Minnesota Noxious Weed Risk Assessment

Developed by the Minnesota Noxious Weed Advisory Committee

Assessment information

Common name: Japanese Tree Lilac

Scientific name: *Syringa reticulata* (Blume) H. Hara ssp. *reticulata*

Family name: Oleaceae

Current reviewer name and organizational affiliation: David Hanson, Minnesota Department of Transportation
Date of current review: August 9, 2021

Species description

Two subspecies are listed in USDA Plants Database.

Syringa reticulata ssp. reticulata **common name of Japanese tree lilac.**

Syringa reticulata ssp. amurensis **common name of Amur lilac.**

A frequently planted variety of Japanese tree lilac is “Ivory Silk”.

Synonym: *Syringa amurensis* Rupr. var. *japonica* (Maxim.) Franch. & Sav.

Photos

Photo caption: Several images of Japanese tree lilac illustrating bark, form, foliage, flowers and seed structure.
Photo credits: Dave Hanson, Minnesota Department of Transportation

Why the plant is being assessed

- Syringa reticulata produces a good deal of seed. In the past, anecdotal reports have circulated regarding seed reaching natural settings and germinating.
- Reports from Duluth with herbarium specimens submitted by David Schimpf (Bell Atlas 2021).
- Reports of seedlings occurring near collections at the University of Minnesota Landscape Arboretum (Monterusso 2017).
- Reports of seedlings occurring near plantings at the Historic Plummer house in Rochester, MN (A. Gupta, 2021, personal communication).
- Reports of seedlings at sites in Plymouth, MN. One of those sites is reported as a monoculture under mature Japanese tree lilac (L. Newberger 2021, personal communication).
- Reports of mature Japanese tree lilac and escapes along Saint Paul's historic trolley line, bordering the southern edge of University of Minnesota Golf Course in Lauderdale (M. Chandler and A. Smith 2021, personal communication).

Identification, biology, and life cycle

- Small trees 20 to 30 feet in height with a typical spread of 15 to 25 feet.
- Bark is reddish-brown to brown on stems. Lenticels are prominent and whitish, this feature separates from other lilacs.
- Buds like the foliage are opposite. Buds are sessile, brownish, subglobose (rounded) typically with 4 scales.
- Foliage is opposite and simple with entire or smooth margins. Typical leaf is ovate at 2 to 5 ½ inches long and about half as wide. Dark green color in the summer, not noted for fall color.
- Flowers are perfect, creamy white, very fragrant when in bloom early to mid-June. Large terminal panicles 6 to 12 inches long by 6 to 10 inches wide.
- Fruits are ¾ inch long, blunt tipped capsules that split to release seed late in the summer.
- Other lilac species such as *Syringa vulgaris* will have many similar characteristics.

Current distribution

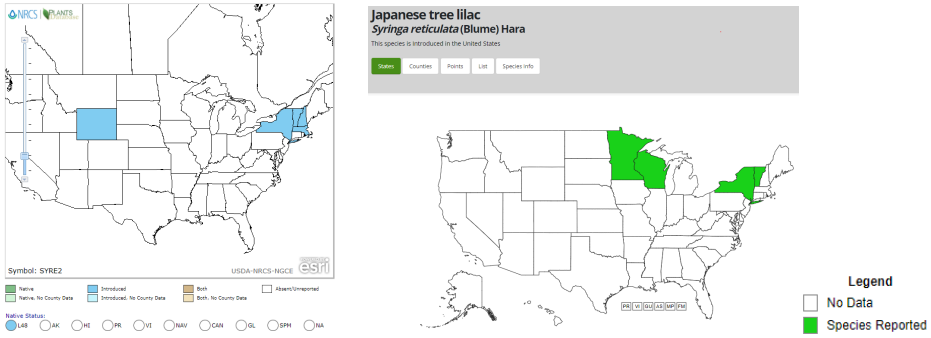

Photo caption: Left image is national level map from USDA Plants. January 12, 2021. And, right is national level map from EDDMapS. January 12, 2021.

These maps under report the introductions of Japanese tree lilac across the United States. It has been a popular landscape plant in the U.S. for some time.

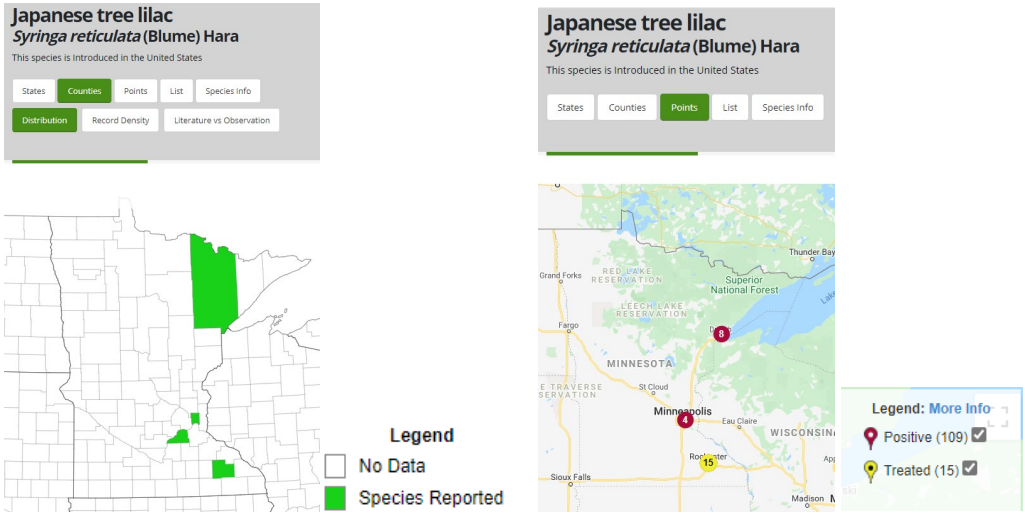

Photo caption: State level maps from EDDMapS. June 15, 2021.

Description of where the plant is found in Minnesota: Again, as with depictions of national distribution, this map is under reporting the distribution and presence of Japanese tree lilac in Minnesota.

As stated, the maps above under report the distribution of Japanese tree lilac in the United States. Japanese tree lilac is present in many community landscapes and boulevards. The map below depicts potential planting range across the United States (Gilman and Watson 1994).

Current regulation

Does not appear to be regulated at State levels or at the Federal level at this time.

Quotation below is from Invasive.org:
"No reference that we have lists this species (*Syringa reticulata*) as invasive in North America. This species is included for comparison to other species that are considered invasive."

Risk assessment

Box 1:

Is the plant species or genotype non-native?

Answer: Yes
Outcome: Go to Box 3
Native geographic location and habitat: Native to Japan (Morton 2021).
Syringa reticulata subsp. *Reticulata* is endemic to Japan. (Flora of China 2021).
There are three subspecies:

- ***Syringa reticulata* subsp. *Reticulata*** (syn. *Syringa japonica* (Maxim.), also syn. *S. amurensis var japonica* (Maxim.) *Franch et Sav. - Ligustrina japonica* (Maxim.)) - Japan.
- ***Syringa reticulata* subsp. *Amurensis*** (Rupr.) P.S.Green & M.C.Chang (syn. *S. reticulata* var. *mandschurica* (Maxim.) H.Hara) – Northeastern China, Korea, southeastern Russia.
- ***Syringa reticulata subsp. pekinensis*** (Rupr.) P.S.Green & M.C.Chang - North-central China. It has very distinct reddish-brown peeling bark.
- (Wikipedia 2020).

Kew Science: Plants of the World Online uses epithet *Syringa reticulata* (Blume) H. Hara.

The map and epithet include the three subspecies identified above.
Figure 1: Native to Amur, China North-Central, China South-Central, China Southeast, Inner Mongolia, Japan, Khabarovsk, Korea, Kuril Is., Manchuria, Primorye (Kew Science 2017).

"Japanese tree lilac was introduced into cultivation in 1876" (Bernheim 2019).

Box 2:

Does the species pose significant human or livestock concerns or have the potential to significantly harm agricultural production?

Question 2A: Does the plant have toxic qualities that pose a significant risk to livestock, wildlife, or people?
Outcome: Decision tree does not direct to this question.

Question 2B: Does the plant cause significant financial losses associated with decreased yields, reduced quality, or increased production costs?

Outcome: Decision tree does not direct to this question.

Box 3:

Is the species, or a related species, documented as being a problem elsewhere?

Answer: Yes.
Outcome: Go to Box 6
Anecdotally, several eastern states describe the invasiveness of Japanese tree lilac in fact sheets. Invasive plant atlas – Vermont and New York State.

In a research paper escaped populations were reported to be found in North American states, including Wyoming, Ontario, Massachusetts, Pennsylvania, Vermont, and Minnesota (Teter 2015).

That same study documented a forested site where *S. reticulata* is the most common, dense, and important tree species. This gives evidence of a negative impact on that riparian forest community (Teter 2015).

Box 4:

Are the species' life history and growth requirements understood?

Outcome: Decision tree does not direct to this question.

Box 5:

Gather and evaluate further information

This information is supplemental and is not part of the flow chart pathway for this risk assessment.
From North Dakota Tree Handbook, an online guide to tree selection.
Uses for Japanese tree lilac
Conservation / windbreaks: Large shrub or small tree for farmstead windbreaks and highway beautification.
Wildlife: Little value for food or browse. May be of value for nesting by songbirds.
Agroforestry Products: Medicinal – Extracts of *Syringa* species have been used as a substitute for aloes in treating burns and malaria.
Urban / Recreational: Good as a specimen or in groupings. Effective on public grounds, parks and boulevards.

American Forests Champion Tree National Register: Japanese tree lilac – Trunk circumference 136 inches, height 30 feet, crown spread 35 feet.
https://www.americanforests.org/big-trees/japanese-tree-lilac-syringa-reticulata.
Cultivars and their differences

Golden Eclipse Japanese tree lilac (*Syringa reticulata* ssp. *Reticulata* 'Golden Eclipse'): A more compact form (to 24 feet high). Leaves develop gold edges as the season progresses.
Ivory Pillar™ Japanese tree lilac (*Syringa reticulata* ssp. *Reticulata* 'Willamette'): A more narrow, upright form (25 feet high by 15 feet wide).
Ivory Silk Japanese tree lilac (*Syringa reticulata* ssp. *Reticulata* 'Ivory Silk'): More compact (20 to 25 feet high); flowers profusely and begins to flower at an early age.
Signature™ Japanese tree lilac (*Syringa reticulata* ssp. *Reticulata* 'Sigzam'): Flower clusters more rounded and smaller than those of 'Ivory Silk'. Flowers a week or two later than 'Ivory Silk'.
Snowdance™ Japanese tree lilac (*Syringa reticulata* ssp. *Reticulata* 'Bailnce'): Flowers at an early age and flowers very prolifically. 20 feet high and wide.
(Morton 2021).

In reference to tree planting in the northeast United States: "Regardless of city size, records also illuminated an overreliance on certain genera for specific ecosystem services; nearly 20% of all shade trees were Quercus species and over 50% of ornamental trees were either *Syringa* or *Prunus* species" (Doroski et al. 2020).

Box 6:

Does the species have the capacity to establish and survive in Minnesota?

Question 6A: Is the plant, or a close relative, currently established in Minnesota?

Answer: Yes,
Outcome: Go to Box 7
Japanese tree lilac is used extensively in landscape and boulevard settings across Minnesota.

Japanese tree lilac is said to thrive in hardiness zones 3 to 7 (Bernheim 2019).

University of Minnesota Bell herbarium contains several specimens collected in Duluth Minnesota by David Schimpf (Bell Atlas 2021). All contain location descriptions such as edge of woods, edge of flood plain, deciduous woods.

Reports of seedlings occurring near thriving Japanese tree lilac collections at the University of Minnesota Landscape Arboretum (Monterusso 2017).

Reports of seedlings occurring near plantings at the Historic Plummer house in Rochester, MN (A. Gupta, 2021, personal communication).

Question 6B: Has the plant become established in areas having a climate and growing conditions similar to those found in Minnesota?

Answer: Yes. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
Escaped populations have been reported in North American states, including: Wyoming, Ontario, Massachusetts, Pennsylvania, Vermont, and Minnesota (Teter 2015).

Question 6C: Has the plant become established in areas having a climate and growing conditions similar to those projected to be present in Minnesota under future climate projections?

Outcome: Decision tree does not direct to this question.

Box 7:

Does the species have the potential to reproduce and spread in Minnesota?

Question 7A: Are there cultivars of the plant that are known to differ in reproductive properties from the species?

Answer: Yes
Outcome: Go to Question 7B and follow the questions and also answer Question 7J
'Bailnce' is essentially sterile as only a very few seedpods have been observed (Bailey 2008).
See 7J below.

Question 7B: Does the plant reproduce by asexual/vegetative means?

Answer: No.
Outcome: Go to Question 7D

Question 7C: Are the asexual propagules - vegetative parts having the capacity to develop into new plants - effectively dispersed to new areas?
Outcome: Decision tree does not direct to this question.

Question 7D: Does the plant produce large amounts of viable, cold hardy seeds? For woody species, document the average age the species produces viable seed.
Answer: Yes - large amounts?
Outcome: Go to Question 7G (yes)

1) Viable – yes: Japanese tree lilac produces viable, cold hardy seeds. A stratification period is required to break dormancy (Dirr 2009).
2) Large amounts: Plants bloom prolifically (Dirr 2009, Morton 2021), with many 'perfect' flowers per structure this statement implies the answer is yes – large amounts. However, there is no documentation on the number of seeds generated per plant or per flower structure.
3) Age of seed production: Lilacs (*Syringa vulgaris*) typically begin sporadic flowering 3 years after germination, with consistent flowering after 4 years (Tyler et al. 2020).

Question 7E: For species that produce low numbers of viable seeds, do they have a high level of seed/seedling vigor or remain viable for an extended period (seed bank)?
Answer: Yes. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
A Nebraska study in 1973 reported germination rates of 60-65% (West et al. 2014).

Seed collections at University of North Dakota in Fargo resulted in germination rates as high as 89% (West et al. 2014). However, West also reports that: "Germination percentage was directly correlated with seed moisture content and decreased as seed capsules matured (natural drying and splitting of capsule seem to disperse seed) during the fall season (West et al. 2014).
"Reports of seedlings occurring near collections at the University of Minnesota Landscape Arboretum (Monterusso 2017).

Question 7F: Is the plant self-fertile?
Outcome: Decision tree does not direct to this question.

Question 7G: Are sexual propagules – viable seeds – effectively dispersed to new areas? List and consider all vectors.
Answer: Yes.
Outcome: Go to Question 7I
Factsheets state the following regarding wildlife:

- "Fruit characteristics: does not attract wildlife; showy; fruit/leaves not a litter problem" (Gilman and Watson 1994).
- Wildlife: Butterflies, Hummingbirds, Insect pollinators. (Morton 2021).

Seeds are fairly heavy – yet, wind is said to be a factor in seed movement (Bernheim 2019).
Monterusso (2020) states "Although *Syringa reticulata* has the ability to produce copious amounts of seed, it does not disperse the seeds far and saplings grow slowly in the understory."
Water is a possibility since it is mentioned in one paper that an infestation occurred in a riparian forest (Teter 2015) and David Schimpf notes on herbarium specimens noted edge of riparian forest (Bell Atlas 2021).

Question 7H: Can the species hybridize with native species (or other introduced species) and produce viable seed and fertile offspring in the absence of human intervention?
Outcome: Decision tree does not direct to this question.

Question 7I: Do natural controls, species native to Minnesota, which have been documented to effectively prevent the spread of the species in question?
Answer: No – None identified.
Outcome: Go to Box 8 (no)

Question 7J: Was the answer to Question 7A (Are there cultivars that differ in reproductive properties from the original species) "Yes"?
Answer: Yes
Outcome: Document those cultivars and differences here (yes) or continue with risk assessment (no)
'Bailnce' is a unique and unlike any existing cultivars of *Syringa reticulata* known to the inventor.

- 'Bailnce' is essentially sterile as only a very few seedpods have been observed.
- *Fruit and seed.*—Essentially sterile, seed capsules have been observed on rare occasion but were not produced on plants available for data collection (Bailey 2008).

According to Michael Dirr 'Bailnce' is marketed under the trade name Snow Dance™ ('Bailnce', PPAF). Statement from NDSU "'Ivory Silk' has been the top variety since its introduction from Ontario in 1973. It is a sturdy tree with deep green leaves. It blooms at a young age and is known for its heavy set of blooms. First Editions Snowdance™ has similar features (Fig. 1), and it has sterile flowers that won't create messy seed heads." (Kalb 2020).

Box 8:

Does the species pose significant human or livestock concerns or have the potential to significantly harm agricultural production, native ecosystems, or managed landscapes?

Question 8A: Does the plant have toxic qualities, or other detrimental qualities, that pose a significant risk to livestock, wildlife, or people?
Answer: No
Outcome: Go to Question 8B
No – There is no evidence in the literature suggesting Japanese tree lilac can significantly harm humans, livestock or agriculture production, native ecosystems or managed landscapes.
Lilac in general is considered nontoxic according to Wisconsin Poison Center (2007). Secondly, a lack of information on poison control center sites, such as pet poison helpline, suggests that common lilac and commonly planted Japanese tree lilac are not highly toxic to humans and animals.

There is a paper describing the development of a beverage derived from the flowers of *Syringa reticulata* (Blume) H. Hara (Qinglian et al. 2011).

A second paper explores the Oleaceae family as a source of various medicinal compounds. Genus *Syringa* is mentioned several times and specifically species *Syringa reticulata* Blume for developing new glycosides (Huang et. al., 2019).

Question 8B: Does, or could, the plant cause significant financial losses associated with decreased yields, reduced crop quality, or increased production costs?
Answer: No evidence.

Outcome: Go to Question 8C
Has not presented itself as a problem in maintained landscapes and likely would not be a problem in fields subject to active tillage and cultivation.

Question 8C: Can the plant aggressively displace native species through competition (including allelopathic effects)?

Answer: No - dominating an ecosystem is unlikely.
Outcome: Go to Question 8D
At this time, the evidence does not suggest dominance or a potential to change that ecosystem (Teter 2015, Monterusso 2017).
"There are no reports of dominating the plant community where established (Russell 2017)."

"Observations in New York **suggest** it **may** dominate in the woody plant understory, resulting in significant changes in native plant populations. However, **more data are needed** (Moore 2011)."

"Naturalized populations of *Syringa reticulata* in the United States appear to be relatively recent discoveries. Significant damage has not been documented. *S. reticulata* appears on invasive species lists as a species to watch (Russell 2017)."

Question 8D: Can the plant hybridize with native species resulting in a modified gene pool and potentially negative impacts on native populations?

Answer: No - None identified.
Outcome: Go to Question 8E
No native species have been identified as likely parent in a hybrid cross.

Question 8E: Does the plant have the potential to change native ecosystems (adds a vegetative layer, affects ground or surface water levels, etc.)?

Answer: No
Outcome: Go to Question 8F
Some evidence suggests there is potential for Japanese tree lilac to become a component in riparian forests. At this time, the evidence does not suggest dominance or a potential to change that ecosystem (Teter 2015, Monterusso 2017).

Question 8F: Does the plant have the potential to introduce or harbor another pest or serve as an alternate host?

Answer: No
Outcome: **At this time (August 2021), research-based evidence does not support listing this plant and Risk Assessment should end here.**
The plant is affected by stem borers that may impact other members of the Oleaceae family such as the ashes (genus: *Fraxinus*).
The plants are impacted by powdery mildew.
Neither of these plant maladies is unique to Japanese tree lilac or would be considered new introductions at this time.

Box 9:

Does the species have clearly defined benefits that outweigh associated negative impacts?

Question 9A: Is the plant currently being used or produced and/or sold in Minnesota or native to Minnesota?

Answer: Yes – Plant is being sold and used in landscapes in Minnesota. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***

Box 9 is being used solely for the purpose of documenting the 2020 Nursery Industry Survey responses regarding Japanese tree lilac.

Responses from the 2020 Nursery Industry Survey:

1. Of 74 respondents 85% currently sell this species or one or more named cultivars of this species.

2. Of 42 respondents 86% indicate that sales of this species are an indispensable source of income for their business.

3. Of 59 respondents 14% believe this species is invasive or problematic in native ecosystems and/or problematic in native ecosystems or agricultural production systems in Minnesota.

4. Of 54 respondents 13% indicate this species should be regulated as a noxious weed to prevent future spread and establishment in new areas in Minnesota.
5. Of 66 respondents 86% indicate this species should not be regulated as a noxious weed to prevent future spread and establishment in new areas in Minnesota.

Question 9B: Is the plant an introduced species and can its spread be effectively and easily prevented or controlled, or its negative impacts minimized, through carefully designed and executed management practices?

Outcome: Decision tree does not direct to this question.

Question 9C: Is the plant native to Minnesota?

Outcome: Decision tree does not direct to this question.

Question 9D: Is a non-invasive, alternative plant material or cultivar commercially available that could serve the same purpose as the plant of concern?

Outcome: Decision tree does not direct to this question.

Question 9E: Does the plant benefit Minnesota to a greater extent than the negative impacts identified at Box #8?

Outcome: *Decision tree does not direct to this question.*

Box 10:

Should the species be regulated as Prohibited/Eradicate, Prohibited/Control, or Restricted Noxious Weed?

Question 10A: Is the plant currently established in Minnesota?
Outcome: Decision tree does not direct to this question.

Question 10B: Would prohibiting this species in trade prevent the likelihood of introduction and/or establishment?
Outcome: Decision tree does not direct to this question.

Question 10C: Does this risk assessment support this species being a top priority for statewide eradication if found in the state?
Outcome: Decision tree does not direct to this question.

Question 10D: Does the plant pose a serious human health threat?
Outcome: Decision tree does not direct to this question.

Question 10E: Is the health threat posed by the plant serious enough, and is the plant distribution sufficiently small enough to be manageable, and are management tools available and effective enough to justify listing as Prohibited / Eradicate species?
Outcome: Decision tree does not direct to this question.

Question 10F: Is the plant known to cause significant ecological or economic harm and can the plant be reliably <u>eradicated</u> (entire plant) on a statewide basis using existing practices and available resources considering the distribution, reproductive biology and potential for spread?

- *For distribution, note if the distribution is well documented, the number and acreage of known infestations and how widespread they are in the state. Note if there are infestations in border areas.*
- *For reproductive biology, note if there are reproductive biology factor that make the plant easier to control and eradication more likely (for example, long pre-reproductive period, self-incompatible pollination, short-lived seed bank).*
- *For potential for spread and re-invasion of controlled areas, note its potential to spread beyond places where it is being controlled such as deliberate planting by people, wildlife vectors, re-infestation from border states, or other factors that facilitate spread.*
- *For known management tools, note what management tools are available, potential non-target impacts, and the reasonableness of state management or mandating that landowners throughout the state use the management tools to eradicate or control existing plants.*
- *For available resources, consider the capacity of state and local personnel and availability of funding to respond to new and existing infestations.*

Outcome: Decision tree does not direct to this question.

Question 10G: Is the plant known to cause significant ecological or economic harm and can the plant be reliably controlled to limit spread on a statewide basis using existing practices and available resources? Would the economic impacts or other hardships incurred in implementing control measures be reasonable considering any ongoing or potential future increase of ecological or economic harm?

- *Also consider all bullet points listed under 10F when evaluating 10G*

Outcome: Decision tree does not direct to this question.

Question 10H: Would prohibiting this species in trade have any significant or measurable impact to limit or reduce the existing populations or future spread of the species in Minnesota?
Outcome: Decision tree does not direct to this question.

Question 10I: Are there any other measures that could be put in place as Special Regulations which could mitigate the impact of the species within Minnesota?
Outcome: Decision tree does not direct to this question.

Box 11:

The species is being proposed to be designated as a Specially Regulated Plant. What are the specific regulations proposed?
Outcome: Decision tree does not direct to this question.

Final recommendations of risk assessment (August 2021)

NWAC Listing Subcommittee

Outcome: **At this time (August 2021), research-based evidence does not support listing this plant.**
Comments: Therefore, listing of this species is not recommended at this time. It is known that Japanese tree lilac does reproduce in Minnesota. Current known Minnesota infestations appear very localized with seedlings and saplings in close proximity to the original source. However, at this time it is not known to what extent Japanese tree lilac will impact or alter Minnesota ecosystems. These and other research questions must be answered. Therefore, as these research questions are pursued and answered in coming years this risk assessment should be revisited.

NWAC Full Committee

Outcome: D not list
Comments: The vote was 16-0 in favor and 1 abstained regarding the recommendation to not list.

MDA Commissioner

Outcome: Do not list.
Comments: No comments

Risk Assessment Current Summary (08-09-2021)

- As of 08-09-2021, research-based evidence does not support listing this plant.

- Subcommittee discussions have focused on the fact that Japanese tree lilac does reproduce in Minnesota. Current known Minnesota infestations appear very localized with seedlings and saplings in close proximity to the original source.
- However, it is not known to what extent Japanese tree lilac will impact or alter Minnesota ecosystems. Therefore, as these research questions are pursued and answered in coming years this risk assessment should be revisited.

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Appendix

Bell Atlas herbarium records in the Duluth Area (Bell Atlas 2021).