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# European Corn Borer Control in Field Corn

Since its appearance in Minnesota in 1943, the European corn borer has been causing some of the most costly insect damage to corn. Infestations and damage done vary greatly from year to year. The high reproductive potential, coupled with favorable weather for survival and reproduction, can result in increased infestations from year to year.

Larvae feeding on leaves, in stalks, in ears, or in shanks of ears cause reduced yields, stalk breakage, and dropped ears. Early infestations, which cause the most yield reduction, are most severe on early-planted corn. Later infestations and second generation borers usually are heaviest in late-maturing corn and cause ear droppage and broken stalks.

### LIFE CYCLE

Corn borers overwinter as larvae in old stalks, corn cobs, weed stems, or in other protected places such as webbed-together leaves or husks. As weather warms up in spring, borers become active and form a brown, cigar-shaped pupa. The adult form is a moth which begins to emerge in June. Development and emergence of the moths depend on the weather. Early hot weather will speed up the action, and a cold spring will delay moth emergence, mating, and egg laying. When the moths have mated, the females are attracted to the tallest, most vigorously growing corn for egg laying. This is why the earliest planted well-fertilized corn is usually most heavily infested. Eggs usually are laid near the mid-ribs on the underside of the leaves in flat clusters of about 10 to 25, overlapping like fish scales or shingles. When first laid they are pearly white. Just before hatching, the dark heads of the young borers are visible through the egg shells. Eggs hatch in about a week. The young larvae feed on the leaves, mid-ribs, and sheaths and move into the whorls and tunnel into the stalks. Depending on the season, some of the borers will pupate and produce a second generation, usually in August. Others will remain as larvae and overwinter. The development and success of a second brood is extremely variable in Minnesota. In the northern part of the corn producing area there is usually one brood, frequently spread throughout much of the season with moths emerging and laying eggs over several weeks.

### CONTROL

There are several things to do to minimize losses from borers. There are also some practices promoted in the past but now considered ineffective.

#### Selection of Varieties

There are genetic differences in susceptibility and resistance in the corn available for planting. Many commercial hybrids and other lines of corn are resistant to the borers or resist stalk breakage and ear droppage even when infested. Use varieties which are adapted to your area and which resist stalk breakage and ear droppage.

#### Planting Dates

Minnesota research results show that higher yields usually will be obtained by planting early and using adequate fertilizer applications. Early-planted, highly fertilized corn is most attractive to the first brood corn borer moths. Therefore, if you use a variety which is very susceptible to borers and plant extremely early for your area, in a year of a large moth flight you can expect heavy infestations.

Late-planted corn, which is tasseling when the second brood of moths is active, will be the most heavily infested by second brood borers.

The best approach is to plant to allow the growing season which will give you the best yields based on research in your area and your own experiences and to avoid unusually early or late planting dates.

#### Destruction of Overwintering Borers

Theoretically, it would be possible to reduce the numbers of borers from year to year by handling the crop residues so that overwintering larvae are killed. However, to be effective this practice would have to be followed over a vast area, for moths can fly many miles. Furthermore, a high percentage of the moths come from pupae in corn cribs where picking and cribbing is the harvest method.

Minimum tillage practices, which leave much stalk residue on the surface, or just disking corn stalks prior to seeding small grain result in high borer survival.

Plowing, which turns under completely the crop and weed residues before moth emergence in the spring, is the most effective method for reducing the overwintering borers and moth emergence. Clean plowing alone doesn't kill all the borers. Some may tunnel up to the surface in the spring. If they cannot find plant debris such as pieces of stalks to bore into, they will die from exposure to weather or natural enemies.

Feeding infested plants as silage or fodder to livestock also will destroy a high percentage of the borers.

The use of stalk choppers in the field is not an effective method of reducing borer populations. If stalk choppers are used as a method of preparing the field for plowing, this will supplement the borer reduction but cannot be suggested solely for borer control.

Burning crop residues is not a good practice. It destroys organic matter and does not completely kill the borers.

None of these cultural practices can be relied on alone to control borers. But any of these practices that fit your particular farming operation will help reduce the number of overwintering borers locally.

#### Use of Insecticides

A number of chemicals will kill a high percentage of borers feeding on the plants being treated. These treatments must be properly timed and applied to be effective. First, the need for

treatment must be determined, to make the treatment pay. The best way to decide if and when a treatment is needed is to calculate the percentage of the plants showing early leaf feeding in the whorl, or "shot-holing." To do this select 25 plants in a row in each of four locations throughout the field. Examine each plant for the presence of small shot holes in the whorl leaves. Other insects feeding on corn may produce holes in the leaves, but these holes are often larger and frequently occur in regular rows across the leaves. Add up the number of infested plants found in the four groups of 25. The threshold count generally used for field corn to determine treatment is 50 percent. For seed fields, irrigated corn, or sweet corn the count would be lower (25 to 50 percent). This usually occurs in southern and central Minnesota in late June or early July.

Treatment for the second brood in field corn will pay if there is an average of one egg mass per plant. This normally occurs in August. However, the extended period of egg laying makes it difficult to adequately control second brood borers in field corn.

If the infestation warrants, use one of the following:

Material	Amount per acre (actual toxicant)	Limitation (days before harvest)
carbaryl granules or wettable powder	1½ lbs	None.
carbofuran (Furadan) granules	1 lb.	Do not apply more than twice.
diazinon granules	1 lb.	None.
Dyfonate granules	1 lb.	45 days. First brood.
EPN granules or spray	½ lb.	14 days.
phorate (Thimet) granules	1 lb.	None.
toxaphene granules	2 lbs.	Grain only. Do not ensile or feed plants.

The granules should be applied into the whorls before tassel emergence for the first brood. If a spray is used for the first brood, it should be applied into the whorls.

For information on the control of the European corn borer in sweet corn, see Entomology Fact Sheet 1, "Controlling Corn Borers and Corn Earworms in Sweet Corn."

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