

Minnesota Noxious Weed Risk Assessment

Developed by the Minnesota Noxious Weed Advisory Committee

Assessment information

Common name: Narrowleaf bittercress

Scientific name: *Cardamine impatiens* L.

Family name: Brassicaceae

Current reviewer name and organizational affiliation: Christina Basch, Minnesota Department of Transportation

Date of current review: 21 November 2025

Previous reviewer name and organizational affiliation: Emilie Justen, Minnesota Department of Agriculture

Date of previous review: 10 August 2016

Previous reviewer name and organizational affiliation: Monika Chandler, Minnesota Department of Agriculture

Date of previous review: 18 May 2011

Species description

Photos



Photo caption: Narrowleaf bittercress rosette. Photo credit: Monika Chandler, Minnesota Department of Agriculture



Photo caption: Narrowleaf bittercress bolted and flowering plant. Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Why the plant is being assessed

- Narrowleaf bittercress has previously been reviewed by the Noxious Weed Advisory Committee in 2011 and 2016. Since 2016, few populations have been reported and management efforts are not common where infestations have been reported.
- Other species on the noxious weed list are being listed as a priority with limited resources. Due to length of list, the Noxious Weed Advisory Committee would like to determine whether this is still a management priority in Minnesota.

Identification, biology, and life cycle

- Mostly grows as a biennial forming a rosette in the first year, and bolting/producing seed the second year. There are some recorded instances where plants have bolted and flowered in a single growing season.
- Summer heat breaks dormancy so seed is able to germinate at various times throughout fall and early spring (Yang et al 2025).
- The rosettes have 3- 11 leaflets with rounded lobes. In contrast, bolted plants have 6- 20 sharply toothed leaflets.
- Where leaves attach to stems, there are narrow pointed ears or auricles that grasp and may extend beyond stems.
- Multiple small flowers with 4 white petals produce slender seedpods (siliques) from May to September. Narrowleaf bittercress reproduces exclusively by seed and a single plant can produce up to 5,500 seeds (Kimata 1983).
- Look-alike species:

- Garlic mustard (*Alliaria petiolata*) and yellow rocket (*Barbarea vulgaris*) (Minnesota Department of Transportation 2023)
- Native sand bitter-cress (*Cardamine parviflora*), Pennsylvania bitter-cress (*Cardamine pennsylvanica*), tansy-mustard (*Descurainia pinnata*) and common yellow-cress (*Rorippa palustris*) lack narrow-leaved bittercress' characteristic narrow, pointed auricle at the leaf base (Midwest Invasive Species Information Network 2025)
- Hairy bittercress - *Cardamine hirsuta* (Poindexter 2006)

Current distribution



Image caption: National level map from EDDMapS (2025). Map accessed on 26 December 2024.

Narrowleaf bittercress has been reported in the Northeastern United States extending to Minnesota to the west, and Ontario to the north (most reports are centered around Toronto). No reports in adjacent states of North Dakota, South Dakota, and Iowa (EDDMapS 2025). The report in North Carolina is from two plants found on a new river embankment and is considered a rare occurrence (Poindexter 2006).

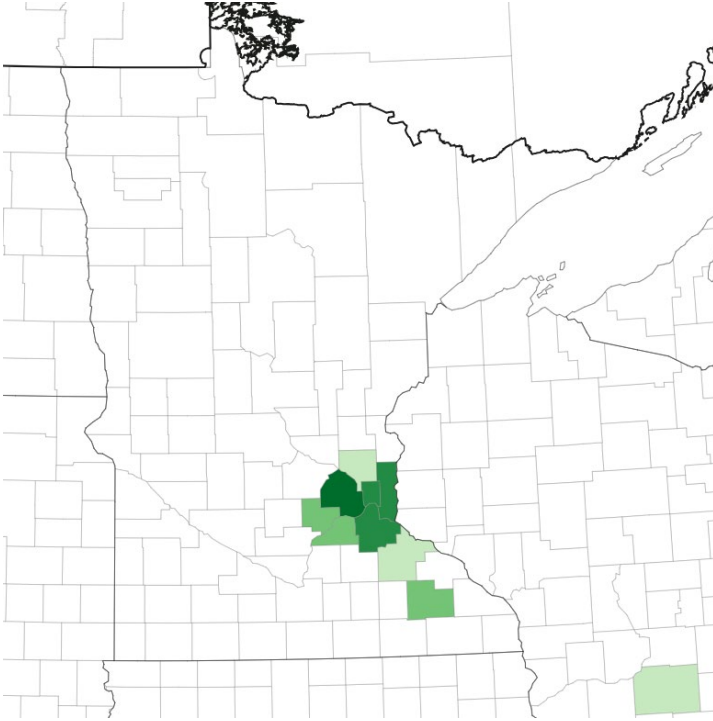


Image caption: County level density map from EDDMapS (2025). Map accessed on 26 December 2024. Plant reports are more dense around the metro area with limited reports in Anoka, Goodhue and Olmsted County. Counties shaded in darker green have more confirmed observations (EDDMapS 2025).

Current regulation

Narrowleaf bittercress is currently regulated as a prohibited-control noxious weed in Minnesota. It has been a regulated species in Minnesota since 2011 and was reassessed in 2016.

EDDMapS (2025) lists additional states with regulations: Wisconsin – Prohibited, Connecticut – prohibited by statute, Delaware - DISC Invasive Plant List, Massachusetts – prohibited plant list, New Hampshire – Invasive plant watch list, New York – Prohibited plant. A 2025 review of information compiled by the National Plant Board (2025) listed Massachusetts and Wisconsin as regulating narrowleaf bittercress.

Box 1:

Is the plant species or genotype non-native?

Answer: Yes

Outcome: Go to Box 3.

Cardamine impatiens is widespread throughout most of Europe except in parts of the south-east (Marhold 1995). It is also found in Siberia, the Himalayas, India, China, Taiwan, Korea, Japan and has been introduced into North America (Marhold 1995).

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

Narrowleaf bittercress can form dense stands that outcompete native species (Commonwealth of Pennsylvania 2025).

Narrowleaf bittercress outcompetes desirable vegetation which may result in decreased species diversity and habitat quality. The full impact of narrowleaf bittercress remains unknown due to the newness of most infestations in North America. Narrowleaf bittercress proliferates and spreads very quickly, provoking apprehension that it may prove highly invasive. The experience of other states with this species provides a basis for concern. Narrowleaf bittercress is established in New England. It was recently assessed and ranked as highly invasive plant in New York and a noxious weed in Connecticut and Massachusetts (Minnesota Department of Agriculture 2025).

The Massachusetts Invasive Plant Advisory Group lists narrowleaf bittercress as a plant that is Likely Invasive (Massachusetts Invasive Plant Advisory Group 2022).

Easily dispersed due to its seed shooting ability; can form dense stands, outcompeting native species (Wisconsin Department of Natural Resources 2025).

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

See Appendix A for distribution maps and reports in Minnesota from 2011 to 2025.

There are reports originating of a single plant from 2008 at Riverside Park. By 2009, plants were being removed by the truckload (Minnesota Wildflowers 2025).

Note from previous risk assessment:

Narrowleaf bittercress is reported in the northeastern United States and New Brunswick and Ontario in Canada, but was not reported in Minnesota until 2008. It was found at the Riverside Park site in St. Paul Park by Connie Fortin with Fortin Consulting, a private company restoring the park to native vegetation. In 2008, Fortin Consulting sent narrowleaf bittercress samples to the Minnesota Department of Natural Resources (DNR) for a definitive identification. Only a few plants were observed by Fortin Consulting staff in 2008. By May 2009, there was a population explosion of narrowleaf bittercress. Mature, flowering plants were hand-pulled and removed by a National Park Service invasive species crew. In June 2009, large patches of seedlings and rosettes were observed throughout approximately eight acres. Narrowleaf bittercress has been observed, but not documented on adjacent private land. Connie Fortin and DNR staff also found small infestations of narrowleaf bittercress at Afton, Fort Snelling, Great River Bluffs, and William O'Brien State Parks and Big Willow Park in Minnetonka. Adam Robbins and Nathan Johnson with St. Paul Parks and Recreation found a small infestation of narrowleaf bittercress at Crosby Farm/Hidden Falls Park in St. Paul and reported the infestation to the Ramsey County Cooperative Weed Management Area. All plants were hand-pulled from Crosby Farm/Hidden Falls Park and Big Willow Park sites. Some plants may remain at the state park sites and adjacent areas. Given the wide distribution of this species, eradication may not be a realistic goal.

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?

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

Briscoe Runquist et al. (2019) examined habitat suitability under current and future climate conditions for narrowleaf bittercress in Minnesota. They found that under current climate conditions narrowleaf bittercress, 43% of the state was deemed suitable. This area was in the southern half of Minnesota and includes the St. Croix River Valley, the Twin Cities region, and the Minnesota River valley as the areas that had the greatest habitat suitability scores. Under projections for 2050 and 2070 climate, Minnesota has only marginal suitability as the suitable habitat is predicted to be in Canada and not Minnesota. They note that the species may be able to persist in appropriate microclimates.

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: No

Outcome: Go to Question 7B

The author could not find any known cultivars for sale. Narrowleaf bittercress is not a typical plant in the nursery industry.

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

Answer: No

Outcome: Go to Question 7D

Narrowleaf bittercress spreads exclusively by seed (Kimata 1983).

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

Outcome: Go to Question 7G

A single plant can produce up to 5500 seeds (Minnesota Department of Agriculture 2025). Narrowleaf bittercress can produce seed under a variety of light and moisture conditions, allowing for seed production in a variety of environments. Huffman (2008) notes: "Plants then self-pollinate and form sets of siliques, each containing eight to twenty seeds. Glenn and Berringer (2004) documented that seeds germinate from May through August as soon as they're ejected from the plant's mechanically explosive siliques." Seed germination is variable based on environmental factors with most seeds germinating late summer or early spring (Yang et al. 2025).

There are reports originating of a single plant from 2008 at Riverside Park. By 2009, plants were being removed by the truckload (Minnesota Wildflowers 2025).

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)?

Outcome: Decision tree does not direct to this question.

Question 7F: Is the plant self-fertile?

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

According to Huffman (2008): "Kimata (1983) found that this species is 99.5% self-compatible and that seeds of *C. impatiens*, because of the species tall infructescences, were found to have a greater seed dispersal distance than *C. flexuosa* and *C. scutata*. *Cardamine impatiens* at the age of reproduction is reported to reach one meter tall."

Question 7G: Are sexual propagules – viable seeds – effectively dispersed to new areas? List and consider all vectors.

Answer: Yes

Outcome: Go to Question 7I

Narrowleaf bittercress can self-pollinate and produces prolific quantities of seed in siliques that can shoot the seed a short distance from the plant when the dried seedpods burst open. Thus, a single plant can quickly form a

colony. Seeds can germinate in water and rivers and streams are considered a method of long-range dispersal. Seeds can also be moved by human, animals, and vehicles (Minnesota Department of Agriculture 2025).

This plant is able to spread easily due to its seed-shooting ability. Each flower contains ten to 24 seeds. Seeds are also spread by water and can stick to clothing and animals (Commonwealth of Pennsylvania 2025).

According to Huffman (2008): “Kimata (1983) found that this species is 99.5% self-compatible and that seeds of *C. impatiens*, because of the species tall infructescences, were found to have a greater seed dispersal distance than *C. flexuosa* and *C. scutata*. *Cardamine impatiens* at the age of reproduction is reported to reach one meter tall.”

There are reports originating of a single plant from 2008 at Riverside Park. By 2009, plants were being removed by the truckload (Minnesota Wildflowers 2025).

Other *Cardamine* species (*C. hirsuta*, *C. flexuosa*, *C. corymbosa*, *C. oligosperma*) have been documented as contaminants and costly weeds in the container nursery industry and spread through that pathway (Post et al. 2011), but *C. impatiens* has not been documented in this way.

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.***
The author could not find hybridization information for *Cardamine impatiens*, but *Cardamine pratensi* and *Cardamine raphanifolia* have been observed hybridizing in Spain (Lihova 2007).

Question 7I: Are there 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

No natural controls are known to be present in Minnesota.

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

Outcome: Decision tree does not direct to this question.

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: Question 8B

Narrowleaf bittercress is edible. Leaves and young shoots and can be used as a vegetable (Plants for a Future 2025).

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

Narrowleaf bittercress is a forest understory pest and poses limited risks to agriculture.

According to Williams (2000): "It is a plant of varied habitats including shady woodland, rocks and screes. shady banks of streams and rivers and of damp roadsides. It occurs on both calcareous and neutral soils. *Cardamine impatiens* was predominately associated with hedgerow edge habitats. In almost all other cases it could be found within 10 m of a hedgerow, for example, on ditch and stream sides, in nearby scrub and on ground that had been disturbed near to hedgerows."

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

Answer: Yes

Outcome: Go to Box 9

Narrowleaf bittercress populations have been observed having a cyclical growth and decrease of population sizes in its native range. According to Williams (2000): "Variations appeared to be due to the cyclic nature or population at each colony. to unexplained variations possibly related to the weather and to ground disturbance. The species increased in response to occasional ground disturbance. The reappearance of plants where it had not been observed for several years suggested the role of a buried seed bank. The average spread in a south-easterly direction was 17 meters a year over the decade."

There are reports originating of a single plant from 2008 at Riverside Park. By 2009, plants were being removed by the truckload. Ripened pods burst open and can shoot seed several feet from the mother plant, thus it can form dense colonies fairly quickly (Minnesota Wildflowers 2025).

Because of the species tall infructescences, narrowleaf bittercress plants were found to have a greater seed dispersal distance than *C. flexuosa* and *C. scutata* (Kimata 1983, Huffman 2008).

Huffman (2008) performed shading experiments. They conclude: "From these two experiments, we determined that *Cardamine impatiens* is a species that exhibits phenotypic plasticity and therefore may pose a threat as an invasive species. *C. impatiens* is able to grow and exhibit plasticity of plant architecture under the conditions of very low light. The number of leaves per canopy area decreased as shade increased, suggesting that *C. impatiens* is highly adaptable to low light conditions, and therefore may be exhibiting phenotypic plasticity by reallocating its resources by producing fewer leaves while maintaining canopy area. This data along with other *C. impatiens* traits such as high levels needed for seed production, its persistence in seed banks, along with a lack of known major enemies, indicates that they have a great capacity to invade a wide variety of habitats. We also determined that a cold treatment is necessary in order for *C. impatiens* to obtain optimal growth and reproduction."

Perles et al. (2023) noted that narrowleaf bittercress was one of the species that accounted for increases in invasive species richness and cover along the Delaware River in New Jersey in a rare riverscours plant community.

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

Outcome: Decision tree does not direct to this question.

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

Outcome: Decision tree does not direct to this question.

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

Outcome: Decision tree does not direct to this question.

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

Narrowleaf bittercress has been regulated in Minnesota since 2011 and sales of seeds are not easily available online. Narrowleaf bittercress 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

Reports of narrowleaf bittercress in Minnesota originate from 2008. See Appendices for distribution of maps and reports from 2011 to present (EDDMapS 2025).

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

Narrowleaf bittercress is edible. Leaves and young shoots and can be used as a vegetable (Plants for a Future 2025).

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 eradicated (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 factors 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

Distribution: See appendices for change in distribution compared between 2011, 2016 and 2025. Positive occurrences have been recorded in 9 counties for a total of 308 reports as of 8 May 2025. Expansion outside of the metro area was reported for Goodhue County in 2024 and Olmsted County in 2022 (EDDMapS 2025).

Reproductive biology: Narrowleaf bittercress behaves as an annual or biennial and produces large quantities of cold hardy seed. Flowering occurs throughout the summer months, so management timing is variable based on the population's specific phenology.

Potential for spread and reinvasion: Narrowleaf bittercress has an evolutionary advantage with seed dispersal projection from mature plants. Ejection of mature seeds from siliques on the parent plant allows for larger range expansion in a single growing season. Seed also easily moves through water, along equipment, and wildlife. For mechanical management to be effective, it must be deployed before seeds mature. See Appendix C.

Known management tools: Not much research has gone into effective herbicide management of narrowleaf bittercress, but similar formulations to other invasive brassica species have been implemented. Recommended herbicide formulations for brassica include: 2,4-D, glyphosate, imazapic, metsulfuron-methyl, and triclopyr. Basal foliage dies back during winter so herbicide applications must be applied before leaves senesce in late fall/early winter (Minnesota Department of Transportation 2023).

Mechanical methods such as hand pulling and torching plants are effective but labor intensive. Weed torching is effective in destroying rosettes and sterilizing any mature seed present on soil surfaces. Narrowleaf bittercress has a shallow root system that can easily be pulled from loose soil. Digging or hand pulling is feasible for smaller infestations. Mowing before flowers develop siliques can be effective to prevent seed maturation. Plants will try to bolt and produce flowers after mowings, so frequent applications are necessary. Narrowleaf bittercress tends to grow in forest understories or along riparian corridors where mowing is not a feasible approach to control (Minnesota Department of Agriculture 2025).

Potential for statewide harm and statewide eradication: Recorded infestations are continuing to grow, and it is unlikely that populations would be able to be reliably eradicated. See Appendix B.

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*

Answer: No

Outcome: Question 10H

See 10F. Narrowleaf bittercress is currently not widespread throughout the state. Population expansion, ecological harm, and economic hardship have not been as expected and may not be as large of a problem as previously believed. With its ability to produce large volumes of cold hardy seeds that germinate throughout various times of the year, reliable control is not likely.

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: No

Outcome: Go to Question 10I

Narrowleaf bittercress is currently a prohibited control noxious weed in Minnesota and is not something typically sold in the nursery industry. The author had a difficult time finding seed for sale online. Primary spread is through movement of equipment, and wildlife, so nursery industry restrictions would have minimal impact.

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?

Answer: No

Outcome: DO NOT LIST THE PLANT

No special regulations come to mind that would mitigate the impact of narrowleaf bittercress in Minnesota.

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 outcomes of risk assessment (2025)**NWAC Listing Subcommittee**

Outcome: Do no list. Remove from current status as prohibited control noxious weed (delist).

Comments: Recommend continued education with the Minnesota Department of Natural Resources webpage and Minnesota Department of Transportation noxious weed book. Counties can individually list narrowleaf bittercress as a noxious weed if needed.

NWAC Full Committee

Outcome: Remain a prohibited control noxious weed.

Comments: The vote on 12/16/25 was 10 in favor of the recommendation to 8 against who supported delisting and 1 abstained.

MDA Commissioner

Outcome: Remain a prohibited control noxious weed

Comments: No comments

Risk Assessment Current Summary (08-05-2025)

- Narrowleaf bittercress produces large amounts of cold hardy seed that are effectively dispersed via ejection from seed capsules (Glen 2004). Germination can occur in various environments and during different times of the year (Yang 2025) making spread easier and control more labor intensive.
- As of 5 August 2025, narrowleaf bittercress has been reported in Minnesota 337 times covering 954 acres (EDDMapS 2025). Populations are gradually increasing with few revisits reported through EDDMapS. Organizations and agencies are focusing their limited resources towards eradication and control efforts on other species that are deemed a higher priority.

Final outcomes of risk assessment (2016)

NWAC Listing Subcommittee

Outcome: Remain Prohibited Control

Comments:

NWAC Full Committee

Outcome: Remain Prohibited Control

Comments: Voted 14 – 0 to accept Listing Subcommittee recommendation.

MDA Commissioner

Outcome: Remain Prohibited Control

Comments:

Final outcomes of risk assessment (2011)

NWAC Listing Subcommittee

Outcome: Prohibited Control or Species of Concern

Comments:

NWAC Full Committee

Outcome: List as a Prohibited Control Species

Comments:

MDA Commissioner

Outcome: Listed as a Prohibited Control Species

Comments:

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Appendix A: Maps of EDDMapS reports over time

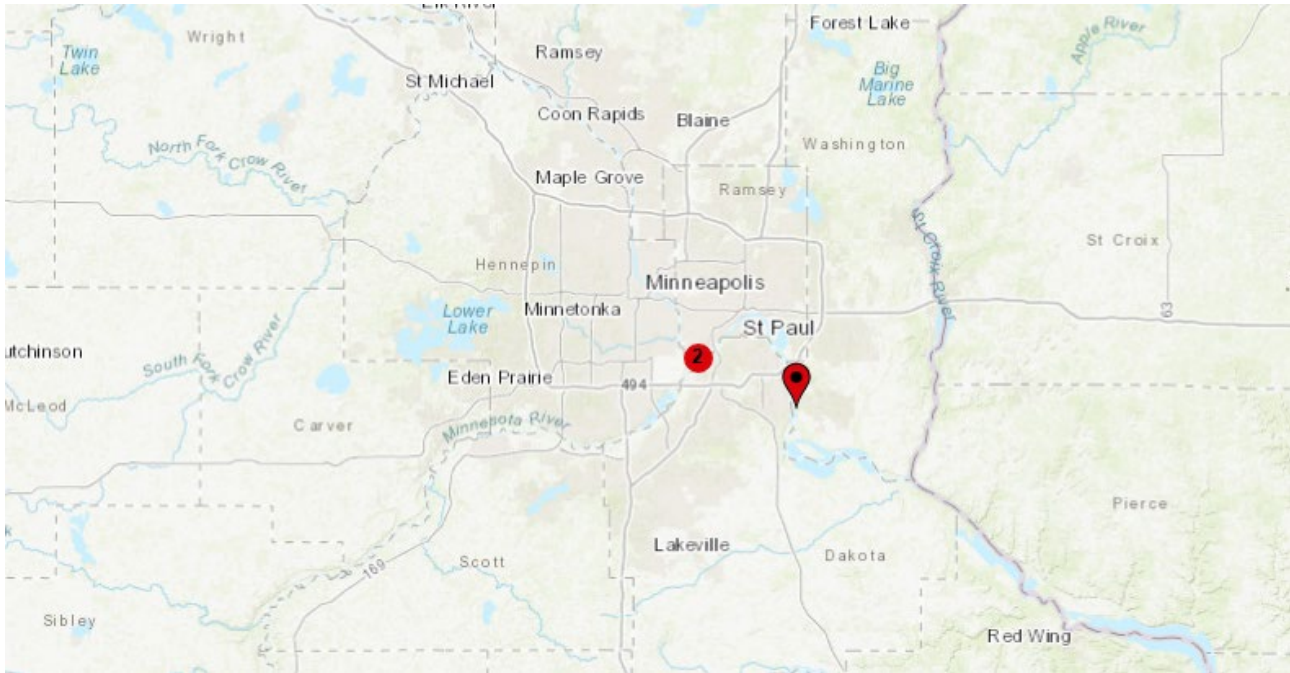


Image caption: Prior to 2012 there were 3 records for narrowleaf bittercress, both in the Twin Cities metro area (EDDMapS 2025).

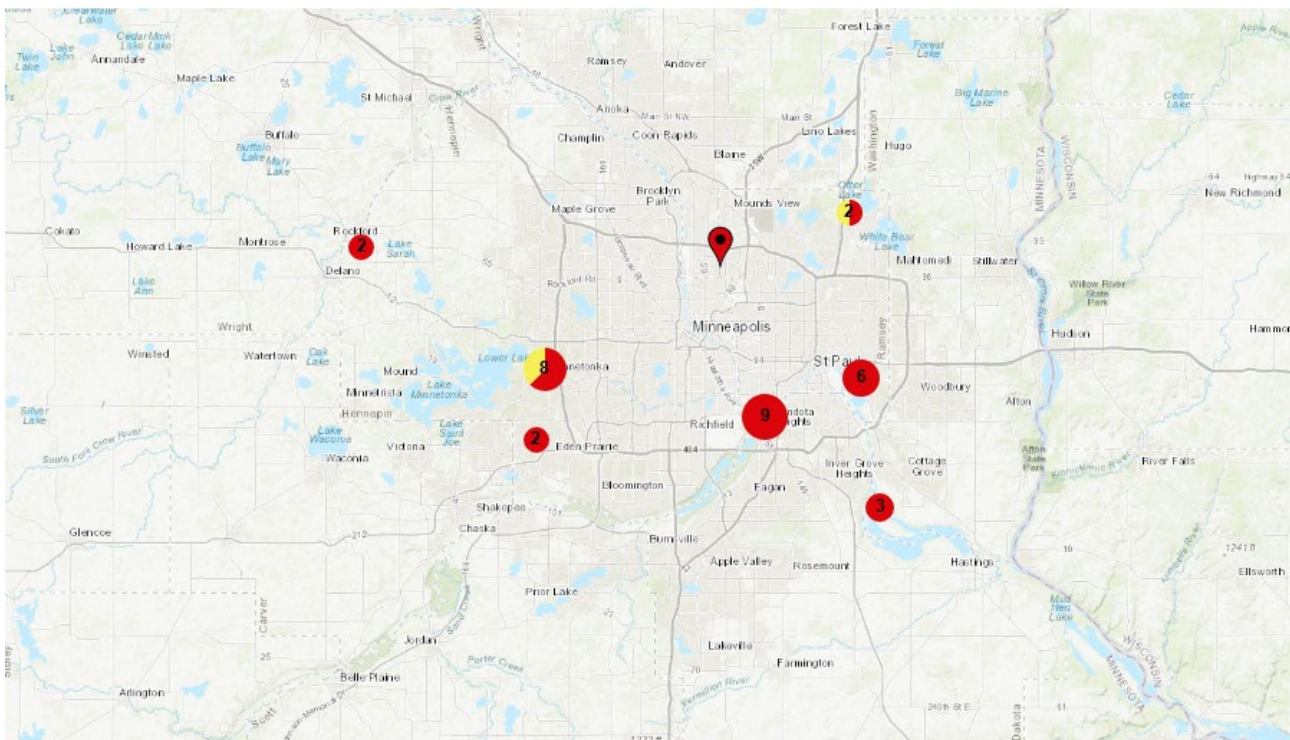


Image caption: There were 41 records for narrowleaf bittercress reports up to December 2016 (EDDMapS 2025).

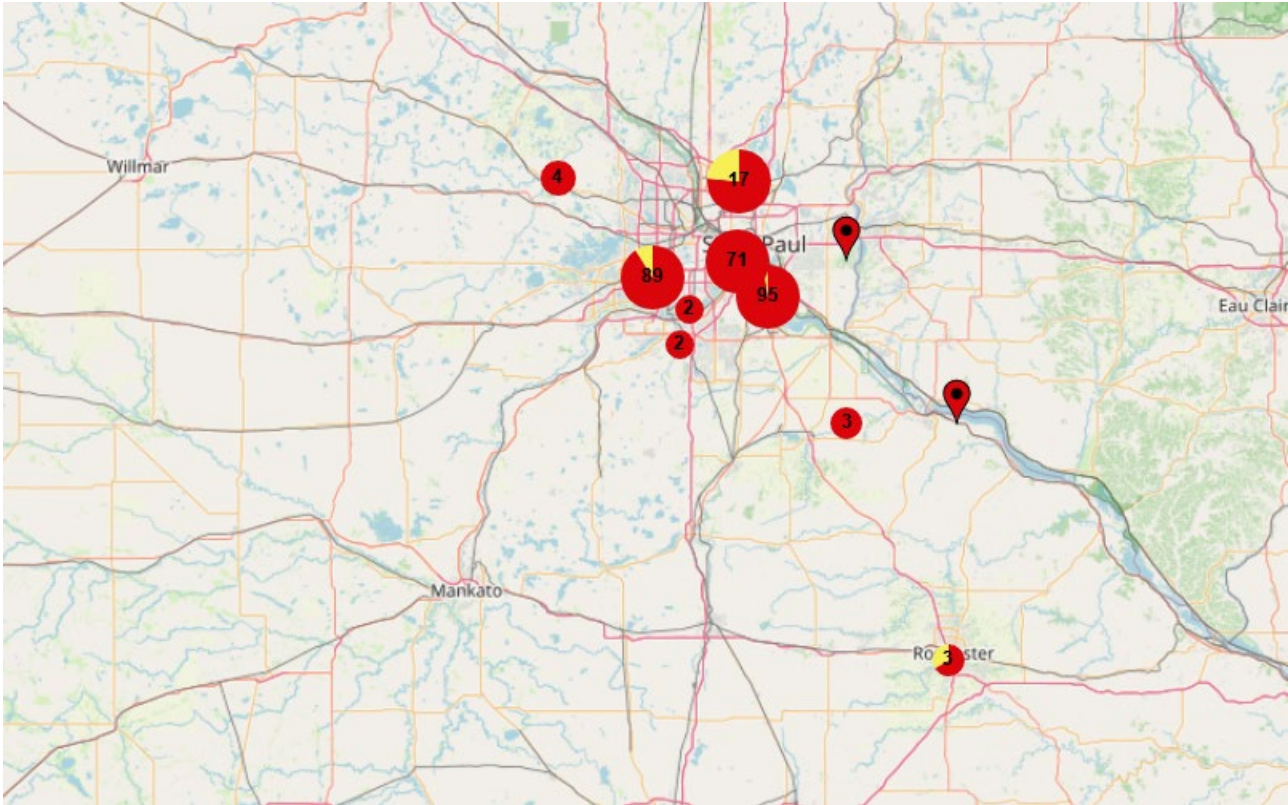


Image caption: As of 8 May 2025, there were 308 reports covering 954 acres.

Appendix B: Graph of EDDMapS reports over time

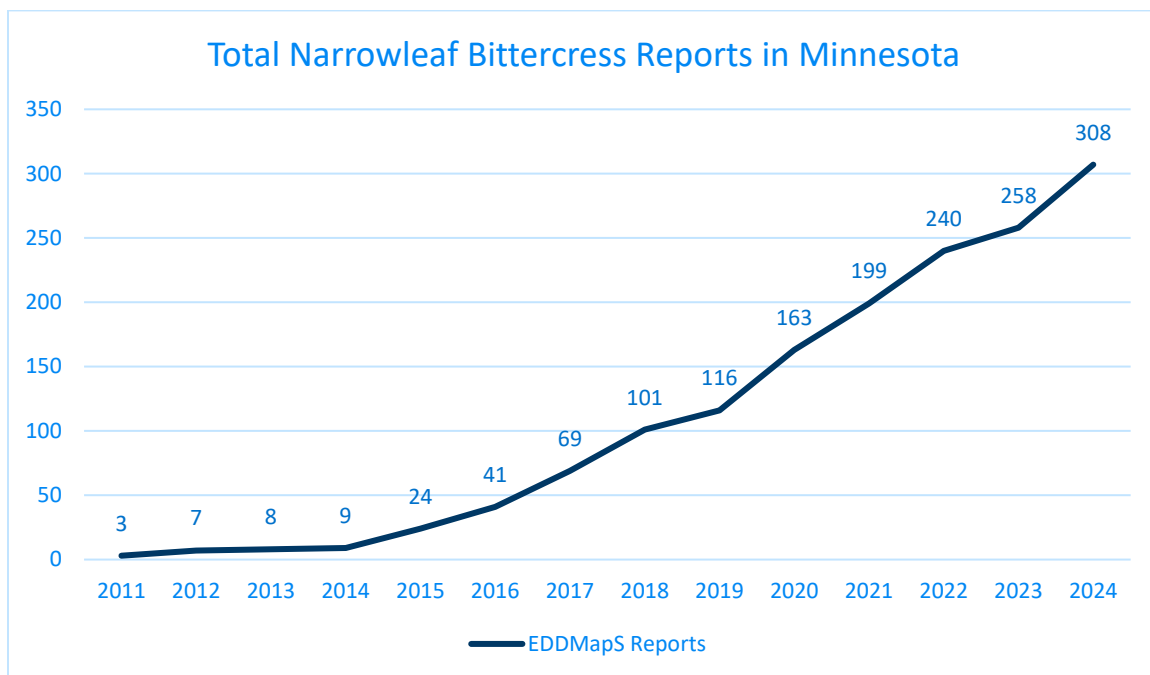


Image caption: Total reports of narrowleaf bittercress in Minnesota between 2011 and 2024.

Appendix C: Life cycle and treatment graphic

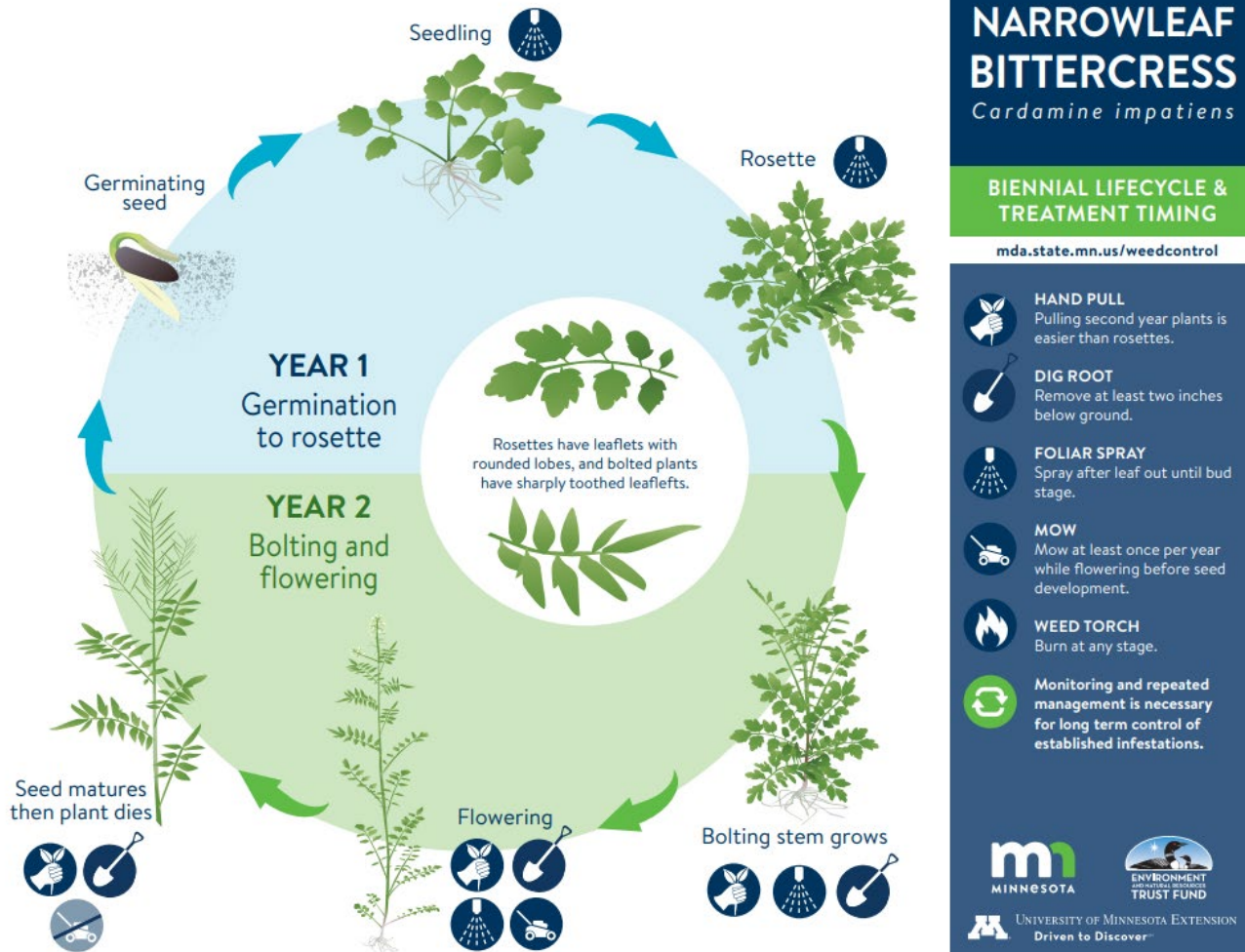


Image caption: Lifecycle and treatment timing of Narrowleaf bittercress (Minnesota Department of Agriculture 2020).

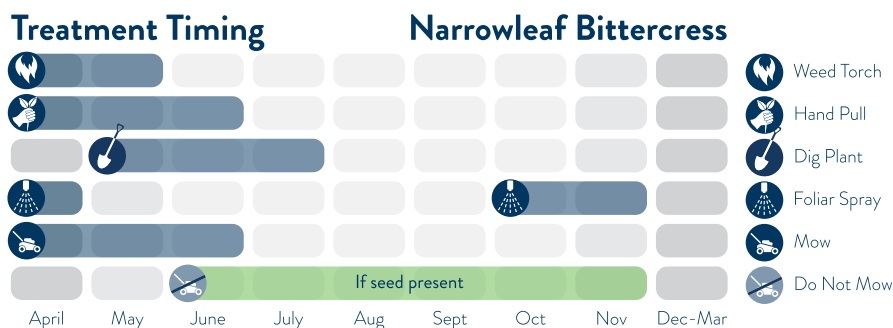


Image caption: Treatment timing graphic of narrowleaf bittercress (Minnesota Department of Transportation 2023).