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The corn earworm, Heliothis armigera Hbn., is easily the most destructive insect attacking sweet corn, and heavy infestations of this pest have occurred in Kentucky through the years. Garman and Jewett in 1914 described fields which were 100 percent infested.The situation apparently remains unchanged for it is quite common to find untreated sweet corn fields with virtually every ear infested.

Infestations are not limited to corn; much damage is done yearly to tomatoes in Kentucky by this insect. Corn is the preferred host, however, and losses are particularly heavy from the infestations of this insect when plantings of market sweet corn are made in succession during the season. In this situation, the earworm populations have the opportunity of building up in successive generations.

Control measures have to be aimed at the hatching larvae in the corn silk; the eggs are deposited on the silks and the hatching worms immediately seek to tunnel they way down the silk channel to the ear to the kernels. Emmert and Price (1942) found that clipping of corn silks, after the silks had begun to dry, provided good control of the earworm; this was a more effective and more economical method of control than a pyrethrum-oil treatment which was applied by hand to the individual ear.

With the advent of the chlorinated hydrocarbons, in the past several years, much work has been done by various investigators in the control of the corn earworm on sweet corn. Kelsheimer et al. (1950) tested DDT, methoxychlor, parathion, chlordane, and toxaphene on corn earworm and found that DDT gave the best and most consistent control. Blanchard et al. (1950) also found DDT the most satisfactory of the materials used. This report and other studies by different investigators agree further that sprays of DDT and mineral oil are considerably more effective than dusts.

Because the population level of the corn earworm is probably the most important single factor in corn earworm control and because this population level is likely to be different in different parts of the country, it is essential that the control problem be studied in each area. Other variable factors which have an influence on the control program are: corn varieties, cultural practices, and, of course, the climate or weather.

Recent Work in Kentucky

This progress report is presented in order to give sweet corn growers in the state an indication of what to expect in the way of infestation levels and the control that can be obtained under various conditions. The work thus far (1950-51) has been conducted in large field plots with the cooperation of market sweet corn growers in the Louisville area. [1]

Methods and Materials. Dusts were applied with a conventional power duster using three fixed nozzles per row. Sprays were applied with a self-propelled high clearance sprayer equipped with a boom and extension drops, allowing three fixed nozzles per row, and applying about 25 gallons per acre at 100 pounds pressure. DDT, 25% xylene based emulsion concentrate, was used in all the sprays. This was used at 3 quarts (1 1/2 pounds) to the acre. White mineral oil (70-80 second Saybolt viscosity) was used at 1 1/4 and 2 1/2 gallons (5 and 10 percent) per acre. The emulsifiable DDT concentrate plus the mineral oil were diluted to 25 gallons, the amount used per acre. Agitation was provided by a strong overflow stream into the tank.

The plots were eight or more rows wide and usually several hundred feet long; treatment was under light and heavy infestations and at different times in relation to silking as well as varying numbers of applications. On treatments calling for several applications, they were made at 3 or 4-day intervals depending on the weather and the development of silking. (Unfortunately the work could not be made extensive enough to give data on all combinations under the various infestations.)

Results. The following tables summarize the results obtained in the work in the Louisville area during 1950-51:

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[1] The assistance of Mr. William A. Schneiter, Mr. William Fagenbush, and Mr. H. C. Brown is gratefully acknowledged.

Table 1. Summary - Corn Earworm Control with Dusts

Materials	Pounds per acre	Applications and Interval	% Silking at First Application	Worm-free Ears per 100
Test 1. (Carmelcross)				
1. Parathion, 1%	40	3 at 3 days	10	30
2. DDT, 5%	40	3 at 3 days	10	50
3. Untreated	--	--	--	4
Test 2. (Carmelcross)				
1. DDT, 5%	40	2 at 3 days	20	62
2. Untreated	--	--	--	10
Test 3. (Golden Cross Bantam)				
1. DDT, 10%	20	2 at 3 days	20	89
2. Untreated	--	--	--	45

Table 2. Summary - Corn Earworm Control with DDT Sprays

Gallons per acre[1]		Applications and	% Silking at First	Worm-free Ears
DDT[2]	Oil[3]	Interval	Application	per 100
Test 1. (Golden Cross Bantam)				
1. 3/4[4]	---	3 at 3 days	10	33
2. 3/4	1 1/4	4 at 3 days	10	90
3. Untreated		---	--	6
Test 2. (Golden Cross Bantam)				
1. 3/4	2 1/2	1	90	89
2. 3/4	2 1/2	2 at 3 days	20	98
3. 3/4	1 1/4	3 at 3-4 days	10	97
4. Untreated		---	--	45
Test 3. (Stowells Evergreen)				
1. 3/4	1 1/4	2 at 3 days	20	96
2. 3/4	1 1/4	1	20	76
3. Untreated		---	--	45

[1] Materials diluted to 25 gallons with water and applied at this rate per acre.

[2] DDT, 25% emulsion concentrate, xylene base, used in all sprays; 3/4 gallons equal 1 1/2 pounds actual DDT.

[3] Oil, white mineral, of 70-80 second Saybolt viscosity.

[4] "Continued European Corn Borer spray" - No mineral oil.

There was only insignificant injury caused by the use of any of the DDT - mineral oil treatments. There was evidence that the Stowells Evergreen variety was more susceptible to injury than Golden Cross Bantam.

Samples of corn treated with DDT dust, DDT emulsion concentrate, and the mineral oil mixtures were frozen and later submitted to a panel of judges of the Home Economics Department.

The samples were tasted as corn-on-the-cob and cream style; the taste panel found no difference in the treated and untreated samples.

Conclusions. 1. Spray mixtures of DDT and mineral oil were superior to any other material tested in corn earworm control, and gave satisfactory control under high infestation conditions.

2. DDT, without mineral oil, used as a "continued European corn borer spray" was totally unsatisfactory as a corn earworm control measure under a high infestation condition.

3. Adequate control with dusts can be obtained only when the infestation is very low.

4. There is no accurate way to determine a population level of corn earworm ahead of time.

5. If the silking period is prolonged, the control becomes more difficult. Four applications at 3-day intervals will usually cover prolonged periods.

6. While only insignificant injury to husks or leaves occurred, it is felt that a mechanical agitator would practically eliminate the possibilities of "burning" and inadequate control due to separation of the DDT and oil.

7. No injurious affects to pollination were observed.

8. DDT and mineral oil treatments did not cause off-flavor in sweet corn.

CONTROL MEASURES

On the basis of present knowledge, the following suggestions can be made:

Commercial Plantings;

Use: DDT, xylene base, 25% emulsion concentrate, 3 quarts; white mineral oil, (70-80 second Saybolt viscosity), 1 1/4 gallons. Dilute to 25 gallons with water.

Method of Application: Apply 25 gallons per acre. Direct 2 to 4 nozzles at ear zone using 100 (or more) pounds pressure. Mechanical agitation is almost a necessity.

Timing and number of applications; Apply four applications starting at 10 per cent silk and continuing at 3-day intervals. This should give satisfactory control under high infestation conditions. If only two or three applications are to be made start at 20 per cent silk and space the other applications to cover the silking period. Doubling the mineral oil to 2 1/2 gallons will aid in control if only two or three sprays can be made.

Smaller Plantings; (Individual Ear Treatment).

1. Knapsack Sprayers. Use the same materials and methods as described above. Constant agitation and maintenance of pressure as high as possible are required. To make one gallon of mixture use about 4 fl. oz. of the DDT and 6 1/2 fl. oz. of the oil. Only a small amount of the mixture (1.5 cc) is needed per individual ear.

2. Injection. Use a DDT (1%) and mineral oil (99%) mixture and apply a measured dose per individual ear (not more than 1 cc) when first wilting appears on the silk. If application is made with a medicine dropper, 1 cc equals one compression of the dropper.

3. Clipping the Silks. Clip the silks and shucks to the tip of the cob 4 to 6 days after the first silks brown. Destroy cut portions.

Literature Cited

1. Blanchard, R. A., W. A. Douglas, G. P. Wene, and O. B. Wooten. 1950. DDT sprays for control of the corn earworm and the budworm in sweet corn. U. S. D. A., Agric. Res. Adm., B. E. & P. Q. E-780 Rev.

2. Emmert, E. M. and W. A. Price. 1942. The control of of the corn earworm by clipping. Ky. Agric. Expt. Sta. Bul. 436.

3. Garman, H. and H. H. Jewett. 1914. The life-history and habits of the corn earworm (Chloridea obsoleta). Ky. Agric. Expt. Sta. Bul. 187.

4. Kelsheimer, E. G., N. C. Hayslip and J. W. Wilson. 1950. Control of budworms, earworms and other insects attacking sweet corn and green corn in Florida. Fla. Agric. Expt. Sta. Bul. 466.