

Plant Propagation Protocol for *Lobelia dortmanna*

ESRM 412 – Native Plant Production

Protocol URL: <https://courses.washington.edu/esrm412/protocols/LODO.pdf>

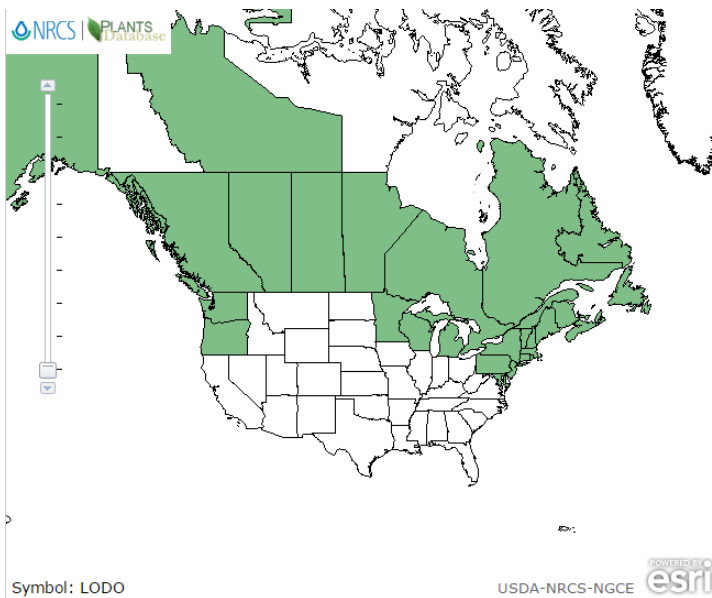


Illustration 2: Distribution along USA and parts of Canada

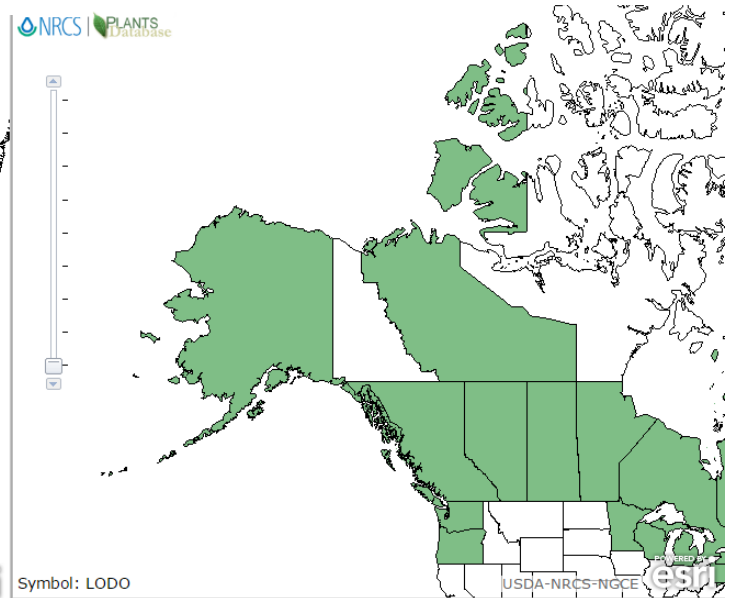


Illustration 1: Distribution along Alaska and remainder of Canada

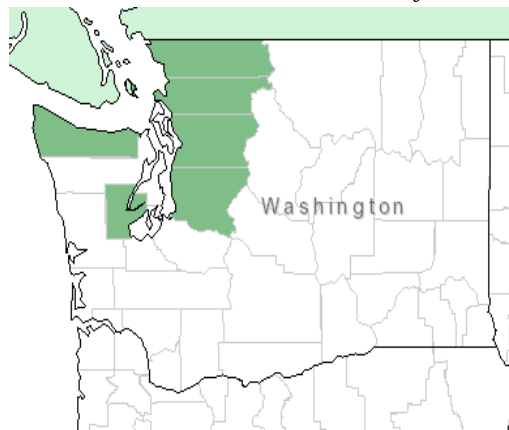


Illustration 3: Distribution along the state of Washington

Source: USDA PLANTS database⁸

TAXONOMY	
Plant Family	
Scientific Name	Campanulaceae
Common Name	bellflower family
Species Scientific Name	
Scientific Name	<i>Lobelia dortmanna</i> Linnaeus
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	
Common Name(s)	Dortmann's cardinalflower, water lobelia
Species Code (as per USDA Plants database)	LODO
GENERAL INFORMATION	
Geographical range	Native to Eastern Canada, Western Canada, North-central USA, Northeastern USA, Northwestern USA, and Southeastern USA. Native to Eastern, Middle, Northern, and Southwestern Europe. ⁸ See above illustrations 1, 2, and 3 for North America, Canada, and Washington state distributions.
Ecological distribution	Low nutrient shorelines and wetlands. Moderately cool climate temperatures can limit growth of species. Commonly found in the circumboreal range. ⁵
Climate and elevation range	Occurs around 900 feet of elevation. ⁶ Cannot tolerate desiccation. Grown depths in 2-3m deep water. ²
Local habitat and abundance	Grows in a variety of standing water sediments. ² Species is threatened in Washington, and Pennsylvania. Considered Special concern in Rhode Island, exploitably vulnerable in New York, and endangered in New Jersey. ¹
Plant strategy type / successional stage	Stress-tolerator. Can withstand periods of freezing if submerged. Houses <i>Endogone sp.</i> mycorrhiza. ²
Plant characteristics	Evergreen perennial forb. Has grass-like leaves with whitish base. White roots. Small pale blue or white snapdragon-like flowers distinguish it in the summer. ¹

PROPAGATION DETAILS	
Farmer, A., & Spence, D. Flowering, Germination and Zonation of the Submerged Aquatic Plant <i>Lobelia Dortmanna</i> ²	
Ecotype	Fresh seeds collected from Loch Fiacail, Sutherland of Scotland with various geographical ranges, during July to August flowering. (Table 1 below)
Propagation Goal	Seed germinants
Propagation Method	Seed
Product Type	Plug and container-field grown hybrid
Time to Grow	One year
Target Specifications	Seedling will have 3-4 rosette leaves with two to four adventitious roots ²
Propagule Collection Instructions	Seeds obtained from sediment cores by divers around 1.5m depth of water body.
Propagule Processing/Propagule Characteristics	Germinants cannot be desiccated.
Pre-Planting Propagule Treatments	-5 degrees Celsius dry stored seeds are cold stratified in 1-3 degrees Celsius and wet conditions for 1-2 months. Longer periods will reduce viability due to fungal growth.
Growing Area Preparation / Annual Practices for Perennial Crops	Seed germination requires a minimum 40 $\mu\text{mol photons m}^{-2} \text{ s}^{-1}$ for 100% germination at 25 degrees C.
Guidelines for Outplanting / Performance on Typical Sites	Outplanting sites must be non-flowing water between 1-2 m depth. Site must retain adequate water to keep plant roots submerged in drought.
Other Comments	To summarize, <i>L. dortmanna</i> can be dry stored in the dark. It requires a cold stratification for 1-2 months and light to germinate. Limited information is available past germination for this study. Periods of anoxia will induce secondary dormancy, but can be broken with one month of cold.

Huxley, A. <i>The New RHS Dictionary of Gardening</i> . ⁴	
Ecotype	Unlisted. Appears that wild-type seeds can be potentially used.
Propagation Goal	Ornamental
Propagation Method	Seed and vegetative
Product Type	Plug and container-field grown hybrid
Time to Grow	One year
Target Specifications	Shoots can be harvested when 10 cm long
Propagule Collection Instructions	“Harvest shoots when 10 cm long with plenty of underground stem. Pot into individual pots and keep in light shade in a cold frame or green house until well-rooting.” ⁴ No timing on collection mentioned.
Pre-Planting Propagule Treatments	Sow ripe seeds in a cold frame.
Establishment Phase Details	Sow ripe seeds in cold frames. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for their first winter.
Length of Establishment Phase	One year
Active Growth Phase	Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Division in spring. Basal cuttings in spring. ⁴
Length of Active Growth Phase	Not listed
Hardening Phase	Pot them up into individual pots and keep them in light shade in a cold frame or greenhouse until they are rooting well. Plant them out in the summer. Layering in moist sand, until it forms roots at the nodes.” ⁴
Length of Hardening Phase	Not listed
Other comments:	The information provided is reference for home-gardening.

INFORMATION SOURCES	
References	See below
Other sources consulted	See below
Protocol Author	Jamie Lei
Date Protocol Created or Updated	04/26/17

Tables and Figures

Name and locality	National grid reference and latitude/longitude	Description
Lochan-na-Thuill, Sutherland	NC 242500 5°0' W 58°24' N	1m depth. Fine silt with <i>Littorella uniflora</i> and <i>Juncus bulbosus</i> Exposed, gravel with <i>L. uniflora</i> and <i>Ranunculus flammula</i> Sheltered, silty with <i>L. uniflora</i> , <i>Carex nigra</i> and <i>J. bulbosus</i>
Loch nan Eilean, Skye	NG 473306 6°12' W 57°17' N	Exposed, gravel with <i>Eriocaulon septangulare</i> , <i>R. flammula</i> and <i>L. uniflora</i>
Loch Airigh-na-Saorach, Skye	NG 502201 5°52' W 57°13' N	Sheltered. Sand and silt with <i>L. uniflora</i> , <i>R. flammula</i> and <i>Potamogeton polygonifolius</i> Exposed, hard gravel with <i>R. flammula</i>
Loch Druidibeg, South Uist	NF 792380 7°19' W 57°20' N	Sheltered, fine, sand and silt with <i>L. uniflora</i> , <i>Isoetes lacustris</i> and <i>Eleocharis palustris</i>
	NF 770381 7°20' W 57°20' N	Exposed gravel with <i>L. uniflora</i>
Loch Kearsinish, Sout Uist	NF 800170 7°18' W 57°8' N	Exposed, gravel with <i>L. uniflora</i> , <i>J. bulbosus</i> and <i>C. nigra</i>
Loch Marulaig, South Uist	NF 825165 7°16' W 57°8' N	Sheltered, silty with <i>Nymphaea alba</i> , <i>Phragmites australis</i> and <i>E. palustris</i>
Loch Dow, Fife	NO 094965 3°27' W 56°9' N	Sheltered, gravel and sand with <i>L. uniflora</i> and <i>I. lacustris</i>
Many Crooks, North Roe, Mainland, Shetland	HU 315863 1°27' W 60°33' N	Exposed, hard gravel with <i>L. uniflora</i> and <i>J. bulbosus</i>
Un-named lochan, North Roe, Mainland, Shetland	HU 327849 1°24' W 60°33' N	Sheltered, very silty. Pure stand
Skutes Water, Fetlar, Shetland	HP 623920 0°51' W 60°37' N	Pure stand of <i>L. uniflora</i> . Terrestrial
Sandy Water, West Mainland, Shetland	HU 296537 1°28' W 60°16' N	Exposed, gravel with <i>L. uniflora</i> and <i>J. bulbosus</i>

Table 1: Geographic location and description of site ecotypes. Source: Farmer, A., & Spence, D. (1987)²

References

- ¹Department of Ecology: State of Washington (2016). Submersed Plants. *Lobelia Dortmanna - Water Lobelia*. Retrieved April 26, 2017.
<http://www.ecy.wa.gov/programs/wq/plants/plantid2/descriptions/lobdor.html>
- ²Farmer, A., & Spence, D. (1987). Flowering, Germination and Zonation of the Submerged Aquatic Plant *Lobelia Dortmanna* L. *Journal of Ecology*, 75(4), 1065-1076.
<http://dx.doi.org/10.2307/2260314>
- ³Farmer, A. M. (1989) *Lobelia Dortmanna* L. *Journal of Ecology*, 77(4), 1161–1173,
<http://dx.doi.org/10.2307/2260830>
- ⁴Huxley, A. (1992) *The New RHS Dictionary of Gardening*. MacMillan Press
- ⁵József Szmeja (1987). The structure of a population of *Lobelia dortmanna* L. along a gradient of increasing depth in an oligotrophic lake. *Aquatic Botany*, 28(1), 1-13
[http://dx.doi.org/10.1016/0304-3770\(87\)90052-0](http://dx.doi.org/10.1016/0304-3770(87)90052-0).
- ⁶Maiz-Tome, L. (2016) *Lobelia Dortmanna*. *Lobelia Dortmanna (Water Lobelia)*. Retrieved April 26, 2017.
<http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T167831A78457082.en>
- ⁷Rook, E. (2002) *Lobelia dortmanna*. *Water Lobelia, Lobelia dortmanna*. Retrieved April 26, 2017.
<http://www.rook.org/earl/bwca/nature/aquatics/lobeliadort.html>
- ⁸USDA, NRCS (2017). *Lobelia dortmanna* L. *Plants Profile for Lobelia dortmanna*. Retrieved April 26, 2017.
<https://plants.usda.gov/core/profile?symbol=LODO>
- ⁹U.S. National Plant Germplasm System (2017). Taxon: *Lobelia dortmanna* L. *Taxonomy*. Retrieved April 26, 2017.
<https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?432638>

Other Sources Consulted (but that contained no pertinent information)

- Sinkevičienė, Z (2011) Unusual Vegetative propagation of Water Lobelia (LOBELIA DORTMANNA) in Lake Salinis (Lithuania). *Botanica Lithuanica*, 17(4), 185-187.
https://www.researchgate.net/publication/270505754_Unusual_Vegetative_propagation_of_Water_Lobelia_LOBELIA_DORTMANNA_in_Lake_Salinis_Lithuania
- Results could not replicate the propagation of *L. Dortmanna* observed in the lake.