



Purple loosestrife leaf-eating beetle larvae

Minnesota Department of Natural Resources



Purple Loosestrife, *Lythrum salicaria*, *L. virgatum*, hybrids, and cultivars

TARGET PLANT DESCRIPTION

Purple loosestrife is a perennial plant native to Europe and Asia. The plant usually grows 4-6' tall with lance-shaped leaves and spiked purple flowers. It produces copious amounts of seed and can also reproduce from stem and root fragments. Purple loosestrife can out-compete native vegetation and infests wetlands, streambanks, and wet ditches potentially resulting in harm to ecosystems and a reduction in biodiversity.

BIOLOGICAL CONTROL AGENTS

Galerucella pusilla and *G. californiensis* are leaf-eating beetles which seriously affect growth and seed production by feeding on the leaves and new shoot growth of purple loosestrife plants. The two species share similar ecology and life history. Adults feed on young plant tissue causing a characteristic "shothole" defoliation pattern. Larva feed on the foliage and strip the photosynthetic tissue off individual leaves creating a "window-pane" effect. At high densities (greater than 2-3 larvae per centimeter of shoot), entire purple loosestrife populations can be defoliated. Several defoliations are needed to kill the plant. Adult beetles are mobile and possess good host finding abilities.

Biological control insects released between 1992 and 2009 have established reproducing populations at more than 75% of the sites visited. The leaf-feeding beetles disperse from release sites and

find new purple loosestrife sites on their own. A recent study by the University of Minnesota and the DNR found the leaf-feeding beetles more than 12 miles away from where they were released on unmanaged purple loosestrife infestations.

EXPECTATIONS

Biological control is now the main method used to manage purple loosestrife in Minnesota. Purple loosestrife eating insects have been released on more than 850 of the 2000 known purple loosestrife infestations in Minnesota. To date, many of the release sites are experiencing exceptional control by the purple loosestrife eating insects.

Development of Two New Biological Control Programs

GARLIC MUSTARD, *Alliaria petiolata*

Development of biological control for garlic mustard began in 1998 and is near completion. A petition for the release of the weevil *Ceutorhynchus scrobicollis* was submitted to the USDA in 2008. In 2009 USDA recommended the testing of additional plant species. Additional host-specificity testing was carried out in 2009-10 and we anticipate submitting those results to the USDA in 2011. Our hope is to implement a national biological control effort against garlic mustard in the near future.

COMMON BUCKTHORN, *Rhamnus cathartica* AND GLOSSY BUCKTHORN, *Frangula alnus* SYNONYM *Rhamnus frangula*

A program was initiated in 2001 to develop biological control for buckthorn. No promising biocontrol agents have been found for glossy buckthorn, so work is now focused on common buckthorn. A number of potential agents for common buckthorn have been tested and eliminated from consideration due to lack of host-specificity. Work is now focused on several sap-sucking psyllids and seed-feeding midges.



www.dnr.state.mn.us/eco/invasives/index.html
For more information on purple loosestrife, garlic mustard, or buckthorn biological control, contact Laura Van Riper (651) 259-5090 Laura.VanRiper@state.mn.us

Biological Control of Invasive Plants in Minnesota

*A collaborative effort of the
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Spotted knapweed root weevil



Introduction

Biological control, the use of natural enemies to control non-native pests, can be an effective tool in managing invasive plants. Non-native plants can become invasive because they lack the insects and diseases that control them in their native environments. Biological control reunites natural enemies, such as herbivores and pathogens, with their host (invasive plant) to reduce impacts caused by the pest. The goal of biological control is to reduce the target pest population and its corresponding impact to an acceptable level. The Minnesota Departments of Agriculture (MDA) and Natural Resources (DNR) have implemented successful biological control programs for leafy spurge, spotted knapweed, and purple loosestrife statewide. Development of new biological control efforts for garlic mustard, buckthorn and common tansy are underway. Our programs utilize specialized insects that were tested extensively for host specificity (safety) and efficacy.

Biological control programs in Minnesota are cooperative. Multiple agencies, associations, institutions, and private landowners work together to accomplish goals. Lead agencies help to coordinate efforts, disseminate information, provide expertise, and collect data.



Knapweed seedhead weevils



Leafy spurge and leafy spurge beetles

Minnesota Department of Agriculture

Spotted Knapweed, *Centaurea stoebe ssp. micranthos* synonym *Centaurea biebersteinii*

Spotted knapweed is a biennial or short lived perennial native to Europe and Asia. It grows approximately 2-3' tall with gray-green hairy foliage and has pinkish purple flowers. It reproduces quickly by seed and produces a chemical that is toxic to other plants and allows spotted knapweed to displace desirable vegetation.

BIOLOGICAL CONTROL AGENTS

In Minnesota, the predominant biological control agents used include seedhead weevils and root boring weevils. They work in conjunction to control spotted knapweed. Seedhead weevils and root boring weevils are collected from established sites and released at new sites.

Seedhead weevils, *Larinus minutus* and *L. obtusus*

Seedhead weevil larvae consume the developing spotted knapweed seed resulting in reduced knapweed spread and proliferation.

Root boring weevils, *Cyphocleonus achates*

Root boring weevils are highly effective biological control agents because they weaken or kill existing knapweed plants. The weevil larvae develop in the roots consuming plant resources and physically damaging the roots.

EXPECTATIONS

Many sites in Minnesota are considered controlled by spotted knapweed biological control. Spotted knapweed biological control has proven a long-term endeavor – taking up to a decade for large sites.

Leafy Spurge, *Euphorbia esula*

Leafy spurge is a perennial plant native to Europe and Asia. It grows approximately 3-4' tall with greenish-yellow flower bracts

and narrow leaves. Spurge reproduces by both seed and rhizome. In Minnesota, leafy spurge usually flowers between late May and early July, but some flowers can be seen throughout the summer. Leafy spurge is a “noxious weed” because of its ability to reproduce and spread quickly thus displacing desirable vegetation. In addition, leafy spurge is toxic to cattle so negatively impacts the economy of infested grazing lands.

BIOLOGICAL CONTROL AGENTS

Species of *Aphthona* flea beetles are released to control spurge. One species, *Aphthona lacertosa*, is particularly effective against leafy spurge in Minnesota. Adult flea beetles feed on leafy spurge foliage, but it is larval feeding on the spurge roots that damages or kills the plant.

EXPECTATIONS

Biological control of leafy spurge is successful at many sites statewide. Almost all counties in Minnesota participate in leafy spurge biological control. Control takes can take 3-10 years to achieve depending on the size of the site, density of spurge, and environmental factors. Often, small areas of control are seen before overall control is achieved.

Common tansy, *Tanacetum vulgare*

Common tansy is an invasive weed of grasslands, forest and field margins, riparian areas, and rights-of-way. Tansy infestations are associated with loss of plant diversity, toxicity to humans and livestock, wildlife habitat degradation, and hindering reforestation and restoration efforts. A joint United States and Canadian effort to develop biological control was initiated in 2006. CABI Europe-Switzerland conducts the overseas research. Six insect biological control candidates have been identified. All of these species have been collected at field sites and host-specificity testing initiated. Additional field collection of these species, rearing method development, and host-specificity testing is necessary. Resources are focused on the two most promising candidates, a root feeding flea beetle, *Longitarsus noricus*, and a stem-mining weevil, *Microplontus millefolii*.



www.mda.state.mn.us/plants/weedcontrol

For information on leafy spurge, spotted knapweed, and common tansy biological control, contact Monika Chandler (651) 201-6537 Monika.Chandler@state.mn.us