Plant Risk Evaluator -- PRE™
Evaluation Report

Lythrum virgatum 'Morden Gleam' -- Illinois

2017 Farm Bill PRE Project

PRE Score: 19 -- Reject (high risk of invasiveness)
Confidence: 72 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Submitted

Evaluation Date: October 18, 2017

This PDF was created on June 15, 2018

Plant Evaluated

Lythrum virgatum 'Morden Gleam'

Image by Green Gate Farms

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Lythrum virgatum 'Morden Gleam'*) in an effort to understand the invasive history, reproductive strategies, and the impact, if any, on the region's native plants and animals. This research reflects the data available at the time this evaluation was conducted.

Summary

Lythrum salicaria is frequently named one of the worst invasive plants in the United States. L. virgatum is very closely related to the invasive L. salicaria: "taxonomic confusion has made it difficult to distinguish these species based on morphological characteristics or isozymes" (Strefeler). Distributions of L. virgatum are therefore not well known. Most of the literature focuses on L. salicaria, but some invasive listing and information sources treat all nonnative species, hybrids, and cultivars of Lythrum as one purple loosestrife complex. This screening only references these sources that also mention L. virgatum and cultivars. At one time thought to be sterile, research shows that the cultivar 'Morden Gleam' produces viable seed when cross-pollinated. Unfortunately, some nurseries still offer 'Morden Gleam' for sale, describing it as seedless and non-invasive. When seed is produced, it is copious and germinates readily. The tiny seeds can be dispersed by wind, water, animals, and humans. Plants also reproduce from fragments. This plant is a particular danger to wetlands, where it outcompetes native vegetation and forms monocultures. This screening shows that 'Morden Gleam' is not a safe choice in Illinois.

General Information

Status: Submitted
Screener: Emily Russell
Evaluation Date: October 18, 2017

Plant Information

Plant: *Lythrum virgatum 'Morden Gleam'*

If the plant is a cultivar, how does its behavior differs from its parent's?
Lythrum virgatum 'Morden Gleam' was developed by crossing L. virgatum ‘Morden Pink’ with select forms of the North American native L. alatum. At one time thought to be sterile, research shows that 'Morden Gleam' produces viable seed when cross-pollinated. Lythrum virgatum is very closely related to the invasive Lythrum salicaria: "taxonomic confusion has made it difficult to distinguish these species based on morphological characteristics or isozymes" (Strefeler). Invasive listing and information sources sometimes treat all nonnative species, hybrids, and cultivars of Lythrum as one.

Regional Information

Region Name: Illinois

Climate Matching Map

To answer four of the PRE questions for a regional evaluation, a climate map with three climate data layers (Precipitation, UN EcoZones, and Plant Hardiness) is needed. These maps were built using a toolkit created in collaboration with GreenInfo Network, USDA, PlantRight, California-Invasive Plant Council, and The Information Center for the Environment at UC Davis.

Click here to see the generated climate matching map for this region. This climate match database is hosted by GreenInfo Network and publicly accessible.

Evaluation Questions

These questions are based in an original article published at the University of California, Davis, and can be found on the PLOS One website, here: https://doi.org/10.1371/journal.pone.0121053

Invasive History and Climate Matching (Questions 1 - 6)

1. Has the species (or cultivar or variety, if applicable; applies to subsequent "species" questions) become naturalized where it is not native?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Lythrum virgatum is naturalized in Germany, France, and Pennsylvania. It could be more widespread in the US, since it is difficult to distinguish from L. salicaria (which is naturalized in 40 states) and can hybridize with invasive populations. Scientists suspect that 'Morden Gleam' does contribute to naturalized populations. "Genetic similarity between weedy purple loosestrife and cultivars, regardless of species origin, was moderate to high, indicating that L. virgatum cultivars might be progenitors of weedy purple loosestrife." (Strefeler) "In addition, the morphological traits of the cultivars are similar to those of naturalized purple loosestrife populations." "Cultivars are highly fertile, producing viable seeds and fertile progeny when crossed as male or female with wild purple loosestrife populations, L. alatum, or other cultivars. Thus, Lythrum cultivars grown in gardens could serve as pollen or seed sources, thereby promoting the continued spread of purple loosestrife." (Anderson)

Reference(s):

- USDA-Grin (2011). Lythrum virgatum L. In: Taxonomy - GRIN-Global Web v 1.9.9.2.
- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).
- Ottenbreit, K. A., & Staniforth R. J. (1994). Crossability of naturalized and cultivated Lythrum taxa. Canadian Journal of Botany. 72, 337–341.
- Strefeler, M. S., Darmo E., Becker R. L., & Katovich E. J. (1996). Isozyme Variation in Cultivars of Purple Loosestrife (Lythrum sp.). HortScience. 31, 279–282.
- Anderson, N. O., & Ascher P. D. (1993). Male and Female Fertility of Loosestrife (Lythrum) Cultivars. Journal of the American Society for Horticultural Science. 118, 851–858.

2. Is the species (or cultivar or variety) noted as being naturalized in the US or world in a similar climate?

- Answer: **Yes**, which contributes **2** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Lythrum virgatum is naturalized in Pennsylvania, which shares a climate with Illinois.

Reference(s):

- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).

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3. Is the species (or cultivar or variety) noted as being invasive in the U.S. or world?

- Answer: **Yes**, which contributes **2** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

'Morden's Gleam' falls under invasive plant regulations in: MI, MN, IA, IN, NC, TN, WA, and WI (and possibly others). L. virgatum 'Morden Gleam' is recognized by scientists as an invasive risk wherever Lythrum salicaria is invasive, which is widespread in the United States. "Genetic similarity between weedy purple loosestrife and cultivars, regardless of species origin, was moderate to high, indicating that L. virgatum cultivars might be progenitors of weedy purple loosestrife." (Strefeler) "Cultivars are highly fertile, producing viable seeds and fertile progeny when crossed as male or female with wild purple loosestrife populations, L. alatum, or other cultivars. Thus, Lythrum cultivars grown in gardens could serve as pollen or seed sources, thereby promoting the continued spread of purple loosestrife." (Anderson) "Cultivars of Lythrum are capable of contributing viable seed and (or) pollen to the spread of purple loosestrife. The sale of cultivars, regardless of parentage, should be prohibited." (Ottenbreit)

Reference(s):

- Ottenbreit, K. A., & Staniforth R. J. (1994). Crossability of naturalized and cultivated Lythrum taxa. Canadian Journal of Botany. 72, 337–341.
- Strefeler, M. S., Darmo E., Becker R. L., & Katovich E. J. (1996). Isozyme Variation in Cultivars of Purple Loosestrife (Lythrum sp.). HortScience. 31, 279–282.
- Anderson, N. O., & Ascher P. D. (1993). Male and Female Fertility of Loosestrife (Lythrum) Cultivars. Journal of the American Society for Horticultural Science. 118, 851–858.
- Ontario Federation of Anglers and Hunters (2017). Purple Loosestrife: What you should know, what you can do - MN Sea Grant.
- USDA NRCS (2017). USDA PLANTS Database: Lythrum virgatum (European wand loosestrife).

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4. Is the species (or cultivar or variety) noted as being invasive in the US or world in a similar climate?

- Answer: **Yes**, which contributes **3** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

'Morden's Gleam' falls under invasive plant regulations in: MI, MN, IA, IN, TN, and WI, which have some climate overlap with Illinois. L. virgatum 'Morden Gleam' is recognized by scientists as an invasive risk wherever Lythrum salicaria is invasive, including the Midwest and Northeast United States where there is climate overlap with Illinois.

Reference(s):

- USDA NRCS (2017). USDA PLANTS Database: Lythrum virgatum (European wand loosestrife).

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5. Are other species of the same genus (or closely related genera) invasive in a similar climate?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

Lythrum salicaria is a noxious weed in the Midwest and Northeast United States as well as Ontario, in climates similar to Illinois. L. virgatum may hybridize with L. salicaria. These two species can be difficult to distinguish.

Reference(s):

- USDA NRCS (2017). USDA PLANTS Database: Lythrum virgatum (European wand loosestrife).

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6. Is the species (or cultivar or variety) found predominately in a climate matching the region of concern?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

Lythrum virgatum has a wider range than climates similar to Illinois.

Reference(s):

- USDA-Grin (2011). Lythrum virgatum L. In: Taxonomy - GRIN-Global Web v 1.9.9.2.

Impact on Native Plants and Animals (Questions 7 - 10)

7. Does this plant displace native plants and dominate (overtop or smother) the plant community in areas where it has established?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

"Once it's present, it has a tendency to dominate, outcompeting native vegetation. The result is solid (monotypic) stands of purple loosestrife. This drastic change in species composition and decrease in biodiversity has been reported to affect the nutrient cycling regime of wetlands and the sue of the area by wildlife." "The showy purple spikes of purple loosestrife (Lythrum salicaria and L. virgatum) are attractive both in the garden and on roadsides. But their rampant spread has greatly reduced the ecological value of marshes by displacing native wetland vegetation such as cattails (Typha spp.) that waterfowl feed on and that muskrats and long-billed marsh wrens need to build their nests." "Adapts to a range of environments with moist soils and shallow waters where it competes with native wetland plants. Through spreading by seed or vegetatively, it can form dense monocultures of little value to wildlife."

Reference(s):

- Manitoba Purple Loosestrife Project (2010). Top 10 FAQ - Purple Loosestrife InfoCentre.
- Meier, T. (0). Sterile cultivars of loosestrife may not be so. Fine Gardening.
- Wisconsin Department of Natural Resources (2015). Wanded Loosestrife/Lythrum virgatum.

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8. Is the plant noted as promoting fire and/or changing fire regimes?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

No evidence of changing fire regimes.

Reference(s):

- [Anonymous] .

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9. Is the plant a health risk to humans or animals/fish? Has the species been noted as impacting grazing systems?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

No evidence of health risks to humans or animals.

Reference(s):

- [Anonymous] .

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10. Does the plant produce impenetrable thickets, blocking or slowing movement of animals, livestock, or humans?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

There is no evidence of impenetrable thickets.

Reference(s):

- [Anonymous] .

Reproductive Strategies (Questions 11 - 17)

11. Does this species (or cultivar or variety) reproduce and spread vegetatively?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

"Purple loosestrife can also spread vegetatively, by pieces of the stems or roots." "Since purple loosestrife can regenerate from even the smallest piece of root tissue left in the soil, digging is not a viable long term solution." "It can spread through seeds when cross-pollinated with other Lythrum species or through rooting stem fragments."

Reference(s):

- Manitoba Purple Loosestrife Project (2010). Top 10 FAQ - Purple Loosestrife InfoCentre.
- Wisconsin Department of Natural Resources (2015). Wanded Loosestrife/Lythrum virgatum.

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12. If naturally detached fragments from this plant are capable of producing new plants, is this a common method of reproduction for the plant?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

"Purple loosestrife can also spread vegetatively, by pieces of the stems or roots." "Since purple loosestrife can regenerate from even the smallest piece of root tissue left in the soil, digging is not a viable long term solution." "It can spread through seeds when cross-pollinated with other Lythrum species or through rooting stem fragments."

Reference(s):

- Manitoba Purple Loosestrife Project (2010). Top 10 FAQ - Purple Loosestrife InfoCentre.
- Wisconsin Department of Natural Resources (2015). Wanded Loosestrife/Lythrum virgatum.

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13. Does the species (or cultivar or variety) commonly produce viable seed?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

"Cultivars rarely produced seeds as a result of selfing but many crosses with wild plants or with other cultivars were fertile. As expected, legitimate (i.e., different style morphs) wild crosses were highly fertile, but other crosses gave high fertility, especially those in which 'Morden Gleam' was the provider of pollen or ovules." (Ottenbreit) "Legitimate pollinations involving ‘Morden Gleam’ did not produce seed; however, selfing ‘Morden Gleam’ and interspecific hybridization with L. alatum did result in seed set (data not shown). In addition, open-pollinated seed (from selfing or crossing in the nursery) was collected from this cultivar." (Anderson)

Reference(s):

- Ottenbreit, K. A., & Staniforth R. J. (1994). Crossability of naturalized and cultivated Lythrum taxa. Canadian Journal of Botany. 72, 337–341.
- Anderson, N. O., & Ascher P. D. (1993). Male and Female Fertility of Loosestrife (Lythrum) Cultivars. Journal of the American Society for Horticultural Science. 118, 851–858.

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14. Does this plant produce copious viable seeds each year (> 1000)?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

'Morden Gleam' had an average of 43-62 seeds per capsule in Anderson's study. A single stem can produce hundreds of capsules. However, 'Morden Gleam' is heterostylous and self-incompatible, so it must be compatibly cross-pollinated. Isolated plants may not produce seed.

Reference(s):

- Anderson, N. O., & Ascher P. D. (1993). Male and Female Fertility of Loosestrife (Lythrum) Cultivars. Journal of the American Society for Horticultural Science. 118, 851–858.

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15. Is there significant germination (>25%) of seeds the next growing season, with no requirement of an infrequent environmental condition for seeds to germinate (i.e. fire) or long dormancy period?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

"Germinability of ripe seeds from any cross was high and averaged 98%." "Seed from legitimate crosses of L. salicaria × cultivars had 30% to 100% germination."

Reference(s):

- Ottenbreit, K. A., & Staniforth R. J. (1994). Crossability of naturalized and cultivated Lythrum taxa. Canadian Journal of Botany. 72, 337–341.
- Anderson, N. O., & Ascher P. D. (1993). Male and Female Fertility of Loosestrife (Lythrum) Cultivars. Journal of the American Society for Horticultural Science. 118, 851–858.

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16. Does this plant produce viable seed within the first three years (for an herbaceous species) to five years (for a woody species) after germination?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

The closely related Lythrum salicaria flowers within the first year after germination.

Reference(s):

- [Anonymous] .

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17. Does this plant continuously produce seed for >3 months each year or does seed production occur more than once a year?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Lythrum virgatum 'Morden Gleam' repeat-blooms for the duration of the growing season.

Reference(s):

- [Anonymous] .

Dispersal (Questions 18 - 20)

18. Are the plant's propagules frequently dispersed long distance (>100 m) by mammals or birds or via domestic animals?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

"Garden seeds can be transported by animals, by humans on clothing or by vehicles, and rainfall carries them into river systems and wetlands through storm water run-off." "Water, wind, wildlife, and humans easily spread the lightweight seeds that are shed throughout the winter."

Reference(s):

- Manitoba Purple Loosestrife Project (2010). Top 10 FAQ - Purple Loosestrife InfoCentre.
- Swearingen, J.., & Bargeron C.. (2016). European wand loosestrife: Lythrum virgatum (Myrtales: Lythraceae): Invasive Plant Atlas of the United States.

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19. Are the plant's propagules frequently dispersed long distance (>100 m) by wind or water?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

"Garden seeds can be transported by animals, by humans on clothing or by vehicles, and rainfall carries them into river systems and wetlands through storm water run-off." "The seeds are small, light and are easily dispersed by the wind, which carries them great distances." “One mature plant can produce over 2 million seeds annually that are easily transported by the wind or water into wetlands."

Reference(s):

- Manitoba Purple Loosestrife Project (2010). Top 10 FAQ - Purple Loosestrife InfoCentre.
- Meier, T. (0). Sterile cultivars of loosestrife may not be so. Fine Gardening.
- Swearingen, J.., & Bargeron C.. (2016). European wand loosestrife: Lythrum virgatum (Myrtales: Lythraceae): Invasive Plant Atlas of the United States.

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20. Are the plant's propagules frequently dispersed via contaminated seed (agriculture or wildflower packets), equipment, vehicles, boats or clothing/shoes?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

"The majority of wild infestations of purple loosestrife are the result of garden escapes." "Garden seeds can be transported by animals, by humans on clothing or by vehicles, and rainfall carries them into river systems and wetlands through storm water run-off." "Water, wind, wildlife, and humans easily spread the lightweight seeds that are shed throughout the winter."

Reference(s):

- Manitoba Purple Loosestrife Project (2010). Top 10 FAQ - Purple Loosestrife InfoCentre.
- Swearingen, J.., & Bargeron C.. (2016). European wand loosestrife: Lythrum virgatum (Myrtales: Lythraceae): Invasive Plant Atlas of the United States.

Total PRE Score

PRE Score: 19 -- Reject (high risk of invasiveness)
Confidence: 72 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

PRE Score Legend

The PRE Score is calculated by adding the point totals for each (answered) question.
< 13 : accept (low risk of invasiveness)
13 - 15 : evaluate further
> 15 : reject (high risk of invasiveness)

Questions Answered Legend

It is important to answer at least 16 questions to consider a PRE Score as "valid".
>= 16 : valid (80% or more questions answered)
<= 15 : invalid (not enough questions answered)

Organization Ownership and Content Privacy

Organization: 2017 Farm Bill PRE Project
Content Privacy: Public

Evaluation Reviewers

The PRE approach is to base decisions on science and make decisions by consensus of diverse horticultural stakeholders. The literature review and process of answering PRE's questions are based on science; the decisions of which plants to prioritize are based on consensus. To ensure this process is in place and that PRE is collaborative, volunteer stakeholders are recruited from each region to review evaluations. The following experts in their profession (plant science, conservation, or horticultural trade) have participated as volunteer PRE reviewers for this evaluation:

- Richard Hawke October 30, 2017

This evaluation has a total of 1 reviewer(s).

Evaluation Issues

The following section lists all public issues for this evaluation. Issues provide a way for stakeholder reviewers to communicate any concerns or suggestions they might have with the plant or evaluation. Please email PlantRight@suscon.org if additional action is required to resolve open issues.

There are currently no issues associated with this evaluation.

About PRE and this Plant Evaluation Report

The PlantRight Plant Risk Evaluator -- PRE is an online database and platform enabling those involved in non-native, terrestrial plant production to know before they grow if a plant poses a regional invasive risk. This tool offers many benefits, and we encourage you to visit the PRE website (https://pre.ice.ucdavis.edu) for more information.

If you are a nursery trade association, or involved in the research, development or distribution of horticultural plants we invite you to join the PRE community. If you are a plant scientist, affiliated with a horticultural college or botanic garden, and would like to learn more about becoming a PRE Screener, please drop us an email, PlantRight@suscon.org, requesting a PRE Account.

PRE beta funding is provided by Sustainable Conservation (http://www.suscon.org/) and a USDA Farm Bill grant.