Invasive Species Report
(Purple Loosestrife)

Purple Loosestrife (*Lythrum salicaria*) is a wetland plant which was introduced to North American, and is taking complete control of wetlands, marshes and drainage ditches. Purple Loosestrife is native to Eastern Europe, Great Britain, central Russia, as well as Japan. The loosestrife plant was introduced early in the 1800's. It was brought to North America for ornamental and medical uses. Seeds were also introduced through mud and sediment in ballast water, along with large amounts of soil uses to stabilize ships while traveling.(Minnesota Sea Grant) Purple loosestrife plants are used to treat health problems such as diarrhea, dysentery, ulcers and sores. (Ecology and Management) The magenta colored flowers are used in many decorations. Purple loosestrife plants are still sold for decorative purposes in many states.

Purple Loosestrife is a perennial herb plant. Individual plants usually stand between 4 and 10 feet tall. An identification key is the square wood stems, with whorled leaves. The leaves are stalk less and heart shaped. It has a longer flowering season, then most native wetland plants, extending from June through September. The flowers supply large amount of nectar in order to persuade insect pollinators. One mature plant can have up to 20 flowers, which will release 2-3 million seeds. Along with reproduction by seeds, the plant can also expand the population by vegetative reproduction. This process is done through the use of underground stems, which can grow up to one foot per year. Having two processes of reproduction aids the purple loosestrife plant in taking over wetland areas (Ecology and Management).

Purple loosestrife adapts best to disturbed, moist soils. It will grow in freshwater wetlands, meadows, tidal and non-tidal marshes, on river banks, pond edges, reservoirs, and drainage ditches. It quickly establishes itself and expands to cover the entire wetland area. Purple loosestrife will remove native grasses, sedges, and other flowering plants. In the process Purple loosestrife will greatly reduce the valued biodiversity found in many native wetland areas. In reduction in the variation in wetland plants, places difficulties on native wetland wildlife, as having a reduced source of available nutrition. Purple loosestrife will outcompete native plants in multiple ways. Having a greater seed dispersal and longer flowering season allows it to simply put more offspring into the environment, then other native species. Secondly, once it has been established, it will form dense, homogeneous stands that will restrict native wetland species from growing in the affected wetland. Stands of purple loosestrife have been found to be so dense as to restrict the natural movement of water through a wetland. It also reduces the amount of usable material for many wetland birds to build nests. (Swearingen)

It has been estimated that nearly 190,000 hectares of wetlands are infested with densely packed populations of purple loosestrife every year. (Minnesota Sea Grant) Purple loosestrife devastates the biodiversity of our native wetland areas. Once introduced it out competes every other native plant species. This has a huge affect on the habitat or wetlands used by birds, toads, frogs, muskrats, and other wetland animals.

Action against Purple loosestrife has taken three major forms. The first tactic to deal with this invasive species is simple hand pulling. If done correctly, this is the simplest way to remove Purple loosestrife plants from native wetland areas. Due to the hard, physical work of removing the plant by hand, this tactic works best on small patches of the invasive plant, areas of a few square meters. If Purple loosestrife is found in control of larger patches, entire wetlands or meadows, more effective methods can be used. Another removal method is the use of herbicides. Many over the counter brands of weed killer have shown promise in controlling Purple loosestrife. The main down side to using

herbicides is that they kill all plants that they come into contact with, and are not species specific. If used on a large area, this tactic, in killing all the plants would open up the entire treated area to Purple loosestrife infestation. So even though the herbicide removed all present Purple loosestrife plants, the grow back could have an even higher Purple loosestrife density then before. This action, of course, due to the aggressive nature of the Purple loosestrife in taking over open wetland areas. The third and most promising tactic for controlling and removing Purple loosestrife from wetland areas has been introduction of beetles and weevils, which are the Purple loosestrife's natural enemies.

A total of five species of insects have been introduced in North America as means to control and potentially remove Purple loosestrife from all infected areas. Of the five species, one is a root-mining weevil (*Hylobius transversovittatus*). Two species are leaf feeders (*Galerucella calmariensis*) and (*Galerucella pusilla*). The final two species are flower feeding beetles (*Nanophyes galerucells*) and (*Nanophyes hylobius*). All five of these species are the natural predator of Purple loosestrife. (Swearingen). One key factor when introducing one species to control or remove an invasive, is determining what type of affect the introduced species will have on the environment. If we introduce the five species of beetles and they find that native North American plants are better to eat then the Purple loosestrife, then in introducing them we have only introduced another invasive species and not helped our situation with Purple loosestrife. To prevent this situation from happening, long field tests were done to see if in fact the beetles would only eat and affect the Purple loosestrife plants. This was done by bringing 50 North American native wetland plant species over to Europe, and exposed to the beetles, in a closed environment. It was determined that the beetles were in fact host specific, would only eat Purple loosestrife, and therefore were introduced in North American wetlands (Weeden). The two leaf eating beetles and the root mining weevil were introduced first in 1997 (Swearingen). Once test studies had been done on the impact the introduced beetles were having on the Purple loosestrife populations, the two flower eating beetles were also introduced. The introductions occurred in 16 states, Michigan being one, and have been continuously studied since introduction.

The impacts that the beetles have on the Purple loosestrife plant are varied and highly effective. As the beetles feed on the photosynthetic tissue, the Purple loosestrife plant can be defoliated, which will cause the plant to die. If the beetles are in high enough densities, they are able to defoliate entire Purple loosestrife populations. If the plant is not completely killed by the beetles, reduced shoot growth, stopping seed production, and reduced root growth will occur. Although killing the Purple loosestrife plant would be best in all cases, the hindrances placed on the plants by the beetles will level the playing field for the other native plants, in competing with Purple loosestrife for habitat. It was interesting to find that people can actually purchase beetles to introduce to their own backyard, as a way of controlling the Purple loosestrife populations. When introducing the beetles, it is suggested to place a sleeve bag over the first Purple loosestrife plant as a way to keep the beetles concentrated for the first few days. This will act as a central command point, as the population of beetles grows (Ecology and Management). All five types of beetles are extremely susceptible to pesticides. In order to raise a strong beetle population, all pesticides and herbicides, mainly used to control the Purple loosestrife, should not be used. There has been some great success with the introduction of the Purple loosestrife's natural predators. There has been a projection, estimating that around 90% of the Purple loosestrife that is currently in the wetlands of North America can be controlled and removed using the beetles. However, the progress is slow moving. It takes nearly 10 years to raise a strong enough beetle population in order to control or remove a patch of Purple loosestrife that is five to ten acres in size (Weeden).

In my personal opinion, I think it is great to use the natural predators of Purple loosestrife to control and remove it as an invasive species in North America. It is not common to find a natural predator that is host specific and will not have an effect on the natural ecosystem. I do have my doubts. Only testing fifty native species in the preliminary tests, I don't believe is enough. The introduced

beetles are sure to come into contact with more than fifty wetland plant species as their numbers increase. I just hope they don't find something they prefer over Purple loosestrife, or we will soon be introducing the beetles' natural enemies to North America.

Literature Cited:

1. Ecology and Management of Invasive Plants Program (invasiveplants.net) 2002, Cornell University, Purple loosestrife. (http://www.invasiveplants.net/plants/purpleloosestrife.htm

2. Minnesota Sea Grant: Purple loosestrife: What you should know, what you can do. University of Minnesota, Last Modified Dec 18th, 2006 http://www.seagrant.umn.edu/ais/purpleloosestrife_info

3. Swearingen, Jill, M., National Park Service, Washington DC. PCA Alien Plant Working Group-Purple loosestrife (Lythrum salicaria) http://www.nps.gov/plants/ALIEN/fact/lysa1.htm

4. Weeden, Catherine R. Biological control: A guide to Natural Enemies in North America. Cornell University. Balerucella spp. http://www.nyusaes.cornell.edu/ent/biocontrol/weedfeeders/galerucella/html