

grape rootworm

Fidia viticida Walsh

INTRODUCTION

The grape rootworm (abbreviated GR) is a native species of leaf beetle that occurs from the Atlantic Seaboard states to North Dakota, Nebraska, Kansas, and Texas. The wild hosts of this pest are grapes (*Vitis* spp.), Virginia creeper (*Parthenocissus quinquefolia*), and redbud (*Cercis canadensis*). Feeding by GR larvae (grubs) on the root system of vines can seriously damage commercial vineyards.

The grape rootworm produces only one generation per year. During its lifetime, a rootworm will begin as an egg which is deposited under the bark of grape vines by an adult female. It will spend the following 9 to 10 months of its life in the immature grub stage in the soil (Fig. 1) feeding on roots, and will spend the ultimate month or so of its life as an adult feeding on grape foliage and laying eggs. The GR requires at least one year to complete its life cycle.

THE ADULTS

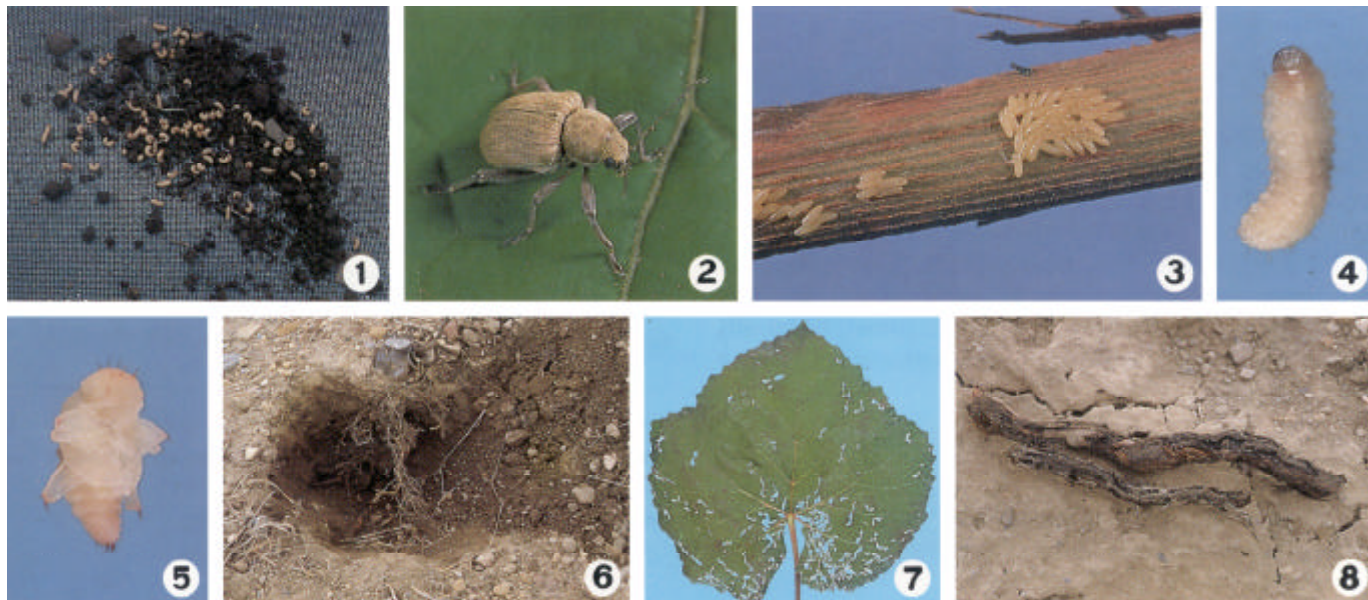
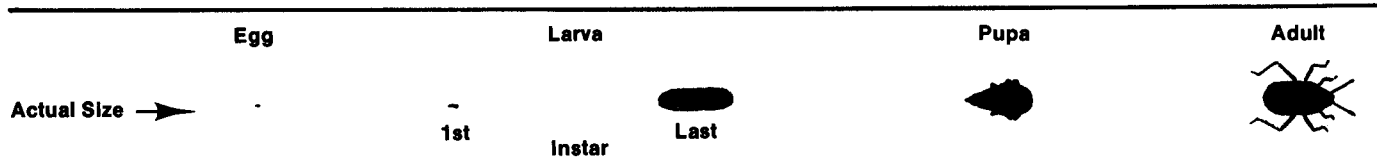
Though the leaf-feeding adult stage of grape rootworm inflicts little damage to vines, control of GR is most easily achieved by insecticide treatments carefully timed to kill the adult stage (Fig. 2). Adult beetles begin to emerge from the soil sometime between late May and early- to mid-July, depending upon yearly variations in soil temperatures. Mating of adults takes place within approximately 7 days after emergence

and 3-7 days following mating, the first eggs are laid. The life span of adults is highly variable ranging from 1-7 weeks in the laboratory.

Adult GR are approximately 8-10 mm (5/16 - 3/8 in.) long and are grayish-brown or chestnut colored with a fine light-colored pile covering the thorax and elytra (wing covers). Initially, the beetles seem to concentrate their feeding among the leaves of sucker growth and the lower canopy. When present in high densities, GR beetles have been found feeding on the leaves of the upper canopy and on grape berries. There seems to be a peak in activity of rootworms around mid- to late morning.

THE EGGS

Mature females produce their first eggs approximately 3-7 days following mating, generally between early June and late July. Egg laying peaks sometime during the period between late June and late July, but can continue into September. GR eggs may be found in infested vineyards during this period by carefully peeling off strips of bark from the vine and examining the underside of the strips for egg clusters (Fig. 3). Eggs are laid in tight crevices between layers of the bark of canes and stems. The creamy-yellow to white-colored, oblong eggs are about 1-1.5 mm (1/20 in.) long, are deposited in clusters of about 20-100 eggs, and hatch in 10-15 days.



GUIDE TO STAGES

STAGE	TIMING	WHERE TO LOOK
Adults	Late May to early August	Surfaces of trunk, canes, and leaves
Eggs	Early June to mid-August	Under bark of trunk and canes
Larvae 1st - 3rd Instars	Late June to late August	Top 30 cm (12 in.) of soil within 45-60 cm (18 - 24 in.) of trunk
4th - 5th Instars	Throughout year, but most common when active in early to late May and late July to mid-October	Top 30 cm (12 in.) of soil within 45-60 cm (18 - 24 in.) of trunk, and deeper in overwintering cells during winter
Pupae	Mid-May to late July	Pupal cells in upper 15 cm (6 in.) of soil

THE LARVAE

The larvae of GR are creamy-white with a dark brown head capsule (Fig. 4). They move from the hatching site under the bark to the soil where all further larval development will take place. Development through the 5 larval stages progresses as the larvae feed on grape roots throughout the growing season. It is this feeding that is destructive to vine health. Though most larvae are able to complete development through all 5 larval stages during the growing season in which they hatch from the egg, some larvae do not complete larval development before the onset of winter and therefore must continue larval development the following season. Upon completion of larval development in the following growing season, these "2-year larvae" will remain in the soil for the duration of their second season and pupate and emerge as adults the following spring. While actively feeding on roots, most GR remain within the upper 30 cm (12 in.) of soil. In late fall, they move deeper into the soil and form overwintering cells. The following spring, they move back toward the surface to pupate or to complete larval development.

THE PUPAE

After overwintering, 5th instar larvae construct a chamber in which pupation takes place. Pupation occurs in the upper 15 cm (6 in.) of soil and is completed in about 14 days. Pupae are 5-7 mm (3/16- 1/4 in.) long and are initially pearly-white (Fig. 5), but the body becomes increasingly brown in color and the eyes progressively darken. The teneral (newly hatched) adults remain in the pupal cell several days before emerging from the soil.

INJURY

The most serious damage that grape rootworm causes to grapevines is not generally seen - that

caused by larvae feeding on the roots (Fig. 6). However, the most noticeable damage is the characteristic chain-like feeding pattern caused by the adults on the leaves (Fig. 7). In heavy infestations, the beetles have been observed to feed on immature berries in addition to leaves. Vine damage by adults is relatively inconsequential. The damage to the grape root system resulting from high densities of GR larvae can stunt, and in some cases, even kill grapevines. Larvae are thought to prefer small tender roots, but, in heavy infestations have been observed to channel along the inner bark of older, larger roots (Fig. 8). In some vineyards, marked reductions in vigor and production have been observed in as little as 3 years. Because dispersal of GR is generally slow, infestations are often spotty within a region and within a particular vineyard.

CONTROL

Control of the grape rootworm is most easily accomplished through treatments directed at the adult stage. The key to effective control of adult GR is proper timing of treatments. Treatments applied too early may not persist long enough to kill rootworm adults during the 3- to 4-week period when most emerge from the soil. Treatments applied too late will allow some eggs to hatch and the larvae to enter the soil unharmed. Treatments should be made when the first beetles are observed in vineyards. This period will vary from late May to early- to mid-July, depending upon location. Growers should carefully check their vineyards each week following application of treatments. A second application should be made if any adult rootworms are detected. Growers should contact their local extension agent for specific treatment recommendations.

Published by the New York State Agricultural Experiment Station, Geneva, a Division of the New York State College of Agriculture and Life Sciences, Cornell University, Ithaca. Authored by T. J. Dennehy and L. G. Clark. Photographs by J. M. Ogradnick.