

Biological control of leafy spurge, spotted knapweed and Dalmatian toadflax in Montana, and an update on houndstongue insects

What is biological control? Biological control agents are organisms (e.g. insects, nematodes or fungi) that can be used to manage large weed populations. Usually, these organisms are natural enemies of the target species in their native continent and are introduced to their new range following testing to ensure they do not harm non-target plants. Biocontrol agents have been approved and released for several weed species in Montana, and some of the most successful are for leafy spurge, spotted knapweed, and Dalmatian toadflax. These insects are available commercially, and through collection and redistribution if your neighbor has a large population. Ask your county weed coordinator if collection events are planned for your area.



Figure 1. *Aphthona* flea beetles feeding on leafy spurge (Photo BLM.gov)

Leafy spurge: Several insects are approved as biocontrols of leafy spurge, and three have proven most effective in Montana and neighboring areas. The most widespread and effective insects are two species of flea beetle (*Aphthona lacertosa* and *A. nigriscutis*, Fig. 1) and a stem-boring weevil (*Oberea erythrocephala*). Flea beetles have proven particularly effective. For example, in northern Canada, *A. nigriscutis* decreased leafy spurge cover from 40% to 1.7% five years after release. In North Dakota, a mix of flea beetle species reduced leafy spurge cover from 45% to 7% over three years. The stem boring weevil appears to be most useful in open, sunny sites near streams.

Spotted knapweed: There are thirteen insects approved for biological control of spotted knapweed in the U.S. The most effective and widely established in Montana include a root-boring weevil (*Cyphocleonus achates*, Fig. 2) and two seed head feeding weevils (*Larinus minutus* and *L. obtusus*). *Cyphocleonus achates* has been reported to reduce spotted knapweed densities by 77 to 99%, while *C. achates* in combination with *Larinus* species can reduce seed production by 94% in some cases.



Figure 2. Root-boring weevil *Cyphocleonus achates* adult and larva (Photos by Southern Interior Weed Management Committee).

Dalmatian toadflax: The stem-mining weevil *Mecinus janthinus* (Fig. 3) is a biocontrol agent of Dalmatian toadflax that is effective in some warmer areas of Montana. Adult weevils overwinter in standing stems, and winter temperatures below 18° F cause up to 100% mortality. Adults consume leaves and growing tips of shoots, while the larvae cause damage in the stem by boring into the stem and breaking conductive tissue. Together, larvae and adults affect plant vigor and decrease shoot biomass, and eventually cause plant mortality and decreases in toadflax density at suitable sites.



Figure 3. *Mecinus janthinus* weevil.

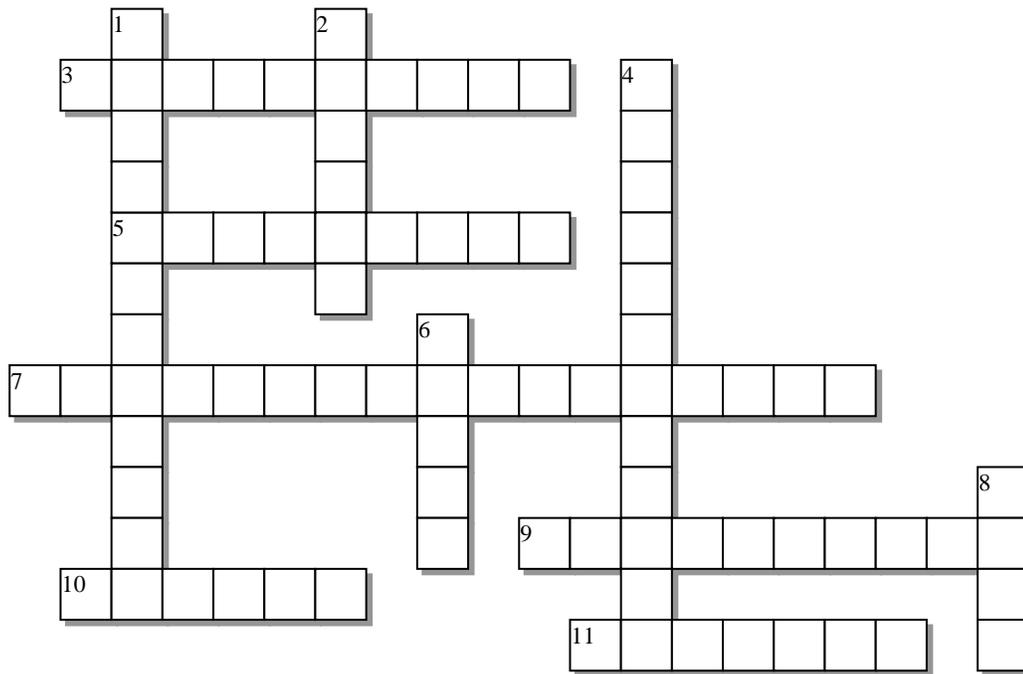
Houndstongue: Producers in Montana have expressed interest in biological control options for houndstongue. The root weevil *Mogulones cruciger* (Fig. 4) is used in Canada, but is not approved for release in the U.S. because it feeds on native species in the same family as houndstongue (Boraginaceae). The weevil has dispersed from Canada and is present in Montana, but intentionally moving it to new locations is discouraged. Research is currently being conducted in both Canada and the U.S. on other *Mogulones* weevil species that may not impact native Boraginaceae species.



Figure 4. *Mogulones cruciger* weevil.

For more information on these and other biological control agents, see the online publications Biology and Biological Control of Leafy Spurge, Biology and Biological Control of Knapweeds, and Biology and Biological Control of Dalmatian and Yellow Toadflax (<http://www.invasive.org/library/index.cfm>). Also see Biological Weed Control Using Insects; A Field Guide for Montana (http://mtwow.org/MT_bio-control_guide.pdf).

Weed Post Puzzle: Test your knowledge of biological control in Montana



Across:

- 3 - Monitoring of biocontrol insects is important, in part to determine if there is a large enough _____ for collection and redistribution.
- 5 - Moving *M. cruciger* to new locations in the U.S. is discouraged, though the weevil has _____ to Montana from southern Canada.
- 7 - A method of weed management using a plant's natural enemies.
- 9 - In one location, a species of _____ was responsible for decreasing leafy spurge cover from 40% to 1.7% after five years.
- 10 - A root-boring _____ is an effective biological control agent for spotted knapweed, due to damage inflicted by the larvae.
- 11 - _____ *janthinus* is a species of stem-boring weevil that can be used to manage Dalmatian toadflax.

Down:

- 1 - This weed species has no biological control agents approved for use in the United States.
- 2 - Before release in the U.S., potential biocontrol insects are tested for non-_____ impacts.
- 4 - The weevil *Mogulones cruciger* was not approved for release in the U.S. because of impacts on native plant species in the _____ family.
- 6 - Biological control is probably most useful as a management tool when weed populations are _____ in size.
- 8 - When *Cyphocleonus achates* and *Larinus* species team up, they can reduce knapweed _____ production by up to 94%.

Solutions are posted to the MSU Extension Invasive Rangeland Weed website:
<http://www.msuextension.org/invasiveplantsMangold/extensionsub.html>

