

Plant Propagation Protocol for [*Delphinium nuttallianum*]

ESRM 412 – Native Plant Production

Protocol URL: [https://courses.washington.edu/esrm412/protocols/\[DENU2.pdf\]](https://courses.washington.edu/esrm412/protocols/[DENU2.pdf])

| TAXONOMY | |
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| Plant Family | Ranunculaceae |
| Scientific Name | <i>Delphinium nuttallianum</i> |
| Common Name | Buttercup |
| Species Scientific Name | |
| Scientific Name | <i>Delphinium nuttallianum</i> ex Walp. |
| Varieties | <i>Fulvum</i> C.L. Hitchc <i>Levicaule</i> C.L. Hitchc |
| Sub-species | |
| Cultivar | |
| Common Synonym(s) | <i>Delphinium nelsonii</i> Greene <i>Delphinium venenosum</i> A. Nelson (GRIN, 2017) |
| Common Name(s) | Twolobe larkspur, Nuttall's larkspur, Upland larkspur, Common larkspur (Taylor, 1998) |
| Species Code (as per USDA Plants database) | DENU2 |
| GENERAL INFORMATION | |
| Geographical range | All US mainland states west of and including Montana, South Dakota, Nebraska, Colorado, and New Mexico. Canada Provinces DC and Alberta (NRCS, 2017); (Strickler, 2004). |
| Ecological distribution | <i>D. nuttallianum</i> : Open forests; Drylands, sagebrush plains, Eastside mountain slopes and valleys (Kruckeberg, 1995). For Western Larkspur (<i>Delphinium x occidentale</i>) & <i>Delphinium bicolor</i> (DEBI): Dry Subalpine Meadow, grassland, and Ponderosa pine forest, Fir – spruce, Sagebrush, Chaparral – mountain shrub, Pinyon – juniper, Mountain grasslands, Mountain meadows, Plains grasslands, Alpine (USDA, 1993). |
| Climate and elevation range | |
| Local habitat and abundance | For Western Larkspur (<i>Delphinium x occidentale</i>) & <i>Delphinium bicolor</i> (DEBI): <i>Pinus Ponderosa</i> , <i>Pseudotsuga menziesii</i> , <i>Artemisia tridentate</i> , <i>Agropyron spp</i> (USDA, 1993). |
| Plant strategy type / successional stage | x |
| Plant characteristics | Small herbaceous perennial forb. Recognized by |

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| | backward projecting spur. Dark blue flowers with occasional white blossoms display 5 spreading sepals (Faust, 1999). |
| PROPAGATION DETAILS | |
| Ecotype | x |
| Propagation Goal | Plants/seeds (Williams and Nickolas, 1999) |
| Propagation Method | Seed (Williams & Nickolas, 1999) |
| Product Type | Container (plug) (Skinner, 2007) |
| Stock Type | x |
| Time to Grow | 2 years |
| Target Specifications | 4-20 in, fewer than 14 flowers on ascending hairless stalks (Turner and Gustafson, 2006). |
| Propagule Collection Instructions | Seed collected in June and stored at room temperature until cleaned (Skinner, 2007). |
| Propagule Processing/Propagule Characteristics | Seeds are crushed to remove follicle and separated with an air column chamber. Stored at 40 degrees Fahrenheit at 40 percent humidity. 617,143 seeds/Lb (Skinner, 2007). |
| Pre-Planting Propagule Treatments | To mimic natural conditions, must undergo moist, cold stratification and experience spring temperatures. Sown outdoor in November and will germinate the following spring (Kruckeberg, 1995); (Skinner, 2007) . |
| Growing Area Preparation / Annual Practices for Perennial Crops | Ray Leach Super cell container used filled with Sunshine #4 soil. Seeds sown and topped with a pea gravel applied to avoid displacement or floating. Thorough watering needed and then transported outside (Skinner, 2007). |
| Establishment Phase Details | Seeds may take 2-3 weeks to fully germinate, expected germination in early March (Skinner, 2007). |
| Length of Establishment Phase | 1 month |
| Active Growth Phase | Fertilized with water soluble fertilizer once per week, soil kept dry and watered only to prevent total desiccation (Skinner, 2007). |
| Length of Active Growth Phase | 2 months |
| Hardening Phase | Not necessary as plants are established outside (Skinner, 2007). |
| Length of Hardening Phase | NA |
| Harvesting, Storage and Shipping | Fibrous or tuber-like roots, take 1-2 years for root plug to develop (Kruckeberg, 1995). Breaks easily from stem at ground level. (Turner and Phyllis, 2006) Fragility must be a consideration that is taken for transplanting. |
| Length of Storage | Seed sowed in November, ready for transplant by early May (Skinner, 2007); (Kruckeberg, 1995). |
| Guidelines for Outplanting / | Dig/drill hole diameter of container. Little growth first |

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| Performance on Typical Sites | year, expedited second year with possible flowers (Skinner, 2007). |
| Other Comments | Well draining potting soil improved performance (3:1:1 peat, vermiculate, perlite). Container growth is slow. Pollinated primarily by hummingbirds and Bumblebees (Bosch & Waser, 1999). Highly toxic to sheep and cattle. Flowers used by Hopi for blue dye, early settlers used for ink (Faust, 1999). |

INFORMATION SOURCES

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| References | <p>Bosch, Maria, and Waser, Nickolas. "Effects of Local Density on Pollination and Reproduction in <i>Delphinium Nuttallianum</i> and <i>Aconitum Columbianum</i> (Ranunculaceae)." <i>American Journal of Botany</i> 86.6 (1999): 871. Web.</p> <p>Faust, Ralph, and Peggy Faust. <i>Wildflowers of the Inland Northwest: Idaho, Montana, Washington, Oregon, British Columbia & Alberta: Simplified Identification of 216 Wildflowers for the Flower Lover: Interesting Comments Both Factual and Mythical</i>. Coeur D'Alene, ID: Museum of North Idaho, 1999. Print.</p> <p>Germplasm Resources Information Network - (GRIN) Online Database. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov2/cgi-bin/npgs/html/taxgenform.pl (26 April 2017).</p> <p>Kruckeberg, Arthur R. <i>Gardening with Native Plants of the Pacific Northwest: An Illustrated Guide</i>. Seattle: U of Washington, 1995. Print.</p> <p>Skinner, David M. 2007. Propagation protocol for production of container <i>Delphinium nuttallianum</i> Pritz. ex Walp. plants; Pullman Plant Materials Center, Pullman, Washington. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 23 February 2007). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.</p> <p>Strickler, Dee. <i>Wayside Wildflowers of the Pacific Northwest</i>. Columbia Falls, MT: Flower, 2004. Print.</p> <p>Taylor, Ronald J. <i>Sagebrush Country: A Wildflower</i></p> |
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| | <p>Sanctuary. Missoula, Mon.: Mountain, 1998. Print.</p> <p>Turner, Mark, and Gustafson, Phyllis. Wildflowers of the Pacific Northwest. Portland: Timber, 2006. Print.</p> <p>USDA, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (1993). Fire Effects Information System, [Online]. Available: http://www.fs.fed.us/database/feis/ [Accessed 4/26/2017].</p> <p>USDA, NRCS. 2017. The PLANTS Database (plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.</p> <p>Williams, Charles F., and Nickolas M. Waser. "Spatial Genetic Structure of Delphinium Nuttallianum Populations: Inferences about Gene Flow." <i>Heredity</i> 83.5 (1999): 541-50.</p> |
| Other Sources Consulted | <p>Jones, Kristina Niovi. "Do Dandelion Flowers Influence Seed Set of a Native Plant (Delphinium Nuttallianum) in Subalpine Meadows?" <i>The American Midland Naturalist</i> 151.2 (2004): 201-05. Web.</p> <p>Pettinger, April, and Brenda Costanzo. <i>Native Plants in the Coastal Garden: A Guide for Gardeners in the Pacific Northwest</i>. Portland, Or.: Timber, 2003. Print.</p> <p>Pfister, J.a., D.r. Gardner, and K.e. Panter. "Consumption of Low Larkspur (Delphinium Nuttallianum) by Grazing Sheep." <i>Rangeland Ecology & Management</i> 63.2 (2010): 263-66. Web.</p> <p>Rose, Robin, Caryn E. C. Chachulski, and Diane L. Haase. <i>Propagation of Pacific Northwest Native Plants</i>. Corvallis: Oregon State UP, 1998. Print.</p> |
| Protocol Author | Kyle McDermott |
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Plant Data Sheet

Species:

Two-Lobed Larkspur, *Delphinium nuttallianum*



photo credit: Gary A. Monroe @ USDA-NRCS PLANTS Database

http://plants.usda.gov/cgi_bin/topics.cgi

Range:

Western US, Washington east to Montana, South Dakota and Nebraska, South to California, New Mexico and Arizona (USDA, NRCS PLANTS Database, 2002)

Climate, elevation:

Drier continental climate, 1,000 to 3,000 meters, (USDA, 1993)

Local occurrence:

Found in eastern Washington state in Ponderosa Pine forest and associated grasslands or Sagebrush desert

(Hitchcock and Cronquist, 1973)

Habitat preferences:

Full sun, in dry grasslands, open forest, and wet seeps (USDA, 1993)

Plant strategy type/successional stage:

Ruderal, pioneer to early seral (USDA, 1993)

Associated species:

Pinus ponderosa, *Artemesia tridentata*, *Agropyrons spp.*, (USDA, 1993)

May be collected as:

Seed (Skinner, 2002)

Collection restrictions or guidelines:

Collect whole follicle when it begins to split, store in paper bags, or shake opened follicles into bag (Skinner, 2002)

Flowers from May to August, peaks in July (USDA, 1993)

Seed germination:

Cold moist stratification required

when sown in December it failed to germinate, but sown in November it germinated in spring

(Skinner, 2002)

Seed life:

not found

Recommended seed storage conditions:

40° F and 40% relative humidity (Skinner, 2002)

Propagation recommendations:

The following protocol for cuttings is from, Skinner, (2002) working in eastern Washington:

In November, seed was cleaned if entire follicle was collected using air-column separator after crushing follicles

Seed was then sown in liner tray and covered slightly

Liner trays were filled with 3:1:1 peat:vermiculite:perlite blend

Seed was covered with thin layer of pea gravel and watered in well

Flats were stored outside for winter, and watered when dry

Germinated in March, watered as needed, fertilized once weekly

Moved to lath house in June, and stored there over winter

Plugs were planted on site the following May with drill (1.5 inch diameter) and became dormant in June

Following year produced vigorous growth and seed.

Soil or medium requirements:

Used 3:1:1 peat:vermiculite:perlite blend, but increased drainage was recommended (Skinner, 2002)

Installation form:

1.5 inch diameter plug (Skinner, 2002)

Recommended planting density:

not found

Care requirements after installed:

Note: This genus is generally poisonous to cattle, but palatable to many wildlife species (USDA, NRCS, PLANTS Database, 2002)

Normal rate of growth or spread; lifespan:

Slow, perennial, can persist in seedbank (USDA, NRCS, PLANTS Database, 2002)

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Hitchcock, L. C. and Cronquist, A., 1973. Flora of the Pacific Northwest, University of Washington Press, Seattle, WA 730 p.

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USDA, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (1993). Fire Effects Information System, [Online]. Available: <http://www.fs.fed.us/database/feis/> [Accessed 6/22/03].

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Data compiled by:

Matthew Ramsay, June 22, 2003