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The Grape Root Borer in Tennessee

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The grape root borer (GRB), *Vitacea polistiformis* (Harris), is the most damaging insect pest of grapes in Tennessee. Damage usually appears slowly; and because the pest attacks the plant below ground, symptoms are not always associated with a pest infestation. Chemical control is difficult. Here we provide information to help you identify a GRB problem and protect your grapes against damage.

Description. The GRB is a clear-winged moth in the family Sesiidae, whose members mimic wasps and are daytime flyers. Its forewings are dark and hindwings are clear with brown borders. The abdomen is dark brown with reddish-brown markings and very narrow, yellow bands (Fig. 1). The top of the head is orange and antennae are orange with dark-brown markings. Male moths measure about 5/8 inch in length, while the female is larger, about 3/4 inch in length. Four tufts of scales project beyond the end of the male's abdomen.



Fig. 1: Adult male grape root borer (Univ. Kentucky).

Larvae are white with brown heads and are from 1 to 1¼ inches in length when mature (Fig. 2). Pupae are dark brown.



Fig. 2: Mature grape root borer larva (D. Cook, UT).

Life Cycle. Adults emerge from the soil from June until September, with peak emergence occurring in late July. About 8 days after emergence and after mating, female moths begin laying eggs on the soil surface, grape leaves and weeds. Each female lays an average of 350 eggs. Eggs hatch in about two weeks, then larvae immediately tunnel into the soil in search of grape roots. Most larvae (about percent) die before reaching roots; but less than 1 percent of the larvae that find roots die. After locating a host plant, larvae move very little within a vineyard, usually living in the roots of a single vine.

Larvae tunnel into and feed internally upon the larger roots and crown. Larval development time is dependent primarily on climate. In Tennessee, most larvae complete development in about 22 months. Then the larvae leave the plant to pupate in earthen cells just under the soil surface near the plant. After pupating for 35 to 40 days, adult moths emerge from their cocoons to repeat the cycle.

Damage. Damage caused by larval feeding can range from a few feeding sites to complete root destruction. Feeding by only one larva can substantially reduce

production; feeding by several can kill the plant. Larvae bore through the roots, leaving their tunnels packed with frass (larval feces). Tunneling and feeding reduce the plants ability to obtain water and nutrients from the soil and provide entryways for plant pathogens. Usually, the first signs of infestation are loss of plant vigor and reduced production. Only a portion of a vine may be affected. Because adult moths are highly mobile, infested vines occur randomly across a vineyard rather than in localized areas. New grape plantings are rarely affected. Problems usually develop after several years of production.

Detection. Symptoms of GRB feeding usually develop slowly and may be attributed to other causes; therefore, it is often difficult to determine if you have an infestation. The soil underneath plants exhibiting loss of vigor should be observed for signs of GRB. Adults emerge from pupal cases at the soil line, leaving the brown cases protruding partially from the ground (Fig. 3). Check the soil surface around the base of vines out to a distance of 18 inches. Keeping the area clear of vegetation will aid in detection. July is the best month for observing pupal cases.



Fig. 3: Grape root borer pupal case protruding from ground.

A less time-consuming method for detecting GRB activity is using traps containing a mating pheromone lure and an insecticidal strip (Fig. 4). Traps are placed in, or on the edge of, a vineyard at the rate of one trap per acre. They should be put out beginning in early June and monitored once a week until no moths are caught. Collection of GRB in traps not only alerts you to the problem, but is used to time insecticidal treatments.



Fig. 4: Pheromone trap. Dead moths and insecticidal strip inside of trap (right).

Another common clearwing moth similar to GRB that may be collected in GRB traps is the squash vine borer (Fig. 5). It can be distinguished from GRB by the brush-like red and black scales on the hind legs, and a dense covering of shiny, black scales on the forewings.



Fig. 5: Adult male (left) and female squash vine borers mating (A. Windham, UT).

Management. Because GRB spend the majority of their lives protected within the plant's roots, management options are limited. Currently, there are two major types of management: cultural and chemical. *Cultural.* Because female GRB lay their eggs on weeds, reducing weed cover around the base of vines may reduce the number of eggs laid beneath a plant and the resulting larvae attacking roots. Weed control also improves air flow under vines, which can increase mortality of newly hatched larvae by desiccation (drying out). University of Tennessee Extension bulletins PB 1475, "Grape Growing in Tennessee," and PB 1197, "Commercial Small Fruit Spray Schedules," provide recommendations for weed control in vineyards.

Mounding soil around the base of vines can reduce the emergence of adult GRB. Timing is critical because the soil must be mounded after larvae have pupated and before adults have emerged. Pheromone trap catch records from previous years may be used to predict the onset of adult emergence and, thus, the time to mound. Plastic mulch under vines can prevent egg laying and reduce adult emergence. Both of these practices may be practical only for small vineyards.

Wild grapes can serve as alternate hosts for GRB. Grape root borer moths may fly from these plants and into a nearby vineyard to lay eggs; therefore, wild grapes adjacent to vineyards should be eliminated.

Chemical. The only insecticide registered for control of GRB is Lorsban 4E (by diluting 4.5 pints in 100 gallons of water), which is a restricted-use pesticide. It is applied as a coarse spray to the base of vines to kill adults as they exit the soil and newly hatched larvae before they enter the soil and plant roots. Two quarts of the spray mixture are applied to a 15-square-foot area around the base of the vine. Because only one application is allowed per season, timing is critical. The application should be made when moths are first collected in pheromone traps. In most of Tennessee, moth collections usually begin around the end of June

or early July. An application should not be made within 35 days of harvest. Lorsban's efficacy against GRB may be improved by controlling weeds under vines. Without weeds, more of the insecticide reaches the ground where it can contact newly-hatched GRB larvae entering the soil.

Experimental Management Options. The GRB mating pheromone, applied at 100 lures per acre, has been used to disrupt mating. Males are unable to locate females for mating, thus reducing egg production. Reducing GRB numbers to acceptable levels, however, takes several years. Another control method using the mating pheromone involves the trapping out of male GRB. Traps used to monitor for presence of GRB are placed throughout the vineyard to reduce the number of male GRB available for mating.

Another promising management tool is the use of insecticidal nematodes, which are applied to the soil around the base of vines, and infect and kill GRB larvae. Nematodes can survive in the soil for months after application; and they can reproduce in their GRB hosts, producing more infective-stage individuals that can infect and kill other GRB larvae. The nematode most lethal to GRB, however, is not yet commercially available.

Disclaimer

This publication contains herbicide recommendations that are subject to change at any time. The recommendations in this publication are provided only as a guide. It is always the herbicide applicator's responsibility, by law, to read and follow all current label directions for the specific herbicide being used. The label always takes precedence over the recommendations found in this publication.

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