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G80-521 Common Stalk Borer in Corn (Revised April 2000)

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Common Stalk Borer in Corn

The life history and appearance of common stalk borers is described, along with information on damage they can cause, economic injury levels and ways to control them in corn.

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In the past, the common stalk borer, *Papaipema nebris*, has not been a major pest of corn in Nebraska. Stalk borer damage in corn commonly is confined to occasional plants in the first few rows near field margins, fence rows, grass terraces and waterways. In addition to attacking corn, this insect attacks over one hundred other species of plants, including ornamentals, broadleaf weeds and grasses. It may feed on soybeans as well, but is not an economically important pest of that crop. Understanding the common stalk borer life cycle and behavior is critical to selecting management practices to reduce its damage in corn.

Life History

Female stalk borer moths lay their eggs primarily on grasses such as smooth brome or on ragweed in late summer and early fall. The moths tend to lay eggs singly or in groups under sheaths and in folded or rolled leaves. Egg laying sites usually are located in fence rows, terraces and waterways, but can be throughout a crop field if preferred hosts are available.

Eggs overwinter and hatch in late April or early May. Larvae bore into the stalks of grasses or other hosts such as ragweed, and begin feeding. As they become larger or if the plants are mowed or burned down with herbicides, the stalk borers migrate into adjacent corn plants to complete their development. In some cases, if an appropriate weed host is not

available when eggs hatch, stalk borers may begin feeding on corn directly.

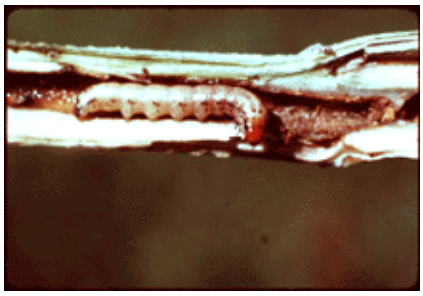

Figure 1. Common stalk borer larva (a) young, (b) mature.

Corn that is between the two and eight leaf stages can be attacked by the migrating stalk borer larvae. Larvae develop through seven to 10 instars, or stages, in about 10 weeks. Pupation occurs in the soil and moths emerge in August, September and early October. There is a single generation each year.

Description

The stalk borer adult is a dull, grayish-brown moth that commonly has several white or silver spots in two rows across the front wings. There is a faint whitish line across the wing near the outer edge. The hind wings are dull brownish-gray. The moth's wingspan is approximately 1 to 1 1/4 inches.

Common stalk borer larvae are distinctive in appearance. Young larvae (*Figure 1a*) are brownish-purple and have three prominent longitudinal white stripes at the front and rear ends of the body. The stripes are interrupted at mid-body by a solid dark purple to black area on the third thoracic segment and first three abdominal segments. Fully grown larvae do not have these characteristic markings, being uniformly dirty gray (*Figure 1b*). Fully grown larvae can be 1 1/2 to 2 inches long.

Damage

Stalk borer larvae injure corn plants in June and early July. They feed on leaves in the whorl and then tunnel into the stalk (*Figure 2*), or they burrow into the base of the plant and tunnel up through the center of the stalk. Leaf feeding alone does not cause economic damage.

Figure 2. Common stalk borer larva tunneling in corn.

Tunneling into the stalk can result in deformed or stunted plants which may not produce an ear. Severely damaged plants can die. Plants attacked at earlier growth stages tend to be more severely injured. A single stalk borer larva may attack more than one plant if the first plant does not support the larva as it increases in size.

Damage caused by feeding in the whorl will first show irregular rows of holes through the unfolding leaves (*Figure 3*). These irregular rows of holes will be much larger and more ragged than those caused by whorl-feeding of first generation European corn borer larvae. In severe cases an infested plant will have a very ragged appearance, with abnormal growth habits such as twisting, bending over, or stunting. If the feeding injury to the central part of the plant is severe enough, the whorl will appear dead while the outer leaves are green and apparently healthy (*Figure 3*). This condition is commonly called "dead heart."

Figure 3. Common stalk borer damage to corn (a) 'dead-heart injury', (b) whorl leaf feeding.

Conservation Tillage and Stalk Borer

Conservation tillage and stalk borer incidence are related in two ways. Poor weed control in conservation tillage and no-tillage cropping systems may result in late season survival of grass and broadleaf weeds. If suitable grasses or broadleaf weeds are present in crop fields in late summer and fall, the moths will deposit their eggs on these plants and the infestation of stalk borer may extend throughout the entire field. Also, if a stalk borer infested cover crop or an existing weed infestation is chemically "burned down" after planting, surviving larvae are forced to leave their original host, and will attack nearby corn.

Degree Days (DD) and Stalk Borer Development

Stalk borer hatch and migration to new hosts can be predicted using degree days (DD) (41° F base temperature) accumulated from Jan. 1 (*Table I*). The simple method for calculating degree days is to subtract the threshold temperature from the average of the daily maximum and minimum temperatures. Results from daily values are then added together to obtain cumulative degree days. Based on research at Iowa State University, stalk borer egg hatch begins at about 575 degree days and should be complete at 750 degree days. Begin scouting corn when 1,300-1400 degree days have accumulated. This corresponds with the beginning of larvae moving out of grassy hosts. Determine the need for treatment when 1,400-1,700 degrees days have accumulated.

Table I. Degree day requirements for common stalk borer development and management activities (41° F base).

Degree day accumulation from January 1	*Event (Egg and larva development)*
575	Egg hatch begins
750	Egg hatch complete
1,400	10% of larvae move out of grasses
1,700	50% of larvae move out of grasses
	Event (Pest control)
1,300-1,400	Begin scouting grassy field borders and corn
1,400-1,700	Make insecticide treatment decision in corn

Cultural Control

Any weed control method that helps eliminate grasses will reduce the number of potential stalk borer egg-laying sites, reducing the probability of stalk borer damage the next year. Control of grassy weeds is important in keeping a stalk borer infestation from becoming more and more of a problem each year.

Planting date may have some influence on the degree of injury from common stalk borers. Since smaller plants are more heavily damaged, earlier planting may allow corn to escape some of the most severe damage.

If most common stalk borer damage is next to grassy field borders and waterways, burning these areas before eggs hatch has been shown to reduce common stalk borer populations. The best option is to burn these areas in late winter, before the grass begins to grow. At this time all eggs have been laid, and the soil will be bare and subject to erosion for the shortest time. Also, this timing has the least effect on bird populations which have not yet begun to nest.

Current transgenic Bt corn hybrids do not provide high levels of control of common stalk borer.

Sampling and Economic Injury Levels

Check corn plants bordering grassy areas to determine the percentage of plants with stalk borer injury when 1,300-1,400 degree days (41° F base) have accumulated since Jan. 1. Examine several sets of 10 plants. Look for feeding damage and dissect damaged plants to see if live larvae are present. If weedy grasses were common throughout the field in the previous year, the whole field may need to be scouted for common stalk borers. Use the information in *Table II* to determine the economic injury level.

Table II. Common stalk borer economic injury levels (percent injured plants). (Assumes 80% insecticide efficacy.) (Based on P.M. Davis, 1990, Ph.D. dissertation, Iowa State University.)

Corn leaf stage	*125 bu/acre yield potential*					
	$2/bu crop value			*$3/bu crop value*		
	Control costs/acre			*Control costs/acre*		
	$7	$10	$13	$7	$10	$13
1	7	9	12	4	6	8
2	8	11	15	5	8	10
3	10	14	18	6	9	12
4	11	16	20	7	10	13
5	11	16	21	7	11	14
6	22	32	41	15	21	27
7	100	100	100	100	100	100
Corn leaf stage	*150 bu/acre yield potential*					
	$2/bu crop value			*$3/bu crop value*		
	Control costs/acre			*Control costs/acre*		

	$7	$10	$13	$7	$10	$13
1	5	8	10	4	5	7
2	7	9	12	4	6	8
3	8	12	15	5	8	10
4	9	12	16	6	8	11
5	9	13	17	6	9	11
6	18	26	33	12	17	22
7	100	100	100	100	100	100

Chemical Control

To be effective, insecticides must be applied before common stalk borer larvae have entered the stalk. In cases where stalk borers begin feeding on grassy weeds or other vegetation in field edges, control is most effective if timed between 1,400 and 1,700 degree days (base 41° F), which corresponds to first half of the period that stalk borers are migrating from weedy hosts into corn. If the infestation is restricted to the field margin, use a border treatment.

In cases where there is a history of fieldwide stalk borer damage at a site, insecticides applied to corn and timed for egg hatch may be used to reduce damage. The disadvantage of this approach is that there is no effective way to sample for stalk borers at this time, so treatments are made without knowledge of whether an insecticide treatment would be profitable that year.

Insecticides may be mixed with fast-acting herbicides being used to burn down early season weeds, or applied several days after use of slower-acting herbicides. Check the label for compatibility of different insecticide and herbicide mixtures.

A variety of foliar insecticides are effective against common stalk borers in corn. See NU's Field Crop Entomology Web site or insecticide label information for labeled insecticides, their rates, and restrictions.

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