



## Integrated Pest Management Program

Department of Plant Science and Landscape Architecture  
UConn Extension

### Homegrown Beetles: Backyard Biocontrol

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Invasive non-native plants have become a serious concern because they decrease native species and reduce biological diversity. Some of the most invasive plants found in New England include Asiatic bittersweet (*Celastrus orbiculatus*), common reed (*Phragmites australis*), Japanese knotweed (*Fallopia japonica*), multiflora rose (*Rosa multiflora*) and purple loosestrife (*Lythrum salicaria*). Integrated Pest Management (IPM) can be used to control invasive plants and includes biological, mechanical, cultural and chemical controls.

Biological control -- the use of natural enemies (also known as biological control agents or beneficial insects) to reduce a plant's population below an economic or biological threshold--is not yet an option for most invasive plants. It takes many years of research to identify suitable natural enemies that will attack and control the invasive plant, to conduct extensive laboratory and field tests for effectiveness, and to obtain appropriate permits from federal and state governments.

Purple loosestrife, however, is one invasive plant for which biological control agents have been identified and tested. During the 1990s, four different insect species were approved for biological control. The insects, which are all different species of beetles, feed primarily on purple loosestrife leaves, stems, flowers and roots but do not prefer other kinds of plants. Feeding injury by the beetles helps to reduce purple loosestrife populations that invade wetlands throughout the United States. In Connecticut, we have introduced more than 2 million purple loosestrife biological control agents into 110 wetlands since 1996. We conduct long-term monitoring studies at the release sites to observe feeding damage to purple loosestrife by the beetles, measure reductions in purple loosestrife populations and identify native plants as they become more abundant in the wetlands.

To increase the number of purple loosestrife natural enemies in Connecticut and help distribute them to more wetlands each year, we raised two kinds of beetles (both are *Galerucella* sp.) at the University of Connecticut Plant Science Research and Education Facilities in Storrs, CT. The following information for rearing the biological control agents, adapted from the [University of Minnesota Cooperative Extension](#) and modified for the Connecticut purple loosestrife program, may be suitable for rearing projects in Massachusetts. A timetable is included to help plan each step of the rearing process.

**February.** Winter is a good time to line up the supplies needed to rear the *Galerucella* beetles. Three-gallon containers, potting mix, slow-release fertilizer, screen cages, bamboo stakes to support the screen cages, and 5-foot diameter children's wading pools are some of the supplies needed. Sleeve cages can be ordered from several suppliers, or if you are handy with a sewing machine, they are easy to make. In Connecticut, we reared approximately 30,000 *Galerucella*

beetles annually in two wading pools that hold 24 containers of purple loosestrife. The Minnesota guidelines provide other details for supplies.

**April.** April 1<sup>st</sup> is the target date in Connecticut to dig purple loosestrife root crowns from the wetland. This date can be shifted depending on the weather but should occur as soon as the ground thaws, when the soil is workable and before buds appear at the base of the plants. You will need a large shovel to dig up the plants and heavy plastic bags or containers to transport the root crowns from the field to the rearing location. Try to remove other plant material from the purple loosestrife root crowns to minimize the growth of other plants once the root crowns are placed into containers. The roots can be trimmed before planting. Follow the Minnesota guidelines for information on filling the containers with potting mix and fertilizer. These materials can be mixed in one of the plastic pools. Fill each 3-gallon container about half full before adding the root crowns, and cover with the remaining potting mix. Make sure that you put several small holes halfway up the sides of the pools to allow excess water to run out in the event of heavy rain. Also note that water should be added to the pools but do not water the tops of the containers to avoid fertilizer leaching into the water.

Space requirements for this project are minimal, depending on the final number of *Galerucella* beetles desired. We grow 24 potted purple loosestrife plants in two pools and only need a 5-foot x 10-foot area. If the purple loosestrife plants are healthy and an average of ten to 15 adult beetles is introduced onto each plant, we estimate a 100- to 200-fold increase in the number of offspring produced. Thus, a rearing project with 24 plants will yield approximately 30,000 new generation beetles.

It takes several weeks or more before active growth is observed on the potted purple loosestrife plants, and this will vary with the spring temperatures. Be aware of late frosts in May, which may damage the new growth. The plants can be covered at night if frost is likely, but be sure to remove the covers the next morning.

**May.** As plant stems grow to 12 inches in height, pinch the top growth back to encourage lateral growth that will result in a bushier plant (i.e., more host food for the beetle adults and larvae to feed on). Once the plants are 18 inches tall, *Galerucella* beetles can be introduced.

**Late May to mid-June.** This is the optimum time to introduce *Galerucella* adult beetles onto the purple loosestrife plants. Beetles can be collected from another wetland and transported to the rearing site. Small plastic containers are suitable to collect the adults. Collect ten to 15 adults per plastic container, which will be enough beetles to inoculate one purple loosestrife plant. A warm sunny day when the adults are active in a wetland is optimal for collecting. It may be difficult to determine male and female beetles on the plants as you are collecting them. If you collect mating pairs of beetles, you will ensure that there are both male and female beetles being introduced onto each plant. Keep the beetles in a cooler during transport to the rearing location.

To prepare the containerized purple loosestrife plants just prior to introducing the beetles, place four bamboo stakes equidistantly into the soil of each container. Next, slide a sleeve cage over the plants and secure the bottom of the cage to the pot. We use sleeve cages with drawstring bottoms and attach cord stops onto the string to maintain a tight seal around each pot and prevent beetle adults or larvae from escaping. Gently tap the beetles from one of the small plastic collection containers onto a purple loosestrife caged plant and secure the top of the sleeve cage with a twist tie. You can string a clothes line over the top of the wading pools and attach the top of each sleeve cage with a clothes pin to help keep the pots upright on windy days.

During the next five to six weeks, female beetles will deposit eggs onto the caged plants. Both adult beetles and the developing larvae feed on the leaves, shoot tips and stems of purple loosestrife. Keep the pools with the containerized plants half full with water so the purple loosestrife stays healthy, thereby providing adequate food for the biological control agents.

**July.** Near the end of the rearing cycle, although it may appear as if the purple loosestrife plants have died and no insects can be found inside the sleeve cages, this is a good sign! Active feeding by *Galerucella* adults and larvae will defoliate the plants. The beetle larvae then move down into the pots to pupate and the new generation of beetles will emerge gradually over the next several weeks. You will start to observe adult beetles climb to the top of the sleeve cage as temperatures warm up during the day and the beetles attempt to disperse. You are now ready to transport the pots, with the sleeve cages still attached, to wetlands to begin purple loosestrife management. Remove the pots from the pool and drain excess water. Remove the bamboo stakes from the pots, then place the pots and sleeve cages in heavy plastic bags before putting them in the vehicle to transport the plants and beetles to the release location (the plastic bags help keep the vehicle clean).

Once you reach the wetland, carry the plastic bags to the release location, remove the pots from the plastic bags and take off the sleeve cages, being careful to remove any beetles clinging to the material. Place each pot near a healthy purple loosestrife plant in the wetland so the emerging beetles can easily find new host material on which to feed. Remember that the new generation beetles will emerge over several weeks, so the containers should remain at the wetland. You can return to the site later to retrieve the containers.

**Note:** If you find large numbers of new generation *Galerucella* beetles at the tops of the sleeve cages, you observe that the containerized plants have been defoliated, but you won't be able to transport the beetles to the wetland for a day or two, you can make purple loosestrife "bouquets" to feed the beetles until they can be released. Place cut pieces of purple loosestrife stems into a jar of water and set the jar in the sleeve cage near the bottom of the pot. Make sure the bouquet is thick enough that the adult beetles won't fall into the water in the jar.

Since we began raising our "homegrown" beetles in 1999 at the University of Connecticut, we have produced more than 100,000 biological control agents. Cooperators from nature centers,

wildlife sanctuaries and elementary schools have participated in this project, raising their own beetles to introduce onto purple loosestrife that has invaded their wetlands. The use of IPM methods to control this aggressive invader is an ideal project for students, 4-H youth, Scouts, conservation groups or communities.

Note that in Connecticut we have Federal and State permits in place so that we can release the beneficial insects. I require a third level - the property owner or person responsible for the site must sign a consent form so all parties are informed of the project.

See Natural Areas Journal 2001, 21(4): 368-377 for an article by Bernd Blossey et al. on damage by biological controls on non-target plant species. (Biocontrol agents prefer purple loosestrife and may do some feeding to a few other species of plants but cannot reproduce on the other species.)



**Preparing the pots before planting purple loosestrife root crowns**



**Young purple loosestrife plants just prior to introducing *Galerucella* beetles**



**Rearing facility - *Galerucella* beetles on purple loosestrife plants in sleeve cages**

*Photos by Donna Ellis*

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**Releasing new generation *Galerucella* beetles into the wetland**

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