Insect Pests of Sweet Corn

Cutworms
Cutworms damage a few plants in most gardens every year, but some gardens are so heavily infested as to warrant control by the grower. Bottom land (low-lying land, creek bottoms, etc.) is most frequently the site of damage, although fields that are neither bottom land nor well-drained land commonly have cutworms.

All cutworms pass the winter as partly to fully-grown larvae (caterpillars) in the soil or under trash or clumps of grass. They start feeding in the spring and continue growth until early summer. They enter the soil to become pupae (the non-feeding stage where the larva changes to an adult form). They emerge as moths during the summer. The moths are grayish or brown "millers" that are attracted to lights in the spring and summer. Each female moth lays about 1,000 eggs on the ground or on foliage in grassy or weedy fields. The eggs hatch and the young larvae feed on roots and foliage of grasses and weeds, hibernate and attack whatever vegetation is present the following spring. The larvae are hairless, plump, soft-bodied caterpillars that vary in color and markings. All have huge appetites.

Cutworm damage can often be avoided by not planting on newly broken sod or on land that was grassy or weedy the previous summer. In addition, home gardeners can place a collar of stiff paper, cardboard, or aluminum foil around each plant for protection after transplanting to the garden. At the first sign of cutworm moths, spray the plant stems and leaves with Bacillus thuringiensis (B.t.) to kill the larvae. A bait can be made by mixing a B.t. suspension with bran until the liquid is absorbed by the bran, and then adding a small amount of molasses. Crumbled pieces can be scattered around the base of the plants to protect them. Cultivating the soil can kill cutworms.

Seed-Corn Maggot
On sunny days in early spring, many small flies are often seen darting about, hovering or resting on posts, fences, implements, surface trash or the ground. These are probably the adults of the seed-corn maggots (Delia platura).
Seed-corn maggot adults (*Delia platura*) appear similar to small houseflies. Pest and Diseases Image Library, www.insectimages.org

Eggs are laid on the soil surface where there is an abundance of decaying vegetable matter. The eggs hatch and the larvae (maggots) feed and develop at temperatures as low as 40 °F (4 °C). Injury is usually most severe in wet, cold seasons and on land high in organic matter. The maggots feed on many forms of vegetable matter present in the spring. They are most noticeable when corn fails to germinate or produces weak seedlings due to the maggots feeding in the kernels. Full-grown yellowish-white maggots are about one-fourth inch (6 mm) long, sharply pointed at the head end, legless and very tough skinned.

Injury can be avoided by planting late enough to get quick germination of seed, especially if soil is rich in organic matter. If damage does occur, prompt replanting will usually result in a good stand, because of quicker germination.

**Southern Corn Rootworm**

This insect is often called the corn budworm (*Diabrotica undecimpunctata howardi*), which in South Carolina more accurately describes its habits than the name rootworm. It is not usually found in the roots and as a rule does not feed on them, as is the case with rootworms found elsewhere. This insect eats directly into the heart or bud of the plant, right above the base of the stalk. This causes the bud leaves to wilt and die.

Several insects injure corn seedlings in such a way that suggests a "budworm" caused the damage. Only by pulling up the plant and examining it carefully can the proper diagnosis be made. If the southern corn rootworm is suspected, look on the base of the stalk for a clean-cut round hole about 1/32 inch (.8 mm) in diameter. No other corn pest makes such a hole. If one is found, cut into the stalk or examine the soil for a thin, soft-bodied, ivory-colored larva (immature form) with a brown head and a brown disc on the last body segment.

The adult corn rootworm is the familiar spotted cucumber beetle, which overwinters in protected spots, flies about whenever the temperature reaches 65 °F (18 °C) or above, and feeds on nearly any growing crop or weed during the early spring. Winter legumes are especially attractive to the beetles. On warm days between January 1 and April 15, eggs are laid in the soil near where the adults have fed.
The adults are attracted to gardens that have an abundance of certain plants and generally avoid clean, bare land. The best way to avoid injury is by turning under cover crops at least 30 days before planting corn or keeping gardens free of weeds for 30 to 60 days before planting. This practice largely eliminates the threat of injury by larvae that hatch from eggs laid near these other plants. Late planting also helps avoid injury from this insect but may result in increased damage by other species.

**Wireworms**

Although several species of wireworms are found in South Carolina vegetable gardens in the spring, only two are serious pests of sweet corn. The tobacco (or corn) wireworm (*Conoderus vespertinus*) eggs are laid in the summer. They hatch into larvae that feed on the roots of a variety of plants. The wireworm overwinters as a larva. When sweet corn is planted in this field the following spring, the wireworms feed on the kernels and cause poor germination and stunted, spindly, sickly plants that often die or are nonproductive.

Damage varies from year to year, but some injury occurs every year. Some years there are widespread outbreaks and then many years may pass without damage being reported. Sand wireworms (*Horistonotus uhleri*ii) overwinter as larvae but feed on both the kernels and the roots. Plants over 2 feet (61 cm) high stop growing, turn yellow, wilt on hot days and die. During this period they are easily pulled out of the ground because most of the roots have been severed. Over two dozen sand wireworms may be found per hill of corn in a heavily infested field. Surviving plants do not yield normally. Pupation occurs during May, eggs are laid from June 15 to July 15, and the tiny larvae feed for a while on the roots of various plants but cause no damage to the mature crops.

Home gardeners can use various measures to control wireworms. Trap wireworms in pieces of potato scattered around the garden, rotate crops and plow or cultivate infested soil in late summer or in autumn to kill or expose various insect stages to predators.

**Corn Leaf Aphid**

Corn leaf aphids (*Rhopalosiphum maidis*) on sweet corn are generally of minor importance in South Carolina. Occasionally conditions will favor the build-up of aphid populations over part of a field. The population peak usually occurs soon after tassel formation. Aphid feeding results in stunted and deformed tassels, development of black mold on the aphid honeydew (a sugary material excreted by aphids as they feed on plant sap) on the leaves and silk, and poor pollination and grain development. About this time, their natural enemies become established and the aphid population rapidly falls off. Corn leaf aphids are vectors of Maize Dwarf
Mosaic Virus. Some varieties of corn are more susceptible than others to leaf aphids.

Corn leaf aphid (*Rhopalosiphum maidis*) infestation. Department of Plant Pathology Archive, North Carolina State University, www.insectimages.org

**Corn Flea Beetle**

The corn flea beetle (*Chaetocnema pulicaria*) has a black, oval-shaped body, tinged with bronze or bluish green. They overwinter in litter and trash around fields. In early spring, beetles are active on weeds and then move to corn seedlings during May through June. Infestations are more severe when a cold spring follows a mild winter. Corn flea beetles are vectors of Bacterial Wilt of corn.

Corn flea beetle adult (*Chaetocnema pulicaria*). University of Illinois at Urbana-Champaign Archive, University of Illinois at Urbana-Champaign, www.insectimages.org

Keep areas around the garden clean and free of plant debris and weeds to reduce overwintering sites. Late planting of corn may help reduce flea beetle damage.

**Corn Earworm**

Corn earworm (*Helicoverpa zea*) is the most common of the sweet corn insects, being found in all areas of South Carolina. Infestations are generally uniform throughout the state. In untreated plots, up to 90 percent of the ears can be expected to show feeding signs. Eggs are laid on the leaves when the plants are small. The caterpillars go down into the whorl to feed, and by the time this injury is first seen, most of the damage has been done and the worms are covered by a plug of frass (a sawdust-like waste) which protects them from parasites and insecticides. Injury to the foliage occurs before tasseling. The corn leaves are ragged when they grow out, but this damage usually does not seriously affect the crop. Late-planted corn is likely to be severely damaged, for the egg-laying adults become more numerous as the season progresses.

Corn Earworm larva (*Helicoverpa zea*). Whitney Cranshaw, Colorado State University, www.insectimages.org

Adult beetles leave numerous, small, circular feeding holes and bleached out spots or stripes on the corn leaves. Such direct feeding is insignificant unless large numbers of beetles attack slow-growing corn, especially during a cold spring.
The new generation of moths lays eggs on fresh corn silk as it appears. Usually several eggs are laid on the silk of each ear, but only one worm reaches maturity due to natural enemies and cannibalism. Ears having tight husks extending well beyond the tip of the ear are least injured since feeding may be completed in the silk channel. Larvae cut a small hole at the side of the ear, through which they emerge. They drop to the ground and enter the soil to transform to pupae (the nonfeeding stage where the larva changes to an adult).

All of the damage caused by corn earworms is not direct. The indirect damage occurs when other insects and disease organisms use the earworm holes as entrance sites. The resulting damage often exceeds that caused by the earworm.

The adult moths have a wingspan of about 1½ inches (3.8 cm). They vary in color, being usually light tan-brown, marked with dark gray, irregular lines and a dark area near the tip of the wing. Hind wings are light tan with a dark band near the margin. Moths are often found in the daytime resting in the whorl of young corn or at the base of the leaves of older corn. Each female may lay from 1,000 to 3,000 eggs. Larvae vary in color from a light green or pink to nearly black, though most individuals are brownish green. Usually alternating light and dark stripes run the length of the body. The eyes are yellowish orange with an inverted "Y" between them. Mature larvae are about 1½ inches (3.8 cm) long.

To control this pest, plant corn as early as possible and apply mineral oil on corn silks five to six days after silk emergence. Mixing a Bacillus thuringiensis (B.t.) product with mineral oil can improve control of earworms. With liquid B.t. products, use a ratio of 1 part B.t. to 20 parts oil. One application of ¼ teaspoon or five drops of the oil mixture should be applied to the silk at the tip of the ear. Alternatively, insecticides may be used for control. Thoroughly wet the silks with insecticide, and repeat until ears are harvested. Select tight-husked corn varieties, as this trait inhibits corn earworm movement into the ear. Varieties that show resistance to damage are Country Gentleman, Stay Gold, Victory Golden, Silver Cross Bantam, Golden Security and Silvergent.

**Fall Armyworm**

This insect is present during most years, but occasionally the fall armyworm (Spodoptera frugiperda) is extremely numerous. The larva feeds on corn foliage, stalks and ears, entering the base of the ears, feeding along the sides of the ears and even tunneling into the cob. It usually emerges near the base of the ears, leaving round holes 3/16 inch (4.8 mm) in diameter in the shucks.
moths emerge about two weeks later and fly off to plague another section of the country.

Since South Carolina sweet corn is usually mature by the time this pest arrives in great numbers, it is not injured. However, if corn is planted late or the insects come early, they catch the corn at or just before the milk stage and cause severe damage. The leaves may be stripped from the stalk and the ears so thoroughly damaged that no corn is harvested. Cold, wet weather in the spring favors insect development and suppresses its natural enemies. Furthermore, gardens are usually grassier in cold, wet years and thus attract the moths for egg laying.

The adult fall armyworm is a moth about 1½ inches (3.8 cm) across the wings. The forewings are dull, mottled, brownish gray, while the hind wings are pinkish white edged with a smoky-brown line. The dark-eyed larva is about 1½ inches (3.8 cm) long when mature. It is variable in color from light brown to nearly black and has several narrow lines down the back and sides. It feeds during the daytime, in contrast to larvae of related species which leave the plant to hide, coming back to feed at night.

The fall armyworm can be effectively controlled only while the larvae are small. Early detection and proper timing of an insecticide application are critical. Early planting is the most effective cultural control method in the south.

**European Corn Borer**

A telltale sign of injury from European corn borers (*Ostrinia nubilalis*) appears as broken tassels caused by the borers feeding in the tassel stems. Much frass (sawdust-like waste) is pushed out of the burrows. Later in the season their presence is indicated by small, round holes at any location on the stalk. In either case, the point of entrance is usually marked by a protruding mass of white frass that accumulates at the base of the leaves. The tunneling within the stalks weakens them so that plants break over. Feeding on the shank of the ear causes it to fall to the ground. The larvae (caterpillars) also feed on the developing kernels or tunnel into the cobs.

The adults are strong-flying moths with yellowish-brown wings marked with wavy dark lines. Eggs are laid in groups on corn leaves, and the young larvae of the first generation feed on foliage before boring into the stalk. The larvae are flesh-colored, faintly spotted caterpillars, about ½ to 1 inch (1.27 – 2.54 cm) long. There are about three generations a year in South Carolina. The winter is passed as full-grown larvae in the stems where they have been feeding, especially those close to the ground.

Destroying the crop stubble by tillage eliminates this overwintering site and aids in control. Spray whorls twice weekly with *B.t.*
**Corn (Dusky) Sap Beetle**

The corn (dusky) sap beetle (*Carpophilus dimidiatus*) is the most common of several species of small, flat, brown and black sap beetles that are present in most corn fields.

Adult beetles are first noticed at about the time tassels appear on the earliest sweet corn. They invade corn borer tunnels and feed on frass (sawdust-like insect waste). They also feed on the pollen as it ripens on the tassels and later as it lodges in the leaf axils. Mating and egg laying begin when females are five to six days old. Eggs are deposited on caterpillar frass and wet accumulation of pollen. If these sites remain moist for 10 to 14 days, they are suitable for larval development.

Sap beetle activity continues to increase as the corn matures. They usually invade the ear when the silks begin to turn brown. The majority of eggs are laid on worm frass at the ear tip or scattered through the silk strands. The milky white eggs resemble tiny kernels of rice, about 1/16-inch (1.6 mm) long. The larva is a yellowish-or-pinkish-white grub (about ⅛-inch or 6 mm long) with a translucent spiny body and three pairs of short legs near its head. As the larvae hatch, they move deeper into the ear where they penetrate and hollow out the developing kernels.

Sap beetle problems are more severe during June and early July, particularly if corn is damaged by other pests. Ears injured by corn borers or corn earworms attract sap beetles more than ears with no previous injury; however, beetles can enter and severely damage ears that have no previous injury. Bird-damaged ears often are infested with sap beetles.

Plant varieties of corn that have tight, long husks to avoid damage by the corn sap beetle, such as Victory Golden, Golden Security, Tender Joy, Stowell’s Evergreen, Country Gentleman, Early Sunglo and Trucker’s Favorite.

**Japanese Beetles**

Japanese beetles (*Popillia japonica*) often feed on the silking ears of sweet corn from mid-June through July. They cut off the fresh silks and sometimes expose the ear tip to other insects, such as sap beetles. Silk feeding can interfere with pollination if the beetles feed continuously for five to six days after the fresh silks emerge from the ear tip. Infestations usually are limited to scattered "hot spots" rather than distributed uniformly in the field.

![Japanese beetle (Popillia japonica) feeding on corn silks. M.G. Klein, USDA Agricultural Research Service, www.insectimages.org](image)

**Control of Insects of Sweet Corn in the Home Vegetable Garden**

Consider cultural control methods for cutworms, seed-corn maggots and corn rootworms as outlined in the discussion of these pests. Also, initially try less toxic pesticides for the control of corn insect pests before resorting to conventional contact insecticides. Examples are *B.t.*, spinosad, horticultural oil, neem oil extract, pyrethrins and insecticidal soap. *Bacillus thuringiensis (B.t.*) is a microbial insecticide that contains spores of this bacterium and is sprayed to control caterpillars when they feed on leaves containing the spores. Baits of *B.t.*, bran and molasses are used to control cutworms. A suspension of liquid *B.t.* and mineral oil is applied to corn silks to control corn earworms. Caterpillars may also be controlled with sprays of spinosad, which is a byproduct from a soil microorganism. Aphids may be controlled by sprays of insecticidal soap or horticultural oil. Neem oil extract or pyrethrins sprays can be used to control most beetles.

Common vegetable garden contact insecticides, such as carbaryl, cyhalothrin, cyfluthrin, permethrin or bifenthrin, will adequately control caterpillars.
(corn earworms, fall armyworms and European corn borers) as well as beetles (flea beetles, Japanese beetles and sap beetles). Corn leaf aphid can be controlled with cyhalothrin, cyfluthrin, permethrin or bifenthrin sprays.

Sweet corn plants can sustain heavy whorl (foliage) feeding prior to tasseling without much loss in yield. For insect-free ears, however, routine sprays on the developing ears and silk are necessary. Follow pesticide label directions closely to avoid killing beneficial insects like honeybees that are highly attracted to the pollen. If contact insecticides are applied, read the product label to know the pre-harvest interval (PHI). The PHI is the number of days after spraying a pesticide before the crop can be harvested.

Examples of products containing the natural pesticides, as well as conventional contact insecticides, are listed in Table 1 below.

### Table 1. Insecticide Products Labeled to Control Sweet Corn Insect Pests.

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<th>Insecticides &amp; Pre-harvest Interval</th>
<th>Examples of Brand Names &amp; Products</th>
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| **Bacillus thuringiensis (B.t.)**  
(0 days PHI)                       | American Brand Thuricide Concentrate  
Bonide Thuricide *B.t.* Concentrate  
Hi-Yield Thuricide Concentrate  
Monterey *B.t.* Concentrate  
Organic Laboratories Organocide Worm & Caterpillar Control  
Safer Caterpillar Killer with *B.t.* Concentrate  
Southern Ag Thuricide *B.t.* Caterpillar Control Concentrate  
Tiger Brand Worm Killer Concentrate |
| Bifenthrin  
(1 day PHI)                        | Ferti-lome Broad Spectrum Insecticide Concentrate |
| Carbaryl  
(2 days PHI)                      | Garden Tech Sevin Concentrate; & RTS¹ |
| Cyfluthrin  
(1 day PHI)                      | Bayer Advanced Vegetable & Garden Insect Spray Concentrate |
| Cyhalothrin  
(1 day PHI)                      | Spectracide Triazicide Insect Killer for Lawns & Landscapes Conc.; & RTS¹  
Bonide Beetle Killer RTS¹  
Bonide Caterpillar Killer RTS¹ |
| Insecticidal Soap  
(0 day PHI)                         | Bonide Insecticidal Soap Multi-Purpose Insect Control Concentrate  
Espoma Earth-tone Insecticidal Soap Concentrate  
Natural Guard Insecticidal Soap Concentrate  
Safer Brand Insect Killing Soap Concentrate  
Garden Safe Insecticidal Soap Insect Killer Concentrate |
| Horticultural Oil                  | Ferti-lome Horticultural Oil Spray Concentrate; & RTS¹  
Southern Ag Parafine Horticultural Oil  
Bonide All Seasons Spray Oil Concentrate  
Monterey Horticultural Oil Concentrate |
| Neem Oil Extract  
(0 day PHI)                         | Bonide Neem Oil Fungicide, Miticide & Insecticide Concentrate  
Concent Garden Defense Multi-Purpose Spray Concentrate  
Ferti-lome Rose, Flower & Vegetable Spray Concentrate  
Garden Safe Fungicide 3 Concentrate  
Monterey 70% Neem Oil Fungicide, Insecticide/Miticide Conc.; & RTS¹  
Natural Guard Neem Concentrate  
Southern Ag Triple Action Neem Oil Concentrate  
Safer BioNeem Insecticide & Repellent Concentrate |
| Permethrin  
(1 day PHI)                        | Bonide Eight Insect Control Vegetable Fruit & Flower Concentrate  
Bonide Eight Insect Control Yard & Garden RTS¹  
Hi-Yield Indoor/Outdoor Broad Use Insecticide Concentrate  
Tiger Brand Super 10 Concentrate  
Martin’s Vegetable Plus Concentrate |
| Pyrethrin (0 day PHI)                                                                 | Bonide Garden Insect Spray Concentrate  
|                                                                                     | Southern Ag Natural Pyrethrin Concentrate  
|                                                                                     | Spectracide Garden Insect Killer Concentrate  
|                                                                                     | PyGanic Crop Protection EC 1.4  
|                                                                                     | Espoma Earth-tone Insect Control Concentrate (with canola oil)  
|                                                                                     | Monterey Take Down Garden Spray Concentrate (with canola oil)  
| Spinosad (1 day PHI)                                                                | Bonide Captain Jack’s Dead Bug Brew Concentrate; & RTS¹  
|                                                                                     | Bonide Colorado Potato Beetle Beater Concentrate  
|                                                                                     | Ferti-lome Borer, Bagworm & Leafminer Spray Concentrate  
|                                                                                     | Monterey Garden Insect Spray Concentrate  
|                                                                                     | Natural Guard Spinosad Landscape & Garden Insecticide RTS¹  
|                                                                                     | Southern Ag Conserve Naturalyte Insect Control Concentrate |

Note: The PHI (pre-harvest interval) is time to wait in days between spraying and harvesting.

¹ RTS = Ready to spray (a hose-end applicator).