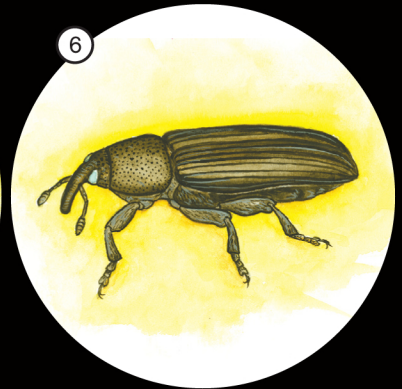
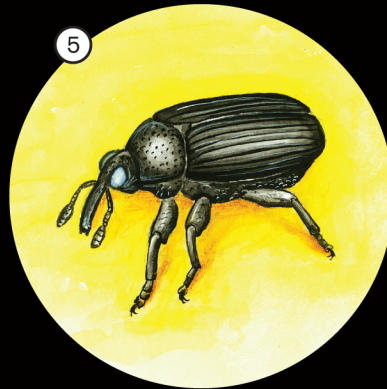
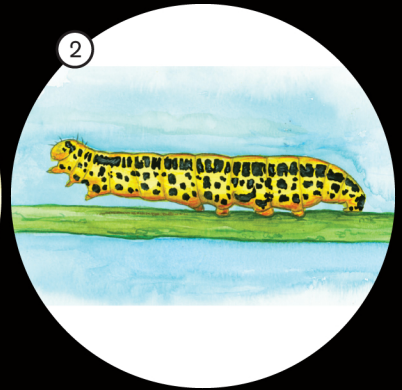
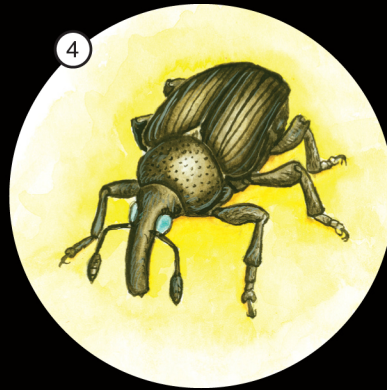
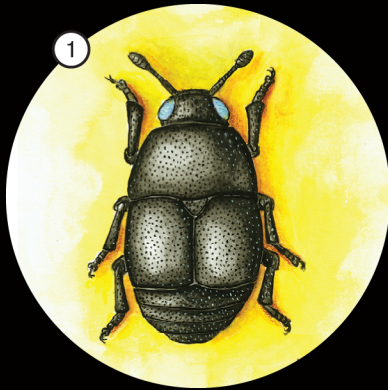


# Not All Alien Insects Are Bad



These insects prey  
on Toadflax

1. *Brachyterolus pulicarius*
2. *Calophasia lunula*
3. *Eteobalea serratella*
4. *Gymnetron antirrhini*
5. *Gymnetron linariae*
6. *Mecinus janthinus*

# Some are beneficial . . . biological noxious weed control can be elusive and long term

The flower-feeding beetle *Brachyterolus pulicarius* was brought to North America by accident in 1919, probably in a shipment of toadflax. The beetle adult eats the tips of toadflax shoots, and the larvae feed on pollen, flower parts, and seeds. Feeding on yellow toadflax can reduce the number of seeds by 80 to 90%. Although seed reduction is huge, scientists consider this ineffective because it does not reduce plant populations.

Two root-boring moths *Eteobalea intermedia* and *E. serratella* lay their eggs on toadflax, and their larvae then feed on the root crown. This really damages the roots and weakens the whole plant. As the plant dies off, the top of the root easily breaks off, and the plant can't grow any more. The toadflax moth *Calophasia lunula* lays its eggs on toadflax. The eggs hatch within 11 days, and the little gray-black larvae start feeding on the plant's leaves and flowers. The larvae grow into inch-long caterpillars with black and bright yellow stripes running the length of their bodies. If enough caterpillars feed on a stand of toadflax, they can strip off most of the leaves and flowers. This weakens the plants and reduces the number of seeds produced.

Seed capsule and root-galling weevils *Gymnetron antirrhini* and *G. linariae* were released in Montana from Eurasia in 1996. The Dalmatian toadflax-adapted strain of *G. antirrhini* was first released in Montana in 1996. The yellow toadflax strain is established in Idaho, Montana, Oregon, Washington, and Wyoming. These insects are generally available where yellow toadflax infestations occur. The only definitive record of *Gymnetron linariae* establishment in the United States is at a solitary Dalmatian toadflax site in Wyoming. A small release of the Dalmatian toadflax-adapted strain occurred in Wyoming in 1998.

*Mecinus janthinus*, toadflax stem weevil, was first introduced into Montana in 1996 and is established in Colorado, Idaho, Montana, Washington, and Oregon. Adult stem weevils attack both Dalmatian and yellow toadflax leaves and stems. Larvae mine the stems. In Europe, adult feeding on the leaves and stems apparently has a limited effect under field conditions. However, mining of the stems by the larvae causes premature wilting of shoots and suppresses flower formation, particularly under conditions of high weevil

density and cases of multiple attacks. Effects of the weevil on the plant reportedly are enhanced under drought stress. A small release of the Dalmatian toadflax-adapted strain of *Gymnetron linariae* occurred in Wyoming in 1998. As of 2003, this was the only definitive record of *G. linariae* establishment in the United States.

Dalmatian Toadflax  
*Linaria dalamatica*



## Statewide Noxious Weed Awareness and Education Campaign

Montana State University  
Land Resources and Environmental Sciences  
in cooperation with  
United States Department of Agriculture  
Animal and Plant Health Inspection Service  
Plant Protection Quarantine



# Not All Alien Insects Are Bad

This insect preys  
on Saltcedar

*Diorhabda elongata*



# Some are beneficial . . . biological noxious weed control agents

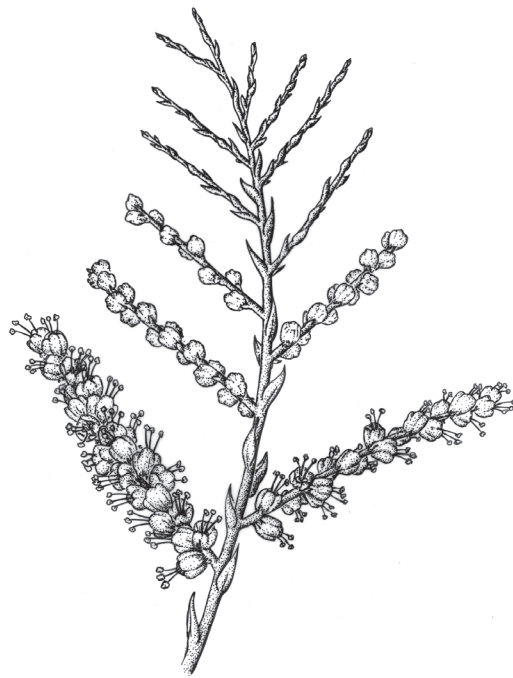
Most weed plants are weed-size, not tree-size. One of the largest noxious weeds in the United States is saltcedar, a shrub or tree that can grow to be thirty feet tall. Imagine a weed as tall as a three-story house!

Scientists are experimenting with an insect that eats saltcedar, called the saltcedar leaf beetle *Diorhabda elongata*. The saltcedar leaf beetles were brought to the United States in 2001 from Asia, just like the saltcedar. An adult beetle lays up to 200 eggs on a saltcedar plant. When they hatch, the larvae eat the leaves. Together, adult beetles and larvae can strip all the leaves off a saltcedar plant. When a swarm of beetles eats a stand of saltcedar bare, they'll fly a few hundred yards to the next saltcedar dining table.

Saltcedar grows along streams and rivers, around springs, and along the shores of lakes and reservoirs. A stand of saltcedar can suck the ground dry, using 200 or more gallons of water every day. That's enough in a growing season to create a swimming pool the size of a city block and 9 feet deep!

That kind of thirst reduces streams to a trickle, or even drinks them dry. Saltcedar clogs river channels and reduces the size of spring floods. Floods are part of the natural ebb and flow of many rivers, and many native plants depend on floods. Cottonwood trees and willows, for example, will grow only where floods scour mud off the gravel and cobblestones.

Once saltcedar takes over an area, it keeps other plants out by oozing salt from its leaves. The leaves dip and fall to the ground, making the surrounding soil too salty for most plants. Soon, birds, animals, and even insects are driven away to look elsewhere for food.



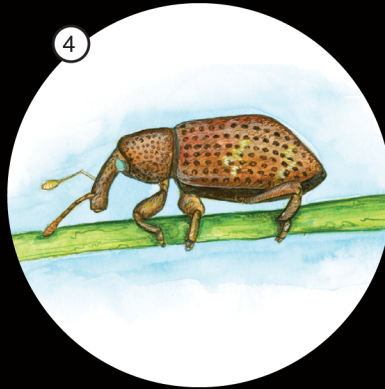
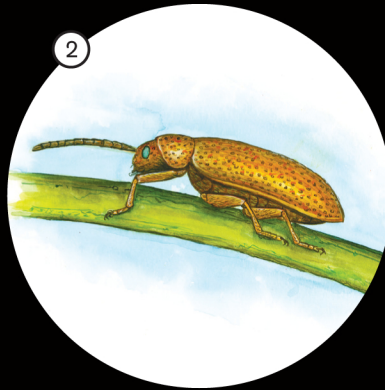
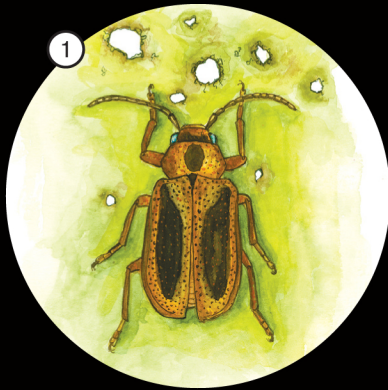
Saltcedar  
*Tamarix ramosissima*

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# Not All Alien Insects Are Bad



These insects prey on  
Purple Loosestrife

1. *Galerucella californiensis*
2. *Galerucella pusilla*
3. *Nanophyes marmoratus*
4. *Hylobius transversovittatus*

# Some are beneficial . . . biological noxious weed control agents are host specific

Researchers study insects that feed on particular plants. Plants that insects feed on exclusively are called the insect's "host" plant. For example, purple loosestrife is a host plant for loosestrife beetles. The black-margined and golden purple loosestrife beetles, *Galerucella californiensis* and *G. pusilla* were introduced into the United States from northern Germany in 1992. More golden beetles were released than its look-alike and highly mobile black-margined beetle. The adult black-margined beetle feeds on loosestrife leaves and buds while the golden beetle skeletonizes and defoliates loosestrife so severely that the plant turns brown.

*Hylobius transversovittatus* root weevils deplete loosestrife root storage reserves during the growing season and *Nanophyes mamoratus* seed weevils tolerate a wide range of climates and landscapes where they easily find purple loosestrife. Depleted root storage reserves limit loosestrife's ability to recuperate after the beetles defoliate the leaves. Although more damage is done by the other insects, scientists believe the seed weevil may play an important role after loosestrife abundance declines and other insects become less effective.

## Why is it not bad when these insects damage purple loosestrife?

Purple loosestrife, once established, changes how riparian systems function. These insects were introduced to control purple loosestrife spread. Researchers introduced these insects because they attack purple loosestrife without significant impacts on other plants or endangered species. A lot of testing and research goes into selecting biological control agents. A technical advisory group (TAG) helps with communications between groups responsible for environmental and potential risk to endangered species.

Once the public have an opportunity to comment and the responsible regulatory agencies have together found no significant impact on anything besides the target plant, in this case purple loosestrife, a permit is issued and insects can be placed in quarantine. Quarantine laboratories confirm insect identity, get rid of parasites, and check for and eliminate diseases before insects are released into the field.

Although purple loosestrife is the targeted plant, the black-margined loosestrife beetle

also feeds on two native plants, Swamp loosestrife *Decodon verticillatus* and Winged loosestrife *Lythrum alatum*, and two introduced plants, Lesser loosestrife *Lythrum hyssopifolia* and the tree Crape Myrtle *Lagerstroemia indica*. The black-margined beetle was permitted because it does not reproduce on these host plants.



Purple Loosestrife  
*Lythrum salicaria*

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