



Extension FactSheet

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European Corn Borer in Peppers

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European corn borer is the most important insect pest of peppers in Ohio. Commercial pepper growers can lose a significant number of pepper fruit to this pest in most years if preventive control measures are not taken. It is more of a problem in sweet peppers than in hot peppers.

European corn borer was accidentally introduced to North America around 1910 and was first found in Ohio in 1921. It is now well established throughout the eastern and central United States. In addition to corn and peppers, it is an occasional pest in potato and tomato stems, snap bean pods, cabbage petioles, and apple fruit.

Damage

European corn borer larvae bore into the pepper fruit. If attack occurs when fruits are small, then the infested fruits are usually rotten by harvest and marketable yield is reduced. If attack occurs when fruits are larger, then at harvest an infested fruit can appear to be perfect on the outside but is deteriorated on the inside. Infested peppers usually have a small hole surrounded by sawdust-like frass (excrement) at the edge of the cap (Figure 1). Larvae feed in the central seed mass, in the ribs, and in the wall of the fruit. At harvest, frass and webbing are found inside fruit in addition to the larva itself. There can be more than one larva per fruit.

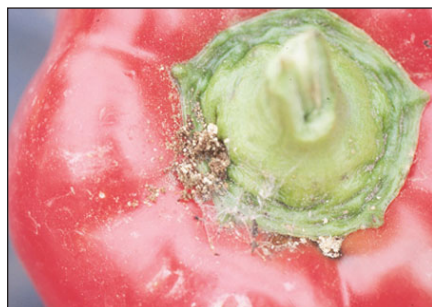


Figure 1. Entry hole at edge of pepper cap as made by a young larva of European corn borer.

Infestation by European corn borer is of great concern to pepper processors, who can reject a load of peppers if random sampling of fruit shows a single infested fruit of cherry or jalapeño peppers, or more than 3% of bell peppers infested. Infested loads of bell peppers are sometimes accepted but the price is docked.

Appearance

European corn borer eggs are laid in small flat masses, each with about 20 white eggs. Each egg mass is about 1/4 inch in diameter. Larvae are caterpillars that are creamy white to light pinkish brown with several light brown spots on each segment and often with two faint white lines down the back (Figure 2). They have a small, dark brown head. Larvae start out about 1/16 inch long, and they reach a length of about 7/8 inch when fully grown. The pupa is shiny reddish brown, about 3/4 inch long.



Figure 2. European corn borer larva.

Adults are brown moths with wings marked by zig-zag patterns (Figure 3); body length is about 3/4 inch. The adult female has a plump abdomen and creamy, light brown wings; the adult male has a thin abdomen with tufts of scales on the tip, and reddish-brown wings.



Figure 3. European corn borer adults: female (left), male (right).

Life Cycle and Habits

The European corn borer overwinters as fully grown larvae inside corn stalks or corn cobs. In the spring, they go through the pupal stage and emerge as adults. The adult is a moth. European corn borer moths begin emerging after about 450 degree-days (base 50°F) accumulate after the start of the new year. In central Ohio, this is usually the third week of May. Emergence is a few days earlier in southern Ohio and a few days later in northern Ohio.

European corn borer moths spend most of their time in moist grassy areas, where they rest during the day and mate at night. After sundown, female moths fly to nearby fields of young corn and lay eggs on the underside of corn leaves. The first generation of larvae rarely damages peppers unless the crop was planted unusually early. Eggs hatch into larvae that feed on corn leaves then bore into tassels, stalks, and ears. Larvae go through five instars with a molt after each instar. After feeding for about 4 weeks, from early June until early July, larvae are fully grown then they pupate in corn stalks or ears. The pupal stage takes about 2 weeks.

New adults begin to emerge in July, usually in the third or fourth week of July. These moths lay eggs on either corn or peppers. If there is corn in the fresh silk stage nearby, the moths are more likely to lay eggs on corn than on peppers. If nearby corn is past the fresh silk stage, then moths are likely to lay eggs on peppers. Egg masses are laid on leaves of the pepper plant. Eggs hatch in about 4 to 7 days. Larvae crawl immediately to fruit more than 1 inch in diameter, and bore in at the edge of the fruit cap. Second generation larvae feed inside peppers throughout August and early September.

In approximately two of every three years in Ohio, this pest has only two generations per year, with first generation

larvae active in June and second generation larvae active in August. In approximately one of every three years, there is a warmer than average summer, which allows an additional generation to develop in September. This third generation causes severe injury to peppers.

Monitoring

Traps can be used to determine when the European corn borer moths are active. *Blacklight traps* are often used by researchers; these traps catch male and female European corn borer moths as well as numerous other species. Blacklight trapping requires skilled labor to sort through the mass of insects trapped to count the European corn borer moths. Moth catch in typical years is shown in Figure 4.

Pheromone traps use a synthetic imitation of the female moth's sex attractant to trap male moths of the same species. The best trap style for this pest is a large cone-shaped trap (Figure 5) such as the plastic-mesh Scentry™ Heliothis trap or the metal-mesh Maryland trap or Hartstack trap. Two types of pheromone lure are available for European corn borer; only the Z-strain ('Iowa' type) is effective in Ohio, not the E-strain ('New York' type). Lures made by Hercon®, Trécé®, or Scentry® can be used. The pheromone trap should be placed over the crop canopy or in a weedy area at the edge of the crop field; the trap is much less effective if placed over bare ground. The trap should be checked twice per week. A comparison of moth catch in blacklight and pheromone traps is shown in Figure 6.

Weekly catches of European corn borer moths in blacklight and pheromone traps from May through September at several Ohio locations are posted on the internet at: <http://bugs.osu.edu/welty/veg-traps.html> as well as at <http://www.ag.ohio-state.edu/~vegnet/vegipm.htm>.

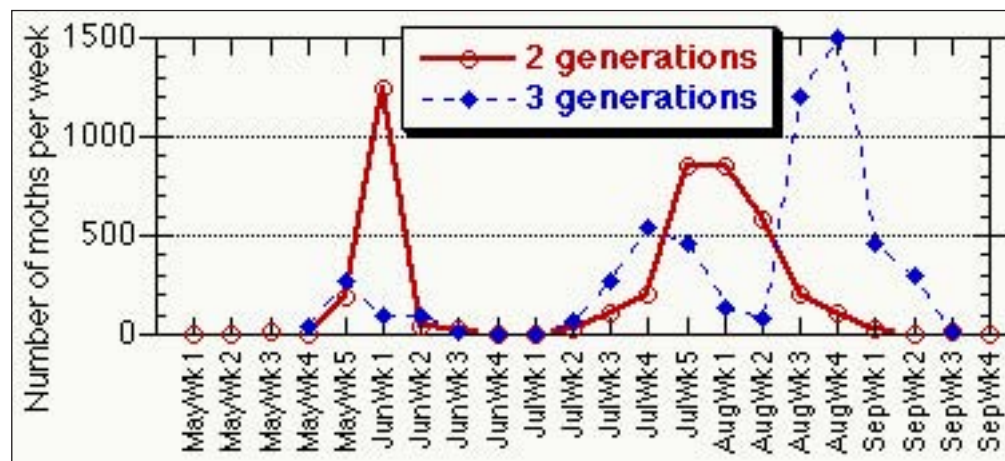


Figure 4. Catch of European corn borer moths in a blacklight trap in a typical 2-generation year (1996) and a typical 3-generation year (1995) at Fremont, Ohio.



Figure 5. Pheromone trap.

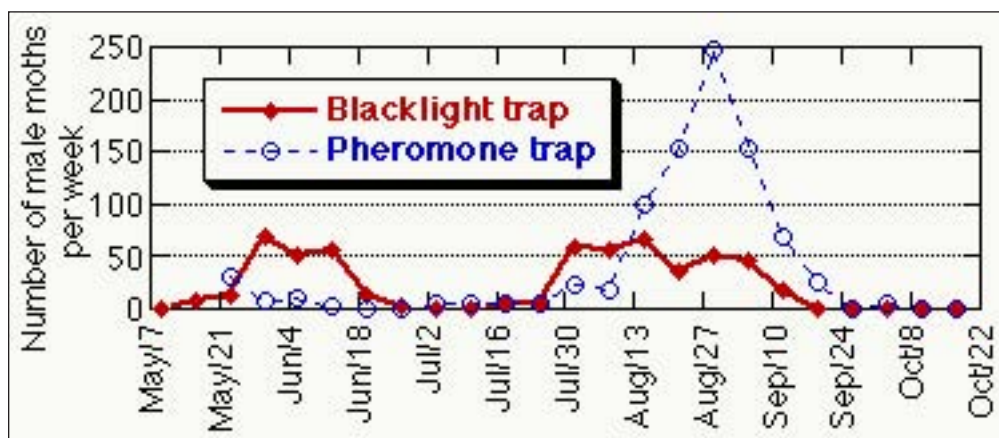


Figure 6. Catch of male European corn borer moths in pheromone and blacklight traps at Fremont, Ohio, 2000.

Traps and lures are available from Great Lakes IPM (10220 Church Road NE, Vestaburg MI 48891; phone (517) 268-5693; internet www.greatlakesipm.com; e-mail: glimpm@nethawk.com) and from Gempler's (P.O. Box 270, Belleville WI 53508; phone 800-382-8473; internet www.gemplers.com).

Management by Insecticides

A preventive insecticide program is effective if started soon after the new generation of moths begins emerging in mid to late July, as determined by traps. Insecticide should be applied at 5- to 10-day intervals during the 4 to 6

weeks that moths are active, or longer if a third generation develops. Use a sprayer with hollow cone nozzles and at least 60 psi pressure to get thorough coverage of the pepper canopy. Fifteen insecticides are available for control as shown in Table 1. Details on rates and restrictions are given in the Ohio Vegetable Production Guide (Extension Bulletin 672), which is published annually and posted on the internet at: <http://ohioline.osu.edu/b672/>.

Since the year 2000, Orthene is limited to two applications per year. Orthene is best used during the time of peak egg hatch, which can be estimated by the time of peak moth catch. In late July or early August, a final plan

Table 1. Insecticides for control of European corn borer on bell peppers.

Trade name ¹	Active ingredient	Efficacy	PHI ²	REI ³
Orthene	acephate	Excellent	7	24
Mustang (RUP)	zeta-cypermethrin	Good	1	12
Decis (RUP)	deltamethrin	Good	1	12
Warrior (RUP)	lambda-cyhalothrin	Good	5	24
Proaxis (RUP)	gamma-cyhalothrin	Good	5	24
Capture (RUP)	bifenthrin	Good	7	12
Baythroid (RUP)	cyfluthrin	Good	7	12
Intrepid	methoxyfenozide	Good	1	4
Confirm	tebufenozide	Good	7	4
SpinTor, Entrust	spinosad	Good	1	4
Permethrin, Pounce (RUP)	permethrin	Good/fair	3	12
Lannate (RUP)	methomyl	Fair	3	48
Sevin	carbaryl	Fair	3	12
Asana (RUP)	esfenvalerate	Fair	7	12
DiPel, Javelin	<i>Bacillus thuringiensis</i>	Fair	0	4

¹RUP = restricted use pesticide

²PHI = pre-harvest interval (days)

³REI = re-entry interval (hours)

needs to be made about when to use Orthene. If summer temperatures have been average or lower than average, then both applications should be directed at second generation larvae. If temperatures have been higher than average, so that there is a good chance of a third generation developing in September, then one application of Orthene should be directed at second generation larvae, and the second application of Orthene can be saved for the third generation.

After Orthene is used at the time of peak egg hatch, later hatching larvae can be targeted by any other insecticide listed above. Orthene, the pyrethroids (Mustang, Decis, Warrior, Proaxis, Capture, Baythroid, Pounce), and the insect growth regulators (Intrepid, Confirm) should be applied at 7-day intervals during peak moth activity, or at 10-day intervals once moth activity begins to decline. SpinTor should be applied at 5-day intervals during peak moth activity, or at 7-day intervals once moth activity begins to decline. The microbial insecticide B.t. (DiPel, Javelin, and others) can give effective control when ap-

plied twice per week. Applications must be scheduled to allow for the required pre-harvest interval (PHI) and re-entry interval (REI).

Other Management Strategies

Row covers made of lightweight polyester or polypropylene can physically exclude moths from pepper plants. Research elsewhere has shown some promise for release of tiny parasitic wasps (*Trichogramma*) that lay their eggs in European corn borer eggs, but more research is needed before specific recommendations are available for use of this biological control in commercial pepper fields.

Other Pests Sometimes Confused With European Corn Borer

Fall armyworm, corn earworm, and beet armyworm can attack peppers, mostly in late September and October. Peppers can be attacked by pepper maggot, but this pest is not common in Ohio.

Visit Ohio State University Extension's web site "Ohioline" at: <http://ohioline.osu.edu>

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