PURPLE LOOSESTRIFE – NOT JUST ANOTHER PRETTY PLANT

Purple loosestrife [*Lythrum salicaria* L. (Lythraceae)] is an invasive non-native plant from Eurasia that was introduced into North America almost 200 years ago. The largest occurrences of this species are found in wetlands in the northeastern U.S. Purple loosestrife aggressively moves into wetlands, eliminating native plants such as cattail, sedge, and bulrush. When a wetland is infested with purple loosestrife, few species of wildlife are supported, a reduction in stopover sites along bird migratory pathways occurs and valuable natural resources in these ecosystems are destroyed.

Optimum growth of purple loosestrife occurs under sunny or partly sunny conditions. Plants are known to survive under a range of soil moisture from dry soil to shallow water. Purple loosestrife is typically found in wet meadows and open fields, river and stream banks, floodplains, ponds, lakes and marshes. These plants are particularly common to disturbed areas, such as roadside drainage and construction sites. When purple loosestrife invades land used for field crops, hay meadows or forage pastures, it reduces yields. Due to the low palatability of purple loosestrife plants, they are not grazed by livestock.

Plant Description. Purple loosestrife is a tall herbaceous perennial that may grow up to 10 feet tall and 4 feet wide. Plants can reach maturity in 3 to 5 years, producing as many as 50 stems per plant. Leaves may be opposite, alternate or in whorls of three. The leaves are lance shaped and directly attached to stems. Stems are usually square, but may become five-or six-sided and quite woody as plants mature. Leaves and stems of purple loosestrife may be smooth or covered with soft hairs.

The woody roots form a dense mat underground, up to 20 inches in diameter. The taproot is a major source of carbohydrate for the plant that is used for regrowth when aboveground vegetation is mowed, suppressed by herbicides or damaged by insect feeding. The ability to

rapidly send up new shoots gives purple loosestrife a competitive advantage over other plant species in disturbed habitats.

The length of the spike inflorescence ranges from one inch to more than three feet long, with up to 3,000 flowers produced on an individual plant. The reddish-purple flowers have 5 to 7 petals. A single mature plant can produce as many as 2.5 million seeds each year. Purple loosestrife seeds are very small (1 mm) and dustlike, and are easily carried by wind or water. Seeds may also be moved about on animal fur or feathers or in mud on humans or other animals.

Purple Loosestrife Management. Physical and chemical methods to manage purple loosestrife infestations in wetlands are often time consuming and very expensive, providing only temporary relief to curb the spread of this invasive species. Biological control is recommended as a sustainable, cost-effective, long-term management tool to reduce populations of purple loosestrife. The use of biological control may ultimately be one component of an integrated management program in wetlands to effectively reduce purple loosestrife populations and restore plant diversity in these habitats.

Purple loosestrife is a relative newcomer to weed biological control, with the first introductions of natural enemies occurring in 1992 in eight U.S. states and one Canadian province. By 1997, more than half of the U.S. states participated in biological control of purple loosestrife. In Europe, where purple loosestrife is native, plants are found in small populations of approximately 100 to 200 plants along with many other native species. This association is due in part to a complex of natural enemies that provide biological control in wetland habitats. In North America, however, purple loosestrife is often observed in single-species stands of as many as two million plants, its growth unchecked without some form of management.

In 1992, The U.S. Department of Agriculture (USDA) approved six plant-feeding insects to introduce into wetlands for biological control of purple loosestrife infestations. *Galerucella*

calmariensis L. and *Galerucella pusilla* Duftschmidt (Coleoptera: Chrysomelidae) are two beetles that feed on leaves, stems and terminal buds of purple loosestrife. These natural enemies are very host-specific, feeding only on purple loosestrife and not on native wetland plants. Decreased shoot growth and suppression of flower and seed production by the natural enemies, resulting in significant reductions in purple loosestrife populations, have recently been reported from Canada, Minnesota and New York. Through massive rearing efforts at Cornell University, USDA Animal and Plant Health Inspection Service (APHIS), and state cooperators, approximately one million *Galerucella* beetles were released in the U.S. during 1997. Wetland sites will continue to be monitored for many years to document interactions occurring between the natural enemies and purple loosestrife.

The Sterility Issue. Horticultural cultivars of *Lythrum*, such as 'Robert', 'Morden Gleam' or 'Morden Pink' are described as being cultivars of *Lythrum salicaria*, *Lythrum virgatum* L., both from Eurasia, or the native *Lythrum alatum* Pursh. Taxonomists in North America have determined that *Lythrum salicaria* and *Lythrum virgatum* are the same and that they intercross freely.

Purple loosestrife has three flower types, or morphs, that differ in the length of the style (female flower part) and anther (male flower part). Flower types are described as short-, medium- and long-styled. Each flower has two whorls of stamens that are different lengths from the style and from each other. A short-styled flower, for example, has one set of medium anthers and a second set of long anthers. Purple loosestrife is self-incompatible and must be outcrossed to produce seed. Seedset is greatest when a stigma (the pollen receptor, on the tip of the style) on one plant is fertilized with pollen from an anther of similar length on another plant. For example, pollen from a medium length anther (on a short- or long-styled plant) must fertilize a stigma on a medium-styled plant for a "legitimate" cross to occur and seeds to develop.

As you can see by this lengthy description, there has been some confusion in the past as to whether purple loosestrife cultivars can produce seed. Neil Anderson and Peter Ascher at the University of Minnesota determined fertility levels of 18 cultivars of *Lythrum salicaria* and *Lythrum virgatum* in a 1993 study. Their results showed that purple loosestrife cultivars are ***not*** sterile, but are, in fact, very fertile. Although most cultivars are self-incompatible, they can produce large amounts of seed when used as a male or female parent in making crosses. Gardeners sometimes comment that when they put one or two purple loosestrife plants in their flowerbeds, the plants never set seed. If both plants are of the same flower type, they are not compatible with each other and seedset will probably not occur. However, purple loosestrife is insect pollinated. When bees, wasps or butterflies visit these garden plants, the insects carry pollen to purple loosestrife plants in nearby wetlands, adding to the spread of this invasive species in natural areas. With one purple loosestrife plant producing as many as 2.5 million seeds each year, an acre of purple loosestrife yielding up to 24 billion seeds per year, and seeds remaining viable in the ground for at least 5 years, even a few plants can pose a serious threat to the environment.

As a nursery grower, you may produce several cultivars of purple loosestrife that have the same flower type. 'Morden Gleam' and 'Morden Pink', for example, are both medium-styled. If the cultivars in your nursery are of the same flower type, they are not compatible with each other. If your nursery is located away from purple loosestrife growing in backyard gardens or naturalized in nearby wetlands, and if no other pollen source is available locally from purple loosestrife plants of a different flower type, seed may not be produced on your plants before they leave the nursery. However, these plants are quite fertile and can serve as pollen or seed sources, ultimately contributing to the spread of purple loosestrife in wetlands.

Regulations. Purple loosestrife is officially regulated as a noxious weed in 19 states. Two additional states have broader regulations that include all introduced and foreign plants and plants that are injurious to agriculture. The regulations vary from state to state, with the most stringent laws restricting the sale, distribution and planting of non-native *Lythrum* species, including *Lythrum salicaria*, *Lythrum virgatum* and all associated cultivars. Purple loosestrife is currently not regulated in any New England state.

Canada has been very active in managing purple loosestrife infestations. To encourage participation from the general public, the Canadian government established a replacement incentive program for the general public a few years ago. When landowners brought in a purple loosestrife plant dug from their property, they received a free, non-invasive perennial replacement.

In a 1994 survey of nursery growers and retailers in North Dakota, 70% reported that they did not sell purple loosestrife or its cultivars (Note: North Dakota began regulating purple loosestrife as a noxious weed in 1997). Of the growers and retailers that did sell purple loosestrife, 69% responded that purple loosestrife represented less than 1 percent of gross annual sales, and the remaining group reported that purple loosestrife made up only 1 to 5 percent of gross annual sales. The majority of the surveyed retailers indicated they would be willing to alert customers to environmental problems that occur when purple loosestrife becomes established in wetlands.

What Can Growers Offer as Alternatives? It is recommended that nursery growers gradually phase out production of purple loosestrife cultivars over the next several years. If you are a grower, you can offer alternative plantings for customers who are looking for perennials with similar growth form and/or color of purple loosestrife. The following plants are recommended as alternative perennials for purple loosestrife:

- Blue Flag Iris (*Iris versicolor*)
- Blue Vervain (*Verbena hastata*)
- Cardinal Flower (*Lobelia cardinalis*)
- Delphinium (*Delphinium* spp.)
- False Spirea (*Astilbe spp.*)
- Fireweed (*Epilobium angustifolium*)
- Foxglove (*Digitalis purpurea*)
- Garden Sage, Salvia (*Salvia* spp.)
- Joe-Pye Weed (*Eupatorium* spp.)
- Lilies (*Lilium* spp.)
- Lupine (*Lupinus*)
- Obedient Plant (*Physostegia virginiana*)
- Purple Coneflower (*Echinacea purpurea*)
- Siberian Iris (*Iris sibirica*)
- Speedwell (*Veronica spicata*)
- Spiked Gayfeather, Blazing Star (*Liatris* spp.)

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