Purple Loosestrife (*Lythrum salicaria* L) Identification and Control

Introduction

Purple loosestrife is a federally listed invasive perennial that typically occurs in wetland areas. This aggressive species has the potential to quickly replace native vegetation, degrade wildlife habitat, and obstruct drainage areas. Native to Europe, it is believed that purple loosestrife first arrived in North America through the ballast water of sailing ships. Occurrences have been reported in provinces of Canada and most of the continental United States (excluding Arizona, New Mexico, Louisiana, Florida, Georgia, and South Carolina) (USDA 2005). Purple loosestrife may possibly still be sold as an ornamental even though it is listed as a noxious weed in many states. Synonyms include purple lythrum and bouquet-violet (Uva et al 1997).

Identification

Purple loosestrife is an erect, multi-branched perennial that can obtain 1 – 2 meters in height. Juvenile plants tend to emerge from root buds or root crowns but may also develop from seed germination. Mature plants have square, sometimes six-sided, stems with leaves in opposite or whorled arrangement. Leaves are lanceolate to linear with entire margins and can be up to 10 cm in length. Root systems are thick and fleshy and develop a large woody crown as it matures (Uva et al 1997).

Flowers develop from July to September and are showy purple to lavender in long (10 – 40 cm) terminal spikes. Plants may produce up to 3,000 flowers which are insect pollinated (SE-EEPC 2006). Seeds are contained in capsules that are produced after pollination. Each capsule contains an average of 120 seeds and a plant may contain up to 900 capsules at one time (SE-EPPC 2006). A single plant has the potential to produce up to 2 million seeds in one year (Uva et al 1997). Seeds are wind dispersed but may also be transported via water and mud flow. Seeds can germinate over a wide range on temperature and environmental conditions (Young and Clements 2001), are long-lived, and can even remain viable up to 20 months in completely submerged conditions (SE-EPPC 2006).

Reproduction by seed germination is viable; however, sprouting from root buds or cuttings can dramatically increase the size of infestations. Mowing can displace stem fragments that can root to form new plants. Mowing can also create favorable conditions for increased stem density from existing root crown sprouts. Infestations will die back at the end of the season resulting in red foliage and dead stalks that persist throughout the winter.

The preferred habitat of purple loosestrife is wetland areas. It is considered an aquatic to semi-aquatic weed occurring in shallow water areas such as marshes, river banks, wet pastures, roadside ditches, and lake a reservoir shores. Plants grow best in moist soil conditions with full sunlight but can persist in areas with as much as 50 % shade (SE-EPPC 2006).

Control Options

Mechanical Control

Mechanical control methods, such as mowing and hand removal, are not deemed to be effective and may actually increase the size of a current infestation. Mowing will increase sprouting potential and may transport cuttings to areas currently uninfested to compound the problem. Hand removal may be appropriate in extremely small infestations; however, it is necessary to remove the entire plant, including the root system. Proper disposal of plant parts includes burning and transporting to an approved landfill. Transporting plant parts needs to be performed with care as this may lead to new infestations. Establishment of native vegetation in areas where infestations have been removed will reduce the potential of new seedlings through competition.

Biological Control

Biological control options for purple loosestrife have been researched extensively. *Galerucella calmariensis* L. and *Galerucella pusilla* Duftschmid are two types of leaf eating beetles that have been approved for biological control of purple loosestrife in the United States. Studies have shown that these two species of beetles are host specific to Lythrum species (Blossey et al 1994). The young larva feed on developing plant tissue while adult beetles will feed on almost any above-ground plant part. Native to Europe, these species where introduced in 1992 in a 5 – 15 year program to control purple loosestrife in the mid-Atlantic states and the program has since moved to the Midwest along with Colorado and Montana (Blossey et al 1994). Establishment of populations great enough to impact purple loosestrife may take up to 10 years; however, estimates are that once established North American populations of purple loosestrife will be reduced up to 90 % (Blossey et al 1994).

Hylobius transversovittatus Goeze, a nonnative root feeding weevil, has also been researched as a potential biological control agent for purple loosestrife (McAvoy et al 2004). Research is ongoing as to the impact this species will have in controlling purple loosestrife and its ability to establish great enough populations to justify its use.

Chemical Control

Chemical control of purple loosestrife can be achieved with the use of approved herbicides. Recommendations from non-profit and invasive plant management organizations (i.e. The Nature Conservancy, Southeast Exotic Plant Pest Council, etc) commonly include the use of an aquatic glyphosate as a foliar spray of 2 %. Glyphosate is a nonselective herbicide and may not leave desirable species in the treated area. The use of a selective herbicide, such as imazapyr or triclopyr, would be preferred to allow desirable grasses to survive herbicide applications and outcompete loosestrife regrowth.

Knezevic et al (2004) examined the ability for several selective herbicides along with glyphosate in their ability to control purple loosestrife for multiple years with one application along with the response of desirable vegetation. At 1 YAT, all treatments of

imazapyr, ranging from 20 to 96 fl oz of product, and metsulfuron, tested at 0.0125 and 0.25 oz of product, maintained greater than 90 % control of purple loosestrife. At 2 YAT, two rates of imazapyr, 64 and 96 fl oz, and the two rates of metsulfuron maintained 90 % control or greater. The imazapyr treatments did have a negative effect on desirable vegetation as the two high rates resulted in only 68 and 40 % vegetative cover, respectively. The metsulfuron treatments allowed for 100 % vegetative cover 2 YAT. Two rate of glyphosate tested, 64 and 96 fl oz, resulted in 70 to 75 % control, respectively, 2 YAT but allowed for 100 % vegetative cover. Triclopyr, tested at 1.5 and 2.5 qt, provided quick burndown at 10 WAT; however, the level of control decreased below 50 % over the next two years. The results of this study indicate that it is possible to eradicate purple loosestrife and, if used in with an integrated approach of replanting desirable species, one may be able to reclamate an infested site.

Research at the University of Kentucky

A trial was installed in central Kentucky to examine the ability for three herbicides, glyphosate, imazapyr, and triclopyr, all of which have an aquatic label, in controlling purple loosestrife. The study was located in the westbound cloverleaf in Interstate 64 at exit 35 near Shelbyville, KY. Purple loosestrife infestations were concentrated along and in a drainage way and due to area restrictions, only three treatments were installed in a randomized complete block design with three replications. The trial was installed on August 5th, 2005. Treatments were applied at 20 GPA and all treatments included NIS at 0.25% v/v. Treatments included imazapyr (formulated as Habitat®), triclopyr (Renovate 3®), and glyphosate (Aquamaster®). Plots were rated for percent control 6 WAT. This was the only evaluation made in the current growing season due to the time of year. Table 1 summarizes rates used and control levels by treatment.

There was no statistical difference across all treatments at the evaluation interval. The study will be reevaluated in the spring of 2006 to measure control for the following growing season. Statistical differences may be exhibited at this time. The triclopyr treatment did result in a higher level of control at 6 WAT (95 %) which may have operational implications. Triclopyr may be a desirable treatment if control levels are operationally acceptable since damage to desirable grasses would be minimal and may allow for the reduction of purple loosestrife regrowth through competition.

Table 1: Control of purple loosestrife 6 WAT

Trt No.	Type	Treatment Name	Rate	Rate Unit	42 DAT	
1	HERB	Habitat	1	pt/a	83	a
	ADJ	NIS	0.25	% v/v		
2	HERB	Renovate 3	4	pt/a	95	a
	ADJ	NIS	0.25	% v/v		
3	HERB	Aquamaster	4	pt/a	88	a
	ADJ	NIS	0.25	% v/v		

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