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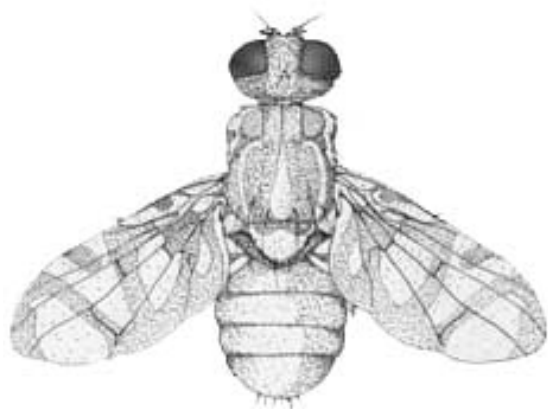
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PEPPER MAGGOT (*Zonosemata electa* (Say))

The pepper maggot, *Zonosemata electa* (Say), Diptera: Tephritidae, is a native and sporadic pest of peppers. It is found throughout the eastern United States and southwestern Ontario, Canada. The pepper maggot is confined to solanaceous plants, including ground cherry, horsenettle, tomato, pepper and eggplant. Cherry peppers and green bell peppers are the preferred hosts. The original wild host is the horsenettle, *Solanum carolinense* L., which is a perennial weed.



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Fig. 1: Pepper maggot

Description:

The adult pepper maggot is a brightly colored yellow striped fly. There are three yellow stripes down the back (thorax). It has iridescent green eyes and distinctive dark colored stripes on the wings (Fig. 1). The fly

is approximately 6.5 mm to 7.5 mm long. The male is smaller than the female. The egg is about 2 mm long, opaque white with a small stalk at one end. The maggot is legless and, when young, is white, but turns more yellow as it matures. The puparium (pupa) is approximately 8 mm long by 4 mm wide and shaped somewhat cylindrical with variable coloration from dark brown to tan.

Biology:

The pepper maggot has complete metamorphosis; egg, larva, pupa and adult. In Connecticut, from mid-July to early August, the adult flies emerge from the soil. The emergence time can vary by two or more weeks depending on seasonal temperature changes. This may bring forward first emergence dates to late June. Once an adult fly has emerged, it rests for 24 hours and then mates. After mating, about 6 to 7 days later, the female lays one or more eggs per fruit. A female fly lives an average of 23 days but can live up to 45 days. During that time, she usually lays 50 to 60 eggs. Plant damage is seen as a small puncture wound made by the female's ovipositor (egg laying organ). The pepper is usually 1 to 3 cm in diameter when eggs are laid. As the pepper increases in size, the area around the puncture wound becomes slightly depressed, forming a shallow dimple. After about 10 days, the maggots hatch and burrow into the pepper. Many maggots go to

the core and remain there until they mature. Damage appears as brown mines with peppers prematurely turning red and softening. In extreme damage, peppers can become watery, often dropping from the plant. Soft spots on the walls of the pepper also indicate maggot feeding activity. The maggots remain within the peppers for 2 to 3 weeks. Then they exit, dropping onto the soil below. After burrowing into the soil, they pupate. It is this stage that overwinters until the following spring. The pepper maggot has one generation per year.

Control:

Infestations of pepper maggot can be patchy and sporadic even in locations where there is a history of the insect infestations. To reduce populations, sanitation and crop rotation is helpful. Pick up any fallen peppers and destroy them. Destroy any horser nettles (an alternate host) in the vicinity.

Monitoring adult fly emergences is an important tool for control. Adult flies like to aggregate in trees near the garden or field prior to laying eggs. Sugar maples seem to be a favorite tree. This may be because the flies need carbohydrates for mating, and the tree can furnish this need. The adults also have been found in black cherry, pin oak, choke cherry and white pines. Trapping has been most successful at a height of 20 to 28 feet above the ground using a modified yellow sticky trap baited with ammonia. The Still's-style trap, used for the apple maggot fly is effective. It is a rectangular yellow sticky trap baited with a vial of 27-31% liquid ammonia concentrate. The trap is available commercially as an apple maggot trap. Another approach is to use an indicator plant. Hot-cherry peppers planted at widely spaced intervals around the edge of the pepper patch and especially between a line of trees and the garden or field can intercept adult flies. The hot-cherry peppers set earlier than other

peppers and have high-gloss surfaces. This makes oviposition (egg laying) sites easy to observe with the naked eye.

Once flies have been detected, there are several control methods available. One method is to cover the pepper plants with fine netting, sealed by dirt on the ground. This physically excludes the fly. The approach can only be effective if there is no possibility of adult flies emerging from the soil underneath the plants.

Parasitic nematodes are also a possible control. *Heterorhabditis bacteriophora* (H.B.) nematodes are active pepper maggot larva seekers and move quickly through the soil. When adult flies are first detected in mid-July, the nematodes can be placed into the soil about 1 month later, from mid to late August, to intercept the maggots as they drop into the soil to pupate. They are effective in the first year of release if conditions are favorable.

Choosing resistant cultivars can also reduce pepper maggot populations. The adult female prefers fleshy peppers, such as dark green bell and cherry peppers, to lay her eggs on. Pepper plants, like the thin-walled Cayenne, Jalapeno, Tabasco yellow or red banana and Serrano peppers, are not attractive to the fly. Cultivars that reach maturity during August often sustain little damage because the adult flies are absent.