



Black Vine
WEEVIL
and
Other Root Weevils
in Wyoming Gardens

Alexandre Latchininsky, Assistant Professor/Extension Entomologist
Scott Schell, Assistant Extension Entomologist

Department of Renewable Resources

B-1176

November 2006

UNIVERSITY
OF WYOMING

Issued in furtherance of cooperative extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Glen Whipple, director, Cooperative Extension Service, University of Wyoming, Laramie, Wyoming 82071.

Persons seeking admission, employment, or access to programs of the University of Wyoming shall be considered without regard to race, color, religion, sex, national origin, disability, age, political belief, veteran status, sexual orientation, and marital or familial status. Persons with disabilities who require alternative means for communication or program information (Braille, large print, audiotape, etc.) should contact their local UW CES Office. To file a complaint, write the UW Employment Practices/Affirmative Action Office, University of Wyoming, 1000 E. University Ave., Dept. 3434, Laramie, WY 82071.

Root weevils quick facts

- Adult root weevils leave characteristic notches on leaf edges
- They are nocturnal, flightless, and hide in the litter during the day
- Larvae of the weevils can seriously damage roots of garden ornamentals
- Adults may enter homes but do not bite or do any damage
- Parasitic nematodes can be applied to control larvae in the soil
- Foliar sprays of bifenthrin, lambda-cyhalothrin, and cyfluthrin insecticides gave the best adult root weevil control in experimental trials in the Rocky Mountain Region



1. How do I recognize the symptoms on my plants?

Damage by the adult black vine weevil (*Otiobrychus sulcatus* F.) is evidenced by small (about 1/8-inch), multiple notches on the edges of the leaves of ornamental plants (Photos 1 and 2). Similar leaf-feeding damage can be caused by grasshoppers (Photo 3) or leaf-cutting bees (Photo 4). The notches caused by the black vine weevil (BVW) are smaller and less rounded. Ordinarily, plants can withstand the leaf damage caused by BVW, although such plants may look unsightly; however, the larvae, which live in the soil, feed actively on the roots and, if the infestation is heavy, they may cause wilting and eventual death of the plant.

2. Which plants can be attacked?

BVW can feed on over 100 plant species. Almost all garden shrubs and vines (lilac, rose, raspberry, peony, cotoneaster, euonymus, clematis, and even conifers) and many herbaceous plants (strawberry, lilies, phlox, primrose) can be attacked. Some plants (such as columbine, iris and Maltese Cross) appear to be less frequently damaged by BVW, although the reason remains unclear.

3. What does the BVW look like?

The black vine weevil is a 1/3- to 1/2-inch long beetle, dark brown to jet black in color. A magnifying glass shows that the hard front wings (elytra) covering the abdomen bear parallel series of tiny round “pits” and short tufts of yellowish hairs (Photo 5). BVW belongs to the family Curculionidae, which is characterized by having a head elongated into a snout with elbowed and clubbed antennae (Photos 5-8). Weevils are the largest family of beetles with over 40,000 species worldwide. Many members of this family, such as the alfalfa weevil and boll weevil, are important pests. Some species are used as biological control agents to control invasive weeds.

Besides the BVW, there are three closely related root weevils that can cause similar damage to garden plants. They are the strawberry root weevil (*Otiobrychus ovatus*) (Photo 6), rough strawberry root weevil (*Otiobrychus rugostriatus*), and lilac root weevil (*Otiobrychus meridionalis*) (Photo 7). The strawberry root weevil is shiny and brownish-black. It often covers itself with a thin coating of dirt (Photo 8). In hot, dry weather, the adult beetles will sometimes move into houses. It is the

Alexandre Latchinsky



Photo 1. Black vine weevil leaf damage

Alexandre Latchinsky



Photo 2. Black vine weevil leaf damage

Alexandre Latchinsky



Photo 3. Grasshopper leaf damage

Alexandre Latchinsky



Photo 4. Leaf-cutting bee leaf damage

smallest of the four root weevils, less than ¼ inches long. The rough strawberry root weevil and the lilac root weevil are intermediate in size being about ⅓ inches long. The biology and ecology of the strawberry, rough strawberry, and lilac root weevils are similar to those of the BVW.

4. Is the BVW native to Wyoming?

BVW is believed to have been accidentally brought to North America from Europe in the 19th century with plant material. Although flightless, the beetle quickly spread in plant containers shipped across the continent. Due to its very wide host range and high adaptability to different climates, it is now established in most of Wyoming.

5. Why is it important to understand the BVW life cycle and habits?

To manage this and any other insect pest, it is necessary to learn about its biology, ecology, and behavior. BVW has only one generation per year. Adult beetles emerge from pupae in the soil in early summer. They start feeding on plants and leave the characteristic notches. An unusual trait of BVW biology is all weevils are females and reproduction is parthenogenetic (eggs develop without being fertilized by males); however, the eggs will not develop inside a female until she feeds.

Feeding occurs for three to four weeks, but gardeners rarely notice the culprits because BVW feed at

Alexandre Latchirinsky



Photo 5. Adult black vine weevil

Scott Schell



Photo 6. Black vine weevil and strawberry root weevil and a kitchen match for scale

Washington State University Extension



Photo 7. Lilac root weevil

Scott Schell



Photo 8. Strawberry root weevil with a thin coating of dirt flaking

night and hide in soil litter during the day. Then females start to lay eggs in the soil near the base of host plants. Each BVW can lay 200 to 500 eggs during the summer. The eggs hatch in 10 to 15 days into C-shaped, wrinkled, cream-white larvae with brown head capsules. The larvae are legless (Photo 9), which distinguishes them from turf pests like white grubs of chafers and June beetles (Photo 10).

Larvae start feeding and may cause severe damage by girdling the roots, especially on container plants. Larvae grow until late fall and then overwinter in the soil. The following spring, larvae resume their development and continue root feeding until they pupate. Pupa is a non-feeding stage which lasts about four weeks.

The adult beetles emerge from pupae in early summer, completing the life cycle. Most adults die



Photo 9. Strawberry root weevil larva

in the fall but sometimes invade houses, where they may overwinter. Weevils may be a nuisance in the homes, although they bite neither humans nor pets nor damage furniture or fabric. For dealing with BVW as house pests, see Colorado State University Cooperative Extension Bulletin Root Weevils, available at www.ext.colostate.edu/PUBS/insect/05551.html.

6. Now that I know of the BVW biology and behavior, what can I do to prevent plant damage?

BVW is a difficult pest to manage; appropriate timing is crucial when applying treatments. Unfortunately, gardeners often notice damage only when too late to efficiently control the beetles because many eggs have already been deposited in the soil. Regular monitoring of plants, especially lower leaves and branches, is essential in BVW management. Symptoms of adult feeding, the characteristic notches on leaf edges, usually appear in June. Detect the weevils by shaking plants at night over a white sheet. Try also to spot nocturnal adults with a flashlight or make pitfall traps by burying a glass jar flush with the soil surface. Check the traps twice a week and destroy the collected adults (since they cannot fly, they will not be able to get out).

The mass emergence of the adult BVW has started when weevils or their plant damage are first seen. Beetles will actively feed for three to four weeks before they start egg laying. This period offers a window of opportunity for applying control mea-



Photo 10. White grub

asures aimed at reducing the adult population and preventing egg laying. Eradication of adults before they start to lay eggs breaks the life cycle and is the key to controlling BVW.

Several management options are available, including biological, chemical, and mechanical measures.

Biological control of adults and larvae

An entomopathogenic fungus, *Beauveria bassiana*, is very effective in controlling both adults and larvae of the BVW. When the fungal spores come in contact with the weevil's cuticle, they germinate and grow into the insect's body, release toxins, and eventually kill the pest (Photo 11). There are several commercially available formulations of *Beauveria bassiana* registered for BVW control (Table 1).

Bioinsecticides

Spinosad is an insecticidal substance produced by a soil microorganism. Some formulations of spinosad are allowed for use by the U.S. Department of Agriculture National Organic Standards board. Spinosad has reduced effects on beneficial, predatory insects because it must be ingested to be lethal. Spinosad must be applied at the label rate with good coverage to be effective on any leaf feeding beetles.

Botanical insecticides

The active ingredient azadirachtin (an extract from the nut of the neem tree native to India) disrupts insect feeding and can be used as a foliar spray



Photo 11. Black vine weevil adult infected with *Beauveria bassiana*

against adult BVW or as a drench against the larvae (Table 1).

Entomopathogenic nematodes

Heterorhabditis bacteriophora can effectively control BVW larvae (Photo 12), although this nematode is very sensitive to soil moisture and temperatures and will fail under drought conditions unless the site is irrigated. These parasitic worms are also commercially available and are applied as soil drenches (Table 1). They should be applied in late summer when young BVW larvae start to feed on roots.

Chemical control of adults

Insecticides belonging to different chemical groups effectively reduce adult populations of BVW. These chemicals include many pyrethroids (such as bifenthrin, lambda-cyhalothrin, cyfluthrin, and permethrin), organophosphates (such as acephate), and chloronicotinyls (imidacloprid) (Table 1). Foliar sprays should be applied in the evening just before the weevils start to feed at night for greatest effect. The best time of year to apply these insecticides is the three- to four-week period after adult emergence, usually late June to mid-July in Wyoming (the exact timing for each location will vary with elevation and weather conditions).

Chemical control of larvae

Soil-dwelling insect larvae are notoriously difficult to control. Soil drenches with insecticides containing imidacloprid appear to provide residual activity



Photo 12. Black vine weevil larva infected with nematodes

against the BVW larvae (Table 1). The larvicides should be applied in late summer.

DISCLAIMER. *Pesticides are poisonous. Be sure to read and follow directions and safety precautions on labels. Handle carefully and store in original labeled containers out of reach of children, pets, and livestock. Dispose of empty containers immediately in a safe manner and place. Do not contaminate forage, streams, or ponds.*

7. How can I prevent damage by BVW without applying any insecticides?

Handpicking adult BVW beetles can be an effective way to reduce their population, especially if the infestation is light. Remember the beetles are nocturnal, and they hide in the soil or litter in the daytime. Although flightless, the BVW are excellent walkers, so be sure to secure well the lid of the collection container. Using burlap wraps around trunks of attacked trees and shrubs may also help. Adults will remain in the wrap during the day instead of hiding in the soil, and they can be easily gathered from the fabric. Finally, do research and notice which plants in your garden are less damaged by the weevils. Using more of these varieties (in our experience, columbine and iris suffer less damage) will be a good way to manage BVW without insecticides.

TABLE 1. Control products labeled for the black vine weevil, strawberry root weevil, lilac root weevil, and rough strawberry root weevil. Make sure the plant being treated is on the product's label and be sure to follow instructions carefully.

Active Ingredient	Trade name	Kills larvae	Kills adults	Notes
<i>Beauveria bassiana</i>	Naturalis®	not sure	Yes	Sensitive to daylight, apply in evening
	BotaniGard®	not sure	Yes	
	Mycotrol O®	not sure	Yes	
Spinosad	Monterey Garden Insect Spray®	No	Yes	Organic formulation
Azadirachtin	Neemix®	Yes	No	Use soil drench rates
	Azatin XL®	Yes	No	
Imidacloprid	Merit®	Yes	Possibly	Ornamentals on the label but not all fruit bearing shrubs are listed.
	QualiPro®	Yes	Possibly	
	Bayer Tree & Shrub Insect Control® and others	Yes	Possibly	
<i>Steinernema carpocapsae</i>	NemAttack®	Yes	No	Suited for use in cool climates
<i>Heterorhabditis bacteriophora</i>	NemaSeek®	Yes	No	Adapted to all climates but needs moisture
<i>Steinernema kraussei</i>	Nemasys Vine Weevil Killer®	Yes	No	Will work in cold soil
Carbaryl	numerous brands	No	Yes	
Bifenthrin	numerous brands	No	Yes	
Lambda-cyhalothrin	numerous brands	No	Yes	
Cyfluthrin	numerous brands	No	Yes	
Permethrin	numerous brands	No	Yes	
Acephate	numerous brands	No	Yes	