



IPM 98/01

# Corn Earworm

*Helicoverpa zea*

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Larva on corn ear

## Do You Know?

- ◆ Corn earworm (CEW) is the most destructive insect in sweet corn in Utah.
- ◆ CEW will also attack field corn, peppers, and tomatoes in Utah.
- ◆ The adult form of CEW is a tannish brown moth that is most active at dusk. These moths are carried by wind and have been known to travel 250-300 miles in one night.
- ◆ Monitoring moth population levels with pheromone traps tells growers when moth levels are high enough to warrant spraying.
- ◆ The CEW overwinters as a pupa in the ground in central and southern Utah.



Larva

A. A. Muka

## Life History

In Utah there are normally three generations of corn earworm each year. The first generation of adults either come from overwintering pupae (southern and central Utah), or migrate into northern Utah. The adult moth is tannish brown with a 1.5 inch wingspan. The front wings are marked with a distinct dark gray spot in the center and darker bands near the outer margins. The hind wings are lighter tan, with a dark band along the outer margins. The male moths have light green eyes. Moths fly mainly during warm, overcast, moist evenings. Moth populations can be monitored using pheromone or black light traps.

CEW moths prefer to lay eggs singly on fresh, green corn silks. Each female moth can lay up to 1,000 eggs. Moths may lay eggs on weeds and selected vegetables until corn silk is available. This provides a population that is ready to attack corn as soon as silk is present. Eggs are very small, one-half the size of a pinhead. They are creamy white and dome shaped with ridges; darkening in color as they near hatching. The eggs can be seen with the aid of a hand lens or magnifying glass. In Utah, we have found egg monitoring very difficult due to their small size and



Adult

Curt Ferris



Pupa

A. A. Muka

location. The eggs hatch in 2 to 10 days, depending upon the temperature.

The larva is the damaging stage because of feeding activity on the corn ear, silks, and even leaves. It hatches on the silk and then crawls down the silks into the ear. The larva is a brown headed caterpillar with a green to brown or black body. The caterpillar grows up to 1 1/2 - 2 inches long. There are alternating dark and light strips that run lengthwise on the body, with thorny hairs. Larvae are cannibalistic and so usually only one larva is found per ear. The larvae feed on the ear for 10-14 days and then exit the ear and drop to the ground. They burrow 2-5 inches deep into the soil and pupate.

The pupa is a resting stage. The pupa is cylindrical, brown, and remains in the soil. The adult moth emerges in 10-25 days during the growing season. The second summer generation pupae may overwinter in warmer climates, otherwise it is usually killed by cold winter temperatures.

## Injury

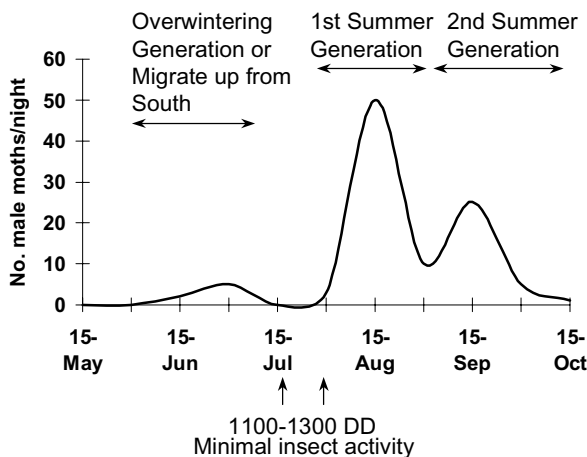
CEW causes several types of injury:

- ◆ Direct damage to the ear tip by feeding on kernels.
- ◆ Feeds on silk. This decreases pollination and causes poor earfill.
- ◆ Produces frass from feeding. This reduces quality, storage life and appearance.
- ◆ Can increase mold growth.
- ◆ Can increase sap beetle infestation by providing an opening in the ear tip.

## Moth Flight Patterns

There are typically three flights per year in northern Utah. The first flight is small and begins mid-June to early July. The second and third flights are much larger and occur

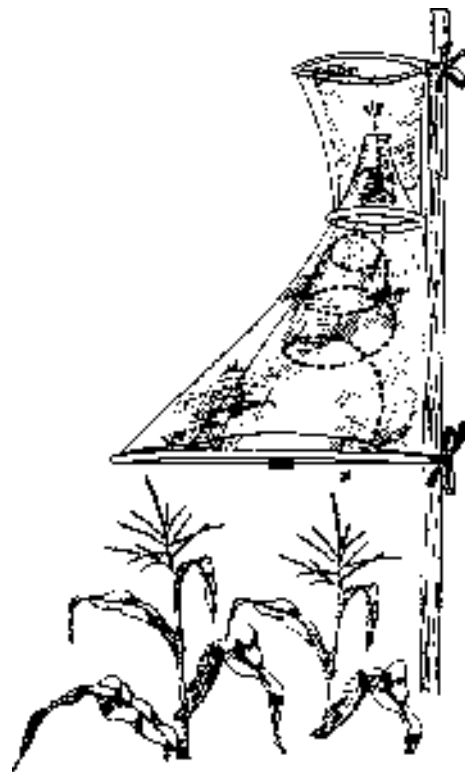
### Corn Earworm Moth Flight Pattern in Northern Utah



during August and September respectively. We have observed that fields with high levels of larvae in the fall also have higher levels of infestation the next spring. This suggests that some pupae overwinter. Other larvae come from moths that have moved in from overwintering areas further south.

## Monitoring Using Traps

The CEW is best monitored using a pheromone lure in a net trap. The pheromone is the sex attractant of the female moth that has been synthetically reproduced and incorporated into a lure. Traps are cone shaped and usually made of wire or plastic mesh. Some guidelines for using traps are:



Pheromone trap for corn earworms

- ◆ Scentry or Hercon lure attractants have been the most reliable.
- ◆ Place trap in May along edge of field. Attach trap to a stake or pole so trap bottom is the same height as corn silk.
- ◆ Check twice weekly until first catch, then check daily or every other day for best results.
- ◆ Moths are collected in the top of the trap. Remove trap top and kill moths by crushing, freezing, or using alcohol or nail polish remover in a kill-jar.
- ◆ Calculate average moths per night over the interval between checking the trap. If the trap is checked daily, calculate the average over a 3-4 day period.
- ◆ A threshold level for control is 0.2 moths per night

- ◆ Move trap to different areas of the field to keep near fresh silk
- ◆ Replace lure every 2-3 weeks
- ◆ Moths other than CEW may enter trap. Be sure of identification.

## Monitoring Using Degree Days

The rate of insect development is primarily controlled by temperature. Degree days (DD) are used to predict when moth development will occur. The lower and upper development thresholds are 55°F and 95°F. Daily DD's can be summed over time for each year beginning approximately March 1. From 1100 to 1300 DD there is an interval between generations when very little moth activity occurs. This interval is an 8-10 day period that usually occurs from the end of July through the first part of August. Little, if any, spraying is needed during this interval.

## Control

### Insecticides

Good control is dependent on applying insecticides before larvae eat their way into the ear. Start spraying within 2 days of silking or as indicated by trapping. About half the eggs are laid within 2 days of silk emergence and the rest by the 9th day after. Once silks turn brown they are no longer attractive as egg laying sites. Reapply insecticides to keep an active residue on new silk. Silk grows one-half inch per day. The following reapplication intervals are based on guidelines from Maine and seem to work in Utah, based on limited validation:

|                           |          |
|---------------------------|----------|
| Less than 0.2 moths/night | No Spray |
| 0.2-0.6 moths/night       | 5 days   |
| 0.7-6.5 moths/night       | 3 days   |
| More than 6.5 moths/night | 2 days   |

### Organic Chemicals

*Bacillus thuringiensis* bacteria products for caterpillars, such as Dipel or Thuricide, can be used. They must be ingested by the larva to be effective. These products are not effective on moths. There is a narrow window for control and the products must be applied every 2-3 days.

Oils such as mineral, petroleum, or vegetable applied directly to the silks work okay for home gardens if they are reapplied frequently. They are very labor intensive for large acreages.

### Cultural

Sweet corn planted early so that it will silk in early June, before major moth activity occurs, may escape injury. Crops silking between first and second generation flights (July 20-August 5 average in northern Utah) may also not be damaged.

Fall tillage of sweet corn fields may destroy pupae and pupal tunnels. In locations where corn earworm pupae overwinter this has been an effective practice.

## Biological

*Trichogramma* wasps are parasites of corn earworm eggs. They can be purchased from vendors and released in the corn field. The timing of releases and maintenance of adequate wasp populations are critical to success. Wasps have been used with limited success in Utah.

USDA scientists have recently discovered a virus that prevents corn earworm from mating. It is called the gonad virus and may be a potential biological control in the future.

Corn earworms in all life stages have some natural parasites and predators but their numbers are typically not high enough to provide adequate control.

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## CORN EARWORM CHEMICAL CONTROL

The chemicals used for corn earworm control can be very toxic to honey bees. To avoid killing bees, make applications in the early morning or late evening and direct the application away from the tassel area where bees feed on pollen.

To prevent corn earworm damage, chemical applications need to start by 2 days after first silking. Home gardeners should use a 5% Sevin or Malathion dust applied to the silks. Sevin is very toxic to bees and particular care should be taken to protect them.

The pesticides labeled for control of corn earworm on commercially produced sweet corn are listed below. Pesticide registrations change so always read and follow label directions for the product being used.

| Name             | Rate of a.i./Acre                    | Preharvest Interval  |
|------------------|--------------------------------------|--|
| carbaryl (Sevin) | 1 to 2 lb                            | 0 days    Note: Is exceptionally toxic to bees. Sevin XLR Plus is less toxic to bees than other Sevin formulations.                          |
| *Lannate         | 0.45 lb                              | 0 days    Note: Do not graze or feed treated plants to livestock within 3 days of application.   |
| *Asana           | 0.025 to 0.05 lb                     | 1 day    Note: Do not exceed 0.5 lb. a.i./A per season.  |
| *PennCap-M       | 0.5 to 1 lb                          | 3 days    Note: Do not graze or cut for forage within 12 days of application.  |
| permethrin       | 0.1 to 0.2 lb                        | 1 day    Note: Do not apply more than 1.2 lb. a.i./A per season.   |
| *Ambush          | 0.1 to 0.2 lb                        | 1 day  |
| diazinon         | 1 to 1 1/4 lb                        | 7 days    Note: Required interval between sprays of 7 days.  |
| Larvin           | 0.5 to 0.75 lb                       | 0 days    Note: Do not feed treated corn fodder to animals.  |
| Thiodan          | 1.5 lb (2 quarts)                    | 1 day    Note: Do not feed treated corn fodder to livestock. Do not make more than three applications per year. Do not exceed 4 quarts/year. |
| *Warrior         | .02 to .03<br>(2.56 to 3.84 fl. oz.) | 1 day  |
| *Pounce          | .01 to 0.2<br>(4 to 8 fl. oz.)       | 1 day  |

*\*Restricted use pesticides - Must have a Pesticide Applicators License to purchase.*