

2007

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Wright, R. J. and Wright, Robert J., "G07-1782 First Generation European Corn Borer Scouting and Treatment Decisions" (2007).
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First Generation European Corn Borer Scouting and Treatment Decisions

Robert J. Wright, Extension Entomologist

The decision to treat for European corn borer is complex and affected by many variables such as weather, plant maturity, borer survival and development, anticipated corn prices, insecticide efficacy, and costs versus anticipated returns. This publication discusses the factors growers need to consider when assessing the need for control of first generation European corn borers in non-Bt corn.

European corn borer moths prefer the tallest plants for egg laying. Expect initial concentrations of egg-laying moths in fields where corn plants are taller than in surrounding fields. If most fields are about the same height, moths may disperse evenly throughout. Even late-planted corn can become damaged if rapid growth makes fields attractive late in the borer moth flight period. Plan to scout all cornfields for at least three to four weeks after peak moth flight, usually between early June and early July. Also, some varieties of corn are more susceptible than others. Consider locally adapted varieties that yield well and have some resistance to the borer.

Begin routine scouting during the moth flight, egg-laying and early hatching period. To determine the need to treat for first generation borer, examine at least 25 corn whorls at each of four locations in each field. Pinhole or shot-hole leaf damage mean early signs of feeding by corn borer larvae (*Figure 1*). Record the percentage of total plants with whorls damaged by corn borer feeding. Also, pull up and unroll several whorls at each site and record the number of live worms present. Calculate the average number of live larvae per damaged plant (total live larvae divided by number of damaged plants examined). Enter data from your sampling into the provided worksheet. This will give you an estimate of the **maximum** number of borers that might survive to produce tunnels in the plant. Remember that mortality of young borers is normally high. If making a treatment decision when most borers are small, scouting figures may overestimate the final borer population. It may be better to delay the treatment decision until just before borers leave whorls and enter stalks; borers begin to enter stalks when they are half-grown.

Caution: Borers that have left the whorl and entered the stalk cannot be controlled. If most have left the whorl, it is too late to attempt control. Be certain to sample enough plants at



Figure 1. "Shot-hole" feeding damage by European corn borer larvae in whorl stage corn (UNL Department of Entomology).

enough locations to ensure that estimates are typical of the field. Twenty-five plants in four locations in each field is a **minimum sample**.

To make a decision on first generation European corn borer treatment the following information is needed:

1. Average percentage of damaged whorls in the field and average number of live worms per damaged plant. These numbers help provide an estimate of the possible maximum number of cavities per plant at the end of the first generation.
2. Cost per acre of the insecticide application (product and application costs).
3. Anticipated dollar value of the grain per bushel.
4. Estimated percentage control given by a particular insecticide.

Example: An average of one borer cavity per plant is capable of causing an approximate 5 percent yield loss. Using the worksheet example, it is known from scouting that 50 percent of the plant whorls are damaged with an average of 2 live worms per damaged plant. Calculate that $50\% \times 2.0 = 1.0$ worm per plant, if all worms survive. Assume 75 percent control and \$3.00 value per bushel of corn with a yield expectation of 150 bushels per acre.

Management Worksheet for First Generation Corn Borer

An online version of this worksheet is available at <http://entomology.unl.edu/fldcrops/index.shtml>

	<i>Example field</i>	<i>Your estimates</i>
1. Yield potential for this field	150 bu/A	_____ bu/A
2. Number of larvae/plant = average live larvae/plant x average % damaged plants (2 larvae x 50% damaged plants = 1 larvae/plant)*	1 larvae/plant	_____ larvae/plant
3. Potential yield loss (1 larvae/plant x 5% loss/larva = 5% loss in yield, 5% x 150 bu = 7.5 bu loss/A)	7.5 bu/A	_____ bu/A
4. Dollar loss/A (7.5 bu/A x \$3.00 per bu = \$22.50 loss/A).	\$22.50	\$ _____
5. Preventable loss (if chemical is 75% effective; \$22.50 x 75% = \$16.87/A)**	\$16.87	\$ _____
6. Chemical (\$8.00/A) and application costs (\$4.00/A). Estimate your own cost or call dealer/applicator. TOTAL = \$12.00/A	\$12.00	\$ _____
7. Compare preventable loss (\$16.87/A) with treatment cost (\$12.00/A). Subtract latter (\$12.00/A) from former (\$16.87/A) to find dollars saved by treatment per acre (\$4.87/A).	+\$4.87	\$ _____

If preventable loss (No. 5) exceeds total cost of treatment (No. 6), you may benefit from an insecticide application for first generation corn borer.

*To determine the need for treatment, it is essential to obtain an estimate of the final population of borers in each field. Ideally, this final population estimate and the treatment decision should be made after egg-laying, when the oldest borers are approaching the third stage (about half-grown), and before the oldest larvae have left the whorl. Remember that natural insect mortality caused by weather (low temperatures, low relative humidity, wind, or driving rain), other insects, diseases, and resistance factors in the corn plant is often high, especially in the very earliest borer stages. Occasionally, such mortality may be as high as 90 percent. However, warm, wet and humid, mild conditions can increase survival considerably. Therefore, due to these variables, it is nearly impossible to support the use of an "average percentage of surviving borers" and plug it into the formula. As it is, the above formula tells what would happen if all the borers observed did survive to invade the stalk and complete a tunnel. The later the treatment decision can be made without compromising control, the more natural mortality will occur and the greater the likelihood of making a correct treatment decision.

**A reasonable expectation for insecticidal control of first generation European corn borer under typical field conditions is approximately 75 percent. Percent control can vary considerably, depending on several factors, including timing of application, product choice, and application method. Research has shown that granules generally work better than liquids for first generation European corn borers, with the exception of center pivot applications.

Resources

European Corn Borer Ecology and Management. 1996. C. E. Mason et al. North Central Regional Extension Publication 327, Iowa State University, Ames.
Handbook of Corn Insects. 1999. K. L. Steffey et al. (eds.). Entomological Society of America. For ordering information, see <http://www.entsoc.org/pubs/books/handbooks/index.htm>

Acknowledgment

Modified from *First Generation European Corn Borer Scouting and Treatment Decisions*, University of Nebraska–Lincoln Extension NF364, by R. J. Wright and J. F. Witkowski.

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Issued October 2007

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