



Pepper Maggot in Sweet (Bell) Pepper

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Introduction: The pepper maggot, *Zonosemata electa* (Say) (Diptera: Tephritidae), is native to eastern North America and is thought to have moved from the weedy perennial horse nettle, *Solanum carolinense* L., to domesticated crops like the bell pepper. Pepper maggot occurrence in pepper is patchy and sporadic, however, infestation levels can reach 100% within a single field. Furthermore, each maggot is capable of completely destroying an entire pepper fruit.

Biology: Within Virginia, the pepper maggot undergoes a single generation per year. The pepper maggot overwinters as a pupa within the soil with adults emerging over a 10-14 day period starting in early June and remaining active throughout mid-August. Adult flies are brightly colored with a pale yellow head, green eyes, honey colored thorax, pale yellow abdomen, and clear wings with brown bands (Fig. 1). Females are about the same size as a housefly whereas males are slightly smaller. Females live an average of 23 days but can live up to 45 days. After mating, a female can lay 50 to 60 eggs, depositing them in punctures she creates with her



Figure 1 Pepper Maggot adult. Steve Scholnick, Bugguide.net

ovipositor in the skin of the pepper fruit. Eggs are about 0.08 inches long, white, and "crookneck" shaped. Maggots emerge in ~8-10 days, burrowing into the pepper fruit and feed ~2-3 weeks. Fully-grown maggots are 0.39 to 0.47 inches long and creamy white to yellow in color (Fig. 2). Mature maggots exit the pepper, drop to the soil, and burrow 2-5 inches into the soil where they form a brown, oval-shaped puparium ~0.31 inches long (Fig. 2) and overwinter.

Damage: Pepper maggots develop successfully only on plants in the family Solanaceae, including the vegetable crops pepper and eggplant. Larvae of both the European corn borer and the pepper maggot

feed inside the pepper fruit by tunneling underneath the cap on the pericarp, and the damage they cause appears very similar. The first sign of a pepper maggot infestation is the appearance of elliptical holes 0.02 inches long by 0.01 inches wide in peppers 0.39 to 1.57 inches in diameter. The female's ovipositor creates these holes as she inserts her eggs just beneath the skin of young peppers. Damage is greatest on fleshy, round or blocky fruit such as the horse nettle or cherry, apple, and cheese peppers. Damage is limited on slender, thin-walled cultivars such as banana, long-hot, cayenne, jalapeno, Tabasco, and serrano peppers. As infested peppers enlarge, the egg punctures become shallow depressions in the fruit, rendering the pepper fruit unmarketable.

Control of Pepper Maggot in Pepper: Field sanitation and rotation typically are used to control pepper maggot. Adult flies are attracted to rotting peppers so removing rotting fruit from fields reduces the fields attractiveness to egg-laying flies. Destroying infested fruit and cull piles, which act as reservoirs, can help minimize future infestations. Where possible, do not plant peppers in or near fields with a history of pepper maggot. Alternate hosts such as horse nettle also should be eradicated from field margins to remove sources of infestation. A combination of trap cropping with hot cherry-pepper varieties and border row insecticide applications has also been used successfully by some pepper growers to reduce the incidence of damage to bell pepper.



Figure 2 Pepper Maggot larva (left) and pupa (right) on green pepper. Ric Bessin, University of Kentucky

Monitoring Pepper Maggot in Pepper: Yellow sticky cards can be used to monitor the flight activity of adult pepper maggots. Traps should be placed around field margins and observed weekly. Traps baited with liquid ammonium hydroxide (Stills-style trap), and hung at a height of ~21 feet in the tree canopy on the edges of pepper fields have been shown to be effective monitoring tools for pepper maggot. Fruit oviposition scars also are

useful site-specific indicators of pepper maggot presence/absence and may aid in determining if insecticide applications are necessary and in timing sprays. In other states where pepper maggot has been a problem, sprays are applied when the flies are detected on the traps and reapplied weekly while the flies remain active.

Chemical Control of Pepper Maggot in Pepper: Several insecticides are currently labeled for pepper maggot control in pepper. Since chemical control measures should be applied prior to egg deposition by the pepper maggot, monitoring of adult pepper maggots is critical. For control recommendations,

refer to the most recent Mid-Atlantic Commercial Vegetable Production Recommendations VCE Publ. No. 456-420 (SPES-103P) <https://pubs.ext.vt.edu/456/456-420/456-420.html>

Additional Reading:

- Boucher, T.J. 2001. Pepper Maggot. In T.J. Boucher and R.A. Ashley (eds.), Northeast Pepper Integrated Pest Management (IPM) Manual. University of Connecticut Cooperative Extension. Storrs, Conn. pp. 77-82.
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- Boucher, T.J., R.A., R. Durgy, M. Sciabarrasi, and W. Calderwood. 2003. Managing the Pepper Maggot (Diptera: Tephritidae) Using Perimeter Trap Cropping. *Journal of Economic Entomology*: 96: 420-432.
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- Capinera, J.L. 2001. Pepper maggot natural history. In: *Handbook of Vegetable Pests*. Academic Press. New York, N.Y. pp. 239-241.