

# Corn Borer Pests in Louisiana Corn



Three important species of corn stalk boring caterpillar pests infest Louisiana corn. These are the European corn borer, the southwestern corn borer and the sugarcane borer.

The European corn borer is an uncommon corn pest that usually occurs in low numbers in the northeastern parishes of the state. The southwestern corn borer is a more common and important pest in that area.

Historically, the southwestern corn borer was a sporadic corn pest and was considered more of a secondary pest. The importance of this species has increased greatly in recent years and currently has major pest potential every year.

The sugarcane borer historically was a problem across south Louisiana, where it would occasionally infest corn grown in the vicinity of sugarcane. In recent years, heavy infestations have occurred in the lower delta of northeast Louisiana where sugarcane is not grown. Now it may be found in the most northern corn producing parishes.

In the absence of effective pest management strategies, corn borers are a major threat to corn production in Louisiana.

## European Corn Borer

### Description

**Egg** — Eggs are produced in masses that are about 1/4 inch in diameter. An egg mass may contain 15 to 35 eggs. The eggs overlap and appear as fish scales or roof shingles. Eggs appear pearly white to yellow when first laid, but turn darker as they age. Eventually, a dark spot appears in each egg, which is the head of a developing larva.

**Larva** — The larva is the damaging stage of this insect. Young larvae are a dull white, with rows of spots. Mature larvae are about 1 inch long. They have a black or dark brown head and appear off-white or gray, with rows of black dots on the body. Young larvae are a dull white, with rows of spots.

**Pupa** — Pupae are cylindrical in shape, dark brown and about 1/4 to 5/8 inch in length.

**Adult moth** — Moths have a wing span of about 1 inch. Female moths are a pale yellowish-brown, with wavy brown lines across the forewings. The male moth is much darker and appears olive brown with less distinct lines on the wings.

### Life Cycle and Biology

The life cycle of the European corn borer varies with temperature, but generally becomes shorter as temperatures rise. Eggs hatch in three to seven days. Larvae feed for 29-33 days, after which they pupate in

the stalk for 10 to 14 days. A female moth can produce about 400 eggs. Typically, three or four generations propagate per year in Louisiana. The European corn borer overwinters as mature larvae in corn stubble and in field debris of stalks and cobs. During favorable spring temperatures, the overwintering larvae pupate and first generation moths emerge after about 14 days.

### Feeding Behavior and Damage

Moths are most active at night, which is when they lay eggs. Egg masses can be found on most plant structures, but certain plant parts are preferred. In whorl stage corn, eggs are usually placed on the undersides of fully expanded leaves. After plants develop tassels, eggs are often found on the underside of the basal 2/3 of leaves, near the midrib.

Larvae initially feed on foliage before boring into stalks. In whorl stage corn, larvae feed briefly on the upper leaf surfaces, causing white spots. They move into the whorl where feeding causes shot holes in the leaves. Larvae migrate from the whorl when they are about half grown. Before boring into the stalk they may bore into leaf midribs, causing the leaf to break off. After the tassel stage, newly hatched larvae feed on pollen, under leaf sheaths and collars and on the outside of the ears. This exterior feeding may last for about two weeks. Afterwards, the half-grown larvae bore into the stalk and there complete their life cycle.

## Southwestern Corn Borer

### Description

**Egg** — Eggs are usually laid in masses of two to 10 eggs that overlap like fish scales or roof shingles. Eggs are creamy white when first laid, but after about 1 1/2 days each egg develops three transverse red bands.

**Larva** — The larva is the damaging stage of this insect. Newly hatched larvae are off-white with a black head. Black spots develop, and the head color changes after the larvae are about half grown. The mature larva is about 1 inch long, with a dark head and rows of black spots along the body. Overwintering larvae lack the black spots on the body.

**Pupa** — The pupa is mahogany brown and about 1/2 to 3/4 inch in length.

**Adult moth** — Moths have a wing span of 3/4 to 1 1/2 inches. The wings are folded roof-like over the body when at rest. The wing is a solid dull white. The female moth is slightly larger than the male moth.

### Life Cycle and Biology

The life cycle of the southwestern corn borer varies with the environment and generally becomes more rapid

as temperatures rise. The time from egg to adult moth ranges from 35 to 40 days. Each female moth may lay about 250 eggs. Eggs hatch in four to five days. Larvae feed for 18 to 20 days, after which they pupate in the stalk or in the ears. Typically, three or four generations propagate per year in Louisiana. The southwestern corn borer overwinters as a full-grown larva by constructing a hibernation cell in the root crown at the base of the stalk. Before pupating, the larva girdles the inner stalk 2 to 4 inches above the root crown.

### **Feeding Behavior and Damage**

Egg masses are most often found on leaves. The newly hatched larvae feed on the outer surface of the leaf, giving it a windowpane appearance. The larvae soon move into the whorl where they continue to feed on the tightly wrapped leaves. The appearance of expanded leaves has a pattern of buckshot holes, indicating leaf feeding in the whorls. After about 10 to 12 days of foliage feeding, half-grown larvae migrate from the whorl and bore into the lower stalk. These larvae tunnel throughout the stalks destroying water and nutrient channels. This insect also pupates in the stalk.

Moths typically lay egg masses on the upper leaf surfaces of tassel stage plants. The preferred sites include the primary ear leaf, as well as the three leaves above and below the ear. Newly hatched larvae feed on upper leaf surfaces, behind the leaf sheaths and at the base of the ear shanks. This exterior feeding continues for about 14 days before half-grown larvae bore into the stalks or into the ears through the shanks. Tunneling continues in the stalk or the cob until the larvae pupate.

## **Sugarcane Borer**

### **Description**

**Egg** — Moths lay their eggs in masses of about 25. These eggs are flat, oval and creamy white when first laid. As the eggs age, they turn yellow-orange.

**Larva** — The larva is the damaging stage of this insect. Young larvae have dark heads and weakly defined rows of spots along the body. The mature larvae are tan and about 1 inch in length. They have black heads and brown spots.

**Pupa** — A pupa is reddish-brown and becomes somewhat darker with age. The male pupa is about ½ inch in length and the female is about ¾-inch long.

**Adult moth** — Male and female moths are straw colored with two lines of black dashes that create a V-shaped pattern on the forewings.

### **Life Cycle and Biology**

The life cycle (egg to adult moth) of the sugarcane borer requires about 35 to 40 days. Females can lay up to 700 eggs when corn is available as a host crop. Eggs hatch in about four to nine days. The larva feeds for about 20 to 30 days, after which it pupates in the stalk. A new moth emerges from the pupa after about one week. Three or four generations propagate per year in Louisiana. Sugarcane borers overwinter as late-stage larvae inside the stubbles and other plant residues of host plants.

### **Feeding Behavior and Damage**

Sugarcane borer larvae feed on corn in a similar

manner to that of the other two borers. In whorl stage corn, moths lay eggs on the leaves. Larvae move into the whorl shortly after hatching and feed on the tightly wrapped leaves. The expanded leaves have a shot hole appearance. Half-grown larvae migrate from the whorls and bore into the lower stalk. The larval stage is completed by feeding in the water and nutrient channels of the inner stalk. On tassel stage plants, newly hatched larvae feed on the leaf surfaces, leaf sheaths and other exterior foliage material. Larvae bore into the stalks or into the cob through the ear shanks. After the feeding stage is complete, larvae pupate in the stalk or in the cob.

### **Scouting**

Scouting procedures for the European corn borer, the southwestern corn borer and sugarcane borer will be discussed as a single pest complex because their feeding behavior is similar, with a few exceptions.

### **Monitoring with Traps**

Commercial pheromones are available for the European corn borer and southwestern corn borer. These traps can detect the moth flights and generation cycles, but they should not be used as the sole indicator of corn borer activity. There is no commercial pheromone for the sugarcane borer; thus field scouting is the only tool for detecting and measuring infestations.

### **Pre-tassel Field Scouting Procedures**

Begin scouting whorl stage corn when plants have four to six leaves. European corn borers usually do not survive on plants that are smaller than the six-leaf stage. Inspect about 25 consecutive plants in several areas of the field for egg masses, feeding damage and live larvae. If the plant population and intra-row spacing is consistent, plants can be inspected by walking the row and viewing the whorls from above. For example, if the plant population averages two plants per row foot, 50 plants can be inspected on 25 feet of a given row.

Observe feeding injury such as white scars, windowpanes and pinholes on leaves. Shot holes will usually be found on expanded leaves. Broken leaves with damaged midribs are evidence of corn borers.

Damaged plants should be inspected further for larvae. Either cut the plant near the base or grab the upper five to seven leaves and pull upward to dislodge the whorl from the lower stalk. Unwrap the inner whorl leaves and look for larvae.

Early stage corn earworm and fall armyworm whorl damage will resemble corn borer damage, and young corn earworm and fall armyworm larvae will resemble young corn borer larvae. Therefore, it is important that corn borer larvae and damage be properly identified.

Whorl damage from larger corn earworms and fall armyworms will result in larger holes and more ragged leaves. The evidence of bored holes with frass indicates that half-grown borer larvae have migrated from the whorls and entered the stalk.

Dead heart plants occasionally result from southwestern corn borer and sugarcane borer feeding in whorl stage corn. This is the most serious form of early season damage, because these plants never recover and develop normally. Dead heart is caused by larvae feeding on the growing point of the stalk.

## Tassel and Post-tassel Stage Field Scouting Procedures

After corn has tasseled, scouting for corn borers becomes more difficult and time consuming. Inspect 10 to 20 consecutive plants in four or five areas of the field. To avoid a border affect, walk at least 100 feet into the field before inspecting plants. Damage along a border may be higher and is not always representative of the entire field. Plant inspection is sometimes easier if the plants are cut at the base and taken to the field border for inspection.

Look for egg masses, small larvae and frass on the leaves, in the leaf collar tissue and behind the leaf sheaths. Larval feeding sometimes will occur on the ear shucks or between the ear and the stalk. Exterior feeding by small larvae usually will occur close to the site of the egg mass. Egg masses can be placed anywhere on the plant, but they are more likely to be found on the middle leaves adjacent to the ear.

Half-grown larvae bore into the plant, leaving evidence of bored holes and frass on the outside of the stalk. Larvae also may bore into the ears, either directly or indirectly, through the ear shank. Advanced evidence of borer feeding on post-tassel stage corn includes broken stalks and dropped ears.

Corn borers cannot be controlled with insecticides after larvae bore into the plant. However, the extent of damage and the stage of pest development are sometimes useful to know. Damaged stalks can be split or dissected to inspect for larvae. Ears can be pulled, de-husked and broken to detect damage and live larvae. Knowing the infestation level as well as the age of larvae and pupae can be used to help manage the next generation of moths.

## Management

Corn should be planted in the early spring, but within the recommended planting date window. Early planted corn increases the probability of escape from corn borer damage. That is, the crop can develop and mature before corn borer populations increase to damaging levels.

YieldGard Bt corn is effective against all of the three corn borer species. The sugarcane borer has been

found less susceptible to Bt corn than the other two borer species. Recommended Bt varieties should be planted in the areas where corn borers have been a problem or in situations where the threat of a heavy infestation is likely.

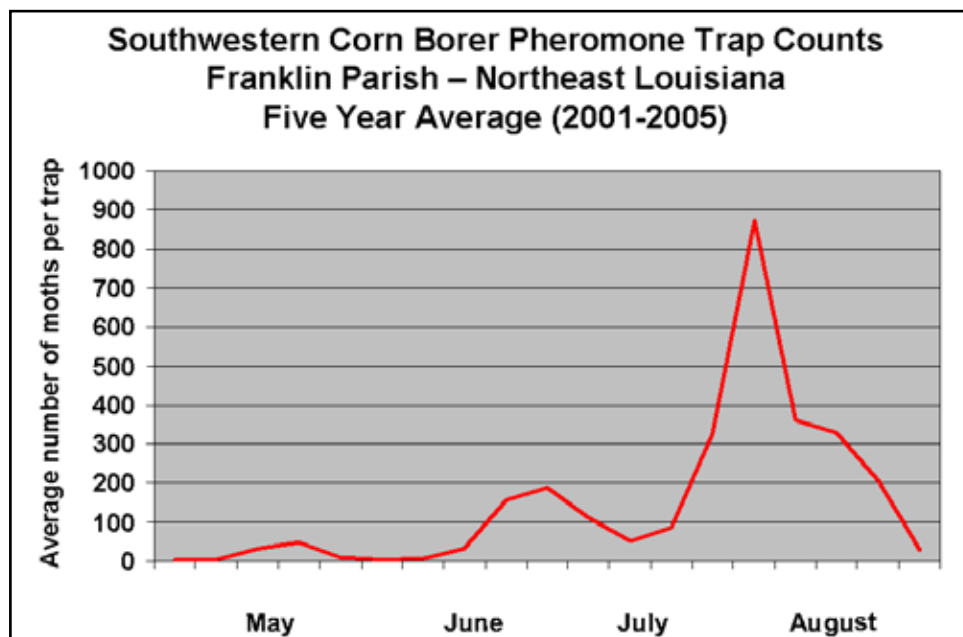
The current insect resistance management program for Louisiana allows producers to plant up to 50 percent of their corn acreage with Bt corn. The non-Bt corn (refuge) should be planted with one-half mile of the Bt corn. Bt corn probably should be planted after the non-Bt corn has been planted, because borer infestations are usually heavier on later planted corn.

Conventional, non-Bt corn should be scouted and treated with insecticide sprays as needed. Treat corn with recommended insecticides when borer populations exceed the action level to initiate treatment. Commercial pheromone traps should be used in areas where the southwestern corn borer is a threat. These traps will help track moth flights and may give a general indication of population levels, but they should never be used as a sole indicator for a field's infestation level. Field scouting is the essential tool.

Certain recommended soil insecticides, such as Regent, will suppress corn borer infestation levels in whorl stage corn. This early season suppression will reduce the number of moths that emerge in the subsequent generation, which is usually when the most damage occurs.

Stalk destruction after harvest will reduce overwintering borer population, which, in turn, reduces the borer population for the next year. For reduced tillage fields, stalks should be cut as close to the base as possible and, preferably, followed by some form of tillage. Stalk destruction is especially effective for the southwestern corn borer, but it will also help reduce populations of other borers.

Avoid planting grain sorghum late in the season. Grain sorghum planted extremely late provides a host that moths will migrate to after corn plants mature and are no longer attractive. Late planting not only increases the chance of excessive damage in grain sorghum, it provides a late-season host crop to help sustain the borer populations that have not yet overwintered.



# Photo Gallery



Adult corn borer moths



Southwestern corn borer egg mass



Southwestern corn borer larva



Sugarcane borer egg mass



Sugarcane borer larva



Young borer feeding signs in whorl stage corn



Sugarcane borer entrance hole, with frass, into an ear shoot



Sugarcane borers and stalk damage



Borer feeding in corn cob, through the shank



Bt corn (L) vs. Non-Bt corn (R) with lodging from borer damage



Favorable over-wintering habitat, standing corn stubble



Sugarcane borer larva over-wintering in corn

### Prepared by:

Jack L. Baldwin, Professor and Extension Entomologist, Department of Entomology  
Fangneng Huang, Assistant Professor, Department of Entomology  
Roger Leonard, Professor, Department of Entomology

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**Louisiana State University Agricultural Center**, William B. Richardson, Chancellor  
**Louisiana Agricultural Experiment Station**, David Boethel, Vice Chancellor and Director  
**Louisiana Cooperative Extension Service**, Paul D. Coreil, Vice Chancellor and Director  
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