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G96-1300 Insects That Feed on Corn Ears

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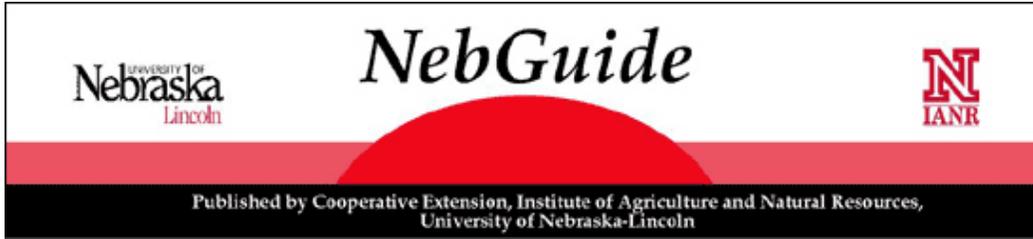


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Insects That Feed on Corn Ears

How to identify mature and immature insects that infest and damage ears of corn.

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Several kinds of insects infest the developing ears of corn, raising farmers' concerns and sometimes causing economic damage. Some of these insects can reduce both yield and quality of seed corn, pop corn, sweet corn and field corn. Control decisions depend in part on the economics of the corn crop produced. In many cases, particularly in field corn where the value of the crop per acre is somewhat lower, the insects may not be sufficiently damaging to require control. The higher value of seed corn compared to field corn would call for control measures at a lower level of pest infestation.

Use Integrated Pest Management (IPM) strategies to reduce losses due to insects and other pests. IPM is a philosophy of pest control which emphasizes the simultaneous use of several management techniques, such as biological, cultural, physical and chemical methods in a way that minimizes potential negative impacts on profit, health and the environment. IPM is much more than just the use of pesticides. Pesticides should be considered the last resort for reducing losses due to pests in most cases. Economic and environmental risks can be minimized by using proven pest monitoring techniques and control measures based on economic thresholds and treatment guidelines. Health risks can be reduced by following all safety precautions and instructions provided on pesticide labels.

Consult the Corn Insect Pest Management Guides available from NU's Department of Entomology for additional information.

MAJOR INSECTS

Western Bean Cutworm, *Loxagrotis albicosta* (Smith)

Damage by the western bean cutworm (*Figure 1*) has occurred most frequently in the Panhandle, southwest, central, north and northeast Nebraska crop districts. This cutworm is also a major pest in dry bean production fields, primarily in the Panhandle and southwestern counties.



Figure 1. Western bean cutworm feeding on corn ear tip.

The western bean cutworm overwinters as a prepupa in an earthen cell in the soil. In May and June it transforms into a shiny, reddish brown pupa, an inactive stage. In July, the adult (moth) emerges from the pupa and pushes its way to the soil surface. The adult is a typical cutworm moth or "miller", about 1 inch long, which flies at night and is attracted to light. The forewings are brown with distinct round and kidney-shaped markings, with a light tan stripe at the leading edge. The hind wings are light grey or white. Once mated, the females deposit masses of cream-colored eggs in corn whorls. As leaves expand and unfurl out of the whorl, eggs will appear on the upper surfaces. Eggs darken to a purplish color as they develop and hatch in about five days, after which young worms disperse over the corn plants. Depending on plant growth stage, these tiny cutworms may proceed to the unfolding whorl where they feed on parts of the emerging tassel, or move directly to the ear or leaf axil. Once on the

ear, they may bore in through the husk or proceed to the tip, where they feed on green silk and later penetrate the ear through the silk channel.

Small western bean cutworms are similar to young armyworms. These two species are difficult to separate without microscopic examination until they are about one-third grown. At the third instar (roughly 1/2 inch long), western bean cutworm larvae are *not* obviously striped, unlike armyworms, and body color varies from cream to tan. A light area runs lengthwise down the middle of the back, beginning on the first segment behind the head and extending the length of the body. This light area is bordered on each side by an irregular, scalloped, broken dark area that extends to spiracles or breathing holes. On the prothoracic shield just behind the head are three white stripes running from front to back.

Once the worms are in the ear tip, control is difficult, but may be possible with an application of insecticide through an overhead irrigation system. Worms that have penetrated deeply into ears will not be controlled. Larvae feed on corn kernels for about three to four weeks, reaching a length of about 1 1/4 inches, and then drop to the ground. The worms then burrow into the soil and form an earthen cell, entering the prepupa stage which overwinters.

Corn Earworm, *Helicoverpa zea* (Boddie)



Figure 2. Corn earworm and damage to corn ear.

The corn earworm (*Figure 2*) is a common pest of many crops including cotton, tobacco, tomatoes, soybeans, and sweet, field and popcorn. Its broad host range enables it to successfully inhabit a large area of the country.

The earworm probably does not overwinter in Nebraska, although larvae have been collected here as early as April. Instead, the insect reestablishes itself each spring when southern moths fly northward.

On average, moths first appear at blacklight traps in June. The moths are green-eyed, 3/4 inch long, with a 1

1/2 inch wingspan, usually buff-colored, sometimes with shades of pink or green, and with dark forewing markings. Hindwings are light, but have dark margins. Eggs are placed singly on corn leaves. A red ring appears around the egg after 24 hours and the black larval head capsule is visible in three to four days.

By mid-June, a few scattered corn plants show ragged whorl feeding by the larvae. Earworms may vary greatly in color, but all have three or four black stripes running the full length of the body. Basic body coloration may be green, yellow, black, brown or even pink. The head is light brown with faint mottling or spots. Under magnification, the skin will show numerous small projections called *microspines*. These microspines are the best way to identify this common ear-infesting insect. There are five or six larval stages or instars. Mature larvae can be up to 2 inches long.

When feeding is completed, the worms drop to the ground and enter the soil where they transform into shiny brown pupae. In a few weeks the moths emerge to mate and deposit eggs for the second generation. These locally emerging moths, plus additional migrants from the south, are the parents of the worms found in corn ears in mid-to-late August. Eggs are laid three or four at a time on the green silks. After eggs hatch, young worms proceed down the silk channels into the ear tips. Corn earworms are cannibalistic, therefore only one will normally mature in each ear.

Treatment for earworms in field corn is not considered practical because single sprays do not provide adequate control. In sweet corn and seed corn, however, two treatments may be justified because of the higher crop value. Good spray coverage is essential for control. "Tight-husked" corn varieties with long silk channels are less prone to earworm infestation. Very early silking or late silking may make certain fields more attractive to egg-laying moths. While blacklight and pheromone traps (the best are the zealure-baited "Hartstack" cone-shaped traps) may be used to monitor moth buildup, counts are difficult to use as indicators due to relative field attractiveness. If most field corn in the area silks at the same time as seed corn, moths will deposit eggs more uniformly over the area. However, early or late silking fields may suffer losses even if moth catches are quite low. Pyrethroid insecticides have been the most effective controls.

European Corn Borer, *Ostrinia nubilalis* (Hubner)

Corn borers overwinter in old corn stalks as larvae or worms. These pupate in May and begin to emerge as adults or moths in late May and early June. Moths are buff-colored, about 3/4 inch long, delta-shaped when at rest and have vague reddish-brown zigzag markings on the forewings. They hide in grasses by day and fly into corn fields at night where they deposit eggs on the undersides of corn leaves, frequently near the midrib. Egg masses consist of 25 to 50 whitish eggs laid overlapping each other like fish scales. Eggs hatch into tiny borers that invade the whorls and produce typical shot-hole feeding damage. After this, they enter the leaf midribs and eventually the stalk through which they tunnel, weakening the plant and reducing potential ear size. Corn borer larvae are grey with six rows of blackish spots down the back and sides. Only four of these rows may be obvious in most specimens. Worms may vary in length from 1/8 to 1 inch.

First generation worms pupate and produce moths which emerge from mid-July through August to lay eggs for the second generation. Second generation borers initially feed on leaf collars and sheaths, cutting off the flow of nutrients to the developing ear. Later, these larvae also bore into the stalks, weakening them and causing breakage. Many worms also invade the ear shank and tunnel through it, often causing the ear to drop. Borers also invade the ear tip and feed on the developing grain, fouling it with their excrement and introducing the spores of various fungi.

MINOR INSECTS

Armyworm, *Pseudaletia unipuncta* (Haworth)

The armyworm probably does not overwinter in Nebraska, but reinvades the northern part of its range each spring. Armyworm outbreaks in Texas, Missouri, Oklahoma or Kansas indicate a potential invasion of

Nebraska and other states to the north; however severe infestations can occur despite low numbers of migrating moths. Conversely, there are times when no economic infestations occur despite large moth flights through our state. The high reproductive potential of this insect and complex environmental factors determine the ultimate degree of infestation.

Armyworm moths are about 1 inch long and are tan to light-reddish brown, except for a small white dot on each forewing. Hindwings are dark smoky grey. Eggs are laid on grasses, including small grains, in masses of 30 to 75, often with the edge of the leaf folded over them. After the eggs hatch, young worms feed on the foliage of grains and grasses which usually grow near corn fields or around field margins. Armyworm larvae are usually green to brown or dark grey with yellow and orange stripes on the sides. The head is marked with a characteristic net-like pattern. After stripping the grasses, the worms can invade adjacent corn. Occasionally, when herbicides fail to control grassy weeds within corn fields, armyworm moths may lay eggs throughout the field, resulting in an outbreak.

Damage consists of stripping of the lower corn leaves and later invasion of the ear tip. Damage to the ear is usually slight and control is not advisable. However, if armyworms are abundant and leaf stripping is obvious, controls may be profitable.

Variegated Cutworm, *Peridroma saucia* (Hubner)

This climbing cutworm is a common Nebraska insect. It is an occasional pest of alfalfa, soybeans and home vegetable and flower gardens. While it sometimes causes concern when it infests corn, it seldom does any serious damage.

This insect passes the winter as a pupa in the soil. The first moths begin to emerge early in May and deposit eggs on host plants. The moths are rather large night-flying "millers", about 1 1/4 inches long, charcoal grey in color, with indistinct black markings on the wings. The hindwings are dusky grey. Egg masses are sometimes found in unusual places, such as on garden stakes, discarded cans, or laundry hung out to dry. Laid in masses of 75 to 150, the small white eggs turn dark purplish-grey when nearly ready to hatch. Young cutworms feed at night and hide in the soil by day.

The variegated cutworm is grey to blackish, with an orange stripe on each side of its cylindrical body. A "W"-shaped black marking is easily observed on the tip of the abdomen, especially in larger specimens. Behind the head is a row of small yellow dots extending along the midline of the back. Variegated cutworms may reach a length of 1 1/4 inches.

There are at least two generations each year, with the second probably of most concern to corn growers. Occasionally, when corn is silking, cutworms can be found feeding on the silks at the tip of the ear. Yield losses by this feeding have been rare and control is not usually justified.

Corn Rootworm Beetles Western, *Diabrotica virgifera virgifera* LeConte; Southern, *Diabrotica undecimpunctata howardi* Barber; Northern, *Diabrotica barberi* Smith and Lawrence

All three species of corn rootworms occur in Nebraska, but only the northern and western are significant pests in corn. The southern species cannot overwinter here and must move north each spring and reestablish itself. Our two major species overwinter as eggs in the soil, hatching in early June to feed on corn roots. The larvae or rootworms eventually reach a length of about 1/2 inch before they pupate in the soil. Root damage is usually over by the end of July in most areas of Nebraska. The adults (beetles) begin to emerge in mid to late July and continue into August, feeding at first on corn leaves, producing white, parchment-like areas. Beetles later consume pollen and move to the ear tips to feed on emerging green silks.

Female western rootworm beetles are yellow with black stripes; male beetles vary from striped to nearly

black. Northern rootworm beetles are either green or tan colored, without stripes. The southern species is often seen in early to midsummer, but not in great numbers. These beetles are yellow with 12 black spots on the wing covers, and about 1/4 inch long.

Beetles can, but rarely do, reduce corn yields by feeding on green silks during pollination. After pollination, direct feeding on grain at the ear tip is usually not serious enough to justify treatment. Often just an occasional ear is damaged, usually in the milk stage of kernel development.

Western and northern rootworm beetles begin to lay eggs in the soil in late July and continue through August. The eggs then overwinter to renew the life cycle the following spring.

Fall Armyworm, *Spodoptera frugiperda* (J. E. Smith)

The life cycle of the fall armyworm is similar to those of the corn earworm and armyworm. The fall armyworm is unable to overwinter at northern latitudes and migrates northward each spring. In Nebraska, little activity is seen until late July or early August when a few moths begin to show up in blacklight traps.

Eggs are laid in masses of about 100 on host plants, such as grasses around field margins. Fall armyworms rarely damage field corn in Nebraska. More commonly, the worms are found in the whorls of late-planted sweet corn, which they can destroy by making the leaves ragged and fouling the whorl with excrement. In field corn, fall armyworms occasionally invade the ear tip, causing damage similar to that of the corn earworm.

Fall armyworms, about 1 1/4 inches long at maturity, vary in color from light tan to green to black. General appearance is similar to that of the armyworm. Three yellowish lines run down the back from head to tail. These are bordered on either side by a dark stripe and a wide yellow stripe with faint reddish markings or blotches. On the head is a white, upside down Y-shaped marking that clearly distinguishes it from the armyworm. On the tail are eight obvious tubercles, or dark colored bumps, each with a strong seta or hair arising from it. Distinguishing very small fall armyworm larvae from small armyworms or western bean cutworms is difficult without a microscope.

Sap Beetles *Glischrochilus* sp. and *Carpophilus lugubris* Murray

These insects breed in fermenting sap emanating from injuries produced by primary ear invaders, such as the corn earworm, European corn borer or western bean cutworm. Sap beetles could play a role in furthering the spread of rot organisms (molds) which also damage corn ears. On the positive side, there is some evidence that sap beetles may drive European corn borers from their cornstalk tunnels. In any case, damage by sap beetles to corn ears is slight and their control would not increase yields.

The two common species observed in ear corn are the picnic beetle (*Glischrochilus* sp.) and the dusky sap beetle (*Carpophilus lugubris*). The former is a small, shiny black beetle with four irregular yellow or reddish spots on the back. The dusky sap beetle is brown and about 3/16 inch long. The wing covers of sap beetles are relatively short and do not extend to the tip of the abdomen.

A KEY TO INSECTS FOUND IN EARS OF CORN

Following is a key to help you identify insects that infest ears of corn. It is simply a series of insect descriptions, presented as paired choices for you to read and compare against the specimen you have. Begin with the first comparison (1a and 1b). If the insect is caterpillar-like in appearance, continue to comparison 2 (a and b) and proceed from there. If the specimen resembles a beetle, go to comparison 7 (a, b, and c) and proceed from there. If your insect does not seem to match either of the descriptions in 1a or 1b, it is not included in this key and the assistance of your Extension Educator may be required to identify it. A small hand magnifying lens (10 power) is helpful, but should not be necessary.

1 a.	Typical caterpillars; body cylindrical, either grey and unmarked or variously striped and spotted; length variable.	2a
1 b.	Beetles with hard shell-like wing coverings; shiny black or yellow and black spotted or striped; green or tan.	7a
2 a.	Body with stripes, or without obvious spots (may have both stripes and spots).	3a
2 b.	Body without stripes; grey with several rows of brown spots or tubercles down the back and sides.	European corn borer, <i>Ostrinia nubilalis</i> (Hubner)
3 a.	No obvious markings on head.	4a
3 b.	Head with markings	5a
4 a.	Body with black stripes; color may vary from yellow to green, brown, or pink; skin covered with microspines.	Corn earworm, <i>Helicoverpa zea</i> (Boddie)
4 b.	Body without black stripes, generally tan to brown; light brown area down midline of back; shield behind head with three light stripes running front to back.	Western bean cutworm, <i>Loxagrotis albicosta</i> (Smith)
5 a.	Head with white inverted Y-shaped mark; tail with dark tubercles on the back; dark green to brown.	Fall armyworm, <i>Spodoptera frugiperda</i> (J.E. Smith)
5 b.	Head without white mark.	6a
6 a.	Four orange stripes running full length of the body; head with net-like pattern.	Armyworm, <i>Pseudaletia unipuncta</i> (Haworth)
6 b.	Two orange or yellow stripes running full length of the body, sometimes faint in older specimens; no net-like pattern on head; row of small yellow dots along the midline of back behind head.	Variegated cutworm <i>Peridroma saucia</i> (Hubner)
7 a.	Beetles with black and yellow stripes; striping not obvious on males (may be completely black).	Western corn rootworm, <i>Diabrotica virgifera virgifera</i> (LeConte)
7 b.	Beetles with spots on wing covers.	8a
7 c.	Beetles without spots or stripes on wing covers; color brown, tan, or green--but not black.	9a
8 a.	Beetles black and shiny with yellow spots on wing covers; antennae with knobs at end, club-shaped.	Picnic beetles, <i>Glischrochilus</i> sp.
8 b.	Beetles yellow with black spots; antennae threadlike.	Spotted cucumber beetle or Southern corn rootworm, <i>Diabrotica undecimpunctata howardi</i> (Barber)
9 a.	Brown, drab looking beetles; no other marks; short wing pads extending only about halfway to the tip of the abdomen; antennae with knobs at end, club-shaped.	Dusky sap beetle, <i>Carpophilus lugubris</i> (Murray)
9 b.	Beetles green or tan; no black markings; antennae threadlike; wing pads cover tip of abdomen.	Northern corn rootworm, <i>Diabrotica barberi</i> (Smith and Lawrence)

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