



# BIOLOGICAL CONTROL OF SCOTCH BROOM

## Pest Watch

By  
**Jennifer E. Andreas**, Integrated Weed Control Project Director,  
Washington State University Extension

WSU PEER  
REVIEWED

FS203E

# Biological Control of Scotch Broom

Scotch broom, *Cytisus scoparius*, is an invasive perennial shrub that displaces desirable species in pastures, roadsides, and forestlands (Figure 1). The state of Oregon estimates that, annually, \$39 million is lost primarily in the cost to control Scotch broom and the loss of timber production (The Research Group 2014). Damage in Washington is likely similar. The ability of Scotch broom to form monocultures and its prolific production of long-lived seeds make it extremely difficult to control.

Biological control, or biocontrol, is one management tool available to land managers and landowners. The seed-feeding beetle, *Bruchidius villosus*, and the seed weevil, *Exapion fuscirostre*, are the primary biocontrol agents used to control Scotch broom. Both species attack the developing seeds within the seedpods, ultimately reducing the number of seeds that germinate.

However, neither biocontrol agent impacts current stands of Scotch broom and thus, should be used as part of a long-term weed management program.

Biocontrol is most appropriate on large sites where other control techniques, such as mowing, pulling, and herbicides, are not being used directly in conjunction with the biocontrol agents.

Information about integrated weed management strategies for Scotch broom control are available from the WSU Integrated Weed Control Project, Washington State Noxious Weed Control Board, or your county noxious weed control program.



Figure 1. Close-up of a scotch broom flower (left). Scotch broom infestation invading forestland after a timber harvest (right). (Photos by Jennifer Andreas, WSU Extension.)

# Identification of Biocontrol Agents

## Scotch Broom Seed Beetle

Adults are small (approximately 1/16 in.), oval to round, gray-black beetles (Coombs et al. 2004; Winston et al. 2014). See Figure 2.

Eggs are clear, oblong, and visible on the surface of developing seedpods (Figure 3).

Larvae and pupae are difficult to observe because they are enclosed inside the developing seeds. Newly formed adults emerge from a hole chewed in the seed wall (Figure 4).

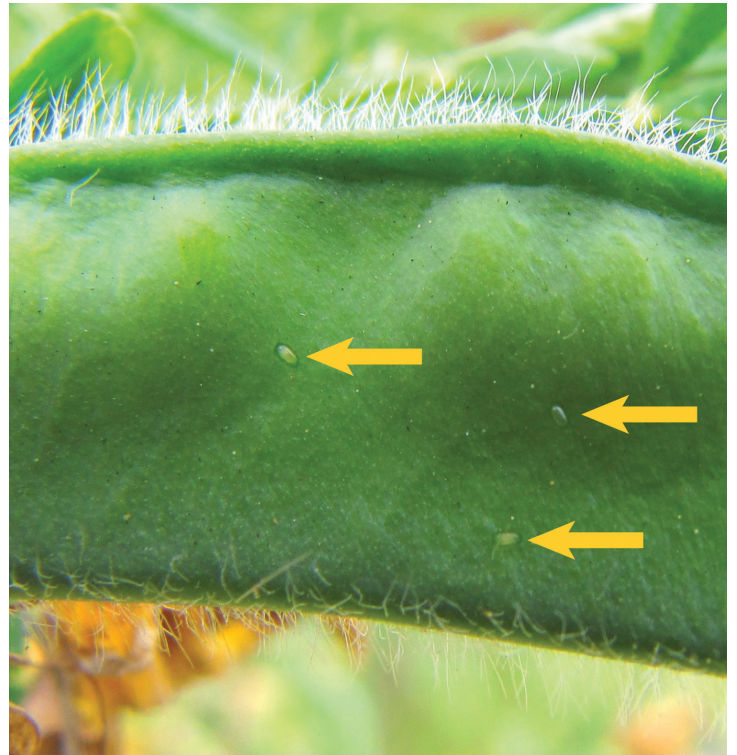


Figure 3. The eggs of the seed beetle, *Bruchidius villosus*, are glued on the wall of a Scotch broom seedpod by female adults in the spring. (Photo by Jennifer Andreas, WSU Extension.)



Figure 2. Adult seed beetle, *Bruchidius villosus*. (Photo by Jennifer Andreas, WSU Extension.)



Figure 4 (A) The seed beetle, *Bruchidius villosus*, feeding within a Scotch broom seed, creates a mottled appearance (left), compared to a healthy seed (right). (B) Once pupated, adults emerge from a hole chewed through the seed wall. (Photos by Jennifer Andreas, WSU Extension.)



Figure 5. Adult seed weevil, *Exapion fuscirostre*. (Photo on left by Jennifer Andreas, WSU Extension; photo on right by Eric Coombs, Oregon Department of Agriculture.)

### Scotch Broom Seed Weevil

Adult are small (approximately 1/16 to 3/32 in.), narrow, brown-gray weevils, with light gray or silver bands extending down both sides of the back (Figure 5; Coombs et al. 2004; Winston et al. 2014).

Larvae are C-shaped, white-yellow with a brown head capsule, and found feeding externally on the developing seeds within the seedpods. Pupae and adults are also visible in damaged seeds (Figure 6).

### Life Cycle

The life cycles of the seed beetle and seed weevil are very similar (Table 1).

In the spring, adults feed on flowers before laying eggs on or into seedpods. Female weevils insert eggs into the seeds within the seedpods, and the female seed beetle glues its eggs on the outside of the pod wall. Larvae mine into the developing seeds to feed and pupate within the seeds. They emerge as adults when the seedpods split open to release the seeds.

One larva per seed usually prevents germination.



Figure 6. External seed-feeding damage created by a seed weevil larva, *Exapion fuscirostre*. (Photo by Jennifer Andreas, WSU Extension.)

Table 1. Life Cycle of Scotch Broom and Biocontrol Agents

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
<b>Scotch broom</b>	Dormant			Flowering/early pod development		Seed production/seed dispersal through pod splitting			Dormant			
<b>Biocontrol agents</b>	Overwintering			Adult feeding/egg-laying		Larval development/pupation/new adults released from seedpods			Dormant—Overwintering			

## Determining the Presence of Biocontrol Agents

To assess whether biocontrol agents are present in the spring, flowering plants can be shaken over a white sheet to dislodge adults. This technique will also dislodge a large number of other species that live or feed on Scotch broom.

Adult seed weevils are fairly easy to distinguish from the seed beetle by their long snout, and by their color and body shape (Figure 7).

Once Scotch broom seedpods are full size and begin to turn brown, they can be gently split open to look for larval stages. Weevil larvae and damage can be easily observed; however, a fingernail may need to be pressed through seeds to confirm whether the seed beetle is present (Figure 8). Split seeds containing the seed beetle will exude a milky-colored juice as the larva is crushed. Unattacked seeds will not have the milky substance or may be too hard to crush. Both the beetle and weevil species are often found in the same seedpods.

At some sites, up to 98% of Scotch broom seeds are attacked by these biocontrol agents. However, attack rates vary greatly and may depend on site conditions (Andreas et al. Unpublished data).



Figure 7. The seed weevil, *Exapion fuscirostre*, (left) can be distinguished from the seed beetle, *Bruchidius villosus*, (right) by the presence of a long snout, and its color and body shape. (Photo by Jennifer Andreas, WSU Extension.)



Figure 8. *Bruchidius villosus* larva are not readily visible as they feed within the developing seed, creating a mottled appearance in the seed (on left). Comparatively, *Exapion fuscirostre* and its feeding damage are readily visible (on right). (Photo by Thomas Shahan, Oregon Department of Agriculture.)

## References

Coombs, E.M., J.K. Clark, G.L. Piper, and A.F. Cofrancesco, Jr. 2004. *Biological Control of Invasive Plants in the United States*. Western Society of Weed Science. Corvallis, OR: Oregon State Univ. Press.

The Research Group, LLC. 2014. [Economic Impact from Selected Noxious Weeds in Oregon](#). Prepared for Oregon Department of Agriculture Noxious Weed Control Program.

Winston, R., C.B. Randall, R. De Clerck-Floate, A. McClay, J. Andreas, and M. Schwarzländer. 2014. *Field Guide for the Biological Control of Weeds in the Northwest*. Morgantown, West Virginia: USDA Forest Service, Forest Health Technology Enterprise Team. FHTET 2014-08.

## Further Reading

Andreas, J.E., E.M. Coombs, J. Milan, and M. Schwarzländer. 2015. [Biological Control](#). In: *2014 Pacific Northwest Weed Management Handbook*. Oregon State University. pp. B1-B6.

Hulting, A., Neff, K., Coombs, E., Parker, R., Miller, G, and L.C. Burrill. 2008. [Scotch Broom Biology and Management in the Pacific Northwest](#). *Pacific Northwest Extension Publication PNW103*.

USDA APHIS PPQ: [How to apply for a 526 Permit](#).



Copyright 2016 Washington State University

WSU Extension bulletins contain material written and produced for public distribution. Alternate formats of our educational materials are available upon request for persons with disabilities. Please contact Washington State University Extension for more information.

Issued by Washington State University Extension and the U.S. Department of Agriculture in furtherance of the Acts of May 8 and June 30, 1914. Extension programs and policies are consistent with federal and state laws and regulations on nondiscrimination regarding race, sex, religion, age, color, creed, and national or ethnic origin; physical, mental, or sensory disability; marital status or sexual orientation; and status as a Vietnam-era or disabled veteran. Evidence of noncompliance may be reported through your local WSU Extension office. Trade names have been used to simplify information; no endorsement is intended. Published April 2016.