Minnesota Noxious Weed Risk Assessment

Developed by the Minnesota Noxious Weed Advisory Committee

Assessment information

Common name: Black locust (also known as false acacia, yellow locust, white locust, green locust, post locust, Chinese scholar tree, ship-mast locust, or common robinia)

Scientific name: *Robinia pseudoacacia* L. (formerly *Robinia acacia*, *Pseudoacacia odorata*, *Robinia fragilis*)

Family name: Fabaceae / Leguminosae

Current reviewer name and organizational affiliation: Robert C. Venette (USDA Forest Service and Minnesota Invasive Terrestrial Plants and Pests Center)
Date of current review: 05/11/2022
Previous reviewer name and organizational affiliation: Ken Graeve (Minnesota Department of Transportation)
Date of previous review: 08/05/2015

Species description

Photo

Photo caption: Flowers of black locust*, Robinia pseudoacacia*. Photo credit: Jan Samanek, Phytosanitary Administration, Bugwood.org

Photo caption: Foliage of black locust. Photo credit: Paul Wray, Iowa State University, Bugwood.org

Why the plant is being assessed

- *Robinia pseudoacacia* is not native to Minnesota but is established in the state. The species is known to be problematic in Minnesota and elsewhere, primarily for its ecological impacts.
- *R. pseudoacacia* is native to the Ozarks, southern Appalachia, and other portions of the mid-south. It has been identified as a species that might be "pre-adapted" to the future climate of Minnesota. As such, it has been considered a candidate for assisted migration to the state.
- *Robinia pseudoacacia* fixes nitrogen and as such can be particularly "aggressive in nutrient poor and disturbed sites, forming dense monocultures which exclude native plants" (Morey 2020).
- In some pine-oak forests in the northeastern United States, *R. pseudoacacia* has displaced blue lupine, *Lupinus perennis*, the host plant of the federally listed, endangered Karner blue butterfly, *Lycaeides melissa samuelis*. Although direct effects of *R. pseudoacacia* on Karner blue butterflies have not been documented, potential negative impacts are a concern due to the potential overlap in occurrence of *L. perennis* and *R. pseudoacacia* in Minnesota (Morey 2020).
- The previous assessment by Graeve (2015) acknowledged that *R. pseudoacacia* has properties that would warrant its listing as a Prohibited noxious weed, but it was listed as a Restricted noxious weed over concerns about the ability to control this species.
- The previous assessment did not include information on black locust toxicity to people or livestock.

Identification, biology, and life cycle

Description of the species from USDA NRCS (quoted from Dickerson 2002)

- "The bark of black locust is deeply furrowed and is dark reddish-brown to black in color. It has an alternate branching pattern, which creates a zigzag effect. A pair of sharp thorns grows at each node. They are ½ to ¾ inches long, and very stout."
- "The pinnately compound leaves are 8 to 14 inches long, with 7 to 19 short stalked leaflets. These dull green leaflets are ovoid or oval, 1 to 2 inches long, thin, scabrous above and pale below."
- "The separate male and female plants have sweetly fragrant flowers that are creamy white with five petals (bean-like) arranged in a pyramidal spike. They usually bloom in May or June. Heavy seed production can be expected annually or biannually. The legume type seed is produced in a flat, brown to black pod, which is 2 to 4 inches long. There is an average of 25,500 seeds per pound. Although black locust is a good seed producer, its primary means of spread is by both rudimentary and adventitious root suckers."

Biology of the species (quoted from CABI 2019)

- "*R. pseudoacacia* flowers at a relatively early age, often around 3 years of age. The fruit ripens during September and October, opens on the tree, and seeds are dispersed from September to April (Olson, 1974) and can persist in the soil for many years. Seed crops occur every 1-2 years, with full seed production beginning from about age 6 and continuing to age 60, is highest when trees are 15-40 years old, but fruiting has also been observed in a single tree 400 years old (Pasiecznik N, CAB International, personal communication, 2004). [Flowers] appear after leaf emergence in May or June and are pollinated by insects, primarily bees. *R. pseudoacacia* usually produces a shallow and wide-spreading root system that is excellent for soil binding but is also capable of producing deep roots (5-7 m deep) and radial root spread is about 1 to 1.5 times tree height (Cutler, 1978)."
- "*R. pseudoacacia* yields 7-15 kg of seeds per 45 kg of fruit, with high number of seeds, 35,000-77,000 seeds/kg (Olson, 1974; Roach, 1965). Dry seeds can be stored and retain their viability for as long as 10 years if placed in closed containers at 0-5°C. Trees sprouts readily from both stump and roots, especially after being cut or damaged, and also graft easily. Although seedlings are produced, root suckers are most prevalent in natural reproduction."

Lookalikes (Warne 2016)

- honey locust, *Gleditsia triacanthos*
- bristly locust, *Robinia hispida*
- false indigo, *Amorpha fruiticosa*
- prickly ash, *Zanthoxylum americanum*
- Kentucky coffee-tree, *Gymnocladius dioicus*

For more information, see:

- Minnesota Department of Agriculture
- Minnesota Department of Natural Resources
- Minnesota Invasive Terrestrial Plants and Pests Center
- University of Minnesota Extension

Current distribution

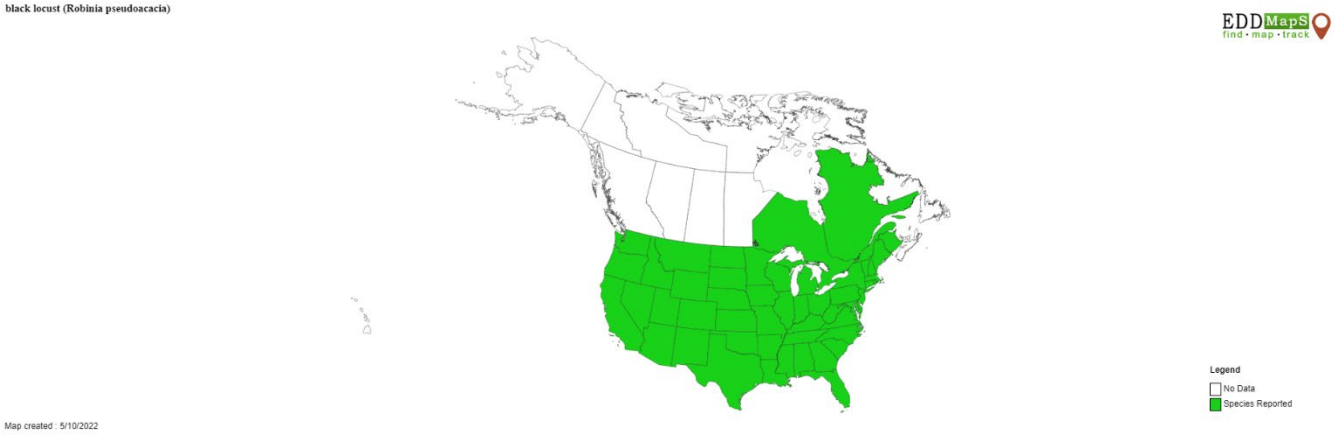

Photo caption: National level map of *Robinia pseudoacacia* from EDDMapS (Accessed May 10, 2022)
The species has been reported in all conterminous US states and several eastern provinces in Canada.

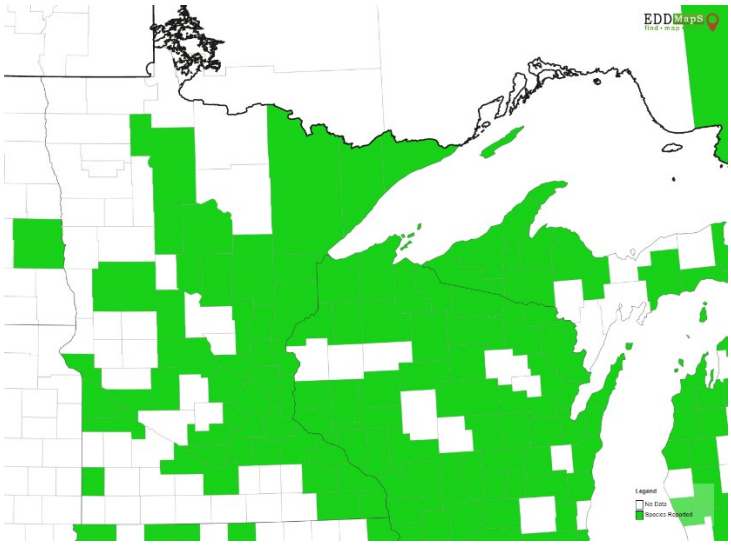

Photo caption: State level map of *Robinia pseudoacacia* from EDDMapS (Accessed 05/10/2022)
Description of where the plant is found in Minnesota: *Robinia pseudoacacia* has been reported from 44 counties. EDDMapS reports that 322 acres are infested from a total of 363 sites; 3 sites in Central Park in Duluth were treated to control black locust.

Current regulation

The species was listed as a "Restricted Noxious Weed" in Minnesota in 2017. The species is listed as 'regulated' in New York and is noted as 'invasive' in Connecticut (USDA-NRCS 2020).

Risk assessment

Box 1:

Is the plant species or genotype non-native?

Answer: Yes
Outcome: Go to Box 3
Although *Robinia pseudoacacia* is native to the Ozarks and southern Appalachia, it is not native to the upper Midwest (Stone 2009, Natureserve 2015).

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
Graeve (2015) commented "Yes, [the species has been reported] as a threat to native ecosystems in many areas of the lower 48 united states that lie outside of its native range (Stone 2009). [It] invades forests, upland prairies and savannas, pastures, old fields, and roadsides…forms extensive, dense groves of clones that exclude native vegetation. [It is] classified as "restricted" in WI (WI DNR). Black Locust is given a "High" Invasive Species Impact Rank by Natureserve (2015). … [The species was] rated as limited for invasiveness by the California Invasive Plant Inventory (Cal-IPC 2006)."

The species has been planted extensively in Europe and is considered 'highly invasive' by multiple sources (reviewed in Vítková et al. 2017). In Europe, ecological impacts are comparable to impacts from knotweeds, *Fallopia* spp, or giant hogweed, *Heracleum mantegazzianum* (Vítková et al. 2017).

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

Outcome: Decision tree does not direct to this question.

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
Morey (2000) notes: "*Robinia pseudoacacia* is currently reported outside cultivation in ~41 Minnesota counties, with the first herbarium record coming from Wabasha Co. in 1887 (EDDMapS 2020; UMN-Bell 2019; MDA 2020)."

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

Outcome Decision tree does not direct to this question.

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: Unknown.
Outcome: Go to Question 7B and follow the questions and answer Question 7J
There are several cultivars of *R. pseudoacacia*, e.g., 'Frisia', 'Inermis', 'Lace Lady', 'Purple Robe', 'Pyramidalis' (='Fastigiata'), 'Tortuosa', and 'Umbraculifera'. Purple Robe is *Robinia* x *ambigua*, a hybrid of *R. pseudoacacia* and *R. viscosa*.

Cultivars differ in size, color, growth form, and the presence of thorns. General descriptions suggest some cultivars/varieties might differ in reproductive properties. For example, "'Lace Lady' … does not produce flowers", "'Tortuosa' …. [produces] fewer and smaller flowers", and "'Umbraculifer' … rarely flowers" (NCSU Extension, no date). However, these descriptions may not be fully reliable indicators of reproductive potential. Schnelle (2019) notes: "Although many cultivars exist for this species, Lace Lady and Frisia seed heavily, with the exception of Pyramidalis, Purple Robe, and possibly others that are less reproductive. Even if sterility were achieved, and the resulting selections aggressively marketed, such plants would still likely sucker, be resistant to herbicides, and thrive in a number of environmental extremes." Quantitative comparisons of reproductive properties among cultivars are not readily available and complicate this portion of the assessment. For example, Gilman and Watson (2006) note that the seeds of 'Purple Robe' are readily dispersed by birds and other wildlife which contributes to the spread of this variety into landscapes. For the purposes of this assessment, it is presumed that differences in reproduction might exist among varieties of black locust, but these differences are not known with enough certainty to affect the course of the assessment.

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

Answer: Yes
Outcome: Go to Question 7C
Morey 2020 notes: "Quantitative estimates of the contribution of vegetative reproduction to annual *R. pseudoacacia* reproduction are sparse. Root suckers can appear after 3-5 years of growth (Huntley 2004; Kolyada & Kolyada 2018). Nicolescu et al. (2020) review that up to 45-46 root suckers can result per tree. A study in North Carolina suggests that 75 clonal offspring were observed from a single tree (Chang et al. 1998) and a report from Russia noted 50 vegetative offspring came from two 'uterine' trees (Kolyada & Kolyada 2018). The latter paper further describes vegetative reproduction as potentially being more intense under favorable conditions, but provided no quantitative figures. None of these estimates, however, defined the time over which the observed reproduction occurred. We assume the rates are on an annual basis for this evaluation, though this could be an overestimate."

Question 7C: Are the asexual propagules - vegetative parts having the capacity to develop into new plants - effectively dispersed to new areas?

Answer: Yes (though limited)
Outcome: Go to Question 7I
Morey (2020) notes, "Vegetative reproduction is often said to be the more common route of natural spread (Cierjacks et al. 2013; Warne 2016; Stone 2009). Root suckers can spread up to 1 meter/year (Cierjacks et al. 2013)." Long distance spread of asexual propagules is not known to occur.

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: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.*** Graeve (2015) considered this plant to produce "moderate amounts" of seed based on the review of Stone (2009). Seed production begins at about 6 years of age but is best when trees are 15-14 years old; seeds are produced annually but larger seed crops occur every 2 to 3 years (Stone 2009).

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: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.*** Yes. Graeve (2015) reported "Seeds have impermeable seed coats, and scarification is required for germination (Huntley 1990, Stone 2009). This gives them a very long seed life (over 80 yrs in one study), accumulating very high soil seed bank densities. This strategy combined with very fast seedling growth allows them to quickly colonize sites following disturbance (Stone 2009). Although black locust is commonly thought to spread primarily vegetatively, recent genetic research of established populations have [sic] shown that establishment from seed is also an important component population expansion (Kurokochi and Hogetsu, 2014)."

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: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.*** Yes. Morey (2020) notes, "One study reported that the minimum mean dispersal distance of *R. pseudoacacia* seeds was 121 meters, with wind the presumed principal vector (Robinson & Handel 1993). Wind blowing seeds (typically in pods) across the snow surface is also an important secondary dispersal vector, with distances of 67 meters reported (Cierjacks et al. 2013). Secondary water dispersal of seed pods is also a known vector; one study showed that 20% of *R. pseudoacacia* pods floated the maximum distance observed of 1,200 meters along two rivers (over 9 days), with 14-58% germination (Säumel & Kowarik 2013; Cierjacks et al. 2013). Birds and other animals have been suggested as additional vectors of *R. pseudoacacia* seeds (Cierjacks et al. 2013; MN-DNR 2020; Stone 2009; Warne 2016); however, evidence of this occurring (or associated dispersal distances) could not be found."

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?

Answer: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.*** Yes. Morey (2020) notes, "[I]nterspecific hybridization within *Robinia* is noted as common, particularly when species are grown in proximity to one another (Peabody 1984; Isely & Peabody 1984). Natural hybridization has been 'most conspicuous' between *R. pseudoacacia* and *R. hispida* (bristly locust) (Peabody 1984). Other species with reported hybrids with *R. pseudoacacia* include *R. kelseyi* (Kelsey locust), *R. neomexicana* (New Mexico locust), and *R. viscosa* (clammy locust) (Stone 2009; Isely & Peabody 1984; Huntley 2004; Cierjacks et al. 2013). Taxonomists have disagreed about taxonomy within the genus; different authors recognize from 4 to 20 species (CABI 2019; Isely & Peabody 1984). The lack of agreement complicates the identification of any possible hybrids among species."

Bristly locust is present in Minnesota.

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
Outcome: Go to Box 8
Graeve (2015) reported, "Natural enemies [of *R. pseudoacacia*] include the locust borer, locust leaf miner, locust twig borer, and heart rot (Converse and Martin 2001). At least two, the locust borer and locust leaf miner, are present in MN and can be a problem when plants are water-stressed or injured (B. Aukema, personal communication, August 3, 2015, J. Hahn, personal communication, August 5, 2015). These native pests of black locust are not documented to effectively prevent the spread--it still appears to be a problem in this region despite the presence of at least the locust borer, but then again it is known as a weedy species in its native range as well."

Question 7J: Was the answer to Question 7A (Are there cultivars that differ in reproductive properties from the original species) "Yes"?

Answer: Uncertain
Outcome: As previously described in Section 7A, differences in reproductive properties among cultivars may exist, but these are not known with enough certainty to affect the risk assessment. 'Purple Robe' is characterized as less reproductive than other cultivars (Schnelle 2019) but still produces enough seed to spread into surrounding landscapes (Gilman and Watson 2006).

This question in the assessment is meant to identify cultivars that might be safely marketed if more restrictive regulations were needed for other cultivars of a problematic species. Currently (August 2022), *R. pseudoacacia* is a restricted noxious weed, and the sale of all cultivars is prohibited in Minnesota. Not enough information is available to support a re-authorization of the sale of select cultivars.

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: Yes, the plant has toxic properties, but no, it does not pose a significant risk to livestock, wildlife, or people
Outcome: Go to Question 8B
Morey (2020) notes: "*Robinia pseudoacacia* produces a chemical (referred to as robitin, robinetin, robin, or robinin in the literature) that is toxic to humans and livestock (e.g., horses, cattle, sheep, mules) (Peabody 1984; Stone 2009; Barr & Reagor 2001; MDA 2020). However, despite this potential toxicity and reports of *R. pseudoacacia* being poor forage, the tree is used as forage in parts of its introduced range (Stone 2009). Estimates associated with negative economic impacts from poisoning could not be found."

Cases of poisoning by *R. pseudoacacia* have been reported in people and animals. In Europe, poisonings of animals by *R. pseudoacacia* have been described as "common" though the frequency of such poisonings was not reported (Cortinovis and Caloni 2013). In Belgium, plants consistently accounted for ~7% of all reported cases of companion animal poisonings from 2000-2009 (n=2155-2700 cases/year); European yew (*Taxus baccata*) and tansy ragwort (*Senecio jacobaea*) caused most poisonings (Vandenbroucke et al. 2010). Lethal horse poisonings by *R. pseudoacacia* were reported in Belgium, but these occurred "usually after horses are tethered to and subsequently eat the bark of poles made of this wood" (Vandenbroucke et al. 2010). The frequency of human poisonings by *R. pseudoacacia* has not been reported, but consequences may be severe. Browne et al. (2020)

note that punctures by slivers of bark, considered common by these authors when felling trees, may introduce the toxin robitin to wounds and that such injuries may lead to necrotizing fasciitis. Such occurrences seem rare. In 2020, poisonings of all types affected 6.3 people per 1000 in the United States; and 'plants' accounted for 2.03% of multiple substance exposures and 2.66% of single substance exposures (Gummin et al. 2021). Plant exposures were greater in children under 6 years, 3.35-3.48%, than adults over 19 years, 1.10 -1.72% (Gummin et al. 2021). "The most frequent plant exposures where positive plant identification was made were (descending order): pokeweed (*Phytolaca americana*), cherry pit, poison ivy (*Toxicodendron radicans*), *Ilex* species, apple seed or fruit, *Spathiphyllum* species, and *Nerium oleander*" (Gummin et al. 2021). Poisonings by *R. pseudoacacia* would be less than 314/52,343 cases.

Question 8B: Does, or could, the plant cause significant financial losses associated with decreased yields, reduced crop quality, or increased production costs?

Answer: No

Outcome: Go to Question 8C

Morey (2020) was unable to document adverse economic impacts of *R. pseudoacacia* on agricultural or forest production. Potential economic losses from black locust could be significant in grazing operations in South Africa (Fraser & Martin 2019), but these losses may not be relevant to Minnesota where large grazing systems are not used.

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

Answer: Yes

Outcome: Go to Box 9

Graeve (2015) noted, "Yes, many documented cases of native species exclusion throughout the U.S. (Stone 2009). 'Invades primarily disturbed habitats, degraded woods, thickets, and old fields, crowding out native vegetation of prairies, oak savannas, and upland forests, forming single species stands.' (MN DNR) Shades out native vegetation in prairies and savannas (Converse & Martin 2001). In its native range, dominant and persistent stands of black locust are rare and usually associated with severe disturbance (Stone 2009)."

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

Answer: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***

Graeve (2015) noted, "No, but it can hybridize with the non-native *R. hispida* (Stone 2009), which is also present in MN."

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

Answer: ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***

Yes. Graeve (2015) noted, "'A common concern with the establishment of black locust in its nonnative range is its ability to replace native vegetation. Developing black locust thickets may prevent other plants from establishing and could block historical successional trajectories ... Through its nitrogen-fixing abilities, black locust may alter local soil characteristics. While advantageous within its native range and on some plantations, this ability may be problematic to managers outside of its native range, particularly in areas of low soil fertility' (Stone 2009). By increasing soil nitrogen, black locust can facilitate the spread of other non-native species such as tatarian honeysuckle, common barberry, garlic mustard, and others (Stone 2009). This is often a species of low-quality disturbed sites, but it also invades some important, high-quality prairie and savanna ecosystems

where it can significantly alter community structure and species composition. In addition, its ability to fix nitrogen may have significant impacts on some ecosystems, including facilitating invasion by other non-native species. The legacy of these impacts may persist, even long after the locust trees have been removed. Removal is considered difficult, with monitoring and re-treatment over several years necessary (Natureserve 2015). [*Robinia pseudoacacia* also] [a]lters fire effects by shading out grasses and producing rapidly-decomposing leaves (Wiesler 2005)."

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

Answer: This information is supplemental and is not part of the flow chart pathway for this risk assessment.

Yes. Morey (2020) reported, "Oviposition by a beetle invasive to the U.S., *Anoplophora glabripennis*, has been recorded on *R. pseudoacacia* plants in China (van der Gaag & Loomans 2014), and *R. pseudoacacia* is noted as an occasional host of the insect in Asia (Haack et al. 1997). *Robinia pseudoacacia* is also a listed host plant for moths invasive to the U.S., including *Epiphyas postvittana* (USDA-APHIS 2007) and *Lymantria dispar* (McManus & Csoka 2007), though the suitability of *R. pseudoacacia* as a host for these species is unclear. While *R. pseudoacacia* is not the only host of these insects, it could nonetheless contribute to their presence on the landscape."

Robinia pseudoacacia has facilitated invasions by other harmful, nonnative plants. Morey (2020) found, "The introduction of *R. pseudoacacia* into an upland coastal ecosystem facilitated the invasion of other non-native plant species (e.g., *Rosa multiflora*, *Holcus lanatus*, *Lonicera morrowii*, *Lonicera japonica*) due mostly to soil changes induced by *R. pseudoacacia* nitrogen-fixation (Von Holle et al. 2006). Similarly, increased soil nitrogen from *R. pseudoacacia* in a savannah/woodland community in Indiana facilitated the dominance of the invasive grass, *Bromus tectorum* (Peloquin & Hiebert 1999), and establishment of *Poa pratensis* in sand dunes in Illinois (Stone 2009). Associations of *R. pseudoacacia* with other species of invasive plants (e.g., *Lonicera tatarica*, *Berberis vulgaris*, *Alliaria petiolata*) have also been observed (Stone 2009)."

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: No

Outcome: Go to Box 10

Black locust was listed as a 'Restricted Noxious Weed' by the Minnesota Department of Agriculture in 2017, and sales of the species have been prohibited ever since. Many online retailers offer *R. pseudoacacia* for sale, though it is unclear if the retailers would sell the material in the state. The species is not native to 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?
Answer: Yes
Outcome: Go to Question 10D
The plant is reported from 41 counties. Reports are generally more common from the Twin Cities Metro and areas south.

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?
Answer: No
Outcome: Go to Question 10F
Although the plant does produce toxic compounds, no evidence of poisonings in the state is available. Elsewhere, though cases of poisoning by *R. pseudoacacia* have been reported, they generally seem to be rare, much less common than poisonings of some unregulated plants.

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.*

Answer: No

Outcome: Go to Question 10G

The species is known to cause significant ecological harm but is currently considered too widespread for the Prohibited Eradicate Category (Tina Markeson, Dave Hanson, and Christina Basch Office of Environmental Stewardship, Minnesota Department of Transportation, personal communication, August 25, 2022).

Distribution: *Robinia pseudoacacia* has been reported from 44 counties in MN. As of 29 August 2022, EDDMaps reports that 336 acres are infested from a total of 637 sites; 3 sites in Central Park in Duluth were treated to control black locust. Current estimates of infested sites and acreage in EDDMaps are probably low given that several reports did not measure or describe the area (ha) that was infested. No recent outreach campaigns have encouraged people to map black locust in EDDMapS, though the species was highlighted during the development of the Minnesota Land Cover Classification System (MN-DNR, 2004). Dr. Laura Van Riper (Minnesota Department of Natural Resources) suggested that EDDMapS reports are probably limited to places where plants have spread on their own, as reporters have been discouraged from mapping planted specimens. Some black locust trees that were planted as ornamental specimens likely were not mapped in EDDMapS. Independent data from the USDA Forest Service Forest Inventory and Analysis indicate that as many as 1.78 million black locust trees might occur on forest land in Minnesota, primarily in McLeod (62.7%), Washington (17.8%), Houston (14.0%), Winona (4.5%), and Steele (1%) counties.

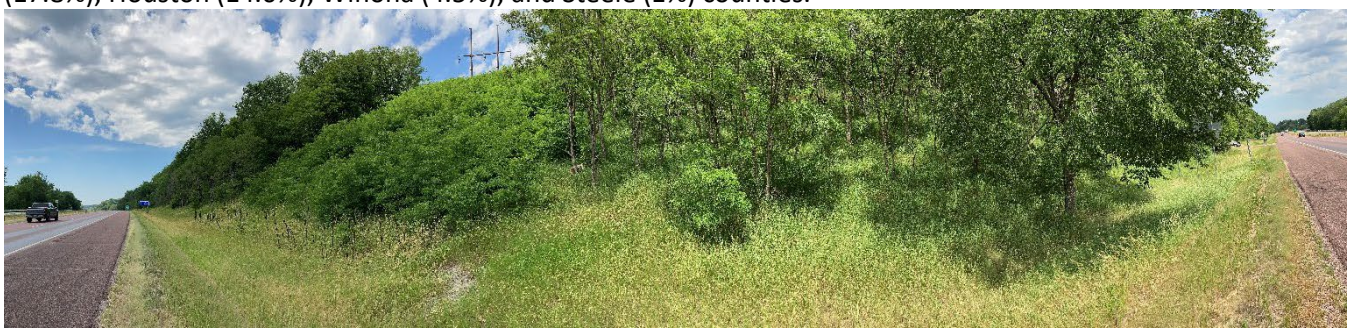

Photo caption: Vegetation along highway US-169, near Henderson, MN can consist mostly black locust. In this image, an area under a utility line had previously been cleared; black locust is growing back in a high density (photo provided by Tina Markeson, Dave Hanson, and Christina Basch Office of Environmental Stewardship, Minnesota Department of Transportation, personal communication, August 25, 2022).

Statewide eradication is generally considered infeasible for the species because it is so widespread, though formal, consistent criteria to determine when a species is too widespread to be eradicated have not yet been defined by the Noxious Weed Advisory Committee.

Management Tools: Methods of control are available. Several herbicides with aminopyralid, clopyralid, imazapyr, and/or picloram provide good to very good control in season and within a year of treatment (MIPN no date). Some herbicides may be applied as basal bark treatments or to cut stumps with good effect. For other management approaches, Graeve (2015) noted, "Top cutting is not effective at control because it encourages sprouting. Black Locust can be killed with herbicide (Boos and Mattson 2011; Huntley 1990) but Stone reports that chemical control needs to be combined with revegetation for a long term solution (2009)." Removal of seedlings and young trees is considered effective in season (3 of 4 stars); any remaining roots may resprout and sucker; similarly, prescribed burning, grazing, or tree girdling are considered generally ineffective (MIPN no date). Steep terrain can make herbicide applications difficult.

Graeve (2015) observed, ''Although a strict adherence to the risk assessment flow chart puts this species in the Prohibited/Control category, the listing subcommittee recommends that it be regulated as a Restricted noxious weed for the following reasons: The control of woody noxious weeds and those in forested settings is more difficult to enforce because of the added complexities of requiring tools such as herbicides and chainsaws that may not be available to a typical landowner. Strict enforcement of the control of black locust could lead to numerous forests, especially in steep blufflands, requiring significant restoration work to prevent erosion and/or recolonization. This type of control and restoration, requiring years of follow-up work, does not have a good track record of implementation with the current system of noxious weed enforcement in Minnesota. Finally, control of this species and the subsequent restoration could require far more resources for agencies and landowners than control of herbaceous species with similar distribution." However, the listing subcommittee recognizes that these management concerns are not specific to black locust and could apply to any woody invasive species in forests. Widespread woody species such as common buckthorn, glossy buckthorn, European alder, Morrow's honeysuckle, Tatarian honeysuckle, and Bell's honeysuckle are listed as Restricted Noxious Weeds partly because of these management challenges. Some woody invasive species that have been listed as Prohibited are not known to occur in the state or were thought to have a limited distribution at the time of listing. As of 2022, Japanese honeysuckle, *Lonicera japonica* Thunb., Oriental bittersweet, *Celastrus orbiculatus* Thunb., and tree of heaven, *Ailanthus altissima* are woody species of concern in forests that are regulated as 'Prohibited eradicate' noxious weeds in Minnesota. Common barberry, *Berberis vulgaris* L. , also a woody species of concern in forests is regulated as a 'Prohibited control' noxious weed. Japanese barberry, *Berberis thunbergii*, is listed as a Restricted Noxious weed, but "landowners are strongly encouraged to manage these invasive plants on their properties in order to reduce spread into new areas," a recommendation that implies a degree of management feasibility and effectiveness.

A change in regulatory status that would require treatment of black locust to prevent spread "… would cause economic hardship to many private landowners and agencies including MN DNR and MnDOT which both own large amounts of land. Resources available to state entities, counties, and private landowners are not consistent and would not cover extensive years of required control. A major source of spread is through root suckering, and incomplete or inconsistent control measures could lead to denser populations" (Tina Markeson, Dave Hanson, and Christina Basch Office of Environmental Stewardship, Minnesota Department of Transportation, personal communication, August 25, 2022).

Question 10G: Is the plant known to cause significant ecological or economic harm and can the plant be reliably <u>controlled</u> 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*

Answer: No.

Outcome: Go to Question 10H.

This plant is known to cause significant ecological harm. It readily displaces native plants, including host plants of the federally-regulated Karner blue butterfly. Though only 336 acres are reported as being infested in Minnesota in EDDMaps, the records seem grossly incomplete, per the Minnesota Department of Transportation. The magnitude of error is not known. A more reliable estimate from the U.S. Department of Agriculture, Forest Service indicates that nearly 2 million black locust trees occur on Minnesota forest lands. Thus, the plant cannot be reliably controlled to limit spread on a statewide basis. Practices do exist that are effective in limiting the local spread of black locust, but these methods are generally considered cost prohibitive to apply statewide. See responses to 10G.

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?

Answer: Yes

Outcome: LIST THE PLANT AS A RESTRICTED NOXIOUS WEED

As of August 2022, black locust remains classified as a restricted noxious weed, with importation, sale, or transportation of the species being prohibited. This designation has reduced the potential for spread of the species in Minnesota. No change to the regulation is recommended.

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.

Black locust is not native to Minnesota and is known to cause significant ecological harm by displacing native plants, such as wild lupine, *Lupinus perennis*. Wild lupine is an essential host plant for the Karner blue butterfly, a species that is federally listed as endangered. Populations of Karner blue butterfly may remain in Winona County in oak savannahs. Black locust is an identified threat to wild lupine, and thus, to Karner blue butterflies in these areas (USFWS 2003). The significant ecological threat posed by black locust to a federally listed endangered species contributes to *Robinia pseudoacacia* being a current research priority by the Minnesota Invasive Terrestrial Plants and Pests Center at the University of Minnesota (Morey 2020). Black locust could be considered a high priority for management in Karner blue butterfly habitat (USFWS 2003). A special regulation might be developed to require management in these areas, at least to prevent spread of this plant, but such a spatially focused recommendation from the Noxious Weed Advisory Committee is unprecedented.

Final outcomes of risk assessment (2022)

NWAC Listing Subcommittee

Outcome: The NWAC listing subcommittee supports the continued listing of *Robinia pseudoacacia*, black locust, as a restricted noxious weed.
Comments: Black locust is not native to Minnesota and causes significant ecological harm by displacing native plants. The current classification of the species as a restricted noxious weed has likely helped to slow the spread of the plant in the state. The species is likely more widespread than currently reported in EDDMapS. In addition, treatments would likely need to occur over several years, involving physical removal of portions of the plant and herbicide applications to remaining stumps/stems. Such treatments are difficult and costly. Thus, management to prevent spread or eradicate the species statewide is considered impractical at this time.

A question was also raised about the impact of climate change on the distribution of the species. Specifically, might climate change facilitate the spread of the species into Minnesota? Limited formal information exists to address this question. Future climate change may improve conditions for the survival and growth of the species. However, climate change is unlikely to change dispersal mechanisms. The species spreads locally through suckering but is generally not considered likely to spread long distances on its own. It is not clear that climate change will "push the species into Minnesota," but this could be a topic for future research.

NWAC Full Committee

Outcome: Continue to list as a Restricted Noxious Weed (12/13/2022)
Comments: There were 17 votes in favor, none against and 1 abstained.

MDA Commissioner

Outcome: No change in status – continue to list as a Restricted Noxious Weed
Comments: No comments

Risk Assessment Current Summary (08-30-2022)

- Black locust is not native to Minnesota, though it is native to portions of the southeastern United States.
- The species fixes nitrogen and forms thickets. Thus, it outcompetes native vegetation. Ecological impacts are more likely than economic or health impacts.
- Nearly 2 million black locust trees occur in Minnesota forestlands, concentrated in southeast counties. The species is probably significantly underreported in EDDMapS.
- Treatment recommendations, involving physical removal and herbicide applications, do exist and can be effective but are costly and require sustained efforts over multiple years.
- The potentially large number of trees in the state and the habitat in which black locust grows would complicate statewide efforts to eradicate or slow the spread of the species.
- The previous designation as a restricted noxious weed has been effective in reducing the potential for spread of the species and should be retained.

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