



Grape Root Borer Life Stages and IPM Strategies in Florida

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Grape root borer, *Vitacea polistiformis* (Harris), is a major pest of grapes in the eastern United States and poses the most serious threat to grapes in Florida. It belongs to the moth family Sesiidae.

Adults are dark brown with thin, yellow-orange bands on their abdomens. They resemble paper wasps. The front wings are brownish-black and the hindwings are transparent. They are daytime fliers and relatively short-lived (about 7 days).

Life cycle. It takes two years to complete (some studies indicate a three-year cycle). Almost all of this time is spent as larvae feeding on grape roots.

Eggs. Females lay 300 to 500 tiny, dark-brown eggs in clusters on the soil surface, grape leaves or surrounding weeds. The eggs hatch in about two weeks, and first-instar larvae drop to the ground and tunnel to vine roots.

Larvae are cylindrical and cream-colored with three pairs of true legs near the head and five pairs of abdominal prolegs. Due to predation, parasitism, and desiccation, only about 3 percent of neonate larvae survive. Once the larvae become established in the roots, mortality is very low. Young larvae are spread throughout the root system, while older larvae are found on larger roots close to the trunk. A fully grown larva has a retractable, brown head and can reach 40 mm in length. The grape root borer overwinters in the larval stage.

Pupal stage. In North Central Florida, larvae leave the roots during May to June of their second year. They pupate in cocoons near the soil surface. The pupal stage lasts approximately 35 to 40 days.

Molting/Emergence. Adults emerge from early June until late October in northern Florida. The shed pupal skin partially protrudes through the soil surface, providing telltale signs of a possible infestation.

Host injury. It causes extensive injury to roots, resulting in loss of vine vigor, grape yield, and eventually vine death. A single larva feeding on a root system can reduce a vine's yield by 50 percent. Two or three larvae within a root system can destroy an entire plant.

IPM Strategies for Grape Root Borer

Cultural. An effective cultural control method involves **mounding** soil beneath vines after borers have pupated. Subsequently, when adults leave the cocoons they are unable to reach the surface. Timing is critical because if mounding is done too early the larvae merely tunnel up through the mound before pupating. Proper **weed control** is important in borer management because of increased larval mortality due to desiccation and decreased egg-laying sites.

Biological. Researchers in Ohio showed that two species of *Heterorhabditis* nematodes were effective against grape root borer larvae. The nematodes were an Ohio strain of *H. bacteriophora*, referred to as GPS-11, and a New Zealand strain of *H. zealandica*.

Pheromone. Mating disruption techniques using pheromone rope ties are being researched. Studies are also ongoing to develop an attract-and-kill system involving the use of Pherocon 1C sticky traps and the grape root borer sex pheromone to reduce the population of males, thus reducing mating occurrences.

Monitoring. Pheromone traps are recommended for monitoring moths. Place traps about 100 meters apart inside vineyards and on the boundaries adjacent to woodlands. Check traps once a week.

Chemical. The adults and first-instar larvae (as they burrow into the soil) can be controlled with insecticides. Once the larvae reach the root system, however, contact insecticides are ineffective.

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Warren Adlerz

Grape root borer adult



Lyle J. Buss

Paper wasp, left, and grape root borer



Warren Adlerz

Grape root borer eggs



Warren Adlerz

Grape root borer larva



Grape root borer pupa



Grape root borer empty pupal case



Grape root borer pheromone trap



Attract-and-kill system