

FIELD CORN

for Corn Borer Control

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IN ILLINOIS ALONE nearly 250,000 acres of field corn have been successfully sprayed or dusted for the control of the corn borer. Since one or two well-timed treatments carefully applied will protect field corn against serious reductions in yield, these methods of fighting this pest are rapidly gaining in popularity. Not all losses can be prevented, but spraying or dusting, properly managed, will greatly reduce them.

Shown below is an operator getting excellent coverage with an orchard sprayer adapted for use in the cornfield. The spray is directed straight down into the tops of the plants.

CIRCULAR 642 · UNIVERSITY OF ILLINOIS · COLLEGE OF AGRICULTURE
Extension Service in Agriculture and Home Economics in cooperation with
ILLINOIS STATE NATURAL HISTORY SURVEY



NOT A SUBSTITUTE

The use of poisons in controlling the corn borer is an emergency or supplementary measure to be used when other means of control were not applied or were not successful. It is not a substitute for good sanitation and proper planting dates. Those two measures must be included in any efficient and economical program of control.

Good sanitation means destroying infested crop residues and weeds by plowing them under or by other available methods. We must constantly strive to improve farming practices so as to kill more of the borers that live over the winter.

Proper planting dates mean not before May 15 on fertile soil in infested areas and not after May 25. Corn planted before May 15 is likely to be heavily infested with early-season worms. That planted after May 25 runs a chance of heavy attack by late-season worms. Thus either extremely early or extremely late planting is a risk.

Planting too early is perhaps the most important single factor that determines the amount of borer damage a community will suffer in a given season. Records for the past eight years show infestation to be closely and regularly related to the percentage of the community's corn crop planted before May 15.

(For more detailed information on sanitation and planting dates, see Illinois Circular 637, Corn Borer Control in Field Corn.)

TESTS SHOW VALUE OF INSECTICIDES

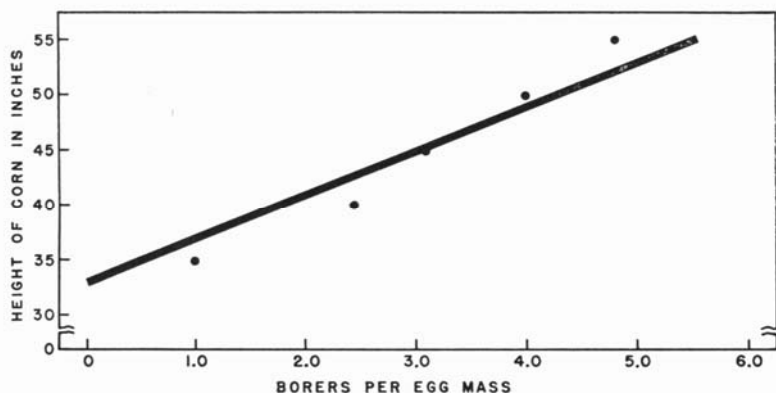
Reduction of losses where insecticides are used. In 1947 a study of borer populations in treated and untreated parts of 11 fields was made. On a representative field the untreated part of the field had an average of 6 borers per plant and yielded 92 bushels of corn to the acre; the treated area had 2 borers per plant and yielded 106.7 bushels an acre. Treating this corn saved 14.7 bushels an acre. *Figured at \$1.25 a bushel, the 14.7 bushels saved were worth \$18.37, or 4½ times the cost of treatment (\$4).*

Losses where no insecticides are used. It has been pretty well established that where no insecticides are used, borer damage will reduce yields about 3 percent per borer per plant. This means that in a field where there is an average of 5 mature borers per plant in early August, the corn yields will be cut 15 percent (a 12-bushel loss in a field normally producing 80 bushels of corn an acre). This includes the loss caused by full-grown borers and by those that fed for a time and died.

WHAT FIELDS TO TREAT

Earliest or most advanced fields are most likely to need treatment.

It is doubtful if any combination of conditions would justify the treatment of all fields in a community. The moths are attracted to the largest corn, usually corn planted early (before May 15) on fertile soil. Borer survival is also highest on larger, more advanced plants. On corn only 18 to 20 inches tall, 100 eggs will usually produce less than 2 mature borers. On taller corn the number of borers that survive goes on increasing until on corn in the tassel or early silk stage 100 eggs may produce about 25 mature borers. (*The height of corn is measured from the ground to the tip of the longest leaf pulled upright.*) Thus the earliest or most advanced fields are likely to be the only ones to need treatment.



Height of corn at dusting time and number of borers per egg mass that hatched and were alive 30 days later on untreated corn. Note how many more borers survived on the taller corn. As an egg mass includes about 20 eggs, one egg mass per plant on the more mature untreated corn is likely to mean 5 borers per plant. This number is a serious threat to the crop.

(Fig. 1)

Fields planted from May 15 to 25 will have fewer eggs than corn planted earlier. Moreover, most of the borers that hatch on corn less than 25 to 30 inches tall will die whether the corn is treated or not. As a rule, most of the borers that mature come from the last 25 percent of the eggs laid.

How to know when treatment is justified. If the most advanced corn in a neighborhood is 25 inches tall or taller, and at the time of the first hatch averages 100 egg masses to 100 plants, it must be watched

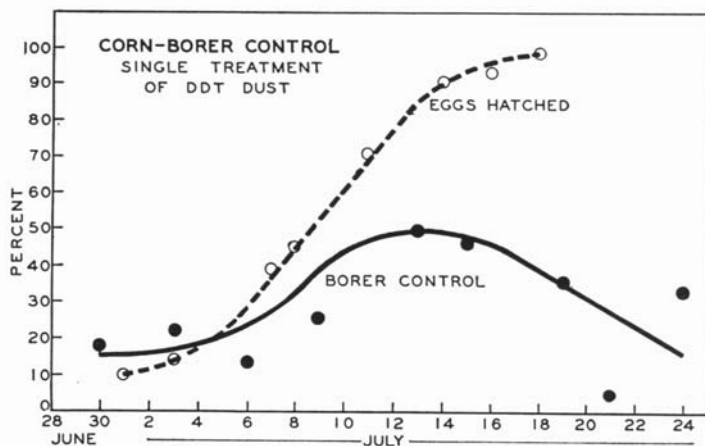
closely and preparations made for treating it. Hard, beating rains with wind, or hot dry winds may knock off most of the eggs and kill many of the young worms. *But if a week after the first worms hatch, there is still an average of 50 unhatched egg masses to 100 plants, treatment will probably be justified.* (Egg masses average 20 eggs each.)

Sometimes egg-laying goes on at only a moderate rate but is spread over quite a long period. When that happens, the moths may lay enough eggs to justify treating the corn even though the egg masses may never average 100 to 100 plants.

Treatment of late-season borers may be worth while under some conditions even though not usually needed. Where a very heavy infestation of these borers develops in a field, treatment to destroy the borers working in the shanks of the ears may be justified, for these borers cause the ears to drop. Seed producers may want to treat their fields in order to reduce chaffiness and improve the quality of the seed.

TIMING OF TREATMENTS

Where spray or dust is to be used only once, it is best to apply it 10 to 14 days after the first hatch of borers. Reasonably good control is obtained when the treatment is made as early as 8 days and as late as 16 days after the first hatch. Later than 16 days, treatments rapidly become less effective, as many borers will have burrowed into the stalks.



Broken line shows percent of borers hatching on given dates. Solid line shows percent of borers killed when crop was dusted once with DDT (different test plots were dusted on the different dates indicated). The best control came when the dust was applied 10 to 14 days after the first hatch. (Fig. 2)

If two applications are to be used, they should be made one week and two weeks respectively after the first hatch.

Control of early-season borers is most important. While both early- and late-season borers attack field corn, control of the early-season worms is the more important. The early-season worms in June and July work in the midribs of the leaves and in the main stalk. They reduce the vigor of the plant and cut down yields more than late-season borers, which appear in August and September after the crop is practically made. Also, the fewer early-season worms there are, the fewer late-season worms there will be.

Watch for newspaper and radio reports. Recommendations as to timing and number of treatments to give are published throughout each season in the newspapers and announced over the radio.

INSECTICIDES TO USE

DDT is the outstanding material. It is highly effective, easy to get, and relatively inexpensive. It can be had as a dust, a water-wettable powder, or an emulsifiable solution. In any of these forms it should be applied at a rate to deliver $1\frac{1}{4}$ to $1\frac{1}{2}$ pounds of actual DDT to the acre. To put it on in these amounts will take 25 to 30 pounds of 5-percent dust, 3 pounds of 50-percent water-wettable powder, or 3 quarts of 25-percent emulsifiable solution.

Ryania is also very effective against the borer but is in short supply and at present rather expensive for general use on field corn.

Oil concentrates and parathion show considerable promise. Oil concentrates, however, have caused some plant injury, and little is yet known of the poisonous properties of parathion to warm-blooded animals. Both are still (1949) considered experimental.

Other insecticides such as benzene hexachloride, chlordane, toxaphene, methoxychlor, and TDE (also called DDD) do not usually give satisfactory control in economical dosages.

Have materials on hand well ahead of time. This is the only way to be sure to have them when needed. The kind of equipment available will determine the kind of material to use.

APPLYING WITH GROUND MACHINES

A good type of ground sprayer for a farmer to own is one that is adjustable for either high or low pressure. Such equipment may be adapted to many other uses on the farm besides spraying to control the corn borer. Some dusters and sprayers can be mounted on a tractor or a detasseling machine, and there are high-pressure sprayers with high clearance for use in cornfields.



Not a good job. The nozzles are dropped too far below the boom and too much spray is hitting the plants too low. Contrast with the picture on page 1, where the tops of the plants are getting the spray. (Fig. 3)

Standard row-crop sprayers give best control. These machines must be equipped with a boom, have three nozzles per row, and provide pressure of 100 to 400 pounds to the square inch. The boom must be adaptable.

Set the boom to travel a few inches above the tops of the corn plants. Direct the two outside nozzles toward the plants and downward; keep the middle nozzle slightly above the outside pair and



Dusting is being done here with a machine attached to corn-detasseling equipment. Dusters or sprayers may also be mounted on a tractor or a trailer.

(Fig. 4)

direct it downward. Adjust all three to put most spray on the three places where the borers feed—that is, on the curl (whorl), the leaf axils (where the leaves join the stalk), and the developing ears.

Low-gallonage, weed-control type of sprayer can be modified for corn borer control. Use the nozzle arrangement just described. Such machines, applying 5 or 6 gallons of spray to the acre, have given fair borer control. Larger nozzles applying 10 to 12 gallons of spray to the acre give better control.

Standard row-crop dusters can also be adapted for corn borer control. These dusters must be equipped with two nozzles or more to the row. Two nozzles to the row will give satisfactory coverage if the duster has 1½- or 2-inch distributor tubes. When dust is being applied to corn before it tassels, at least two nozzles 5 inches above the plants must be provided.

Use special care with low-clearance machines. Such machines should not ordinarily be used early in the morning. Corn plants are likely to be brittle then and stalk breakage too high.

DUSTING OR SPRAYING BY PLANE

Applications from the air are generally less effective than ground treatments. Airplane dusting or spraying nevertheless has three advantages: (1) it is the fastest method of covering large acreages; (2) it can be used when soil conditions will not permit ground opera-

Airplane dusting and spraying is fast and fairly effective, but coverage is uneven and much drift occurs. Ground machines do a better job. (Fig. 5)



tions; (3) it can be called in on short notice to meet emergencies or be used when ground equipment is not available.

Special boom attachments are needed for spraying. An airplane to be used for spraying must have these booms. Each boom must be provided with multiple nozzles so arranged as to give as even distribution of spray across the swath as possible.

Conventional venturi-type distributors can be used for dusting. It is advisable, however, to apply dust by plane only when more satisfactory or lower-cost methods cannot be used.

When either spraying or dusting by plane, the width of the swath may vary with the kind of equipment used, but it should not be wider than the wing span or rotor length. Flight height should be 4 to 6 feet (at the wheels) above the corn.

For best results, treatments should not be made when the wind is blowing more than 4 miles an hour.

WHEN ARE TWO TREATMENTS NEEDED?

Answer to this question depends on how heavy the borer infestation is expected to be, and on how much control is wanted. *On field corn* one treatment will ordinarily be enough, tho where heavy egg-laying goes on over a long period, two treatments may be justified.

On especially valuable crops, such as breeding material and seed fields, two treatments may often be justified.

PRECAUTIONS IN FEEDING FORAGE

DDT is moderately poisonous to warm-blooded animals. Some of it may stick to the leaves, stems, and husks of corn plants, but when corn is treated according to recommendations, experiments have repeatedly shown that practically none reaches the kernels. Three to four weeks after proper treatment, corn plants show only about one part per million of DDT.

While no ill effects have been noted in animals feeding on crops treated with DDT, it may be deposited in the fatty tissues of animals eating the forage and then be thrown off in their milk. Dairy animals should not, therefore, be fed forage treated with DDT.