Minnesota Noxious Weed Risk Assessment

Developed by the Minnesota Noxious Weed Advisory Committee

Assessment information

Common name: Baby's Breath

Scientific name: *Gypsophila paniculata* L. with the synonym *Gypsophila paniculata* L. var. *paniculata*

Family name: Caryophyllaceae

Current reviewer name and organizational affiliation: Monika Chandler, Minnesota Department of Agriculture
Date of current review: November 20, 2020

Species description

Photo

Naturalizing baby's breath plants (left image) and flowers (right image). Photo credit: Minnesota Department of Agriculture.

Baby's breath taproot is large and stores resources to help the plant through drought or dry seasons. Photo credit: Minnesota Department of Agriculture

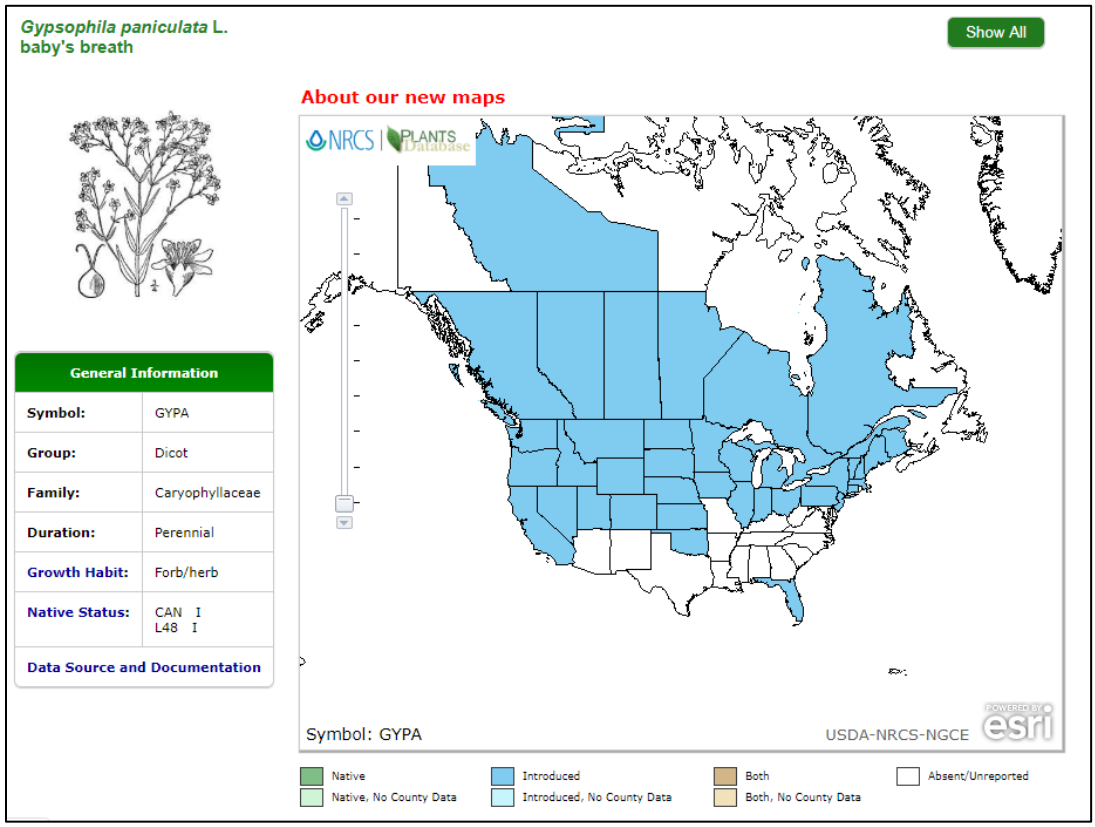
Why the plant is being assessed

- Baby's breath escaped cultivation and is spreading in Minnesota.
- For decades, baby's breath has been problematic in Canada and in other US states.

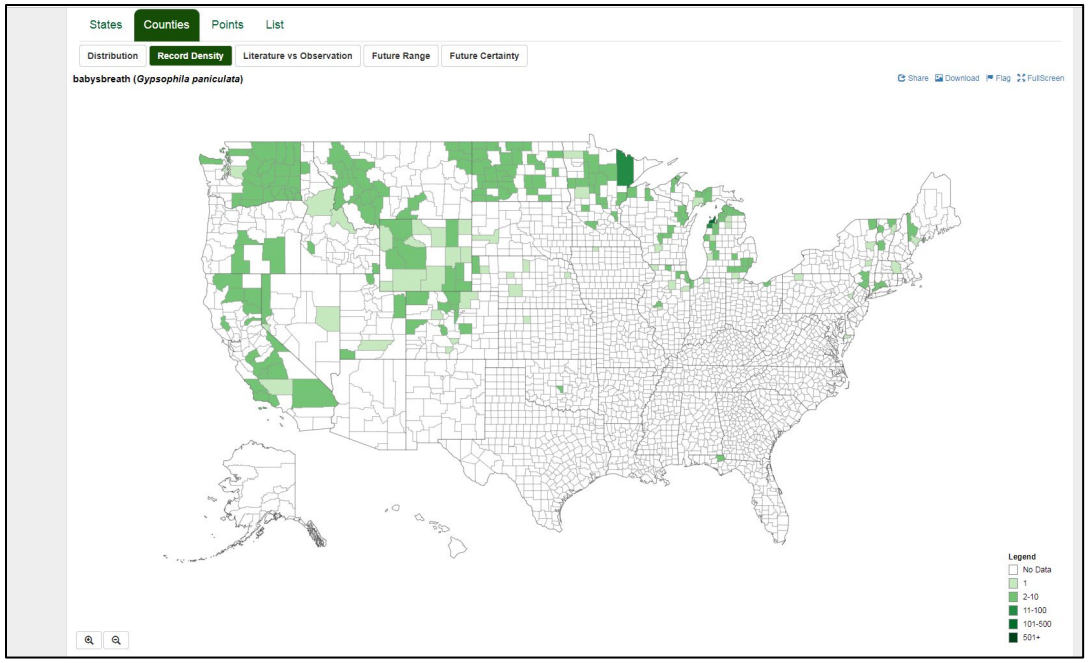
Identification, biology, and life cycle

- Baby's breath is an herbaceous perennial with many panicle-like inflorescences that form a dome shape. It grows to 0.75 m (2.5 ft) tall and has a large, woody taproot.
- Leaves are opposite, narrow and covered in fine hairs. The foliage is greyish-green.
- Stems are upright and there can be single or multiple stems.
- Flowers are small and white. Each flower has 5 petals and 10 stamens.
- Reproduction is exclusively by seed. Seeds are black and 1.5 - 2.0 mm (0.5 – 0.8 in) long.
- *Gypsophila paniculata* var *compacta* Hort has a small form.
- *Gypsophila elegans* is a similar species but is an annual and is shorter at 0.3 – 0.4 m (1 – 1.3 ft) tall. Other *Gypsophila* spp. reported in EDDMapS include *G. scorzonerifolia* (garden baby's breath), *G. elegans* (showy baby's breath), *G. muralis* (low baby's breath) and *G. acutifolia* (sharpleaf baby's breath). Additionally, in USDA Plants, there are recorded populations of *G. oldhamiana* (Oldham's baby's breath), *G. pilosa* (Turkish baby's breath).

Current distribution



This North American distribution map of *Gypsophila paniculata* is from USDA Plants (accessed 01/07/2020). There are reports of naturalizing baby's breath in all northern US states except Alaska and in all Canadian provinces and territories below a latitude of 60°.



National county level map from EDDMapS, accessed 01/07/2020.

Current regulation

Baby's breath is not regulated in Minnesota.

Risk assessment

Box 1:

Is the plant species or genotype non-native?

Answer: Yes
Outcome: Go to Box 3
Gypsophila paniculata is native to central and eastern Europe, Russia, the northern Middle East, Mongolia and China and is considered a widespread species in the native range (Barkoudah 1962).

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
Baby's breath is regulated as a Class C weed in Washington and a noxious weed in Alberta, Canada. It is on a watch list in Colorado and listed as an unregulated invasive plant of concern in British Columbia, Canada. It is not regulated in Wisconsin, but listed as Caution species on the Wisconsin Department of Natural Resources baby's breath webpage.

Box 4:

Are the species' life history and growth requirements understood?

Answer: Yes
This information is supplemental and is not part of the flow chart pathway for this risk assessment.
Baby's breath has been propagated by industry for decades.

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
There are established populations documented in 19 counties in Minnesota: Anoka, Becker, Beltrami, Benton, Cass, Clay, Clearwater, Douglas, Hubbard, Itasca, Marshall, Morrison, Otter Tail, Pine, Pope, Ramsey, Renville, St. Louis and Wadena.

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 but it is likely that seed production could be variable.
Outcome: Go to Question 7B
Presumably, seed production by cultivars could be variable. Cultivars include 'Bristol Fairy', 'Compacta Plena', 'Double Snowflake', 'Double Time', 'Double White', 'Early Snowball', 'Excellence', 'Fairy Perfecta', 'Festival Series', 'Flamingo', 'Fun Time', 'Happy Festival', 'Magic Series', 'Million Star', 'Overtime', 'New Love', 'Perfecta', 'Pink Fairy', 'Pink Star', 'Rosenschieier/Rosy Veil', 'SnowWhite', 'Snowball', 'Snowflake', 'Summer Sparkes', 'Viette's Dwarf' and 'Virgo'. Registered and trademarked varieties include Festival Star ™, Garden Leader ®, Pink Festival ™.

Question 7B: Does the plant reproduce by asexual/vegetative means?
Answer: No
Outcome: Go to Question 7D
New plants are produced by seed (Darwent and Coupland 1966 and Rice et al. 2019).

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
An averaged sized plant growing with low competition produced 13,700 seeds (Stevens 1957).

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.***
Outcome: Reviewer is working on an answer to this question and has requested a couple of papers for an answer. This question can be updated if more information becomes available.

Question 7G: Are sexual propagules – viable seeds – effectively dispersed to new areas? List and consider all vectors.
Answer: Yes
Outcome: Go to Question 7I
Darwent and Coupland (1966) documented that wind was the important factor for seed dispersal. Strong wind caused dried shoots to brake at the base and the whole structure of shoots would blow tumbleweed-like for distances of 0.5 mile or more.

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: Unknown. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
According to Darwent (1975), there are no reports of *G. paniculata* hybrids naturalizing but referenced horticultural cross between *G. paniculata* and *G. repens* L. var. *rosea* Hort.

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
Baby's breath is flourishing at field sites in Minnesota and there are no documented natural controls. There was a disease associated with a phytoplasma documented in Israel (Gera et al. 2007).

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, not a significant risk
Outcome: Go to Box 9
There is no documented toxicity. Occupational asthma caused by baby's breath allergens has been documented (Schroeckenstein et al. 1990 and Vidal and Polo 1998). Despite the many potential allergens the floral industry works with, there are few cases of occupational asthma (Schroeckenstein et al. 1990 and Vidal and Polo 1998).

Question 8B: Does, or could, the plant cause significant financial losses associated with decreased yields, reduced crop quality, or increased production costs?
Answer: No. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
Baby's breath has not impacted crop production.

Question 8C: Can the plant aggressively displace native species through competition (including allelopathic effects)?
Answer: Yes. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
Baby's breath has been documented to overtake sand dune vegetation in Michigan (Emery et al. 2013, Rice et al. 2020) and Latvia (Rudzite 2008). Darwent et al. (1967) described expanding populations on native and non-native species of grasslands in Saskatchewan.

Question 8D: Can the plant hybridize with native species resulting in a modified gene pool and potentially negative impacts on native populations?
Answer: Unknown. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
The reviewer is working to get more information on this.

Question 8E: Does the plant have the potential to change native ecosystems (adds a vegetative layer, affects ground or surface water levels, etc.)?
Answer: Yes. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
Emery and Doran (2013) found that arthropod abundance and diversity was higher in plots with baby's breath than in plots without baby's breath.

Question 8F: Does the plant have the potential to introduce or harbor another pest or serve as an alternate host?
Answer: No. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
Phytophthora species, *Rhizoctonia solani*, *Pythium* species and *Fusarium* species can infect and cause disease in *Gypsophila* (Wolcan et al. 2018) but the author did not find documentation that the plant can introduce or harbor a pest or serve as an alternate host.

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.

Outcome: Go to Question 9B

Baby's breath is an important "filler" flower for the cut flower industry. It is also used as a perennial flower in gardens. Some wildflower seed mixes include baby's breath but it is unclear whether the species is *G. elegans* or *G. paniculata*.

- The following cultivars are the most common varieties sold in Minnesota as cut flowers: 'Double Time', 'Excellence', 'Fun Time', 'Million Star', 'Overtime' and 'New Love' (J. Calkins, personal communication). On 07/20/20, a google search found stems of unspecified varieties of baby's breath were sold online by big box stores such as CostCo and Walmart. Online wholesalers sold cut stems of the following varieties 'Beauty Bride', 'Cosmic', 'Excellence', 'Million Star', 'Mirabella', 'New Love', 'Overtime', 'Wild Pearl'.
- For garden planting, a Google search found 'Bristol Fairy', the Proven Winner designated 'Festival Star'™ and 'Perfecta'. Missouri Botanical Garden Plant Finder lists the following 'Bristol Fairy', 'Compacta Plena', 'Perfecta' and 'Viette's Dwarf'. The plants are sold in pots. 'Bristol Fairy' was introduced in 1927 by Bristol Nurseries, Inc., Bristol, CT and Jackson & Perkins Co., Newark, NY (Biodiversity Heritage Library). Many white flowered baby's breath sold for gardening were varieties of *G. elegans*, an annual species.
- Varieties are vegetatively propagated (Wolcan et al. 2018).

A 2020 survey of nursery certificate holders and Minnesota Nursery Landscape Association members documented the following. 24% of 18 respondents sold baby's breath but 14% of 6 respondents said it is an indispensable income source. 27% of 16 respondents said the species is invasive or problematic in native ecosystems. 47% of 24 respondents said there are good alternatives.

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?

Answer: No, not without understanding the pathway for new introductions

Outcome: Go to Question 9C

It is unknown whether spread can be effectively and easily prevented. We do not know the source of naturalizing baby's breath. In order to prevent spread, we need to understand the source. Information below was provided in conversation with Dr. Neil Anderson.

1. The large cut flower operations are less to be a seed source. Flowering stems are harvested before flowers open so there is a reduced risk that flowers are pollinated and produce seed. The large-scale production fields are in California or South America.
2. Locally produced baby's breath for floral arrangements is a potential source. Typically, flowers have opened before harvest so pollination is possible. It is unknown whether mature seed would be produced and dispersed from arrangements disposed of outdoors. It is unknown whether plants remaining in production fields would produce seed.
3. Use of baby's breath in gardens is a potential source.

Bachman's sources baby's breath from South America for their arrangements (James Calkins, personal communication).

Calistri et al. (2016) state that the flowers of commercial *G. paniculata* plants are sterile and do not produce seeds. New varieties are created through in vitro vegetative propagation and selection of clonal variants. It is not known whether local cut flower growers in Minnesota use varieties that do not produce seed.

Question 9C: Is the plant native to Minnesota?
Answer: No.
Outcome: Go to Question 9D
Gypsophila paniculata is native to central and eastern Europe, Russia, the northern Middle East, Mongolia and China and is considered a widespread species in the native range (Barkoudah 1962).

Question 9D: Is a non-invasive, alternative plant material or cultivar commercially available that could serve the same purpose as the plant of concern?
Answer: No
Outcome: Go to Question 9E
As a landscape plant, yes, but a commercially available cultivar is not readily available for cut flowers.

Question 9E: Does the plant benefit Minnesota to a greater extent than the negative impacts identified at Box #8?
Answer: Yes
Outcome: Go to Box 11
Baby's breath is very important for the cut flower industry. Baby's breath has been documented as problematic in sand dunes and some grassland systems. If research determined the cut flower industry is not a significant source of seed introduction, then regulation could be crafted that would retain benefits for the industry.

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?
Answer: Yes. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
If all baby's breath seed, plants and cut flowers were prohibited, that would reduce the likelihood of introduction. However, it is not clear whether all of these plant materials are sources of new infestations.

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. ***This information is supplemental and is not part of the flow chart pathway for this risk assessment.***
Baby's breath does not pose a human health threat.

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 does the distribution, reproductive biology, potential for spread support a statewide eradication effort?

- *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.*

Outcome: Decision tree does not direct to this question.

Question 10G: Can the plant be reliably eradicated (entire plant) on a statewide basis using existing practices and available resources?

- *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.

Box 11:

The species is being proposed to be designated as a Specially Regulated Plant. What are the specific regulations proposed?

Answer: No regulations are proposed at this time. Effective special regulations cannot be crafted without understanding the pathway/s for new introductions. Research on this topic would inform regulations.

Final outcomes of risk assessment (2020)

NWAC Listing Subcommittee

Outcome: Do not regulate at this time. Continue to collect information on this species and pathways of spread.
Comments: Listing subcommittee was supportive of not recommending regulation at this time due to the need to better understand pathways of spread and if there are special regulations that could reduce spread.

NWAC Full Committee

Outcome: Do not list
Comments: Vote was 15-0 on the recommendation to not list.

MDA Commissioner

Outcome: Do not list
Comments: No comments

Risk Assessment Current Summary (04-26-2021)

- Baby's breath escaped cultivation and is spreading in Minnesota. For decades, baby's breath has been problematic in Canada and in other US states.
- Baby's breath is an important flower in the cut flower industry.
- No regulations are proposed at this time. Effective special regulations cannot be crafted without understanding the pathway/s for new introductions. Continued research on this topic is needed to inform regulations.
- The commissioner agreed with the recommendation to not list at this time.

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