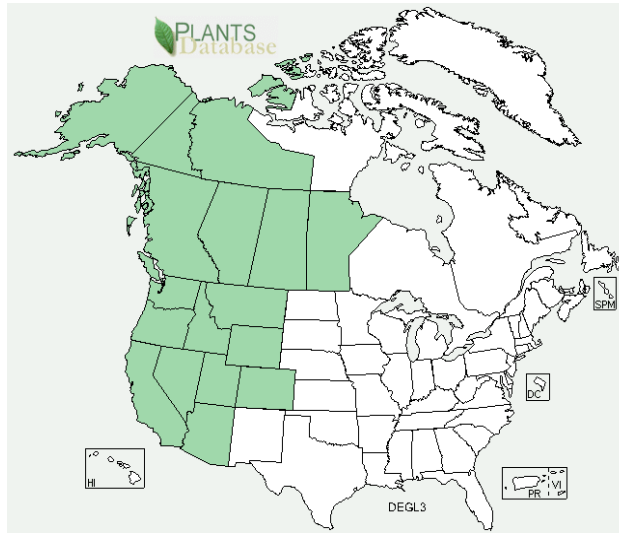


Plant Propagation Protocol for *Delphinium glaucum*

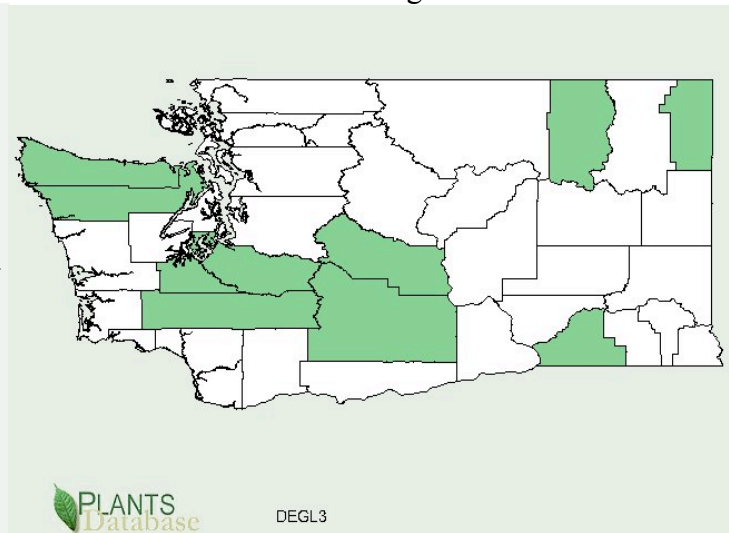
ESRM 412 – Native Plant Production

Spring 2014

North America Distribution



Washington Distribution



Source: USDA PLANTS Database

TAXONOMY

Plant Family	
Scientific Name	Ranunculaceae
Common Name	Buttercup Family or Crowfoot Family
Species Scientific Name	
Scientific Name	<i>Delphinium glaucum</i> S. Watson
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	<i>Delphinium brownii</i> Rydb. <i>Delphinium scopulorum</i> A. Gray var. <i>glaucum</i> (S. Watson) A. Gray <i>Delphinium scopulorum</i> auct. non A. Gray <i>Delphinium splendens</i> G. N. Jones
Common Name(s)	Sierra larkspur, giant larkspur, mountain larkspur, tall larkspur, western larkspur, Brown's larkspur, duncecap larkspur, Hooker's larkspur ²
Species Code (as per USDA Plants database)	DEGL3

GENERAL INFORMATION

Geographical range	Klamath Ranges, High Sierra Nevada, San Gabriel Mountains, San Bernardino Mountains, N East of Sierra Nevada; to Alaska, western Colorado. ¹ Western and Subarctic Canada. ² See maps above for distribution in North America and Washington state.
Ecological distribution	Meadows, wet thickets, bogs, streamsides, open coniferous woods. ³
Climate and elevation range	Grows above or near treeline. ³

	<p>Prefers high-moisture, low-light conditions and may occur as sporadic individuals.³</p> <p>Tall forb-shrub communities adjacent to coniferous forests, often along streams or other moist places, at or near sea level to 2775 m.⁷</p>
Local habitat and abundance	<p>Widely distributed in mountainous areas throughout Washington.¹</p> <p>Conservation Status: Abundant; of no concern.</p>
Plant strategy type / successional stage	Facultative Seral Species ¹¹
Plant characteristics	<p>Perennial, hermaphroditic herb with purple, zygomorphic, spurred flowers. A flowering ramet produces 10-60 flowers on the main inflorescence axis, and inflorescences of some large plants also include a few basal, lateral branches with 1-10 flowers.⁶</p> <p>Flowers open sequentially, rather than simultaneously; and male function precedes female function within flowers.⁶</p> <p>Long-tongued bumblebees are the principle pollinators.¹⁴</p> <p>Poisonous due to high concentration of toxic alkaloids.⁸</p>
PROPAGATION DETAILS	
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	Container with minimum depth of 8 cm (3 in) ⁴
Time to Grow	10 - 12 months ⁹
Target Specifications	Erect forb that is 3 to 8 feet tall. ¹¹
Propagule Collection Instructions	<p>Flowers in July and August and the seeds mature from August to September.¹¹</p> <p>Seeds are collected in late August to early September when plant produces papery light brown seedpods that open at the top when ripe. Mature seed will be a dark brown color. Remove entire stalks of ripe seedpods and spread them out to dry. Alternatively, the plants can be shaken over a container to remove the seed from the open pods.¹¹</p>
Propagule Processing/Propagule Characteristics	<p>Keep seeds in an airtight container in a refrigerator at 36°F to 40°F for up to one year.⁴</p> <p>Seeds lose viability quickly.⁴</p>
Pre-Planting Propagule Treatments	None. Though some report germination to be higher when seeds undergo chitting. For this process, seeds are spread on a wet paper towel in a plastic container, which is then

	covered with a lid and kept in a warm room at about 15°C. As soon as any seed is found to have germinated, it should be removed with tweezers and planted in an individual 5 cm pot of moist seed compost. ¹³
Growing Area Preparation / Annual Practices for Perennial Crops	<p>Prepare to sow seed in autumn in thoroughly washed seed container.⁴</p> <p>Direct seeding in greenhouse or outdoor nursery setting.</p> <p>Seeds should be sown thinly and need to be only lightly covered with compost. The level of compost should be no greater than the thickness of the seed itself. The compost should be moist and it is beneficial to include a layer of perlite at the bottom. Fill each container with compost, lightly firm and level the surfaces so that it is about 1.25 cm (1/2 in) from the top. The container should then be watered, preferably by standing it in 2.5 cm (1 in) of water for approximately one hour. A piece of cling film should then be stretched over the pot. The propagation site should be around 15°C, but should not drop below 10°C.⁴</p>
Establishment Phase Details	As soon as the seedlings appear, remove the cling film. The young seedlings must be kept out of the direct rays of the sun. ⁴ A site against a north-facing wall or even a dense shrub is ideal. ⁹
Length of Establishment Phase	Usually three weeks; but can occur sooner. It is wise to start checking after 14 days. ⁴
Active Growth Phase	<p>When second leaves appear, commence pricking out seedlings. Prick seedling out into 8 cm (3 in) pots and again soil-based or peat-based compost can be used. Seed boxes may also be used for pricking out but they must be of sufficient depth, at least 6.5 cm (2 ½ in) deep. The container should be filled in a similar way to those used for sowing. To prick out the seedlings, loosen them with a small implement and grasp them by the leaves. Containers should now be placed in a shady frame.⁴</p> <p>Growth will continue until around December when the light factor will induce a gradual dormancy and the foliage will wither away.⁹</p>
Length of Active Growth Phase	Five to six weeks for the seedlings to have grown sufficiently to be transplanted. ⁹
Hardening Phase	Begin by bringing plants out of doors at least two weeks prior to planting. Plants should at first be placed in a shady location then gradually moved to sunnier locations. Wait until the temperatures are above 45°F. Gradually leave outside a little longer each day. Bring indoors every evening. ⁵
Length of Hardening Phase	2 weeks ⁵
Harvesting, Storage and Shipping	Total Time to Harvest: 12 weeks

	Plants will go dormant during the winter. Store overwinter in nursery in moist, but not saturated compost. ⁹
Length of Storage	5 months ⁹
Guidelines for Outplanting / Performance on Typical Sites	Seedlings that were planted in the open ground between May 26 th and June 14 th had expanding spikes in early August with a few florets showing color. ¹²
Other Comments	Plants are poisonous to livestock, especially cattle, and may be considered undesirable or invasive for that reason. ⁸
INFORMATION SOURCES	
References	See Below
Other Sources Consulted	See Below
Protocol Author	Kayla Finnegan
Date Protocol Created or Updated	4/23/14

References:

¹ Koontz, Jason A. and Michael J. Warnock. 2012. Delphinium, in Jepson Flora Project (eds.) *Jepson eFlora*, http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=22471, accessed on Apr 21 2014

² USDA, ARS, National Genetic Resources Program. *Germplasm Resources Information Network - (GRIN)* [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?316646> (21 April 2014)

³ Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford.

⁴ Cooper, L. (1990). A plantsman's guide to delphiniums. London: Ward Lock.

⁵ Bishop, Frank. The Delphinium. S.l.: Collins, 1949. Print.

⁶ Ishii, H. S. and Harder, L. D. (2012), Phenological associations of within- and among-plant variation in gender with floral morphology and integration in protandrous *Delphinium glaucum*. *Journal of Ecology*, 100: 1029–1038. doi: 10.1111/j.1365-2745.2012.01976.x

⁷ Welsh, S. L.; Ralphs, M, Some tall larkspurs (*Delphinium* - Ranunculaceae) a taxonomic review; Pergamon Press, Oxford, UK, Biochemical Systematics and Ecology, 2002, 30, 2, 103-112, 11 ref.

⁸ M. H. Ralphs, G. D. Manners, J. A. Pfister, D. R. Gardner and L. F. James. Toxic Alkaloid Concentration in Tall Larkspur Species in the Western U.S. *Journal of Range Management*, Vol. 50, No. 5 (Sep., 1997), pp. 497-502

⁹ Edwards, C. (1989). Delphiniums: The complete guide. Ramsbury, Marlborough, Wiltshire: Crowood Press.

¹⁰ "Tall Larkspur." *Range Plants of Utah*. Utah State University, n.d. Web. 21 Apr. 2014.

¹¹ Stubbendieck, J.; Hatch, Stephan L.; Hirsch, Kathie J. 1986. North American range plants. 3rd ed. Lincoln, NE: University of Nebraska Press. 465 p. [2270]

¹² Bassett, David. "DELPHINIUMS FROM SEED." *DELPHINIUMS FROM SEED*. N.p., n.d. Web. 22 Apr.

2014.

¹³ Bassett, D., & Royal Horticultural Society (Great Britain). (1992). *Delphiniums*. London: Cassell.

¹⁴ ISHII, H. S., & HARDER, L. D. (December 01, 2006). The size of individual Delphinium flowers and the opportunity for geitonogamous pollination. *Functional Ecology*, 20, 6, 1115-1123.

Other Sources Consulted (but that contained no pertinent information):

Denver Botanic Gardens., American Rock Garden Society., & International Rock Garden Plant Conference. (1986). *Rocky Mountain Alpines: Choice rock garden plants of the Rocky Mountains in the wild and in the garden*. Portland, OR: Timber Press.

W, M., R, E. M. D., Hall, J. W., & Willms, W. (March 01, 2000). Alkaloid Levels of a Tall Larkspur Species in Southwestern Alberta. *Journal of Range Management*, 53, 2, 207-210.

Inouye, D. W., Morales, M. A., & Dodge, G. J. (February 01, 2002). Variation in timing and abundance of flowering by *Delphinium barbeyi* Huth (Ranunculaceae): the roles of snowpack, frost, and La Nina, in the context of climate change. *Oecologia*, 130, 543-550.

Harker, D. F., & United States Golf Association. (1999). *Landscape restoration handbook*. Boca Raton: Lewis Publishers.

Note: This template was modified by J.D. Bakker from that available at:
<http://www.nativeplantnetwork.org/network/SampleBlankForm.asp>