Biological Control of Purple Loosestrife in Goodyear Swamp Sanctuary, Otsego County, New York.

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INTRODUCTION

Purple loosestrife (Lythrum salicaria) is a perennial wetland plant that is common throughout temperate North America. According to Stuckey (1980) it was inadvertently introduced from Europe in the early 1800's in ship ballast and also imported for medicinal and ornamental purposes (Stuckey, 1980). It commonly establishes in wet areas including marshes, shorelines, ponds, wet meadows, and roadside ditches. In North America, purple loosestrife is very invasive and forms large, dense monodominant stands. It continues to outcompete native wetland plants because it has no natural enemies (Malecki et al., 1993). Purple loosestrife is non-threatening in its native range because it is fed upon by some 120 species of phytophagous insects and is kept in a natural system of checks and balances (Malecki et al., 1993). Purple loosestrife is not a useful resource to most animals and replaces valuable native plants that are used for food and habitat (Haworth et al., 1993). Consequently purple loosestrife has degraded many wetlands, including the Goodyear Swamp Sanctuary, by significantly reducing the abundance of native vegetation and associated species of wildlife. Appropriate measures are being initiated to control purple loosestrife in order to preserve biodiversity and maintain healthy ecosystems.

Purple loosestrife control programs of the past have generally been unsuccessful. Physical control of purple loosestrife includes hand pulling, mowing, draining, flooding, burning, and discing (Carroll, 1996). These methods are costly and labor intensive and must be repeated once purple loosestrife returns. Chemical control of purple loosestrife involves application of a nonspecific herbicide that contains the active ingredient glyphosphate (Carroll, 1996). This method is costly, requires long term application, and has had detrimental effects on non target wetland plants (Skinner et al., 1993). Biological control offers the most promising method for combating purple loosestrife (Blossey, 1995). Biological control of weeds involves human use of a plant's natural enemies to reduce its populations to an acceptable level (Malecki et al., 1993). Biological control of purple loosestrife has been extensively studied and years of research have identified insect species that are host-specific (will only attack purple loosestrife) and therefore will not harm native North American plants.

In this case, control involves the introduction of two species of leaf-feeding beetles (Galerucella calmariensis and G. pusilla) (Figure 1) from purple loosestrife's native range. These beetles lessen the competitive ability of purple loosestrife by feeding on meristems and defoliating the plant resulting in impaired growth, decreased seed production, and increased plant mortality (Blossey et al., 1994).

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Biological control of purple loosestrife has been implemented on a wide scale throughout the United States and many areas in New York State including Montezuma National Wildlife Refuge in Cayuga county, Schoharie county, Greene county, Montgomery county, and Albany county (Sharick, 1996). Follow-ups on release sites report good success in controlling purple loosestrife and no harm to native plants (Blossey, 1996). Some unique advantages to biological control are that its environmentally safe, cost effective, nonpolluting, and self-sustaining.

METHODS AND DISCUSSION

With the assistance from Dr. Bernd Blossey (Director of biological control of non-indigenous plant species at Cornell University), it is proposed to establish controlled study sites of leaf-feeding beetles in Goodyear Swamp Sanctuary. Up to five sites containing purple loosestrife will be chosen in the swamp for the establishment of screened-in cages. Galerucella calmariensis and G. pusilla will be introduced into these cages and feeding progress will be monitored. Once it is demonstrated that these beetles feed only on purple loosestrife, the cages can be lifted and the beetles will be allowed to further their consumption of purple loosestrife in surrounding areas while progress is monitored over the years.

These beetles can successfully overwinter and attack purple loosestrife the following spring. The abundance of purple loosestrife will naturally regulate the abundance of the beetles, and this interaction provides a self-sustaining, balanced system (Malecki et al., 1993). As purple loosestrife is reduced, native wetland plants can have an opportunity to return and maintain biodiversity while contributing to the educational aspect of the swamp.

![Figure 1. a. G. calmariensis (length 3.6-5.6mm), b. G. pusilla (length 3.5-4.6mm) (Manguin et al. 1993).]
REFERENCES

Blossey, B. 1996. Personal communication. Department of Natural Resources. Cornell University, Ithaca, N.Y.


