

## Purple Loosestrife, *Lythrum salicaria*

Lythraceae

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Purple loosestrife is an erect, herbaceous perennial of Eurasian origin that is invading and colonizing our wetlands at an alarming rate. This attractive, vigorous plant forms dense monotypic stands that threaten the diversity of wetland plants and consequently affect the animal inhabitants.

**Identification:** *Plant habit:* stout, upright herbaceous perennial with a dense bushy growth of up to fifty stems (Fig. 1).

*Stems:* stiff, four-sided, two to seven feet tall, dying back each year.

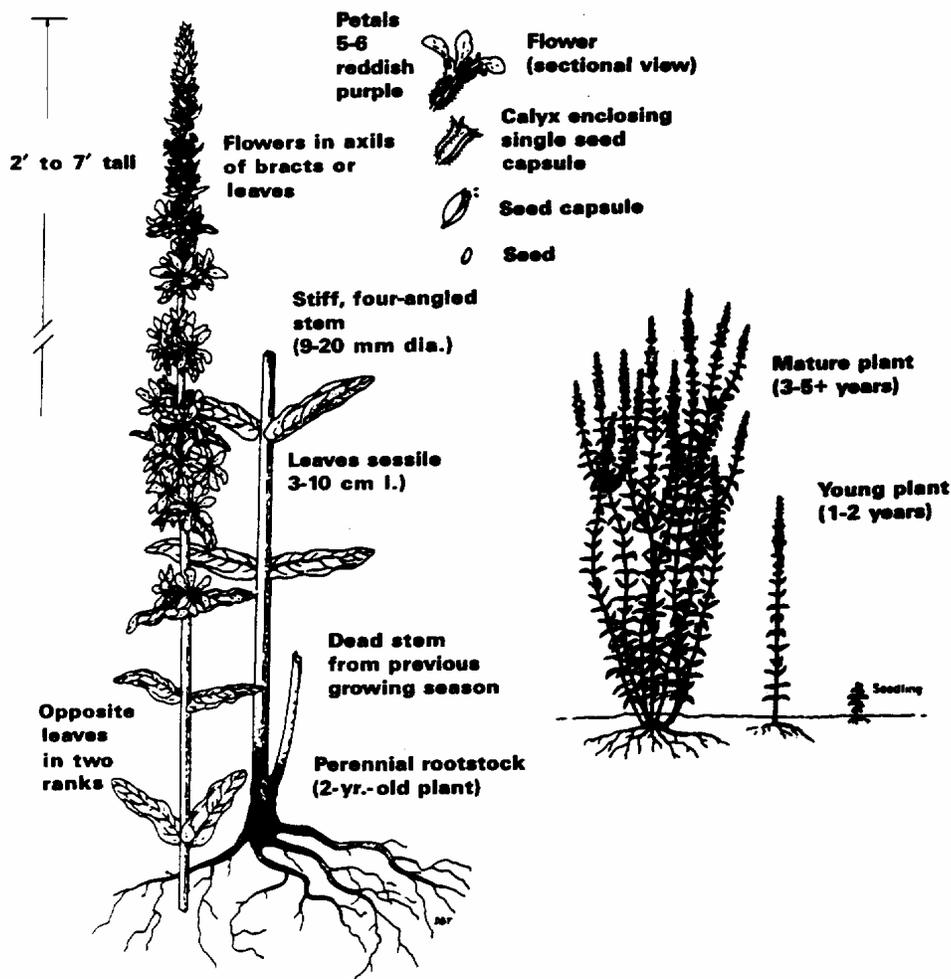


Fig. 1. Structure, growth forms, and field identification characters of purple loosestrife (From Thompson et al.1987; courtesy of U.S. Fish and Wildlife Service.).

*Leaves:* opposite, 2-ranked, linear or lance-shaped, edges smooth, attached directly to the stem (no petioles) (Fig. 2); larger ones nearly heart-shaped at the base. Foliage may be hairy.

*Flowers:* rose-purple, closely attached to the stem, and numerous on long spikelike inflorescences that top the stems (Fig. 2). Individual flowers are 1/2 in. to 3/4 in. in diameter with five or six petals. This plant has a long blooming period from late June through early September as flowering progresses from the base of the spike toward the apex.

*Seeds:* small (1 mm long), numerous, tapered on one end, and borne in spiraling rows of dark brown seed capsules (5mm long).

*Roots:* woody taproot with numerous fibrous side shoots that form a dense mat.



Fig. 2. Purple loosestrife, showing the two-ranked leaves topped by the long, spikelike inflorescence. (Courtesy of Ann Rhoads, Morris Arboretum.)

**Nomenclature:** The genus *Lythrum* consists of about thirty species, mostly of north temperate regions. The generic name comes from the Greek "luthron," blood, possibly referring to the color of the flowers or to one of its herbal uses as an astringent to stop the flow of blood.

The four species of *Lythrum* occurring in Pennsylvania are *L. salicaria* (purple loosestrife), *L. hyssopifolia* (hyssop loosestrife), *L. virgatum* (wand loosestrife), and *L. alatum* (winged loosestrife).

*Lythrum alatum*, our only native species, has inconspicuous solitary flowers in the upper leaf axils. It grows as a natural component of native wetland vegetation.

*Lythrum virgatum* is much like *L. salicaria*, but is hairless throughout, with the leaves narrowed to the base. Several ornamental cultivars of loosestrife are listed under *L. salicaria* or *L. virgatum*. *Lythrum virgatum* is represented by a single herbarium specimen in Pennsylvania, but in Massachusetts and parts of New England it is locally established as an escape from cultivation.

*Lythrum hyssopifolia*, an annual with small, narrow, mostly alternate leaves, is represented in the southeastern tip of Pennsylvania.

**History and Distribution:** Purple loosestrife is an emergent aquatic plant of Eurasian origin. With the rise of marine commerce it became established on all midlatitude continents, except South America.

The arrival and spread of purple loosestrife in the United States has been a combination of accidental and intentional introductions. It was present along eastern seaports in the 1830s as ships from Eurasia dumped seed-contaminated ballast. It then spread via canals, rivers, and streams, taking advantage of major site disturbances as human activity increased with westward expansion. *Lythrum salicaria* was planted in immigrants' herbal gardens for its medicinal qualities, and it was also recommended for planting as a forage for bees. Its beauty, vigor, and long blooming season soon made it an ornamental favorite as well.

In North America, purple loosestrife now occurs in greatest concentrations in northeastern United States and adjacent Canada, where it is common to abundant (Fig. 3). In lower densities it occurs across virtually the entire United States (except Alaska and a few southern states) and the southern portion of Canada.

In Pennsylvania, it is known to occur in 45 of our 67 counties. The greatest density is in eastern Pennsylvania along the Delaware River and its drainage area.

In North America, this plant is a classic example of an introduced species whose distribution and spread have been enhanced by the absence of natural enemies and the disturbance of natural water systems.

**Habitat:** Any sunny wetland is susceptible to invasion by purple loosestrife; this plant grows in moist soil to shallow water, such as:

- wet meadows and pastures
- marshes
- stream and river banks
- lake shores and ditches
- storm water retention basins

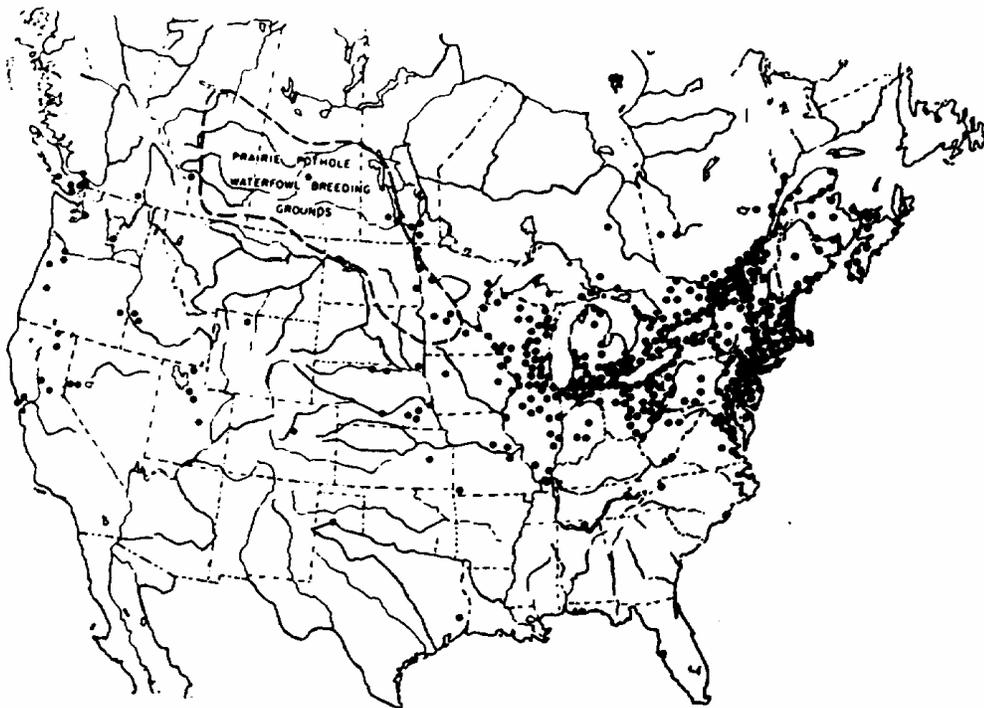


Fig. 3. Distribution of purple loosestrife in North America as of 1988 (From Thompson et al. 1987) (Courtesy of U.S. Fish and Wildlife Service.)

Anywhere you see cattails (*Typha* spp.) is a potential site for purple loosestrife. Established plants, however, can tolerate drier conditions, and this plant is sometimes planted in gardens.

**Biology and Spread:** Purple loosestrife propagates primarily from seed but can also grow from broken-off stem pieces that will root in the mud, and from root pieces that will produce new plants. One mature plant, with its multiple stalks, can produce over 1,000,000 seeds in a season. The tiny seeds can float downstream to invade new areas or can be spread by mud on birds' feet, wildlife fur, boats, vehicle tires, and footwear.

Seeds may remain viable for many years until conditions favor germination. This opportunity occurs when disturbances such as water drawdowns or exposed soil accelerate the process by providing the substrate and sunlight exposure needed for germination. Germination rates are generally high.

A loosestrife invasion usually begins with a few pioneering plants. These first plants may not spread for several years, as they build up a large seed bank in the soil. Then, when the right disturbance occurs, the loosestrife often spreads rapidly, persistently taking space, never giving any up.

**Ecology and Economic Importance:** This semiaquatic perennial weed:

- replaces native wetland vegetation
- eliminates food and shelter for wildlife
- chokes waterways

After being introduced to North America, purple loosestrife managed to escape the specialized insects and diseases that keep it in check in Europe and Asia. Free from these natural controls, loosestrife gained a competitive edge over our native wetland plants. This advantage, along with prolific seed production, the ability to grow in a wide variety of soil types, and a large aggressive growth, allows purple loosestrife to invade wetlands to the near total exclusion of other vegetation. As a result, not only is our diverse wetland vegetation threatened, but also the wildlife that depend upon native vegetation for food and shelter. Wetland animals eat "around" purple loosestrife, consuming the remaining native plant population. As native vegetation is consumed, more space is created for new loose strife plants, which have little or no food and shelter value for wetland wildlife.

Loosestrife can form dense, impenetrable barriers between land and water that not only exclude waterfowl, but also people trying to gain access for fishing and boating (Fig. 4). The matlike root system and foliage of dense stands reduce the natural flow of waterways (Fig. 5). This process promotes the deposit of silt, causing long-term water quality degradation.

Fifteen states have already declared purple loosestrife a noxious weed.

Because it is an attractive plant, nurseries sell cultivars of loosestrife to gardeners. Some beekeepers value this long-blooming perennial as a source of pollen and nectar.

**Control - IPM Options:** Loosestrife control is difficult because of its high reproductive rate, tolerance to a wide range of conditions, and a lack of natural predators.

An integrated pest management (IPM) approach, considering site characteristics and size of infestation, should be developed to take advantage of all available control methods.



*Fig. 4. Dense stand of purple loosestrife. (Courtesy of Ann Rhoads, Morris Aboretum.)*



*Fig. 5. Purple loosestrife closing in on a stream (Courtesy of Minnesota Dept. of Natural Resources.)*

The best control of purple loosestrife is prevention. Once it becomes established in an area, no reasonable expenditure of money or effort can control it.

Efforts should first be targeted at satellite populations away from large infested areas, before a large seed bank is built up. Wetlands that do not currently have loosestrife need to be monitored, to ensure that any invasion is detected early.

*Physical* - generally effective on small clusters up to 100 plants

- younger plants can be hand pulled.
- older plants can be dug out. Avoid excessive soil disturbance. If this is unavoidable, consider chemical methods. Roots must not be broken off or they will resprout.
- mowing can prevent flowering and seeding, but stem pieces must be picked up and destroyed, or they will root in moist soil, multiplying the problem.
- cut and bag the flower spikes if no other options are available. This will prevent millions of seeds from spreading. Removed flower parts should be dried and preferably burned. Do not throw them on your compost pile.

*Chemical* - generally practical for up to 1,000 plants (3 acres)

Currently, the most effective aquatic herbicide for purple loosestrife control is "Rodeo" (glyphosate). Rodeo should be applied to the foliage any time throughout the blooming

Season (late June-early September) at the preferred rate of a 1% solution. Because it is a broad-spectrum herbicide, however, Rodeo will injure or kill any vegetation to which it is applied and is recommended only for spot spraying. Broadcasting this aquatic glyphosate can eliminate the entire vegetative cover of an area. The retention of a dense vegetative canopy is very important for the suppression of seed germination and seedling growth of purple loosestrife.

The herbicide Garlon 3A (triclopyr), not yet labeled for aquatic use but tested under experimental conditions, will likely be the herbicide of choice for loosestrife control when approved for aquatic use. The advantage of Garlon 3A is that it is for broadleaf (dicot) plants and does not harm monocots such as grasses, Cattails, sedges, rushes, etc.

Pennsylvania statutes require that anyone who applies a herbicide to commonwealth waters must have a permit issued jointly by the Pennsylvania Fish and Boat Commission (PFBC) and the Department of Environmental Resources DER. To obtain a permit application, or to determine if a permit is required, contact the nearest regional office of the PFBC or DER.

Due to seedling recruitment from the seed bank and resprouting of purple loosestrife from taproots, herbicide treatments must be reapplied for several growing seasons to achieve control.

**Biological** - long-term control of large infestations greater than 1,000 plants

A major reason for purple loosestrife's expansion in North America is the apparent lack of natural predators and diseases. Biological control using insect predators from loosestrife's native European range is a control strategy currently in the early stages of field development. To date, 90,000 leaf-eating beetles (*Galerucella* spp.) have been released in 16 states.

In 1992, three insects were approved for release in the United States by the U S Dept of Agriculture. Two leaf-eating beetles, *Galerucella californiensis* and *G. pusilla*, and a root-boring weevil, *Hylobius transversovittatus*, have shown promise for controlling loosestrife. Pennsylvania along with six other states, received these three insect species for release and evaluation. At the Pennsylvania release site (John Heinz National Wildlife Refuge at Tinicum), at least one of the leaf beetle species has survived our winters and become established; the status of the other released agents is uncertain. It is too early to know how effective these insects will be as biological control agents in Pennsylvania. Additional releases are planned for the 1995 season.

While herbicides are used to "eradicate" weeds, biological agents are used to control them. They reduce weed densities so their impact on other species is minimized

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