

## Control of Corn Insects and Diseases

**N**UMEROUS insects and diseases attack corn in the field and several insects cause serious damage to corn in storage. It is the purpose of this leaflet to describe briefly the more important insects and diseases of growing corn and to give control measures for them. Control measures for the insect pests of stored corn and other stored products are given in Leaflet No. 8 of this Station.

### CORN INSECTS

#### Southern Corn Root Worm

The southern corn root worm bores into the young stalks of early corn planted on bottom lands or after winter legumes on upland soil. As a result of this injury, the buds wilt and die and the stand of corn may be greatly reduced. The larvae of this insect (Figure 1) is a slender yellowish-white worm about  $\frac{1}{2}$  inch

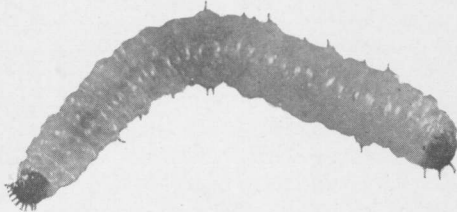


FIGURE 1.—Larva of the Southern Corn Root Worm (Enlarged about 5 times).

long when full grown. The adult is a yellowish-green beetle with a black head and 6 black spots on each wing; it is about  $\frac{1}{4}$  inch long.

Injury from the southern corn root worm may be avoided or greatly reduced by late planting. The exact date of planting necessarily varies with the

season and locality. During a normal season in the vicinity of Auburn winter legumes on upland soils should be turned and disked on or before April 15 and the corn planted early in May. The date of turning and planting should be a few days earlier in South Alabama and a few days later in North Alabama than at Auburn. Bottom lands should be turned at least four weeks before the time of planting and should be kept free of vegetation until the corn is planted. The corn should be planted the first of May in South Alabama and the latter part of May in North Alabama.

A more detailed discussion of southern corn root worm injury in corn following legumes is given in Circular 65 of the Alabama Experiment Station.

#### Lesser Corn Stalk Borer

The lesser corn stalk borer eats holes in the unfolding leaves of corn or bores into the base of the stalk. The most serious damage is produced in corn on poor, upland, sandy soils. Out-

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M. J. FUNCHESS, Director  
AUBURN



FIGURE 2.—Larva of the Lesser Corn Stalk Borer (Enlarged about  $3\frac{1}{2}$  times).

The larva of the lesser corn stalk borer (Figure 2) is a slender greenish worm slightly less than 1 inch long when mature. It can usually be distinguished from other similar insects by the presence of the tube-shaped web the worm spins at the surface of the soil. The adult is a yellowish-brown moth with a wing expanse of about 1 inch.

No entirely satisfactory method of control is known for this insect. Since the immature stages pass the winter in the soil, plowing and harrowing late in the fall are helpful. Not only should the main part of a field be cultivated but also the borders and terraces, as the insect may breed in the wild plants there. Heavy fertilization is another practice which is of some value in combating the lesser corn stalk borer. The fertilizer does not destroy the insects but increases the vigor of the corn, thereby making it more resistant to insect attacks.

### Southern Corn Stalk Borer

The southern corn stalk borer is another worm that bores into the stalks of growing corn, causing the buds to die or weakening the plants so that they are easily broken down by the wind. This insect is sometimes called the larger corn stalk borer. It is a fat dirty-white caterpillar (Figure 3) and when full grown is marked with numerous brown or black spots, on each of which there is a short bristle. The mature worm is about 1 inch long. The adult is a smoky-yellow moth with a wing expanse of about  $1\frac{1}{4}$  inches.

Late planting, as recommended for the southern corn root worm, is effective in controlling the southern corn stalk borer. Another effective control measure is the destruction of corn stubbles in the fall. This practice is especially helpful, as the insect passes the winter in the base of the old corn stalks. Crop rotation is of value if the

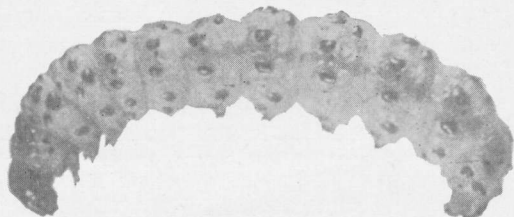


FIGURE 3.—Larva of the Southern (larger) Corn Stalk Borer (Enlarged about  $3\frac{1}{2}$  times).

breaks have occurred recently in three year cycles, i. e., in 1924, 1927, 1930, and 1933. In addition to corn, this insect attacks sorghum, Johnson grass, cowpeas, beans, peanuts, and several other crops.

corn is planted a considerable distance from any field which grew corn the previous year.

### Corn Ear Worm

The corn ear worm is also called the boll worm and the tomato fruit worm. It feeds in the unfolding leaves of young corn and in the tassels and ears of older corn. The most serious damage is produced in South Alabama, where late corn may be almost ruined during certain years. The larva of this insect (Figure 4) is a green or brownish-colored worm with alternating light and dark stripes running lengthwise the body. It is about 2 inches long when full grown. The adult is a grayish moth with a wing expanse of about 1½ inches.

No entirely satisfactory method of control is known for this insect. Since the worms usually become more numerous late in the season and do more damage than earlier, early planting is helpful in avoiding injury. In planting early to reduce the damage from the corn ear worm, however, the

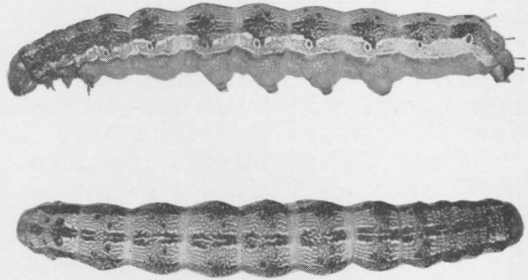


FIGURE 4.—Larva of the Corn Ear Worm (Side and top views, enlarged about 1½ times).

chances of damage from the southern corn root worm and the southern corn stalk borer are greatly increased. In the sections of South Alabama where the corn ear worm is very destructive, the corn should be planted early and thickly in the drill; it should then be thinned to a stand about the first of May. It is possible that the root-worm and borer injury to the early corn may be so great some years that the corn will have to be “planted over” rather than thinned, but the chance is worth taking, since corn planted over will have as good a chance of missing the corn ear worm as will corn which is planted late to avoid root-worm and borer injury.

Fall plowing, as recommended for the lesser corn stalk borer, is of some value in controlling the corn ear worm. Cooperation of neighbors in plowing adjacent corn fields is necessary, however.

Long close-fitting shuck coverings help prevent corn-ear-worm damage to the ears of corn. In selecting seed corn, therefore, only ears with long close-fitting shucks should be used. Careful selection of seed corn will produce a strain of corn with shuck coverings that offer partial protection not only against ear-worm damage but also against damage from corn weevils and other insects.

The best direct control known is obtained by dusting the corn with equal parts of lead arsenate and talc. Several applications should be made at intervals of two to four days. These dustings are usually made at the time of silking to prevent serious damage to the ears but may be made earlier to reduce damage to the buds. Dusting is recommended for corn in small garden areas rather than in large fields.

### Fall Armyworm

The fall armyworm feeds on the foliage and ears of corn and on the foliage of grasses. It is sometimes called the grass-worm. Although this insect occasionally produces serious damage throughout most of the State, it is more common on low lands along rivers. The eggs are laid in clusters on the leaves of grass or corn and the larvae (worms) which emerge from the eggs feed first on the under surface of the leaves; later they eat practically the entire plant. Frequently the worms appear first in grassy areas where they feed until the grass is consumed. They then "march in great armies" to fields of corn, sorghum, or other crops, devouring almost everything in their path.

The larva of this insect (Figure 5) is a caterpillar about  $1\frac{1}{2}$  inches long when full grown. It varies in color from tan or green to almost black. Three narrow yellow stripes extend along the back from head to tail and a wider dark stripe occurs on each side. The front of the head is marked with conspicuous white lines forming an inverted Y. The adult is a grayish, mottled moth with a wing expanse of  $1\frac{1}{2}$  inches.

The fall armyworm is attacked by birds and parasitic insects but other means of control are usually necessary. Young larvae are readily destroyed by thoroughly dusting the infested grass or corn with sodium fluosilicate, lead arsenate or calcium arsenate. Sodium fluosilicate is apparently the most effective of these materials, but may be difficult to obtain. The older worms are much harder to kill than the younger ones. Since the first outbreaks often occur in grassy plots, it is sometimes possible to control the insects by making several dustings before they "march" to the corn fields. If they are already migrating when discovered they may be stopped by plowing a deep furrow across the path of the worms. A large turn plow or "middle buster" is suitable for making the furrow. The worms are unable to cross the furrow if it is deep and freshly made.

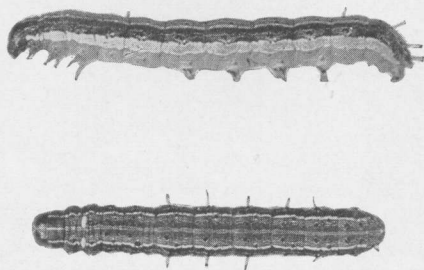


FIGURE 5.—Larvae of the Fall Armyworm (Side and top views, enlarged about  $1\frac{1}{4}$  times). Note the two eggs of a parasitic insect on the back of the worm below.

A log may be dragged along the furrow at frequent intervals to kill the trapped worms. It is advisable to dust all infested areas and provide ditches or furrows to protect uninfested areas.

### Billbugs

Several species of billbugs attack corn and serious injury is sometimes produced by the adults eating holes in the unfolding leaves and by the larvae (grubs) boring in the stalks. Although

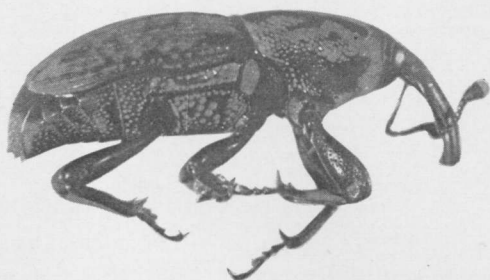


FIGURE 6.—Adult of a Corn Billbug  
(Enlarged about 5 times).

these insects are primarily pests of chufas, nut-grasses, sedges, rushes, and wild grasses on damp lands, they may migrate from these plants to corn. Corn on land which has recently grown any of the regular host plants is also likely to be damaged.

The billbugs (Figure 6) are dark colored weevils having an elongate body and a well developed snout or bill. They vary in size from about  $\frac{1}{4}$  to  $\frac{3}{4}$  inch in length, depending upon the species. The larvae are white or yellowish-colored grubs without legs.

Several farm practices are effective in controlling billbugs. Clean cultivation to keep down nut-grasses, rushes, moisture-loving grasses, and related plants on land to be planted in corn is one of the most important control practices. It is also helpful to plant corn as far away as possible from uncultivated lands growing the wild host plants and to plant crops other than corn on such lands recently brought under cultivation. Crop rotation is another practice which is of some value. The cooperation of several farmers with adjoining land, however, is necessary to make effective the recommended practices for the control of billbugs.

### Grasshoppers and Cutworms

Grasshoppers are not usually serious pests of corn but occasionally a serious and destructive outbreak occurs in localized areas of the State. Cutworms are more generally destructive throughout the State. These insects are too well known to require any description.

Grasshoppers and most species of cutworms may be controlled with poison bran mash. One of the best formulae for this mash is as follows:

Coarse wheat bran -----	100 pounds
Sodium arsenite -----	4 pounds
Syrup -----	2 gallons
Water -----	8-12 gallons

In preparing the above mixture the sodium arsenite and syrup are stirred into about eight gallons of water. The solution thus prepared is then thoroughly mixed with the wheat bran. Mixing may be effected by placing the dry bran on a smooth floor or tight wagon bed, "turning" it with shovels as in mixing fertilizers, and simultaneously adding the poison solution slowly to the bran. Additional water is added if necessary to make the mixture moist; it should not be wet or soggy, but should be a crumbly mixture when properly prepared. The above formula will make enough bait to broadcast over approximately 20 acres.

Poison bran mash should be applied broadcast late in the afternoon in the manner of sowing oats. Care should be exercised to see that no lumps of material are scattered over the field or left exposed elsewhere, as it is poisonous to all animals. When properly applied, however, this material is not injurious to birds or game animals.

If the poison mash is to be used against grasshoppers only, the cost may be reduced by modifying slightly the formula given above. The syrup may be omitted and 50 pounds of wheat bran mixed with an equal volume of sawdust may be used instead of 100 pounds of bran. The sawdust used must be measured by volume and not by weight because of the great variation in water content of the material. Fresh pine sawdust should not be used, but is satisfactory after it ages a few years. Mash containing equal parts of bran and sawdust is as effective against grasshoppers as a bait containing the same amount of undiluted wheat bran. Slightly less water may be needed when sawdust is used than for bran alone.

The insecticides used in bran mash (arsenicals) are slow-acting poisons, especially against grasshoppers. A period of three to five days may elapse before the insects are killed in sufficient numbers to be noticed. Hence, it is essential that the bait be applied first while the hoppers are small. Additional applications may be necessary to prevent serious injury.

Although poison bran mash is sometimes needed to control cutworms, usually these insects may be controlled in small gardens by collecting the worms by hand. The best time to collect cutworms is just after dark when most species come above the surface of the soil to feed. A strong flashlight is suitable to use in locating the worms which should be collected on several successive nights.

### Other Insects

Other insects which attack growing corn include the sugar cane beetle and several species of wireworms and white grubs.

All of these insects breed in sodded areas or other land growing considerable amounts of grass throughout the year. The wireworms and white grubs live in the soil two or more years before transforming into beetles, whereas the sugar cane beetle completes its development in one year.

Damage to corn is produced by the larval stage of the wireworms and white grubs and by the adult stage of the sugar cane beetle. When corn is planted in grassy areas infested with these insects they feed on the germinating seed, the roots, and the stalks of corn, often causing serious damage.

The sugar cane beetle is a dark brown or black beetle about  $\frac{1}{2}$  inch long; it is quite similar in shape to a common "June bug". Wireworms are slender light-yellow to dark-brown worms with conspicuously jointed bodies of rather uniform width throughout. Many forms have a glazed wire-like appearance, whereas a few have rather soft bodies. White grubs are the common soil "grub worms" which are too well known to require description.

Clean cultivation to keep down the wild plants in which these insects breed is helpful in controlling them. When sod lands are brought under cultivation, they should be planted in cotton or some other unsusceptible crop and cleanly cultivated for one or two years before corn is planted. Small areas may be practically ridded of these insects by turning hogs on the land in the fall so they may root up and eat the worms.

## CORN DISEASES

### Smut

Smut may appear on any part of the corn plant above ground, as stem, leaf, tassel, or ear. Boil-like swellings ranging from one to several inches in diameter appear on the plant, especially on the ear and stalk. When these swellings first appear they are lustrous white; later they become lead colored, and finally black and sooty. This black sooty mass consists of millions of spores (comparable to seed) which are blown over the field by wind. These spores may remain alive on old plant parts in the field or even in the soil from year to year. Where smutted stalks and ears are fed to cattle, the spores multiply abundantly in the manure and this is one of the chief means of spreading the disease.

**Control.**—Since corn smut is worse in fields where corn is grown continuously, crop rotation and destruction of diseased stalks seem to offer the best control measures. Do not plant corn on fields fertilized with manure from cattle which have been fed smutted corn, as the spores of smut over-winter in the manure.

### Ear and Root Rots

The damage caused by these diseases is extremely difficult to estimate. Sometimes ear rot and root rot are caused by the same fungus but more frequently they are caused by different fungi, even though the fungus attacking either the ear or the root may readily go to the other of these parts of the corn plant. There are a number of fungi that may cause these diseases and rarely is there a year when some of these diseases do not appear in the field. These diseases are usually more abundant and severe in wet seasons.

**Control.**—There are a number of practices which will aid in the control of these diseases, such as variety selection, crop rotation, and soil improvement.

The grower undoubtedly will profit by crop rotation and seed selection, even though the diseases are only partially controlled. Field selection of seed corn should be practiced by the farmer. Down stalks, small stalks, badly fired stalks, broken ear shanks, ears with exposed tips, ears extremely large in diameter, discolored, moldy and smutted ears are characters that are often associated with diseased plants and should be avoided. In corn, many of the above undesirable characters are inherited. Field selection of seed corn for desirable plants has proved most successful in obtaining disease-resistant and high-yielding plants. (See Alabama Extension Circular 143, 1934, for method of making seed selection.)

In some sections of this Country, particularly in the mid-west, seed treatment has proved valuable but this has not been the case here in the South.

DEPARTMENTS OF ZOOLOGY-ENTOMOLOGY AND BOTANY AND  
PLANT PATHOLOGY