Pale Spiked Lobelia: A Wildflower of the Future

(A Guideline for Future Production of *Lobelia spicata)*

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Executive Summary

Lobelia spicata, or Pale Spiked Lobelia, is a wildflower beauty with the potential to take over the market as the newest drought resistant ornamental flower. As an annual in USDA Zones 4-8 and a perennial in Zones 9-11, *Lobelia spicata* is able to tolerate a wide range of environmental conditions while still producing beautiful, season-long blooms. Similar to other *Lobelia* species on the market, *Lobelia spicata* is best grown in well-drained, slightly alkaline soil with higher levels of organic matter. With its drought resistance and shade tolerance, *Lobelia spicata* is sure to become a staple in the ornamental bedding flower market. Its crisp white blooms and unique five petal flowers will stand out in the background of any landscape. Sold to growers as vegetative cuttings, *Lobelia spicata* doesn't require plant growth regulators and is unlikely to develop disease or pest infestations even without the use of pesticides or fungicides. Rooting hormone can be used to improve root development but isn't required. Weekly pinching will assist in creating a bushy shape and strong flower production. Overall, *Lobelia spicata* requires little attention in greenhouse production but is sure to catch the attention of the market.

I. Introduction

A. Taxonomic Classification and Geographical Distribution in the Wild.

The genus *Lobelia*, of the family Campanulaceae, has been dated back to over 20 million years ago when data displayed its presence in South Africa. Since then, the genus has undergone significant genetic diversification to now include 439 accepted species including *Lobelia spicata* Lam (ITIS, 2023). Although less commonly known in comparison to the similar species *Lobelia inflata* or *L. erinus*, *L. spicata* has become a popular wildflower to promote pollinators across much of the United States and Canada (National Science Foundation, 2023). The species has been adapted into multiple varieties over the years including *L. spicata* var. *campanulate* McVaugh, *L. spicata* var. *hirtella* A. Gray, *L. spicata* var. *leptostachys* (A. DC.) Mack. & Bush, *L. spicata* var. *scaposa* McVaugh, and *L. spicata* var. *parviflora* A. Gray (ITIS, 2023). Beginning in the early 1800s, *L. spicata* was commonly found across Southern Canada and New England and is considered to be introduced to the U.S states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont (Figure 2); the date of introduction is unknown. It has since spread as far west as Montana and as far south as the coast of the Gulf of Mexico. Currently, *L. spicata* ranges from 51°36’00”N, 104°42’00”W to 28°48’00”N, 95°48’00”W and 38°24’00”N, 105°24’00”W to 44°54’00”N, 67°00’00”W (Figure 3). *Lobelia.*

Figure 1: Lobelia spicata raceme inflorescence

spicata is terrestrial and anthropogenic so it is commonly found in disturbed habitats including wet meadows and fields (National Science Foundation, 2023). It is tolerant of both part shade and full sun and can be perennial or annual depending on the location. *Lobelia spicata* grows in a wide array of soil types, ranging from sandy loams to silty clay loams. Sufficient soil drainage is important to prevent excess moisture buildup. It has been found to inhabit soils with pH ranging from slightly acidic to slightly alkaline and everything in between.

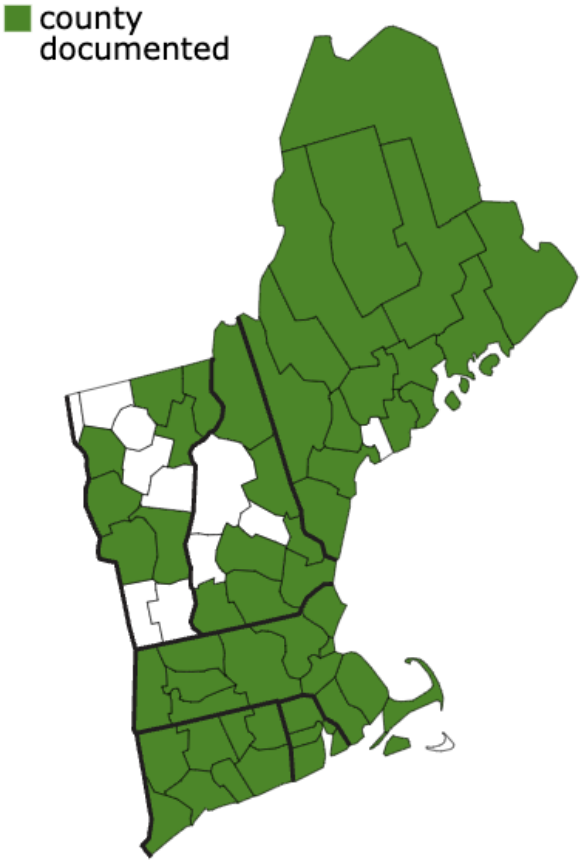

Figure 2: Introduced habitat of Lobelia spicata (The Biota of Northern America Program, 2020).

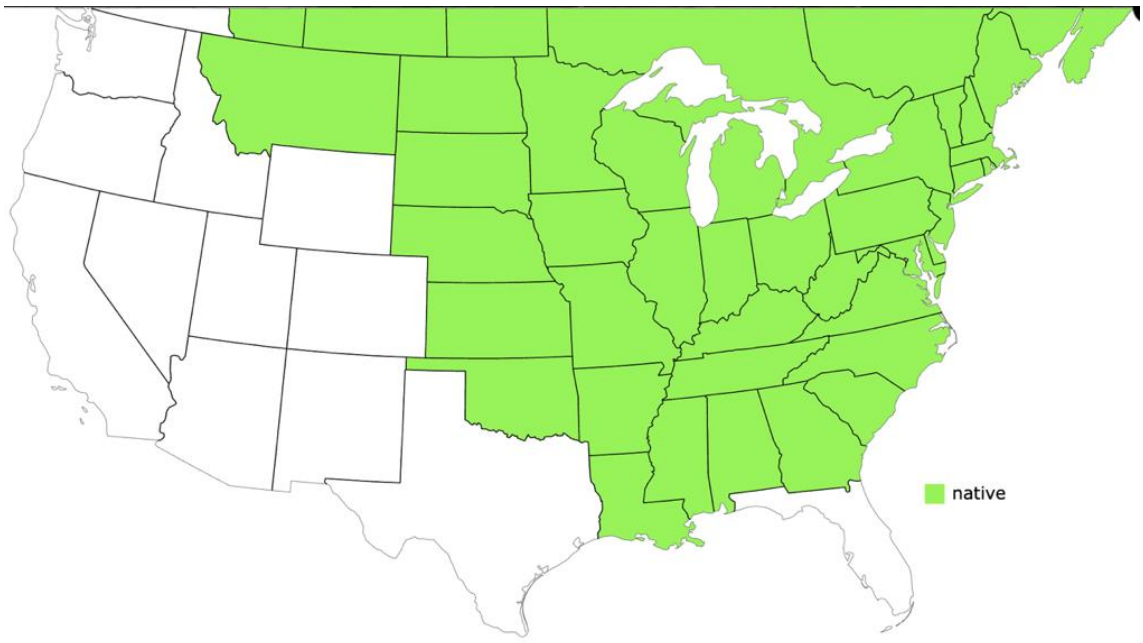

Figure 3: Current geographic distribution of Lobelia spicata (The Biota of Northern America Program, 2020).

General Climactic Conditions and Native Habitat

Due to the presence of *L. spicata* in wet meadows and runoffs, it is assumed that it can tolerate high moisture content without developing root issues including fungal and bacterial infections. Although there is limited information on *L. spicata*, other species of the genus Lobelia display tolerance of cool conditions but a sensitivity to frost. In warmer conditions, Lobelias grow best in partial shade but can tolerate full sun in abundant moisture and when nights provide sufficient temperature drops (Howe and Gilman, 2014). The ideal flowering temperature for Lobelia species is around 21° C. Higher temperatures can cease flowering, though they tend to recover once temperatures drop in early fall. Due to its sensitivity to elevated temperatures, *L. spicata* would be best grown as a spring or late season crop in a production setting. Similarly, *L. spicata* would sell best as a cool season ornamental due to its intolerance for hot temperatures when flowering, similar to cool season ornamental crops like calendulas or pansies.

Invasive Tendencies

Although *L. spicata* is self-pollinating, it has shown limited evidence of invasive tendencies (Cornell, 2006). It is also not included on the USDA National Invasive Species List (USDA, 2023). Because of this, there is little concern for invasive tendencies when planting *L. spicata* as a wildflower species.

Taxonomic Description

Lobelia spicata has an overall plant height between 30 and 60 cm and stands erect and unbranching. The leaves are alternate and simple at a length of 2.5 to 9 cm long (Figure 4). The leaf shape ranges from lanceolate to ovate with subtle toothing along the leaf margin (NC State Extension, 2022). Inflorescences of *Lobelia spicata* develop into a spike-like raceme with bilaterally symmetric, hermaphroditic flowers (Figure 4). The flowers can be blue, purple, or white and have five petals, two at the top of the flower and three below to form a lip (Figure 6). The petals are partially fused into a tube around the five stamen which range in length from 5 to 9 cm (National Science Foundation, 2023). *Lobelia spicata* has a two-chambered inferior ovary and one style that is positioned in the center of the stamen tube (SW

Figure 4: Flowers of Lobelia spicata (Minnesota Wildflowers)

Biodiversity, 2020). The fruit of *L. spicata* is a short, two-chambered capsule with many seeds that measure to around 0.5 mm long (Figure 5). *Lobelia spicata* has a fibrous root system with no underground storage organs. It is hardy to USDA Zones 4 to 8 and blooms between June and August (Minnesota Department of Agriculture, 2023).

Figure 5: Phenotypic traits of Lobelia spicata including scale, coloring, and overall structure (Harvard University, 1948)

Figure 5: Lobelia spicata seeds, illustrating their small size (Missouri Wildflowers, 2023)

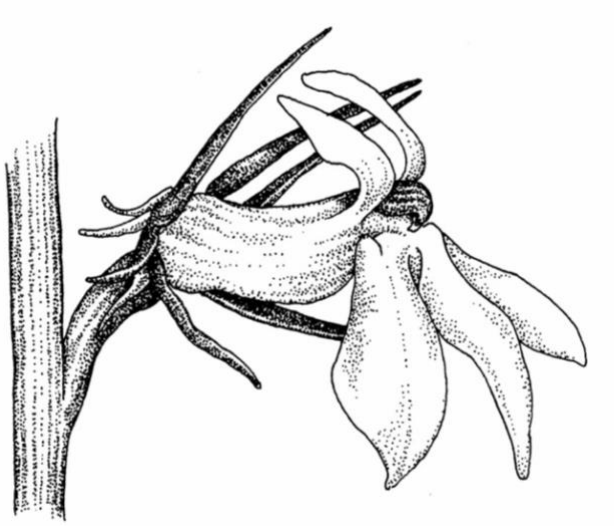

Figure 6: Lobelia spicata flower displaying the fused petal tube (Native Plant Trust, 2023).

Use by Indigenous people and Medicinal Uses

There is little evidence of *L. spicata* being utilized by indigenous people. This may be due to the presence of the alkaloid, lobeline, in the leaves and seed capsules that affects the nervous system similarly to nicotine. Other *Lobelia* species, however, have been utilized as a traditional medicinal plant by the Cherokee, Penobscot, Iroquois, and other Tribal Nations. Specifically, *Lobelia inflata* or Indian tobacco has been used as an herbal treatment for respiratory conditions such as bronchitis, pneumonia, and asthma (Icahn School of Medicine, 2023). Contemporary research in humans is limited due to the adverse side effects that come with high dosages.

II. Crop Species

A. History and Potential Uses.

Currently, there are no *L. spicata* cultivars available on the market, however, many small suppliers sell seed as a wild species. The main supplier is American Meadows, with other smaller producers like Prairie Moon Nursery and EverWilde Farms slowly entering the market.

Based in Vermont, American Meadows sources their seeds from their multi-acre wildflower farm. The Prairie Moon Nursery, based in Minnesota, outsources their seeds from producers across the Midwest. EverWilde Farms was also started on a few acres of land in Minnesota but has since expanded and moved to California where they continued their wildflower farm and began sourcing seeds from growers in the Western US. *Lobelia spicata* is marketed as a good pollinator that can tolerate dry conditions better than other Lobelia species. Although only small-scale producers currently sell *L. spicata*, large-scale seed producers like Ball Seed Company and Burpee Seeds could benefit from the addition. As pollinator species wildflowers become more common, more attention will be placed on species with low maintenance requirements. With its ability to withstand most soil conditions and tolerance to lower temperatures, *L. spicata* would be a wonderful addition to wildflower gardens. Below is a distribution chain with possible companies that could incorporate *Lobelia spicata* into their product list along with the chain of seed producers that could supply the seed and retailers that would buy the product.

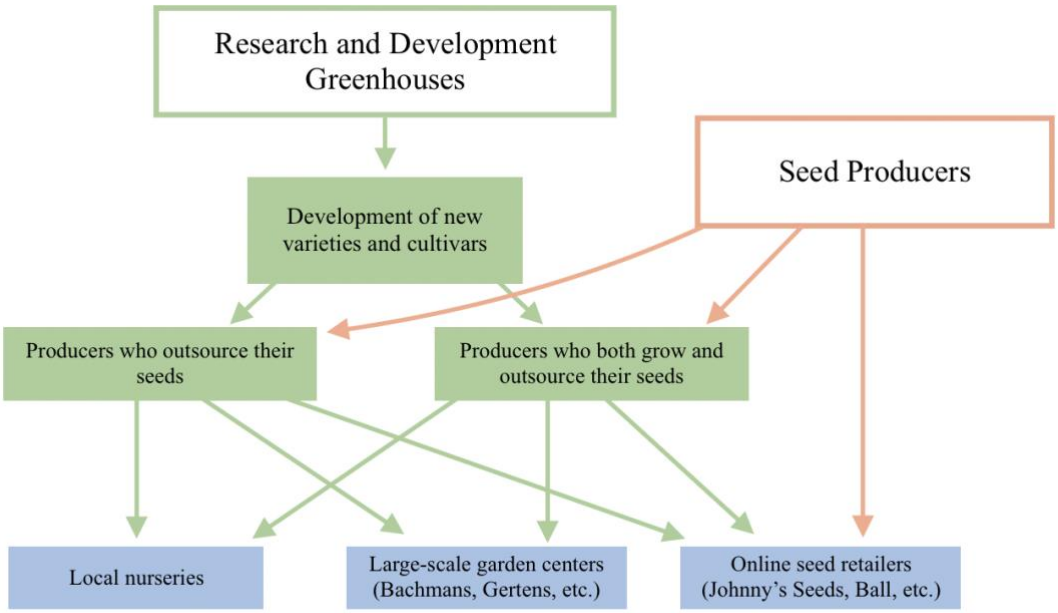

Figure 7: Horticultural distribution chain for Lobelia spicata, starting with seed development at the top of the chain, seed production routes below that, and likely consumers at the bottom.

III. Product Information

A. Anticipated Cultural Requirements.

Life Cycle

As a genus, *Lobelia* is known for having species that can be both perennial and annual depending on the climactic conditions provided (Mahr, 2023). Although it is commonly sold as an annual, *Lobelia* species are likely to drop seed and regrow seasonally (Ohio State University, 2020). Because of its ability to bloom in the spring and again in the fall when temperatures lower, *Lobelia spicata* could be utilized as a spring bedding ornamental as a replacement for common flowering ornamentals like daffodils that won't produce a second bloom as fall sweeps in. Additionally, as the plants drop seed each year, *Lobelia spicata* will spread throughout a garden as needed and provide a colorful, season-long bloom year after year.

Plant Characteristics

Lobelia spicata would be best utilized as a flowering potted plant or an annual bedding plant depending on the climate. In warmer climates, it would be best as a bedding plant to prevent drought stress as ground soil would be able to sustain moisture better than potted soil. It could additionally act as a background ornamental in landscape set ups due to its height and ability to tolerate mostly shaded conditions.

Winter Hardiness and Heat/Drought Tolerance

Lobelia spicata is hardy to USDA Zones 4 through 8 and perennial in Zones 9-11. It can tolerate heat between Zones 2 and 8, though it will flower more often in lower heat zones. With this in

mind, *Lobelia spicata* would be best grown in low heat zones or in shade when used in higher heat zones to prevent it from not flowering or developing heat stress.

Potential Production Environment

In a production environment, *Lobelia spicata* will need ample moisture to thrive. It should be germinated in germination mix before being transplanted into a well-draining soilless media for the remainder of its growth. *Lobelia* species grow best in a pH range of 6 to 7.5 and a relatively high organic matter percentage. This can be obtained by using sphagnum peat moss or coconut coir along with the soilless media. To germinate, *Lobelia spicata* requires soil temperatures between 65 and 75 degrees F and adequate light. For this reason, seeds should not be covered. Once germinated and transplanted, the plants will require cooler temperatures, around 55 degrees F, at night and day temperatures around 70 degrees F for flower bud initiation. Cold-stratification can hasten germination of the seeds by simulating overwintering. This can be done by placing the seeds in temperatures between 35 and 45 degrees F for one to two months before sowing. Deadheading *Lobelia spicata* is an important practice to maintain flower production and prevent leggy growth.

B. Market Niche.

Due to its spring flowering, *Lobelia spicata* could be used as the centerpiece for Easter flower arrangements. Its tall and vibrant flowers would act as a showy but elegant background for the surrounding flowers. Since *Lobelia spicata* can be forced into multiple flowering stages per year, it could be utilized all season long as a potted plant. One limitation that could be encountered in large-scale production of *Lobelia spicata* is the amount of water required to sustain healthy growth.

As a native species, *L. spicata* prefers marshlands and can tolerate moist soil conditions while still receiving adequate oxygen and without the development of fungal infections. As the U.S. moves to a more sustainable way of life, water usage is often an important aspect in what is commonly grown by consumers. When put in comparison to drought-tolerant ornamentals such as *Lantana* or *Zinnia* varieties, *Lobelia spicata* is likely to fall short.

TABLE 1. Major *Lobelia* species cultivars currently on the market and their growth size (height x width), flower types, xxxx . [description of table, should stand alone as well as be reference in your text.]

Plant Cultivars on the Market	**Species**	**Plant Height x Width (inches)**	**Inflorescence Type**
'Cardinal Flower'	*Lobelia cardinalis*	38 x 20	Raceme
'Trailing Lobelia'	*Lobelia erinus*	45 x 45	Raceme
'Vedrariensis'	*Lobelia speciosa*	36 x 24	Raceme
Blue Cardinal Flower	*Lobelia siphilitica*	30 x 18	Raceme
'Queen Victoria'	*Lobelia fulgens*	40 x 22	Raceme

Marketing Story

Whether you're a commercial grower, landscaper, or hobby gardener Pale-spiked Lobelia is the next new thing to brighten your plants. With their well-known, unique *Lobelia* flowers now in crisp white, Pale-spiked Lobelia can act as a potting centerpiece or a bedding ornamental to spice up boring and overused varieties. With its season-round bloom, this new product will provide the color and life you need without all the hassle and work that comes with other bedding ornamentals. Pale-spiked Lobelia is available as seed or vegetative propagules so you can grow happy plants with the germplasm that fits your needs best. Pale-spiked Lobelia will be available for sale starting May 8th. Don't miss this opportunity to grasp the newest *Lobelia* on the market!

IV. Product Information Guide (PIG) & Crop Schedule

A. Current Production Practices

Currently, *Lobelia spicata* is only available on the market in seed packets marketed as a wildflower seed mix. Many of these seed packets are sold by small wildflower companies like Prairie Moon Nursery or Everwilde Farms but have yet to be picked up by large seed companies like Ball Horticultural Company. Many major nurseries instead sell other *Lobelia* species as ornamental flowers, most commonly *Lobelia erinus* or *Lobelia cardinalis.* Although they do sell these species in seed form, most of the varieties are only available as cuttings or plugs. Based on this information, it can be assumed that *Lobelia spicata* would most likely be sold as cuttings as well.

B. Production of *Lobelia spicata*

Based on current production practices of other *Lobelia* species, *Lobelia spicata* will grow best in trays sized at 50, 72, or 84 cells per tray with little variability in results between the three sizes (Konjoian, 1994). Rooting hormone like Indole acetic acid (IAA) is optional but recommended for improve root development among the cuttings. To encourage bushy growth and better flowering, it is best to pinch 18-21 days after sticking and continued on a weekly basis (Bradley & Cromell, 2001). Like most *Lobelia* species, *Lobelia spicata* prefers slightly acidic soil. It will do best grown in soil with a pH ranging from 5.8 to 6.2 (Peck, 2022). Based on its heightened shade tolerance in comparison to other *Lobelia* species, *Lobelia spicata* will grow best in light conditions ranging from 4,000 to 6,000 fc. Ideal temperatures for *Lobelia spicata* range from 70 to 75°F during the day and 55 to 60°F at night. Cooler night temperatures will allow for adequate flower bud initiation (Lang, 2022). Other *Lobelia* species have shown virtually no disease or pest

problems though there's limited research on *Lobelia spicata* pest and disease resistance (North Carolina Extension). Fungicide applications can be used if botrytis develops; Astun fungicide at a rate of 15 fl oz/100 gallons water is suggested (Oregon State University). Product information when sold as a cutting is included in Table 2 below.

Propagation Guide

Tray Sizes: (cells/tray)	Rooting Hormone:	Pinch:	Average Propagation Time: (weeks)	Comments:
50, 72, 84	Optional	Recommended	4-5	Hormone recommended for improved root production.

Finishing

Soil pH:	Light Levels (fc):	Day Temperature:	Night Temperature:	Plant Growth Regulators	Common Pests:	Common Diseases:
5.8-6.2	4,000-6,000	70-75°F	55-60°F	Not needed.	Aphids, thrips	Botrytis

Crop Time

4- to 5-inch Pots, Quarts	6-inch Pots, Gallons	10- to 12-inch Pots or Baskets
7-9 weeks, 1 ppp	9-11 weeks, 1 ppp	10-12 weeks, 4-5 ppp

Table 2: Production information for Lobelia spicata when sold as a propagated cutting.

V. Acknowledgements

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