

JULY 15, 1916

### THE CORN EAR WORM

This insect is known as the corn ear worm, cotton boll worm, green tomato worm, tobacco bud moth, and other names, according to locality and crops attacked. The adult moth is subject to wide variation in color, including various shades of tan, brown, and olive, usually with more or less blackish markings. The wing expanse from tip to tip is about 1 3/5 inches. Corn is a favorite food plant of this insect, the fresh silks being preferred over any other place for depositing eggs. Eggs are laid singly, each female moth being capable of laying from 500 to 3,000 eggs. Several hundred eggs of the corn ear worm are frequently attached to the silk of a single ear of corn. About three to five days after being laid the eggs hatch. The larvae, like the adults, are extremely variable in color and markings, the variation extending from pale green and pinkish to dark brown.

Upon hatching, the young worms make their way at once down into the tip of the young ear. Fortunately they are not on friendly terms with one another, and whenever two of them meet by chance there is usually a battle for supremacy, ending in one of the worms being eaten by the other. One, and not infrequently both, worms die as a result of wounds in such combats. This cannibalistic habit is of considerable importance, since it results in a partial control of the pest. Usually only one or two worms survive to each ear of corn, although several are often found in a single ear. Many eggs are destroyed by egg parasites, while the worms have many insect enemies, among which certain wasps are the most important.

The corn ear worm is troublesome in all parts of Arizona, and it is safe to estimate that, as a rule, from 50 to 95 per cent of the ears

of corn are injured by this pest. Usually on these ears from 5 to 25\* per cent of the individual grains are eaten or damaged.

During hot weather the worm becomes full grown in about two weeks. It is then about  $1\frac{1}{2}$  inches long. When ready to transform, it crawls to the ground and burrows to a depth of from 2 to 5 inches, making a burrow which becomes filled as the worm makes its way downward. Having reached a point suitable for transformation, the worm makes an open cell upward to within about one-half inch of the surface. This makes it possible for the moth, which appears later, to break its way through.



**Fig. 1.**—A Corn ear worm pupa in its burrow showing, at the left, the place where the worm entered the soil before pupating.

The worm now returns to the bottom of the cell, and, in the course of a day or two, transforms to a pupa. The pupa is reddish-brown in color and about four-fifths of an inch long. In this condition it remains for about two weeks, or over winter. During the

summer months in southern Arizona the complete life history from the laying of the egg to the appearance of the adult moth requires about a month. The worms, however, which enter the soil late in the season do not transform into moths, but remain in the pupal condition over winter and appear as moths in the spring. The number of annual generations of the corn ear worm in Arizona varies from one or two, at the highest elevations in northern Arizona, to six or seven at the lower elevations in the southern part of the State.

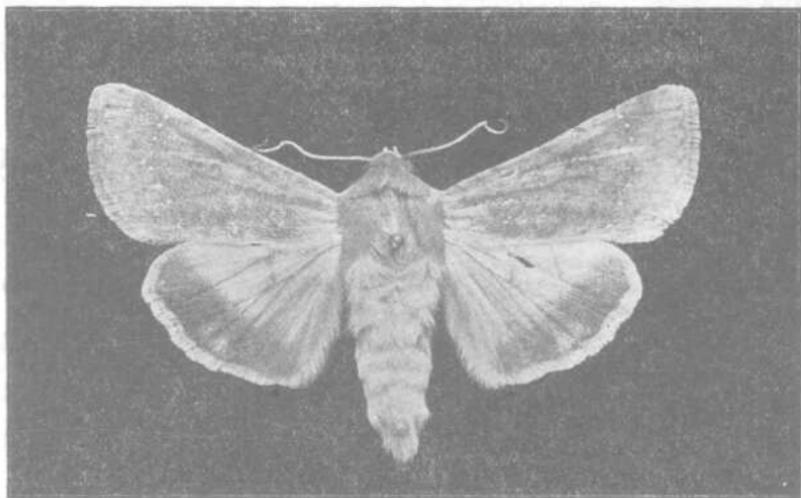


Fig. 2.—Boll worm moth, enlarged about two times.

An important step in the control of the corn ear worm consists in the fall and winter plowing and harrowing of fields used for corn and cotton crops. This breaks up the pupal cells and exposes many of the pupae to destruction by birds, rodents, and other insect-eating animals, also to the action of frost. Other pupae are so deeply buried that even if they are uninjured the adults which develop from them are unable to break their way through to the surface.

Corn plants are often severely attacked by the corn ear worm when they are two or three feet in height, just before the tasseling stage. In such cases it sometimes appears as though very severe injury would be done by the destruction of the growing tips of the plants and the consequent checking of growth. Experiments conducted under the writer's direction in the summer of 1915 showed that it was possible to effectively protect the young corn plants against injury by the corn ear worm by sifting into the top of each plant a small quantity of a 50 per cent mixture of sulphur and powdered arsenate of lead.

In the experiment referred to, from 70 to 75 per cent of the stalks were found to contain living worms on August 12, 1915. It was feared that the buds of a large number of stalks would be destroyed, and consequently the poisoning with a half-and-half mixture of arsenate of lead and flowers of sulphur was undertaken. A tin box with a nail-hole at the bottom used as a shaker proved to be a convenient means of applying the poison. The unfolding bud was opened with one hand while the poison mixture was shaken in from the box held in the other hand. A week after the treatment an examination of 45 plants in the rows of poisoned corn resulted in finding 6 living worms, whereas in 45 plants in adjoining rows which had not been treated, 65 living worms were found. This indicated that 90 per cent of the worms were killed by the poison.

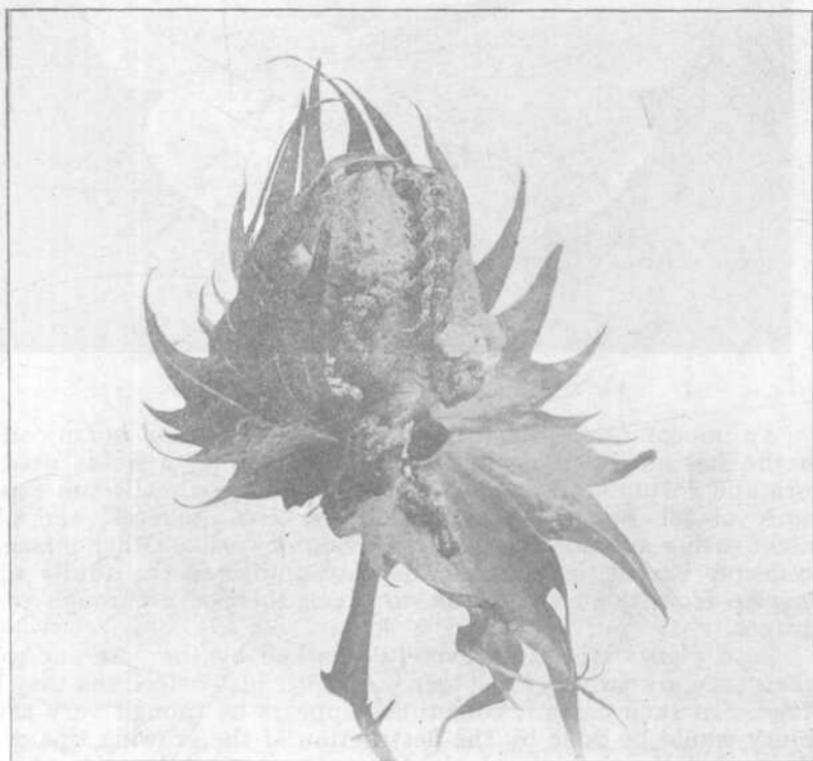


Fig. 2.—The corn ear worm or cotton boll worm attacking a cotton boll. About natural size.

The presence of the worms in the buds of such a large proportion of the plants was expected to result in a marked decrease in yield, but later examinations did not bear this out. In fact, in the experi-

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ment referred to, the benefit derived from the poisoning was not evident at the time of harvesting of the crop. Apparently the poisoning of the plants with the view to protecting the buds against attack can not be recommended as worth while. However, the destruction of the brood which attacks the corn in the bud will undoubtedly result in a decrease in numbers of the next generation which will concentrate upon the ears. For this purpose the poisoning of the buds of sweet corn in home gardens can be recommended, except where such gardens are surrounded by large acreages of field corn or cotton, and where no benefit from the destruction of one generation of the worms can be looked for.

For the protection of the corn ears the application of a 50 per cent mixture of flowers of sulphur and powdered arsenate of lead is recommended. This may be applied by means of a tin box such as that mentioned above in connection with the poisoning of the buds. A small quantity of the poison mixture is shaken upon the silk of each ear of corn. This sifts downward into the tip of the ear where the young worms are most likely to be poisoned in attempting to eat their way inside. In experiments conducted in New Jersey it was found that 75 per cent of the normal damage was prevented by this method of poisoning the ears. In Kansas in one experiment it was estimated that while over 60 per cent of the ears in the treated plot was damaged, this damage was so slight as to be almost negligible. In almost every instance the injury consisted in only one or two grains of corn being destroyed, whereas in the untreated plots the injured ears were rendered practically unfit for feeding to stock.

The foregoing method of poisoning the corn buds and ears is a satisfactory treatment for the protection of sweet corn, but it can hardly be considered practicable for the treatment of field corn. Live stock might be poisoned if by some chance the cornstalks were eaten soon after the poison was applied, but, according to observations thus far made, there is no danger after a few weeks.

A. W. MORRILL,  
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NOTE —The illustrations used herewith are from photographs by Quaintance and Brues, of the U. S. Department of Agriculture