

CIRCULAR No. 42

AUGUST, 1919

ALABAMA  
**Agricultural Experiment Station**

OF THE

**Alabama Polytechnic Institute**

**AUBURN**

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**Cotton Worm Control**

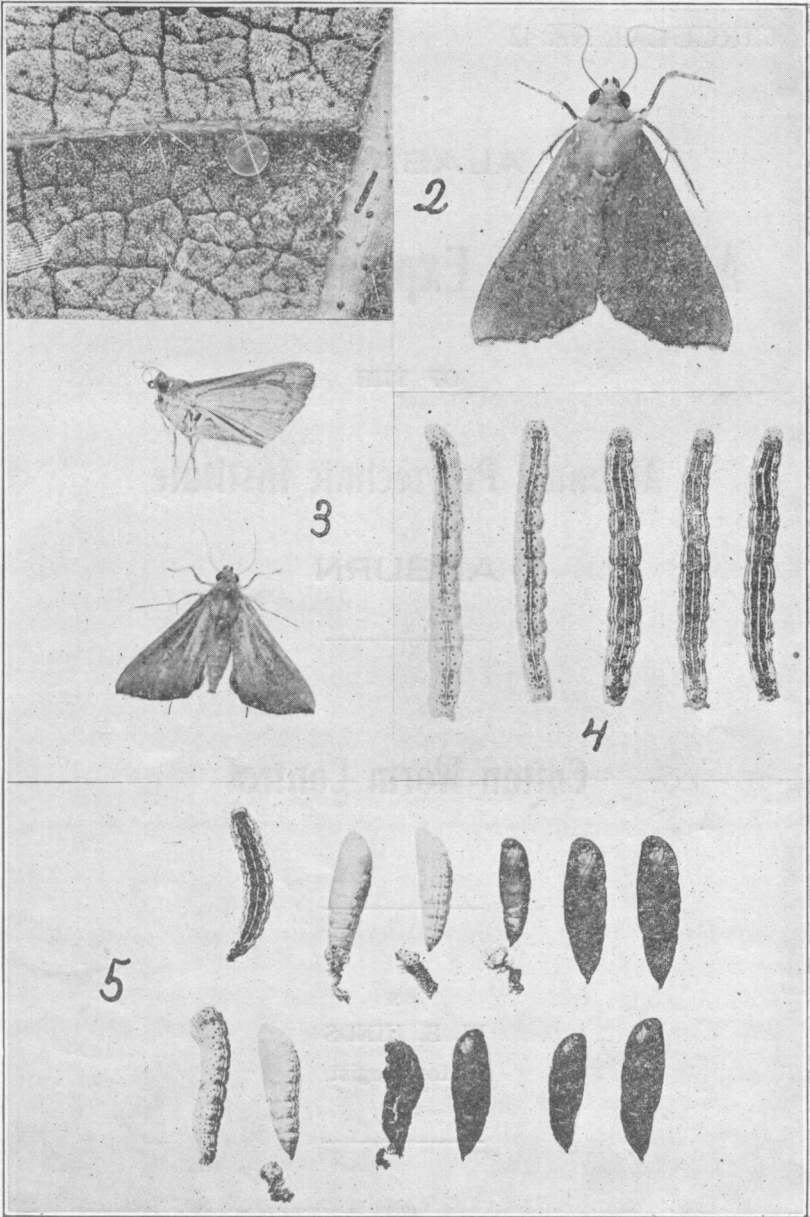
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By  
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Entomologist

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1919  
Post Publishing Company.  
Opelika, Ala.

PLATE I.



COTTON WORM STAGES

Fig. 1, The egg; fig. 2, moth, natural position; fig. 3, moths showing markings on upper and under sides of wings; fig. 4, worms showing variations in color; fig. 5, transformation to pupa stage. Fig. 1, enlarged X 10; fig. 2, enlarged X 2; others natural size.

(Original)

# COTTON WORM CONTROL

By

W. E. HINDS, ENTOMOLOGIST.

## INTRODUCTION

The cotton worm is also known by a number of other common names such as "army worm" and "cotton leaf caterpillar" and "the caterpillar." It is the only species that accomplishes the complete defoliation of the cotton plant throughout large areas. There have been seven serious outbreaks of this species since its first occurrence in Georgia and South Carolina in 1793.

### OUTBREAK OF 1911.

In the outbreak of 1911 the first stripping in Alabama occurred during the last week of July, and before the end of that season the cotton in 66 counties had been practically stripped. Careful field studies in 1911 showed that the cotton worms prevented the opening of approximately 10 per cent of the bolls throughout the State. Nevertheless, the yield in 1911 was next to the largest ever produced in Alabama in spite of the work of the cotton worms. It happened that in 1911 from 90 to 95 per cent of the entire crop was set and the bolls were well on toward maturity by the first of August. The present condition is very different therefrom, and unless cotton can be kept in fruiting during August 1919, the yield this season is bound to be very short.

### PROSPECTS FOR 1919.

There are two important insect factors in the 1919 cotton crop. The first of these is the boll weevil. Every indication during the present season has been for heavy weevil damage, and conditions at the present time indicate that it may prove to be heavier than for any preceding year, except possibly 1916, in this State. On top of this condition of boll weevil infestation, is the prospect that the cotton worm may destroy the foliage over large areas before the end of August so that squares will cease to form and small bolls will be destroyed. If this happens, as seems likely at the present time, the insect damage to the present crop will far exceed that sustained in 1911. The boll weevil damage alone to the 1918 crop was not less than \$12,000,000.00 and weevil work was exceptionally light in 1918.

### WHAT SHOULD BE DONE?

Watch cotton closely every year to detect the first signs of cotton worm attacks. Report immediately to

the Department of Entomology, Auburn, whenever cotton worms appear, as it is of the utmost importance that the extent of distribution of this species and its abundance in every section of the State should be known as soon as possible. This is necessary if proper stocks of poison are to be arranged for and placed where they can be easily and economically secured when needed by the cotton planters. Merchants should not be expected to carry the entire burden for placing this stock of poison. Cotton planters should divide this responsibility with the merchants by ordering enough poison to meet their immediate needs for protecting their rankest cotton, where the worms are most likely to appear first.

The amount needed for cotton worms for each application will be from three to five pounds per acre, and if proper materials are used, such as Calcium Arsenate and Arsenate of Lead, it is likely that one application will be enough to control each generation. A total amount of from six to ten pounds per acre will therefore, provide fairly satisfactory insurance for the cotton crop against the cotton worm. This amount will not be enough to provide for treatment of the boll weevil, which requires approximately twenty pounds per acre for adequate treatment. Whenever there is a prospect of cotton worm occurrence, as under present conditions, it becomes increasingly advisable to treat for boll weevil wherever the fertility of the field is such that there is a possibility of the plant continuing to grow squares and bolls until the early part of September.

#### WHAT POISON TO USE

There are only two poisons on the market at the present time that we recommend for cotton worm control. The first and cheapest of these is Calcium Arsenate, which is a comparatively new insecticide and has not been used extensively in Alabama until the present season. It is being used increasingly for boll weevil control, and the principal stock of poison in the State henceforth may consist of this material. However, Arsenate of Lead, which was used very extensively in 1911 may also be secured and will give practically as good results for cotton worms as will Calcium Arsenate, although it is somewhat weaker in killing power and more expensive. Both of these poisons adhere well to the leaves and can be applied with safety to the plants. They will have no effect in checking the setting of squares, and will not burn foliage, neither are they likely to cause sores on men or mules using these

materials. No other material is needed to mix with either of these poisons.

We do not recommend Paris Green as it is now far more expensive than either Calcium Arsenate or Arsenate of Lead. It is also far more injurious to the plant and more dangerous for the workmen handling it.

#### METHODS OF APPLICATION.

The simplest method of application is that recommended and widely used in 1911, consisting of the home-made so-called "pole and bag outfit." For the pole use a piece of board about three-quarters of an inch thick and four inches wide by such length as will cover two or four rows of the cotton upon which it is to be used. Lay out on the board the plan for the entire outfit, marking for each bag so that it will be about eighteen inches long on the pole and placing the bags so that the middle of each will come over the center of a row. Bore a  $1\frac{1}{4}$  to  $1\frac{1}{2}$ -inch hole at the middle of the space for each bag so that the poison may be introduced after the bag is completed. The holes may be closed with cork stoppers or with corn cobs after the poison has been put in place. For the ends of each bag cut off two pieces of the same board each four inches long. Nail these pieces endwise on the underside of the board and brace by a small piece of 1-inch quarter-round on the inside and underneath the board so that the end blocks will not be drawn out of place by the tension of the cloth and the weight of the poison. (See Plate II). The proper cloth for use may vary according to the method of distribution intended. There are two factors that govern the amount of material applied per acre. One of these is the rate of distribution from the bag, and the other is the rate of progress across the field. The rate of distribution depends upon the tightness of weave of the cloth and the agitation given the outfit. If the poison is to be distributed by a man riding a mule, much will depend not only upon the jar given, but upon the progress, whether the mule is walking or trotting.

As a general rule for cotton worm control, one thickness of unbleached domestic or two or three thicknesses of cheesecloth can be used in the bags for the distribution of either Calcium Arsenate or Arsenate of Lead. With the two bag outfit to be carried by hand, three thicknesses of cheesecloth will give about the proper distribution. A longer pole may be used covering four rows and carried by a man on a mule. In this case, there is greater jarring to the bags at the end of the

pole than those nearest the rider. Therefore, two thicknesses of cheesecloth may be used for the bags nearest the rider and three thicknesses for those at the ends of the pole. The cloth is stretched tightly over the blocks forming the ends of each bag and tacked at a distance of from one inch to an inch and a half apart. The stretching of the cloth should be lengthwise of the bag especially, so that the bottom of the bag will not sag from the weight of the poison. This gives better distribution than where the poison is allowed to accumulate in a short portion of a loose bag. The construction of this outfit is plainly shown in the illustrations on Plate II.

#### NUMBER OF APPLICATIONS REQUIRED.

For cotton worm control alone, a single application for each generation given at the time the worms begin to eat through the tissue of the leaf, should be sufficient for control of that generation of worms. Two or three applications for the season may protect the crop completely from cotton worms. However, if heavy washing rains occur within twenty-four hours after the dusting has been applied, it is likely that an immediate repetition of the treatment may be necessary. The best time for application is from daybreak in the morning until the dew is off the cotton. Do not allow the bags to touch wet plants. The second best time for application is rather late in the evening after the air has become comparatively calm and continuing until dusk. In emergencies however, it becomes advisable to continue the dusting for cotton worm throughout the day, and treatments can easily be given during moonlight nights. The generations of cotton worm develop in slightly less than four weeks. More frequent treatments should be given, however, if the worms threaten the foliage.

#### CONTROLLING BOTH BOLL WEEVIL AND COTTON WORM.

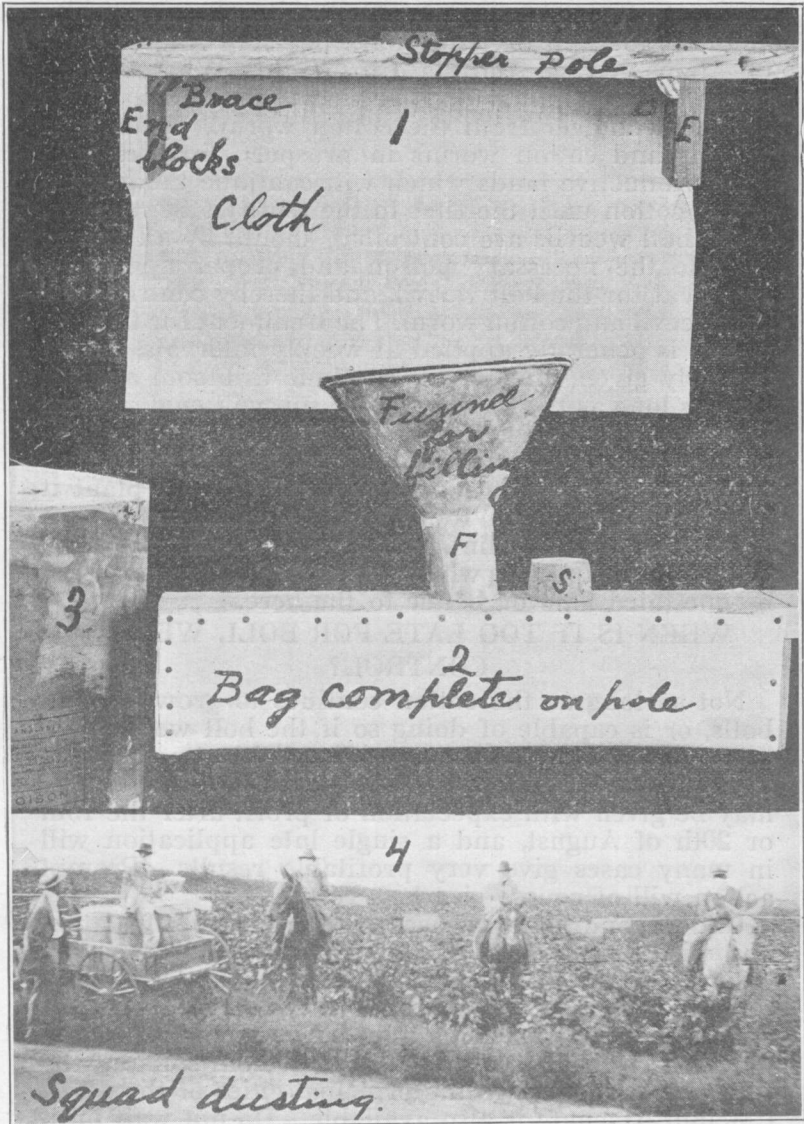
In the past it has been considered that the boll weevil could not be profitably controlled by dusting arsenical poisons on the plants. Therefore hitherto, it has been believed that after the boll weevil has stopped the setting of bolls, it was not advisable to poison. During recent years however it has been found that with a newer and better poison and with better methods of applying it, the boll weevil can be controlled. Calcium Arsenate applied by means of a dust gun driving the poison through the plants very thoroughly, and applied at proper intervals, will control the boll weevil very

satisfactorily. The expense for this treatment usually amounts to eight or ten dollars per acre for four applications. (See Ala. Sta. Cir. No. 31) Wherever the treatment is applied for boll weevil there will be no trouble whatever from the cotton worm. With both weevils and cotton worms in prospect, farmers who have productive lands which will continue the growth of the cotton until the first to the tenth of September, if the boll weevils are controlled, should by all means provide the necessary poison and proper apparatus and treat for the boll weevil, and thereby control both boll weevil and cotton worm. The treatment for the boll weevil is generally applied at weekly intervals, and if properly given, plants may continue to bloom and set fruit as long as the fertility of the soil will enable them to do so. The treatment for cotton worm will cost approximately one-half of that for boll weevil. If treatment saves an average of only two bolls per plant it will pay a profit on four dustings with the present prices for seed and lint. Surely this increase can be reasonably expected wherever the yield promises to be one-third bale or better to the acre.

#### WHEN IS IT TOO LATE FOR BOLL WEEVIL CONTROL?

Not so long as the cotton continues to grow and set bolls, or is capable of doing so if the boll weevils are controlled. In our most productive fields, two or three applications of Calcium Arsenate for the boll weevil may be given with expectation of profit after the 15th or 20th of August, and a single late application will in many cases give very profitable results. Prompt action will of course give best results.

Under conditions of heavy boll weevil infestation and with the prospect of cotton worm occurrence, we believe that it is highly advisable for planters to use the Calcium Arsenate without delay for boll weevil control. Hand dust guns may be obtained in limited numbers from the manufacturers or from some of the wholesale druggists in the principal cities of the State. Calcium Arsenate is also available. Do not wait until the cotton worm stops all possibility of further setting of fruit or the boll weevils infest all of the squares before applying this treatment. The expense for controlling both boll weevils and cotton worms is a very small item when the present price of cotton is considered. Prompt action may save several million dollars worth of cotton to Alabama farmers this season.



COTTON WORM DUSTING OUTFIT

Fig. 1, Dusting bag in process of construction. Either two or four-row poles may be used with one bag for each row. Fig. 2, Dusting bag completed, ready for filling, funnel in place. Fig. 3, Supply of Calcium Arsenate or Arsenate of Lead. Fig. 4, Squad of laborers applying dust from mule-back. Better use a four bag pole for this method of application.

(Original)