutworm overwinters as a mature larva in the soil within an earthen cell. It pupates in that cell and becomes a moth in early to mid-summer. The moth is a typical "miller moth" with noticeable white lines near the forward edge of the front wings. For egg laying moths seek out corn that is in the whorl stage and nearly ready to tassel. Eggs are laid in masses usually on the upper side of the upper leaves. Eggs are pinhead sized and white, although darkening occurs as the eggs are ready to hatch about four to seven days after being laid. Newly hatched larvae are dark brown with faint markings on the back. They lighten in color as they mature and become light brown or tan with faint white or pink markings.

The newly hatched larvae prefer to feed on pollen in the tassel and will chew their way into an unemerged tassel. Once pollen has shed, they crawl to the leaf axils to feed on pollen. Once pollen is no longer available, they move to the silks and will move into the ear to feed on developing kernels. These larvae are not cannibalistic so several can be feeding together in each ear causing much damage and potential yield loss.

Insecticide treatment should be considered when 8-14% of the plants are infested with eggs or small larvae. Timing of the treatment is very important because the larvae are not easily controlled once they move into the ear. If the tassel has emerged from the whorl, best results are obtained when treating at 70-90% egg hatch.

Many insecticides are registered and effective for cutworm control. Both chemigation and aerial application have worked well. For more information, including a list of registered insecticides, refer to Extension publication EC94-1509, Management Guide for Nebraska Corn and Sorghum.

Keith Jarvi, Extension Assistant, Pesticide Management Northeast District
Steve Danielson, Extension Entomologist

Western wheat harvest good; southeast yields suffer

The 1995 winter wheat harvest in central and western Nebraska had excellent yields in most areas, however yields in southeast Nebraska were significantly below average, about 20 bushels per acre on many farms. Several areas of western Nebraska were hailed, resulting in damage up to 100%.

Cutting in southwest Nebraska is about completed but it was slowed in some areas by rain. In the southern Panhandle wheat has been ripe for a week, but rains have kept the moisture high and the fields muddy delaying harvest. In the northern Panhandle and the

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higher elevations in Kimball County, wheat is just beginning to ripen and moisture is high. With the higher temperatures forecast this week, if weather permits, most wheat fields except the Northern Panhandle and the higher elevations in the Panhandle will be harvested. Test weight for this 1995 crop was excellent except in those areas that have had several rains it has been decreasing with each, however, resulting test weights are still 58-60 pounds.

Treating the 1995 winter wheat stubble with herbicides will have several complications. One is that the amount of tillering and the taller plants this year caused a tremendous amount of straw. This means that it is going to be difficult to get herbicides down through the straw to contact the weeds or soil. Since many of the fields have limited weed populations now, growers may want to consider waiting until the straw settles enough and the weeds appear above the straw before applying their after harvest herbicide treatments. Winter wheat that was harvested with combines that did not do a good job of spreading the long straw and fines will have problems this year with the increased residue. There is too much straw for corn or sorghum to grow where the straw distribution was poor. Consider baling the straw.

Timing's the key to 2,4-D use

Do not spray corn with 2,4-D from a week before tassel emergence until after the silks turn brown. Treatments during this critical time often interfere with pollination and reduce yield. After the silks turn brown, pollination is complete and 2,4-D can be safely used. The state's early planted corn is now in the stage where it should not be sprayed with 2,4-D.

Do not spray grain sorghum with 2,4-D after the boot stage. As in corn, pollination problems and yield reductions result from spraying sorghum during this sensitive period. Between a 12-inch height and boot stage, use a drop extension to direct 2,4-D away from the sorghum whorl. Never use Banvel on grain sorghum after it is 15 inches tall.

Alex Martin
Extension Weeds Specialist
John McNamara, Extension Assistant, Weed Science

Remember that contact herbicides must contact the weeds and that rain may be needed to remove the dust from weeds before spraying. Dust will deactivate contact herbicides, diminishing weed control.

Robert N. Klein, Extension Cropping System Specialist
West Central District
David D. Baltensperger
Extension Crop Breeding Specialist, Panhandle District
Gail A. Wicks
Extension Weeds Specialist
West Central District
Worksheet, computer program can help assess borer control strategies

European corn borers are completing the first generation and moths will begin emerging soon. The Nebraska European Corn Borer Software program can be used to predict the timing of egg laying by these moths, based on a sample of first generation larvae and weather data.

Larvae were collected from the South Central Research and Extension Center near Clay Center and the Northeast Research and Extension Center on July 21. Larvae must be identified by larval stage (instar) to be used in the program. The following data were used to run the program:

<table>
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<th>Number of corn borers by stage</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
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<td>9</td>
<td>41</td>
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<td>1</td>
<td>4</td>
<td>15</td>
<td>33</td>
<td>2</td>
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Using 30-year average weather data for each location the program produced the following predicted times for egg laying:

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<th>% Egg laying complete by indicated date</th>
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Past research in Nebraska has shown that these predictions are reasonably accurate (within two to three days). Another run of the model was made assuming that max and min temperatures are 5°F higher than normal for the rest of July and August. Under these conditions, egg laying dates at Clay Center were two days earlier.

Fields with green silks during the peak moth flight period are most susceptible to second generation egg laying. The white, flat eggs overlap each other like fish scales and are laid in masses of 5-40 eggs. Eggs are most likely found on the underside of leaves, near the mid-rib, on the ear leaf and the three leaves above or below the ear leaf. A black spot is visible on the eggs for about 24 hours before they hatch. The spot is the head of the developing corn borer; this stage is often referred to as the black head stage.

Begin scouting for corn borer egg masses when 25% to 50% of egg laying is predicted.

To determine whether control would be profitable, examine 25 plants at four sites per field (100 plants total). Record the number of egg masses and the number of plants sampled. Go through the calculations outlined in the following worksheet to determine if an economic infestation is present. You will also need to know:

- crop stage
- expected yield
- expected market price
- percent control with insecticide
- cost of control (insecticide plus application costs)

Use of this worksheet will allow you to better evaluate the factors influencing the cost/benefit relationship for second generation European corn borer treatments. Average values are suggested in the worksheet, but may be modified for local conditions.

1) Borer survival is suggested to be 15%. Larval survival varies with weather conditions and irrigation. In irrigated corn, larval survival may be 20% or more, while in dryland corn with no significant rainfall, it may be 10% or less. Survival of eggs and small larvae decreases greatly in hot, dry weather, or with extended periods of heavy rain.

2) Yield loss will be about 4% per borer for infestations occurring before silks turn brown and 3% per borer after silks turn brown, but before blister stage. These averages are based on published research, but only account for physiological yield losses (reduced grain production) and do not consider yield loss from stalk breakage or ear drop. These factors are difficult to predict and vary with hybrid, cultural practices and weather.

3) Percent control with insecticides is suggested to be 75%; change this value if you think that control will be different under your situation.

Infestations are most damaging when corn borers enter the stalk early in the reproductive cycle of corn.

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There is a short time between first egg hatch and significant stalk tunnelling when corn borers are best controlled. Concentrate scouting efforts in this early egg laying period and repeat every three to five days. Often second generation egg laying may extend for 21 days or more. Although later hatching corn borers do not directly reduce grain yield as much, they may still cause stalk breakage or ear drop. Early harvest of fields damaged by corn borers and selecting varieties with good stalk strength and resistance to stalk rot can reduce this loss.

If treatment is needed, time insecticide applications to coincide with the beginning of egg hatch to achieve acceptable control. A listing of registered insecticides, their rates and restrictions is available in EC 94-1509, available at your local University of Nebraska Cooperative Extension office.

The Nebraska ECB software program also contains a management model which leads you through the calculation of an economic threshold for second generation corn borers, based on scouting information from individual fields. To run the management model, you need information on the age distribution of first generation corn borer larvae, as shown above. If you plan to use the computer management model, collect a sample of first generation larvae soon.

This computer program, which is sold exclusively in Nebraska (other versions are available in Kansas and Iowa), runs on IBM-compatible computers. The cost is $71.23, which includes state sales tax and shipping and handling. Specify whether you want 5.25” or 3.5” disk. Send checks payable to University of Nebraska to Nebraska ECB Software, 108 ACB, UNL East Campus, Lincoln NE 68583-0918.

Bob Wright
Extension Entomologist
South Central District

Management worksheet for second generation European corn borers

\[
\text{Number of egg masses/plant \times 23 \text{ eggs/egg mass} \times 15\% \text{ survival}^*} = \text{__ borers/plant}
\]

\[
\text{Borers/plant \times 4\% \text{ yield loss/borer}^{**}} = \text{__} \% \text{ yield loss}
\]

\[
\text{\% yield loss \times \text{expected yield (bu/A)} = \text{__ bu/acre loss}}
\]

\[
\text{bu/A loss \times \$ \text{sale price/bu} = \$ \text{loss/acre}}
\]

\[
\$ \text{Loss/A \times 75\% \text{ control} = \$ \text{preventable loss/acre}}
\]

\[
\$ \text{Preventable loss/acre}
\]

\[- \text{Cost of control (chemical + application costs)}
\]

\[= \$ \text{Profit (+) or loss (-) acre of treatment is applied}
\]

If preventable loss exceeds cost of control, insecticide treatment is likely to result in economic benefit.

* Assumes 15% survival rate; may vary with weather.

** Use 3% loss per borer/plant if infestation occurs after silks are brown. The potential economic benefits of treatments decline rapidly if infestations occur after corn reaches the blister stage.
Research offers clues to evaluating greensnap damage, resulting yields

The high winds that often accompany thunderstorms can cause severe stalk breakage (greensnap) in corn during the elongation phase of growth just prior to tasseling. Early July storms in both 1993 and 1994 devastated huge areas of corn across Nebraska. Because of our late planting dates this year corn is susceptible to greensnap now.

In experiments at the South Central Research and Extension Center in 1993 and 1994, stalk breakage increased with nitrogen rate and was reduced with sidedress nitrogen application and no-till. In a site specific management study, stalk breakage was positively correlated with soil organic matter content. Factors which accelerated crop growth also increased susceptibility to stalk breakage.

Hybrids vary considerably in susceptibility to greensnap. Greensnap data recorded from our hybrid trials are reported in the South Central Irrigated sections of the Nebraska Corn Hybrid Tests for 1993 and 1994 (EC93-105 and EC94-105).

How can yield potential of damaged fields be estimated?

Our work in the past two years shows that yield contribution of plants broken at or below the primary ear node is negligible. However, other researchers have shown that plants broken above the primary ear node will contribute more yield than those broken at or below the ear node.

We originally expected that standing plants would compensate for broken plants around them by producing more grain per plant. This did not happen when stalk breakage occurred after the 12th leaf stage.

A conservative estimate for yield potential of fields damaged at the 12th leaf stage or later is that yield potential is inversely proportional to stalk breakage. If 25% of the plants are broken, potential yield will be reduced 25%, etc.

Roger W. Elmore, Extension Crops Specialist
Richard B. Ferguson, Extension Soils Specialist
Both in the South Central District

Corn blotch leafminer damaging corn

A higher than normal infestation of the corn blotch leafminer is causing lots of concern in south central Nebraska within a 40-60 mile radius of Holdrege. This insect is not one that we expect problems with and is usually fairly rare in corn in the Midwest. The adult is a small fly that inserts eggs into the corn leaves. Within a few days, the maggots that hatch from the eggs are mining within the leaf causing blots to appear where the upper and lower epidermis of the leaf only are present. After feeding for up to three weeks, the maggots pupate and transform to the adult stage. The entire life cycle can take four to six weeks and there may be three to five generations each year.

Consultants are reporting that some fields have half or more of the lower leaves on each plant affected to the point that these leaves are not likely to live through the season. In many of these fields, the upper leaves have small blots on them and all stages of the insect are present. We have not determined why the corn blotch leafminer has become such a problem in this area this year. The problem seems to be present in fields with various cultural practices, chemical programs, etc. and there is no particular pattern.

Control of this pest will be difficult. It is not likely that foliar insecticides will provide effective control of the miners in the leaves. Some systemic insecticides might give some control, however, these are normally most effective when applied to the soil to allow root uptake. They also tend to work best with sucking insects. This leafminer is not a sucking insect, however, it is intimately associated with the plant which could be helpful in allowing a systemic insecticide to work. Foliar treatments will be effective in killing the flies present in a field, however, we would expect that reinestation will occur within a few days as new flies emerge from puparia in the field and migrate in from other infested fields in the area.

Steve Danielson
Extension Entomologist
EPA approves short term exemption

Tilt approved for use on dry beans

An EPA Section 18 exemption has been granted in Nebraska to allow the use of propiconazole (Tilt) to control rust of dry beans.

This exemption is subject to conditions and restrictions in addition to the EPA-registered product label. Those relevant to growers/applicators are:

- Propiconazole may be applied at a rate of 1.8 oz. a.i. (4 fl. oz. product) per acre using a minimum diluent of five gallons per acre by air and 15 gallons per acre by ground with a maximum of three applications per year.
- A 28-day preharvest interval and a seven-day grazing or forage feeding interval must be observed.
- To protect endangered and/or threatened Nebraska insect and fish species, Tilt cannot be applied to dry beans within 300 feet of any permanent lake, stream or tributary.

Insect management publications available

Two recent publications from the Entomological Society of America are useful references for people working in field crop insect pest management. The Handbook of Soybean Insects is a comprehensive source of information on identification and management of soybean insect pests. The 144-page handbook is well illustrated, with 92 color photos and 200 illustrations. It was edited by Leon Higley (University of Nebraska-Lincoln) and David Boethel (Louisiana State...)

(Continued on page 127)
Attack weeds with wipers, bean bars

Wiper applicators are popular for controlling weeds at least 10 inches taller than the crop. Roundup is often used for wiper applications in sorghum and soybeans. Use a concentration of 33% Roundup in water to control broadleaf and grass weeds. Shattercane and volunteer corn are very susceptible to Roundup, however, it is less effective against broadleaf weeds. Sunflower and pigweed are usually controlled, but velvetleaf is not readily controlled. Dense weed stands make good herbicide coverage difficult with a wiper. Two passes in opposite directions will be required for good control.

Bean bars have become quite popular for controlling weed escapes in soybeans. Weeds need not be taller than the crop since they are individually sprayed with hand held spray nozzles. Roundup is registered at a 5% concentration for straight stream nozzles and a 2% concentration for spreading nozzles.

Some crop damage occurs with Roundup in a bean bar since spray droplets contact the crop. Using Assure, Basagran, Blazer, Classic, Fusilade, Pinnacle and Post in bean bars provides weed control with less crop injury than Roundup. These herbicides are generally mixed at the per acre rate of herbicide and surfactants in 25 gallons of water. Be certain you heed the preharvest interval when using these treatments.

John McNamara
Extension Assistant, Weed Science

Alex Martin
Extension Weeds Specialist

Postemergence herbicides and heat linked to soybean injury

Recent weather conditions have increased the likelihood of soybean injury from postemergence herbicide applications. Growers have been reporting injury after chemical control of late emerging grass and broadleaf weeds.

Several families of postemergence herbicides for soybeans may cause damage. Generally, injury results from one or a combination of factors, including: type of herbicide, herbicide rate, additives, crop vigor, and environmental conditions.

The active ingredients in Assure (imazaquin), Pursuit (imazethapyr), Classic (chlorimuron), and Pinnacle (thifensulfuron) inhibit production of acetolactate synthase enzyme (ALS), an amino acid necessary for plant growth and development. Soybean injury symptoms include one or several of the following: stunting of growth, death of the terminal growing point, chlorotic (yellow) leaves, or reddish to purplish leaf veination.

The active ingredient in Basagran (bentazon) inhibits photosynthesis, shutting down the plant’s ability to produce food. Injury only occurs where the herbicide makes contact with plant foliage, and under very warm temperatures, soybean leaves may appear yellow or bronze.

Finally, Blazer (acifluorfen), Reflex (fomesafen), and Cobra (lactofen) are in a group of herbicides known as the cell membrane disrupters and likely cause the most crop injury under bright, sunny, and warm conditions. These herbicides are activated by sunlight, forming oxygen compounds, which rupture plant cell membranes. Once again, injury occurs only where the leaf tissue was contacted by the herbicide spray and will cause stunted growth and/or reddish-colored spotting on the leaf surface.

Herbicide combinations which include one or more of the previous active ingredients may cause soybean injury, depending on their formulation. In addition, crop oil concentrates and other additives can increase weed control, however, they also may cause crop injury. Soybeans will tolerate a certain degree of herbicide injury. The severity of injury is influenced by herbicide rate, type and rate of additives, crop size, and temperature. Consult the herbicide label for details on reducing the risk of crop injury.

Marty Williams
Extension Assistant
Lancaster County
Alex Martin
Extension Weeds Specialist

Insect publications
(Continued from page 126)

University). It costs $30 ($25 for ESA members), plus $2.50 shipping.

The 1995 Edition (Vol. 20) of Arthropod Management Tests was recently published. It is a useful source of efficacy data for insecticides against a wide variety of insect pests. This publication contains 400 pages of reports of field and laboratory insecticide efficacy studies on field, fruit, vegetable, and ornamental crops. It costs $40 ($25 for ESA members). Both publications may be ordered from ESA Sales, 9301 Annapolis Road, Lanham MD 20706; phone 301-731-4535.

Bob Wright
Extension Entomologist
SCREC, Clay Center
Heat and hail affecting crops; continued hot dry spell expected

After an extraordinarily wet start to the 1995 growing season, a complete reversal of fortune has hit farmers throughout the eastern half of Nebraska. Rainfall totals across this area have averaged less than 50% of normal since June 1. Although some areas have been fortunate to receive isolated heavy rains, the majority of farmland north of Interstate 80 has remained dry as of July 23.

The recent five day-stretch of 100 plus temperatures placed additional stress on dryland crops. Subsoil moisture reserves in areas that have remained dry have been drawn down to levels where stress is likely to occur if temperatures begin to increase again. The corn crop is expected to be in or reach the critical pollination stage within the next two weeks. If beneficial rains fail to materialize, significant yield reductions are possible.

One benefit of the 1995 growing season being two to three weeks behind normal is that the corn crop had not reached its reproductive phase during the recent heat wave. This stretch of temperatures above 100F marked the first time since 1990 that all locations within the state were above the century mark on the same day. Five consecutive days at or above 100F statistically occurs about once every 10 years over western areas of the state and once every 20 years over eastern areas.

The short term forecast for the next two weeks offers little hope for a change in the recent dry pattern. Temperatures throughout the period are projected to be normal to above normal. Precipitation should be normal to below normal. This is the time of year when isolated convection dominates. In any given thunderstorm event, about 20 percent of the area will get rain, while the remainder will stay dry.

Above average temperatures increase the likelihood of large hail when thunderstorms do develop. There has been significant hail and wind damage to some central and western Nebraska areas. Hail damage within Cheyenne County virtually wiped out what looked to be a very promising wheat crop. Marble to golfball size hail accumulated several inches deep around the Sidney area.

Because grain crops were planted so late this year, some concerns are beginning to surface about the potential for freeze damage this fall. There is no doubt that the crop will be more susceptible to damage, but it is still much too early to begin making projections. If high temperatures during August remain in the upper 80s to low 90s, while lows are in the mid 60s, the probability of freeze damage could be significantly reduced. Freeze probabilities will be addressed beginning in mid-August.

Al Dutcher
State Climatologist
Agricultural Meteorology

Potato leafhopper damages alfalfa in eastern Nebraska

The potato leafhopper has caused severe damage in some eastern Nebraska alfalfa. High numbers of these small, light green insects have been found. The damage appears as inverted triangular yellow areas at the leaflet tips that eventually become purple and then die. Severely damaged plants will become stunted and can die out particularly in weakened or newly established stands.

Growers are advised to sample alfalfa fields regularly and to make management decisions prior to the onset of damage symptoms if possible. Management includes early harvest and insecticide use. Reinfestation is possible as nearby fields are harvested because the adults can fly long distances to locate new hosts. The potato leafhopper has several generations each season and may cause damage until late August in Nebraska.

For more information, refer to these Extension publications, EC95-1511, Management Guide for Nebraska Sugarbeets, Dry Beans, Sunflowers, Vetch, Potatoes, and Onions and G93-1136, Potato Leafhopper Management in Alfalfa.

Steve Danielson
Extension Entomologist
Nebraska weather data as of July 23

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<th>5/28</th>
<th>6/10</th>
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*Com tasseling/silking normally begins at approximately: 1200 GDDs (short season); 1300 GDDs (mid season); or 1400 GDDs (long season)

**Base 50 is used for corn, sorghum and soybean production.
# Precipitation (14-day summary ending July 23)

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