



IDENTIFICATION AND CONTROL OF Purple Loosestrife

(*Lythrum salicaria* L.)

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Purple loosestrife, a beautiful garden plant with an aggressive nature, was first introduced into North America in the early 1800s. The plant was sold in North Dakota by its genus name *Lythrum* for at least 50 years. *Lythrum* plants were brought to North Dakota for flower gardens because of their striking color, ease of growth, winter hardiness, and lack of insect or disease problems (Figure 1). The garden varieties of purple loosestrife were sold by many cultivar names including Morden Pink, Dropmore Purple, and Morden Gleam. These garden cultivars were thought to be sterile but have now been shown to cross-pollinate with the wild *Lythrum* type and sometimes with other *Lythrum* cultivars.

Known purple loosestrife infestations in North Dakota are small and generally found in or downstream of urban areas. These infestations can be traced to escapes from public or private horticultural plantings, often from seed that finds its way to streams and rivers through storm drains. Purple loosestrife was added to the North Dakota Noxious Weed list in 1996 after it was

found on 37 acres in 11 counties. The weed has slowly spread over time and currently infests approximately 1200 acres in 20 counties. State law requires all plants to be removed to prevent this plant from becoming a major weed problem in the wetlands of the state.

The most destructive impact of purple loosestrife invasions is on the ecology of aquatic sites. Purple loosestrife forms dense monotypic stands as it displaces native wetland plants (Figure 2). Under optimum conditions, a small isolated group of purple loosestrife plants can spread to cover aquatic sites in just one growing season (Figure 3). When purple loosestrife replaces native vegetation it also can displace wildlife. For example, songbirds do not consume the small hard seed. Muskrats use cattails to build their homes, and they show a preference for cattail over purple loosestrife for food. Waterfowl, especially ducks, avoid wetlands that have become dominated with purple loosestrife. In addition, overall waterfowl production decreases as suitable nesting habitat is eliminated. The plant's growth is generally too compact to offer cover, and cover may be as crucial to wildlife as food.

Purple loosestrife has been heavily utilized in North Dakota flower gardens, park plantings, and golf courses. Research has found that all varieties of *lythrum* produce seed, which is a source of infestation to aquatic sites, including rivers, lakes, sloughs, dams, dugouts, bogs, swamps, irrigation ditches, streams (perennial or semi-permanent) and other water courses, or wet sites. To prevent spread into aquatic sites, all purple loosestrife plantings are required by state law to be removed.

NDSU

N.D. Agricultural Experiment Station
NDSU Extension Service

North Dakota State University, Fargo, North Dakota

Revised April 2018



Figure 1. Many landscapes and gardens in North Dakota use *Lythrum* as a highlight of the planting.



Figure 2. Purple loosestrife invades wetland areas and displaces native plants, such as cattails shown here.



Figure 3. When *Lythrum* reverts to the weedy purple loosestrife, it can invade wetlands and rapidly spread.



Description

Purple loosestrife is a rhizomatous perennial forb introduced to North America from Eurasia and Africa. Wild infestations are associated with moist or marshy sites. The stems are erect (1.5 to 8 or more feet tall), four to six angled, and can be smooth or pubescent with few branches. Leaves are simple (0.75 to 4 inches long, 0.2 to 0.5 inches wide), entire, and can be opposite or whorled.

The most identifiable characteristic of purple loosestrife is the striking rose to purple colored flowers (Figure 4). The flowers are arranged on a spike, which can be a few inches to 3 feet long. Each flower has five to seven petals arising from a cylindrical green tube. The plant usually flowers from early July to mid-September in North Dakota. The seed capsule is two celled and contains many very small seeds (1 mm long or less). The roots become thick and woody in mature plants. The aerial shoots die in the fall and new shoots arise the following spring from buds at the top of the root crown. Although the root crown expands and produces more shoots each year, the maximum growth of the root crown diameter is limited to about 20 inches.

Spread of purple loosestrife is primarily by seed, but the plant can also spread vegetatively from stem cuttings. Research at NDSU has shown that seed viability of purple loosestrife growing in North Dakota wetlands ranged from 50 to 100 percent. With approximately 2.7 million seeds produced per plant, purple loosestrife has the potential to spread rapidly once established in an area.



Figure 4. Purple loosestrife flowers are very striking purple arranged on a spike.

Control

Several methods are available for purple loosestrife control, including mechanical, biological, and chemical. The size and location of a specific infestation will determine the best control methods. In general, small infestations of a few plants can be controlled by digging, especially when plants are only a few years old. Larger infestations require treatment with herbicides and/or biological control agents.

Mechanical control

Small infestations can be controlled by removing all roots and underground stems. It is difficult to remove all of the roots in a single digging, so monitor the area for several growing seasons to ensure that purple loosestrife has not regrown

from roots or seed. This method is most useful on garden plantings or young infestations.

Dispose of plants and roots by drying and burning or by composting in an enclosed area. Take care to prevent further seed spread from clothing or equipment during the removal process. Removal of all plant material is important. Small segments of purple loosestrife stems can become rooted and reestablish the infestation.

Chemical control

Herbicides can be used to control purple loosestrife in areas too large to be controlled by digging. Also, herbicides can be applied to individual plants selectively in landscape situations to prevent killing desirable plants. Infestations growing along streams or in marshy areas may require specialized equipment and application by trained professionals.

Rodeo or Roundup, various other trade names (glyphosate)

Glyphosate will provide good control of purple loosestrife when applied from July to early September. Many formulations of glyphosate are sold but only those labeled for aquatic use can be applied in or near water. **For example, the Rodeo and Glypro formulations of glyphosate can be used in water.** With the Rodeo or Glypro formulations, a nonionic surfactant approved for aquatic sites at 0.25% vol/vol must be added to the spray solution. **Roundup and similar glyphosate formulations** can be used to remove purple loosestrife from large plantings or infestations away from water. Glyphosate has no soil residual so it could be used to remove purple loosestrife located within an ornamental planting without having to dig in the flower bed. Best results have been obtained when glyphosate is applied as a 1 to 1.5% concentration (1 to 1.5 gallons glyphosate per 100 gallons of water) or (1.3 to 1.9 fl. oz./gallon of water) at bloom or shortly thereafter.

A variety of sprayers, including backpack sprayers and boat-mounted sprayers, can be used to control purple loosestrife in aquatic sites. Wick application is also effective but is labor intensive. Spray dye added to the tank may be useful to ensure uniform application to purple loosestrife with minimal herbicide applied to desirable plants.

Eliminating the entire vegetative cover will promote purple loosestrife seed germination, which can result in an increase in plant density rather than control. Since glyphosate does not provide residual control, treated areas will need to be monitored

for regrowth from the roots or seedlings for several years. A **2,4-D formulation labeled for use near water** applied as a 2% solution (2 gallons 2,4-D per 100 gallons of water) or (2.6 fl. oz./gallon of water) will prevent seedling establishment when applied in early fall or spring before the plants can establish perennial characteristics.

Garlon 3A (triclopyr)

Garlon is a selective broadleaf herbicide that will not kill cat-tail or other desirable monocot species. **Important: Only Garlon 3A formulation is labeled for use in wetland sites. Minimize overspray to open water. See label for precautions for use near potable water intakes.** Garlon will provide good to excellent purple loosestrife control when applied in the pre to early flower or late flower growth stages. Garlon should be applied as a 1 to 2% solution (1 to 2 gallons Garlon per 100 gallons of water or 1.3 to 2.6 fl. oz./gallon of water) and will provide some residual seedling control. Garlon can be applied in dryland sites but should not be used in landscapes or flower beds because soil residual of the herbicide may prevent establishment of other horticultural plants.

Regardless of the herbicide applied, the infested areas should be monitored to ensure that purple loosestrife does not reinfest from root or seed. Also, areas downstream from river or creek infestations and on all sides of a lake or pond infestation should be monitored for purple loosestrife seedlings.

Biological control

Three biocontrol insect species were first released in North Dakota in 1997 and include:

Galerucella pusilla — a leaf-feeding beetle

Galerucella californiensis — a leaf-feeding beetle

Hylobius transversovittatus — a root-mining weevil

Of these insects, the two *Galerucella* spp. leaf feeding beetles have been most successful. These insects overwinter as adults and lay eggs in early June in North Dakota. The adults and especially the larvae feed on the leaves and flowers of purple loosestrife (Figure 5). Following several summers of heavy feeding, purple loosestrife infestations have been greatly reduced (Figure 6). However, since the largest infestations in North Dakota are in urban areas, mosquito control programs have kept these insects from becoming well established. Purple loosestrife infestations in North Dakota are generally small and isolated and **should be controlled by chemical and/or mechanical methods.**



Figure 5. Purple loosestrife biocontrol agents are much smaller than the more familiar *Aphthona* spp. flea beetles used for leafy spurge control and have a much different life cycle. *Galerucella* spp. adults feed on purple loosestrife leaves beginning in early June, then lay eggs underneath the plant leaves and cover them with frass. The eggs hatch in late-June and July and larvae feed on both leaves and flowers before pupating and over-wintering as adults.



Figure 6. Dense purple loosestrife infestation on the Sheyenne River at Valley City in 1997 (left) when *Galerucella* spp. were released, and control in 2000 (right). The purple loosestrife stand was eliminated and native cattails predominated by 2004.

Possible replacements for horticultural plantings

If you currently have a cultivar of purple loosestrife growing in your garden or in a public planting, state law requires the plants be removed. Removal of purple loosestrife is the only way to prevent the plant's spread into North Dakota wetlands. (Reviewed and updated by Dr. Esther McGinnis, NDSU Extension Service Horticultural Specialist.)

Several perennial plants that produce flowers on spikes could serve as replacement plants for purple loosestrife and include:

Blazing Star, Gay Feather (*Liatris* spp.) – Plants grow 2 to 3 feet tall and have flower spikes in white, pink, or purple from July through September. Good cut flower. They are drought tolerant and grow best in full sun. Some species of *Liatris* are native. Likely the best overall replacement plant.

Bugbane or Black Snakeroot (*Cimicifuga racemosa*) – Grows 3 to 5 feet tall with 4 to 6 foot ivory-white flower spikes in late summer. Prefers moist site with high organic matter in full sun or partial shade.

Catmint (*Nepeta x faassenii*) – Hardy border plant with lavender-blue flowers from early summer to fall. Compact cultivars are available and include 'Walkers Low' and 'Kit Kat'. Shear the spent flower heads to encourage a second set of blooms.

Cardinal flower (*Lobelia cardinalis*) – Scarlet red flowers from early to late summer. Grows 2 to 3 three feet tall and prefers partial shade and moist growing conditions. Excellent choice for near ponds or streams. Native to North America.

False indigo (*Baptisia* spp.) – This long-lived perennial features spikes of purple flowers and forms a bush-like clump. Plant height ranges from 30 to 60 inches depending upon the cultivar. False indigo is slow growing in the beginning but will mature into an impressive specimen.

Penstemon, beard-tongue (*Penstemon* spp.) – Bell shaped flowers. Grows about 3 feet tall and wide in full sun with good drainage. The cultivar 'Dark Towers' has wine-red foliage and light pink flowers.

Russian sage (*Perovskia atriplicifolia*) – Grows to 2 to 5 feet tall and wide with feathery spires of purple flowers from mid-summer to frost. Aromatic foliage, gray-green sage color. Grows best in full sun. Drought tolerant.

Salvia (*Salvia nemorosa*, *S. x sylvestris*) – Drought resistant, hardy perennial. Plant grows 2 to 3 feet tall with blue to violet flowers on spikes in June and again in August. 'May Night' and 'Crystal Blue' are good choices for North Dakota gardens.

Spike speedwell (*Veronica spicata*) – Shorter growing (18 inches) than others listed with dense blue, white, or pink flowers on a spike. Best in well drained soil with full sun. The cultivar 'Royal Candles' is a prolific bloomer and has a compact form.

Plants suitable to replace purple loosestrife that was grown for a tall background border but have a different growth form and do not have flowers borne on a spike:

Blanket Flower (*Gaillardia aristata*) – Yellow flowers with red centers. Blooms from June through September and grows 2 to 3 feet tall and wide. Will tolerate heat and survives in poor soils.

Heliopsis (*Heliopsis* spp.) – Resembles sunflowers and used for background border. Grows 3 to 4 feet tall and flowers in mid-summer. Best in full sun. Native to North America.

Purple cone flower (*Echinacea purpurea*) – Drought tolerant, a daisy like flower which blooms from mid-summer to frost with white to purple or red flowers.

Rudbeckia (*Rudbeckia* spp.) – Black-eyed Susan is a short growing example. Some plants grow over 6 feet, such as Autumn Sun coneflower. Yellow daisy like flowers. Native to North America.

For more information on this and other topics, see www.ag.ndsu.edu

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