

# Not All Alien Insects Are Bad

This pathogen feeds on  
Yellow Starthistle

*Puccinia jaceae*



# Some are beneficial . . . biological noxious weed control insects and pathogens

Some biological control agents are not insects, they are plant pathogens. Pathogens such as bacteria, fungus, and virus cause diseases. You have probably heard of whirling disease detected in fish when they swim in a circular fashion. Whirling disease in fish is caused by a virus pathogen that affects the nervous system. *Puccinia jaceae* is a yellow starthistle rust fungus that scientists are studying to see if it causes damage to yellow starthistle. The rust fungus is found in southern Eurasia and the Mediterranean basin while its original source is Turkey.

The rust has five spore stages that are all completed on a single host plant. With ideal weather conditions spores can germinate, spread by wind, and infect new plants. You may recognize a mass of spores on an infected leaf where it will be dark to reddish-brown and powdery in appearance. The fungus attacks yellow starthistle foliage and green stems and scientists expect it to reduce plant vigor. The fungus was first introduced in California and recovered from its first generation. Scientists redistribute the fungus by vacuuming spores from infected leaves, suspending in water with a wetting agent, and then spraying on foliage prior to an extended dew period.

While scientists learn more about fungus, weevils with well-developed snouts and chewing parts at its tip chew deep into yellow starthistle.

Yellow starthistle bud weevil *Bangasternus orientalis* and hairy weevil *Eustenopus villosus* were introduced from northern Greece. Yellow starthistle reproduces by seeds. The bud weevil and hairy weevil are most effective in the larval stage where they cause damage to yellow starthistle seed heads. Both weevils are established in California, Idaho, Oregon, and Washington.

When biological control agents are introduced to damage a specific host plant, they rarely destroy the entire plant population. Once plant populations reduce in size, insects and pathogens must find host plants in other locations. Biological control is not promoted for yellow starthistle in Montana where early detection and rapid response to eradicate small patches is the strategy.

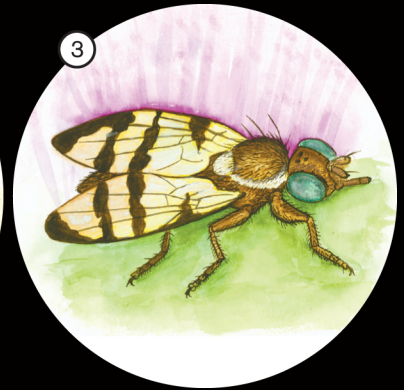
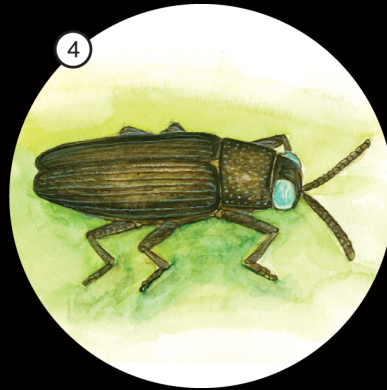
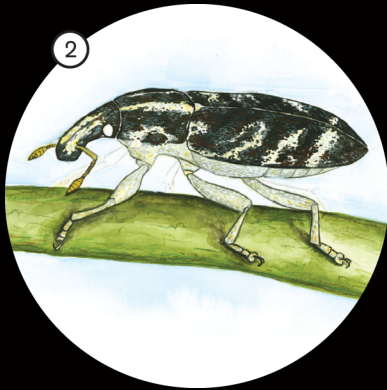


Yellow Starthistle  
*Centaurea solstitialis*

## Statewide Noxious Weed Awareness and Education Campaign

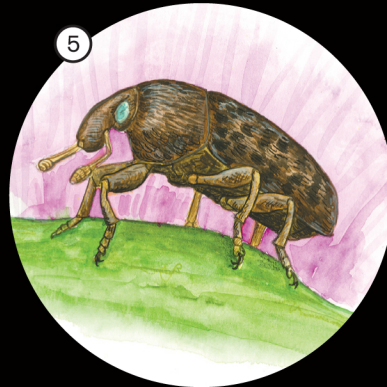
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Land Resources and Environmental Sciences  
in cooperation with  
United States Department of Agriculture  
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These insects prey on Spotted Knapweed

1. *Agapeta zoegana*
2. *Cyphocleonus achates*
3. *Urophora affinis*
4. *Spenoptera jugoslavica*
5. *Larinus minutus*



# Some are beneficial . . . biological noxious weed control moths, beetles, and flies

The sulfur knapweed moth *Agapeta zoegana* is also known as the yellow-winged knapweed root moth. First introduced to Montana from Europe and western Asia in 1984, it feeds on spotted knapweed roots. If you want to see if you have the moth in knapweed patches near you, take a black-light and suspend it over a white sheet in early evening in early August. Mostly male moths will be attracted to the light. You can identify them by their brilliant yellow color.

*Cyphocleonus achates* root weevil feeds on both spotted and diffuse knapweed. The larvae mine and gall the central vascular root tissue. Adults feed on the leaves. First introduced to Montana from Europe in 1988, the root weevil is established in California, Colorado, Idaho, Montana, New Mexico, Oregon, Utah, Washington, and Wyoming. This weevil prefers hot, dry, well-drained sites with low, scattered vegetation in temperate areas. The bronze knapweed root borer *Sphenoptera jugoslavica* larvae attack the center of the knapweed root, which becomes swollen. The root borer was first introduced in 1980 and is established in nine northwestern states. It is readily available in Oregon and Washington.

The lesser knapweed flower weevil *Larinus minutus* was introduced into Montana, Washington, and Wyoming from Greece in 1991. The adult feeds on foliage and the larvae feed inside the seedheads. Defoliation by adults can be severe in sites with high weevil populations. Although somewhat smaller, more reddish tibia, and covered with more grayish hairs, *Larinus minutus* is hard to distinguish from *L. obtusus*, the blunt knapweed flower weevil. The blunt knapweed flower weevil is larger, darker, and has dark reddish-black tibia.

The banded gall fly *Urophora affinis* was introduced into Montana and Oregon in 1973. It is established throughout most of diffuse and spotted knapweed-infested areas of the United States. It does not disperse as rapidly as the other introduced seed head gall fly *U. quadrifasciata*, but has been the more persistent colonizer and is the dominant species at most North American sites where both flies coexist. The seedhead moth and weevils often destroy *Urophora* species when they occur in the same seed head.



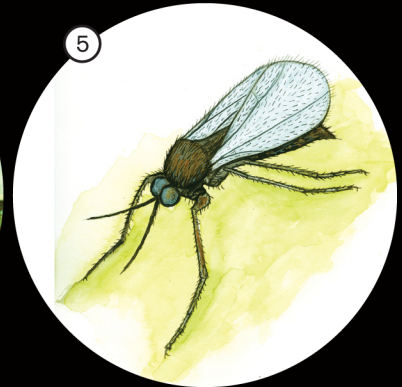
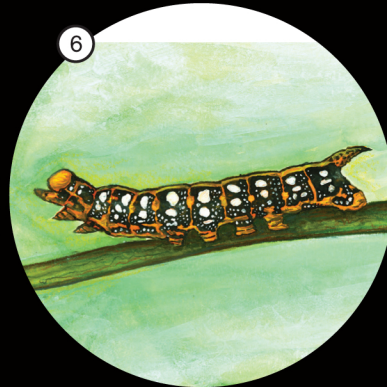
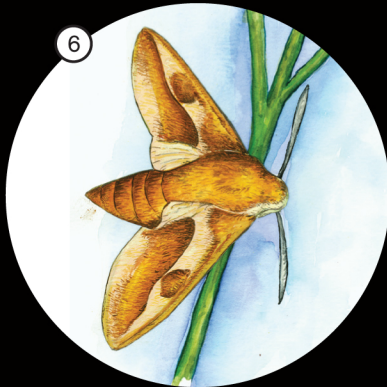
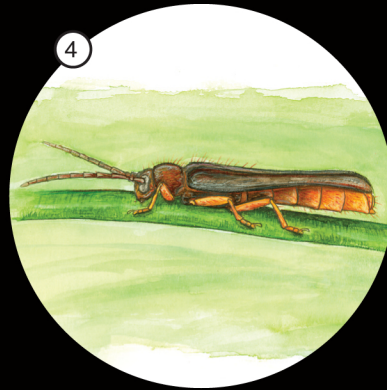
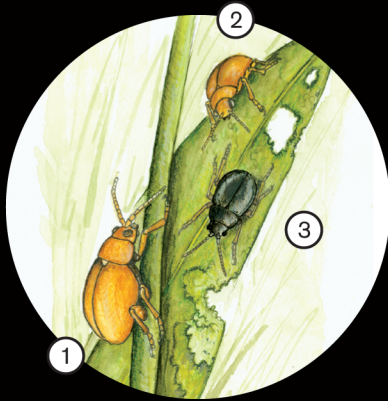
Spotted Knapweed  
*Centaurea biebersteinii*  
also known as  
*C. maculosa*

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These insects prey on  
Leafy Spurge

1. *Apthona flava*
2. *Apthona nigriscutis*
3. *Apthona lacertosa*
4. *Oberea erythrocephala*
5. *Spurgia esulae*
6. *Hyles euphorbiae*

# Some are beneficial . . . biological noxious weed control needs many points of attack

Leafy spurge flea beetles were introduced into Montana and North Dakota from Europe between 1985 and 1993. Copper or amber *Aphthona flava*, black dot *A. nigriscutis*, and brown-legged *A. lacertosa* flea beetles are established in nineteen states. Flea beetles feed on leafy spurge fine roots and foliage.

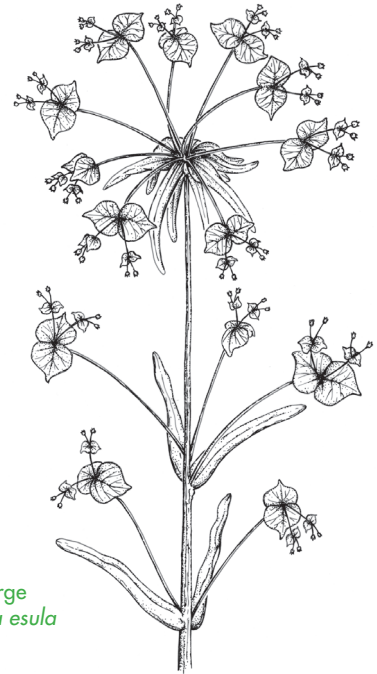
Red-headed leafy spurge stem borers *Oberea erythrocephala* are native to Italy and Switzerland. First introduced into Montana 1982 they are established in seven states. Their heads are red, with small black eyes and two antennae nearly as long as the body. Some people call them the "longhorn beetle" because of their prominent antennae.

The adult red-headed stem borer feeds on leafy spurge leaves, but not enough to really damage the plant. Instead, what kills the plant is how the female lays her eggs. She chews all the way around the stem, sometimes twice or more, before laying eggs. The chewing "girdles" the plant, killing the shoot above. She then bores a hole into the stem above the girdle and lays an egg inside. Larvae feeding in the stem also help kill the plant.

Leafy spurge tip gall midge *Spurgia esula* was introduced into Montana and North

Dakota from Italy in 1985. Sweep nets are not used to redistribute this small delicate fly because it will damage the very fragile adults. Instead, clipped leafy spurge stems should be bunched and the bottoms wrapped in damp towels or damp cotton. They should be taken to the field as quickly as possible and placed upright in a wire frame or other device so that the larvae will not be found by ants and other predatory insects. The tip (leaf bud) gall midge adults and larvae attack the growing parts of the plant destroying the shoots' ability to flower and produce seeds. The tips eventually die, and the plants then produce new shoots from below the attacked areas. These shoots are then attacked by the next generation of midges.

The hawk moth *Hyles euphorbiae* behaves much like a hummingbird and feeds on nectars in the flowers.



Leafy Spurge  
*Euphorbia esula*

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