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Cutworm incidence and damage on peas (*Cropland Insects*)

Description: Heavy cutworm damage was noticed on peas at certain locations in the Sunburst and other Golden Triangle areas of Montana. Cutworms are the larvae (caterpillars) of numerous species of night-flying moths in the family Noctuidae, which are usually active for feeding during the night. The larvae are called cutworms because they cut down young plants when feeding on stems at or below the soil surface. Cutworm damage occurs on early in the season when plant seedlings are small and have tender tissue. On a regular basis monitor your fields, particularly during late afternoon and evening when cutworms are active, so you can notice their movement when they are initial present. Refer the MontGuide to know about biology, damage, monitoring and decision-making guidelines, <http://store.msuextension.org/publications/agandnaturalresources/mt200005ag.pdf> For chemical control, refer High Plains IPM Guide, https://wiki.bugwood.org/HPIPMP:Cutworms_DB

Alert Period: 05/23/2017 - 07/31/2017

Submitted By: Gadi VP Reddy



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Cutworm incidence and damage on peas

Gadi V.P. Reddy

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Cutworm incidence in pea fields (Photo courtesy: Dr. Shabeg Briar and Deb Miller)



Cutworm damage to peas (Photo courtesy: Dr. Shabeg Briar and Deb Miller)

Pale Western and Army Cutworms in Montana

by Sue Blodgett, former MSU Extension IPM specialist; Greg Johnson, professor, Animal and Range Sciences; Will Lanier; and Judee Wargo, former MSU Extension agent, Chouteau County

Describes the life cycle of the two cutworms, how to identify, monitoring adults and larvae, damage caused by them, and how to decide between control options: chemical, cultural management and biological control.

TWO MAJOR CUTWORM SPECIES, THE PALE

western and the army cutworm, are serious but sporadic pests for Montana producers. Outbreaks can occur when cutworm populations are high and weather conditions are favorable for survival. However, outbreaks do not necessarily occur in successive years. An area-wide adult survey has been used in Montana to assess moth activity of pale western and army cutworms which has helped in the forecast of damaging cutworm larvae populations.

Origin and Distribution

Both cutworm species are native to North America. Army cutworms are distributed throughout the semiarid region of the Great Plains, extending to eastern Kansas with reports of occurrence as far east as Illinois and Michigan. They occur in Alberta as far north as the Peace River District and occasionally in Saskatchewan and Manitoba. Pale western cutworms occur from Alberta to Arizona and New Mexico, extending east to western North and South Dakota, Nebraska, Kansas and the panhandles of Oklahoma and Texas.

Army Cutworm

Life Cycle

The army cutworm begins laying eggs in late August and can continue through October. Up to 3,000 eggs are deposited per female on or just beneath the soil surface.



FIGURE 1. A pale western cutworm (left) and an army cutworm are shown with a penny. (Photos in this publication are by P. M. Denke)

Eggs hatch in the fall following rain or snow. This cutworm species overwinters in the larval stage. Larvae become active in late winter or early spring and are particularly damaging to winter wheat. Army cutworms feed above ground so evidence of feeding damage indicates their presence. However, they feed at night, from dusk to dawn, staying below ground during the day except on very overcast days when they can be found feeding above ground. This nocturnal behavior plus the small size of the early instar larvae (1.5 mm) makes them difficult to detect even though the feeding damage to foliage is obvious. When larvae are abundant and food supply is short, the larvae will move en masse to adjacent fields, hence the name army cutworm.

Mature larvae (40 to 50 mm) burrow into the soil and construct earthen cells in which they pupate. Adult moths, also known as millers, emerge from these cells in May and early June. An interesting phenomenon with this cutworm species is its seasonal migration to high elevations in the Rocky Mountains. Adult moths are active at night at these higher elevations, feeding on alpine flower nectar. During the day they form dense aggregations under stumps, logs and other structures that offer them protection from direct sunlight. Wildlife researchers report that these dense aggregations of cutworm moths are an important food source for grizzly bears in the absence of high-quality forage alternatives in July and August. Adult moths return to the plains in

late summer and begin laying eggs. Dry periods during August through October are detrimental to egg hatch and larval survival of army cutworms. Army cutworms have one generation per year.

Description

Adult army cutworm moths range from light brown to dark grayish-brown and are heavy-bodied. The forewing of the adult has a prominent circular spot and kidney-shaped marking. The hindwing is grayish-brown with a whitish fringe. Larvae are greenish-brown to greenish-gray with the dorsal (top) side darker than the ventral (under) side. A narrow, pale mid-dorsal stripe is usually present. The head is pale brown with brown to dark brown freckles.

Pale Western Cutworm

Life Cycle

The pale western cutworm has a life cycle similar to the army cutworm. Moths deposit up to 300 eggs per female in the upper two inches of loose soil in cultivated ground in early fall. Some hatching may occur in the fall but most eggs hatch the following spring. The newly hatched larvae are small, approximately $\frac{1}{8}$ inch, and difficult to detect. Larvae are subterranean and feed on plant stems below the surface of the ground. Mature larvae measure approximately $1\frac{1}{2}$ inches and become less active, burrowing into the soil where they form an earthen cell.

FIGURE 2. An army cutworm feeds on a canola seedling.



FIGURE 2. A pale western cutworm is shown in the soil beside a plant base.



They pass most of the summer in the soil as a prepupa, with pupation occurring in August. Adult moths emerge from the cell during late summer, mate and lay eggs soon after. Pale western cutworm has one generation per year.

Dry weather favors pale western cutworm survival.

Excessive precipitation in the spring can drown larvae in low-lying areas or force larvae to the surface of the soil where they are exposed to attack by predators and parasites. Wet weather produces conditions favorable for the increase of pathogens. A method of predicting cutworm outbreaks is based on the number of wet days (i.e., days on which more than a quarter inch of precipitation falls) in May and June. More than 10 wet days increase cutworm mortality; less than 10 wet days favor cutworm survival.

Description

The adult pale western cutworm is a gray to brownish white, heavy-bodied moth. Distinct markings on the wings are absent and the under-surface of the wing is white. Larvae frequently take on a characteristic C-shape when disturbed. The general body color of the larva is pale yellowish-gray with a distinct white mid-dorsal line. The head is yellow-brown with two distinct vertical black dashes that form an inverted V.

Adult Monitoring

Pheromone traps can be used to monitor adult flights of both cutworm moths. Pheromones are species-specific scents that are produced by females to attract males for the purpose of mating. For example, traps baited with army cutworm pheromone attract only male army cutworm moths. Traps are monitored weekly from early August through early October when moths are locating mates, mating and laying eggs. The cumulative moth catches for the duration of the trapping period indicate the relative abundance of each cutworm species in a locale and can be used to forecast the potential for damaging larvae populations the following spring. An advantage of using pheromone-baited traps is that captures are predominately single species and time spent sorting and identifying adult moths is minimized.

Separate traps with the appropriate lure (bait) are used for the army and pale western cutworms.

An example of adult pheromone trapping results are shown in Figure 4. Cumulative trap catches are shown for participating counties. When 200 pale western cutworm moths or 800 army cutworm moths or more have been trapped the potential for a damaging larval population the following spring by these species is great. However, these thresholds are highly influenced by climatic conditions that occur between moth flight and damage by larvae.

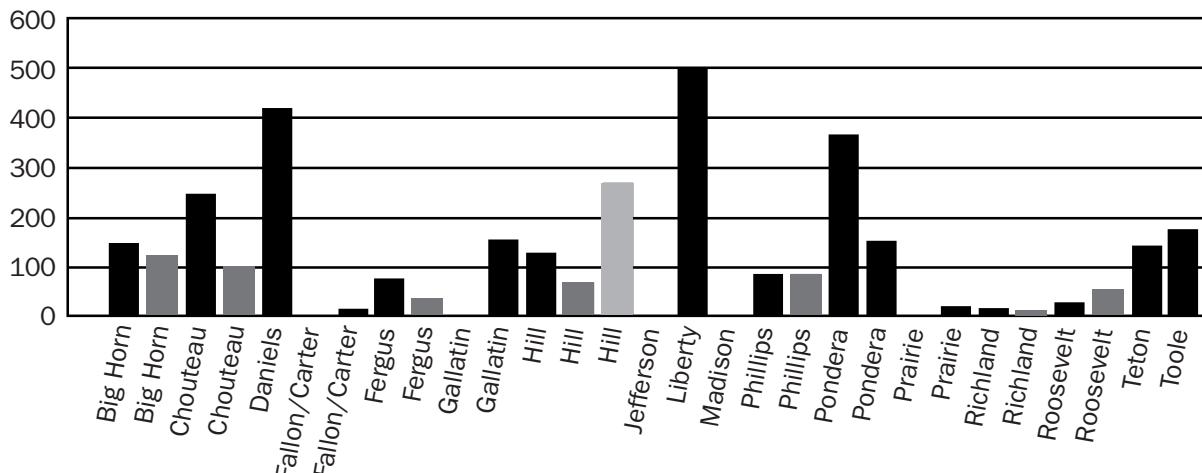


FIGURE 4. Adult pale western cutworm populations as trapped in several Montana counties. (Multiple county listings indicate multiple trap sites in those counties.) Traps were monitored every week for eight weeks beginning in August. Potential for economic damage exist the following spring when pale western cutworm catches are greater than 200.

Larval Monitoring

Larvae of either species generally are not active above ground on bright, sunny days. They can be found just below ground by scraping the soil surface lightly. Small larvae are well-camouflaged and can be difficult to see in the soil. Larval densities can be assessed by digging and screening the soil from one foot of row or a square foot at different sites in the field. Soil samples should be dug to a depth of at least 3 inches. Soil can either be sieved through a fine mesh screen or placed on a piece of white paper; the white background can aid in detecting cutworm larvae. However, soil sieving is both labor and time intensive and has limited practicality as a routine sampling method.

Examining plants for signs of cutworm larval activity and for cumulative larval damage is a more practical approach to assessing larval populations. Damage by cutworms can be distinguished from winter kill by looking carefully for evidence of feeding damage.

Damage

Both pale western and army cutworms can feed on and damage wheat, barley, alfalfa, canola, peas and sugar beets. Bare spots in the field in early spring may indicate cutworm activity. The army cutworm is a climbing cutworm and feeds on above ground foliage. Damaged leaves indicate army cutworm damage. Plants may recover from army cutworm feeding if defoliation is not severe.

Pale western cutworm larvae are subterranean and feed on plants below the soil surface. Because pale western cutworms cut stems, if the growing point is destroyed, the plants cannot recover from damage. Pale western cutworm infestation results in stand reduction. Damage appears as dead or wilted tillers or plants.

As mentioned earlier, moisture can influence cutworm

mortality. Records indicate that soil packing from compaction also forces larvae to soil surface.

Decision-making Guidelines

Early detection of damaging cutworm populations is critical. Adult monitoring provides valuable insight on the potential for damaging army and/or pale western cutworm populations in an area. Fields should be monitored periodically beginning in late winter or early spring for cutworm larvae. Treatment thresholds are directly related to the health and vigor of the growing crop. If the crop is experiencing moisture stress then the effects of cutworm damage will be more dramatic.

Small Grains: If plants are not drought-stressed and appear healthy and vigorous then insecticide treatment is justified when there are four to five army cutworm larvae per square foot. Treatment is justified for pale western cutworms when two to three larvae per foot of row are present. However, under drought conditions, treatment may be justified at lower cutworm larvae populations. Prior to making a decision to treat a field it is important to determine the size of the larvae. Large larvae indicate completion of the feeding or damaging stage of cutworms. When this happens the majority of the damage has been done and a treatment may not be cost effective.

Alfalfa: In mature stands, three to four cutworm larvae per square foot warrant making an insecticide treatment. In new seedling stands, two cutworm larvae per square foot cause economic damage.

Canola: The economic threshold is quite low because seedling canola plants have little ability to compensate for damage. Treatment can be justified at 0.3 to 0.5 cutworm per square foot.

Sugar beets: Army cutworms can seriously damage

seedling sugar beets when they move from adjacent fields or grassy borders into emerging beet fields. Because sugar beets emerge and grow slowly during early establishment, cutworms can drastically reduce a sugar beet stand in a short period of time. Considerable problems with both pale western and army cutworms have resulted where winter cereal cover crops are grown during the winter and beets are direct seeded into cover crop. When the cover crop is killed the cutworms readily move to seedling sugar beets.

Very low cutworm densities, less than one cutworm per 20 feet of row, can cause significant damage. Large larvae can consume several plants each night, and if present in large enough numbers, can completely destroy a sugar beet stand in only a few nights.

Management

Chemical options for control

Several insecticides are registered for cutworm control in small grain, alfalfa, sugar beet and canola (Table 1). Other sources for registered insecticides include your local county Extension agent, the High Plains Integrated Pest Management Guide for Colorado, Western Nebraska, Montana and Wyoming (www.highplainsipm.org), or the Pacific Northwest Insect Management Handbook (www.uspest.org/pnw/insects).

Cultural management strategies

Tillage may cause some mortality of eggs (pale western) and small newly hatched larvae (army) already in soil. However, tillage is not compatible with no-till and conservation tillage production systems.

Biological Control

Both species of cutworms are attacked by wasp parasites belonging to the families of Ichneumonidae, Braconidae and Chalcidae and fly (dipteran) parasites. The following pathogens have been recorded from army cutworms: *Beauveria* sp., *Isaria* sp., *Metarrhizium anisopliae* (Metschnikoff), *Sorosporella uvella* (Krassiltischik) and an entomopox virus. Insectivorous birds are the most common vertebrate predators feeding on larvae.

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- Jacobson, L. A. 1971. *The pale western cutworm, Agrotis orthogonia Morrison (Lepidoptera: Noctuidae): a review of research*. Quaest. Entomol. 7: 414-436.



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Several species of cutworms may be present early in the season in dry bean fields, but damaging levels are seldom experienced. In this region, the most likely problems will develop from the army cutworm or the pale western cutworm, but beans are usually planted late enough to miss serious problems from these insects. Perhaps the greatest risk from these cutworms is found in southwest Colorado.

Identification (and life cycle/seasonal history)

Army cutworm, *Euxoa auxiliaris* (Grote), pale western cutworm, *Agrotis orthogonia* Morrison, and others: Adults of both the army and pale western cutworms are attracted to newly tilled soil to lay their eggs in the fall, and therefore, they are more likely to be a problem in fields planted to winter small-grain cover crops that are destroyed prior to bean planting.

Larvae of the army cutworm have a pale grayish body color that is splotched with variable white or light markings. The upper surface is lighter with a narrow pale stripe along the center of the back. There is a lighter band along the side of the larvae below the spiracles. Larvae can attain lengths of 1.5 - 2 inches when fully grown. Army cutworm eggs hatch in the fall or winter and the larvae feed during the winter and early spring. Army cutworms normally finish development in May, but may still be present when early-planted beans are emerging, especially if other food sources have been inadequate.

The pale western cutworm spends the winter in the egg stage and hatches in the early spring when temperatures at the soil surface reach 70°F (February - March). The pale western cutworm is pale with no distinct markings on its body and can be easily distinguished from other cutworms present at this time. When fully grown, the pale western cutworm is about 1.25 inch long. Pale western cutworms feed through the spring and mature in May and early June. Larvae can go without food for up to a month and later cause damage to emerging crops.

Plant Response and Damage

Cutworm damage to dry beans will be made evident by plants that have been cut off at the soil surface or by the presence of leaf feeding on young seedlings. The army cutworm will climb on the bean plant and feed on leaves. The pale western cutworm is more damaging as it feeds at or below the soil surface and can cut off and kill entire plants.

Management Approaches

Serious cutworm problems are unlikely in the region because in most years these two major cutworm species have mostly finished feeding by the time beans emerge. Plant beans when conditions insure rapid emergence of seedlings. In high risk fields, cutworms can be monitored while beans are beginning to emerge and establish, and insecticide treatments can still be applied if damaging levels are present. High risk areas include fields that had been planted to a winter cereal cover crop or around the grassy borders of other fields. Other species of

cutworms that develop later in the season may be found on occasion in the region. Risk of serious damage from these is relatively low; however, monitoring emerging beans for damage from various insects is an important management practice.

Product List for Cutworms:

Insecticide	Product per Acre (fl oz. or oz. product)	Preharvest Interval, remarks
bifenthrin ^{R,1,2}	See labels	PHI 14 days; REI 12 hrs. No more than 0.3 lb a.i./season.
Swagger ^{R,1}	11.2	PHI 14 days; REI 12 hrs. See labels for additional restrictions for individual active ingredients. No more than 33.6 fl oz product/season.
Baythroid XL ^{R,1}	0.8-1.6	PHI 7 days; REI 12 hrs.
carbaryl ¹	See labels	PHI 21 days; REI 12 hrs.
cyfluthrin ^{R,1,2}	See labels	PHI 7 days; REI 12 hrs.
esfenvalerate ^{R,1,2}	See labels	PHI 21 days; REI 12 hrs.
Belt SC ¹	2-3	14 days, 3 days forage, hay or vines. REI 12 hrs. No more than 6 fl oz product/acre/season.
Fastac EC (alpha-cypermethrin) ^{R,1,2}	1.3-3.8 fl oz	PHI 21 days; REI 12 hrs.
gamma-cyhalothrin ^{R,1,2}	See labels	PHI 21 days; REI 24 hrs.
lambda-cyhalothrin ^{R,1,2}	See labels	PHI 21 days; REI 24 hrs.
methomyl ^{R,1,2}	See labels	PHI 14 days; REI 48 hrs.
Consero ^{R,1}	2-3	PHI 28 days; REI 24 hrs. Do no graze livestock in treated areas and do not harvest treated vines. See labels for additional restrictions for individual active ingredients.
zeta cypermethrin ^{R,1,2}	See labels	PHI 21 days; REI 12 hrs.
Steed ^{R,1}	3.5-4.7	PHI 21 days; REI 12 hrs. See labels for additional restrictions for individual active ingredients. No more than 28.1 fl oz product/season.
Triple Crown ^{R,1}	3.5-4.5	PHI 21 days; REI 12 hrs. See labels for additional restrictions for individual active ingredients. No more than 13.1 fl oz product/season.

^RRestricted use pesticide, ¹Labeled for chemigation, ²Generic active ingredient, several formulations.

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Montana small grain insects

Armyworms and Cutworms

Several species (Lepidoptera: Noctuidae)

Many kinds of armyworms and cutworms attack small grains and alfalfa in Montana.
Heavy infestations may destroy crops if fields are not treated.

Capsule Information Series

Number 34, October 1991

Pale western cutworm



Damage

Pale western cutworms live underground and plants are cut below the soil. Worms are about 1 1/4 inch long when full-grown. They overwinter as eggs. Consider treatment when populations exceed 1 worm per 2 feet of row (young plants) or 1 worm per foot of row (tillered plants).

Army cutworm



Larva



Adult

Army cutworms feed on foliage at night and hide in the soil during the day. They are about 1 1/2 inch long when full-grown. They overwinter as eggs or larvae. Consider treatment when more than 2 worms per foot (young plants) or 4 worms per foot (tillered plants) appear. The adults are moths which are common in buildings and around lights at night.

Wheat head armyworm



Larva



Damaged kernels

Wheat head armyworms feed on foliage and on developing heads. Larvae are brown or green with white stripes. They remain in plants during the day, but are difficult to find. Kernel damage may be extensive, but is seldom detected. Economic thresholds are not established.

Some Concepts:

- Moths lay eggs in the soil in the fall.
- Larvae feed in the spring or summer.
- There is one generation per year for most species.
- Don't treat low populations to prevent future losses.
- Don't treat if worms have nearly completed their development.
- Tillage is not effective for killing worms.
- Many species of cutworms and armyworms are present in Montana, but only a few cause crop damage.
- Pheromone traps may be effective in predicting outbreaks.
- Insecticides are effective; check with the extension service for recent registrations.

IMPORTANT PEST INSECTS IN MONTANA

Pale western cutworm

Agrotis orthogonia
Lepidoptera: Noctuidae

by Wendell L. Morrill and Gary Adams*

Description: The moth is dull grey, with a wingspread of 1 inch. They are similar to many other kinds of moths which are attracted to lights at night. Larvae have clear skins, and a faint dark line can be seen through their backs. They reach 1½ inch in length when full grown.

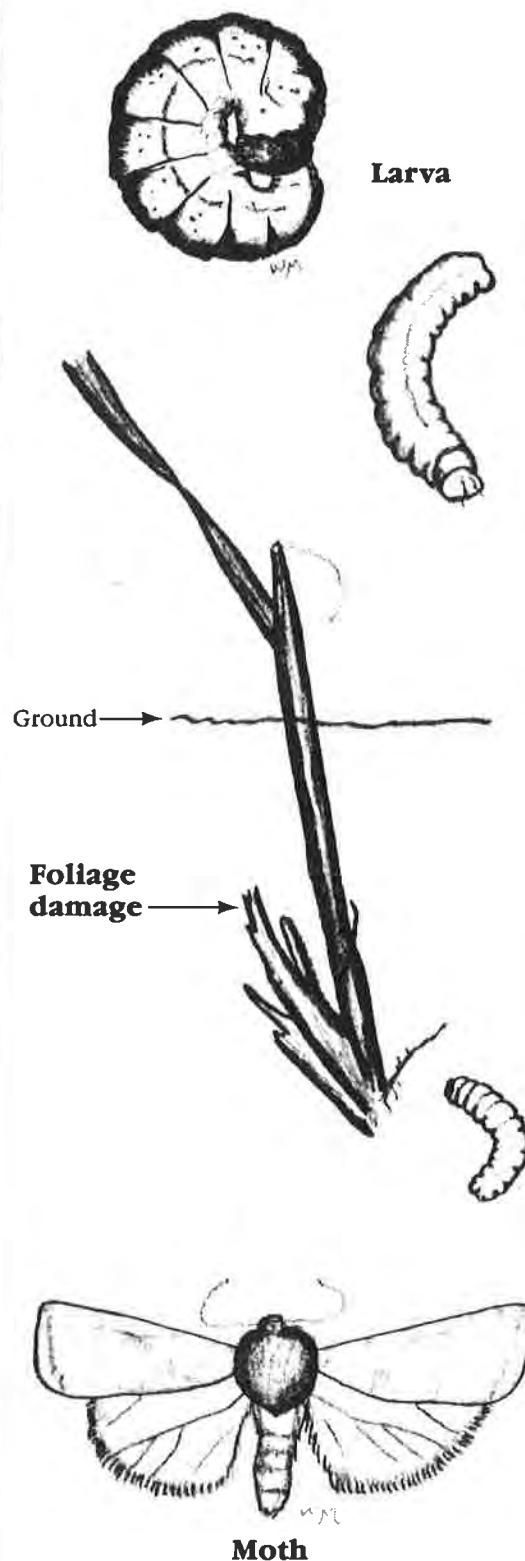
Damage: Worms feed underground on small grains. Small worms may eat through tillers, and plants may fall to the ground and die. Larger worms will pull plants underground where they are eaten. Damage is usually later than that of the army cutworm.

Life Cycle: Eggs hatch in the spring, and worms feed until their development is complete. They pupate in the soil, and moths emerge in August. Eggs are laid from September until the first killing frost. There is one generation per year.

Detection: Damage usually appears first on southern slopes. Search in the soil where stands are thin to find larvae. Pheromone traps may be useful in locating areas where moth activity is high in the fall, suggesting worm infestation for the following year.

Economic Damage Levels: Consider treatment, if there are one or more worms per two feet of row in young wheat, or, if there is more than one worm per foot of row in tilled wheat.

Controls: Treat with insecticides when worm populations exceed the economic damage level. Tillage is not effective, if infested fields are to be replanted. Check with your county Extension agent for recent recommendations.



*Morrill is an associate professor of entomology; Adams assisted with this report as a requirement for Economic Entomology 310.

IMPORTANT PEST INSECTS IN MONTANA

Army cutworm

Euxoa auxiliaris
Lepidoptera: Noctuidae

by Wendell L. Morrill and Todd Borchers*

Description: Moths are brown and tan and have a wingspread of $1\frac{3}{4}$ inches. They are attracted to lights at night. Larvae have a dark stripe down their backs and have dark brown heads. They reach $1\frac{1}{2}$ inch in length when full grown.

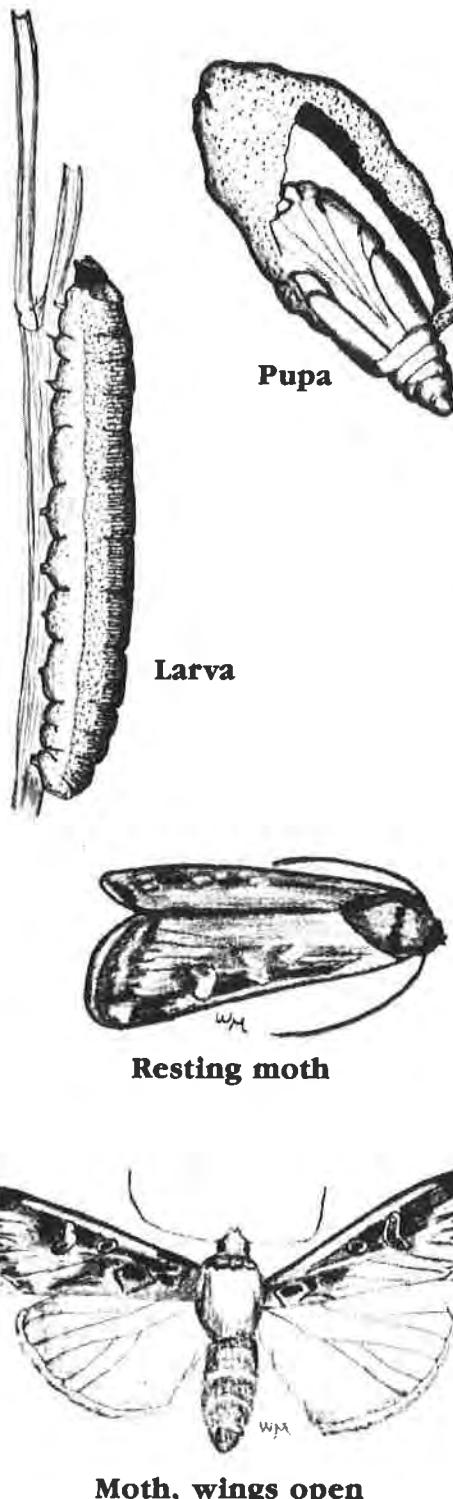
Damage: Worms feed on tips of small grains plants at night and hide in the soil during the day. Wheat damage resembles rabbit or antelope grazing. Heavy infestations will completely destroy fields. Weeds such as fanweed are also attacked.

Life Cycle: Eggs hatch in the fall, and larvae may feed in the winter or early in the spring during warm periods. After the worms are full grown, they form cells in the soil where they enter the pupal stage. Moths emerge from the pupae in the summer and lay eggs in the soil from September until the first killing frost. There is one generation per year.

Detection: Examine fields which are not showing vigorous early spring growth. Search in the dry upper layer of soil for larvae. Traps using sex pheromones may be used to detect heavy fall activity, which suggests problems for the following year.

Economic Damage Levels: Vigorous wheat stands can tolerate more damage than young plants or plants under drought stress. Consider treating when two or more worms are present per foot of row in small wheat, or if three or more are present in tilled wheat.

Controls: Apply recommended chemicals when worm populations exceed the economic damage levels. Tillage is not effective. Predators and parasites are common, but usually are not effective in preventing losses.



*Morrill is an associate professor of entomology; Borchers assisted with this report as a requirement for Economic Entomology 310.