

Plant Propagation Protocol for *Pulsatilla occidentalis*

ESRM 412 – Native Plant Production

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



Images from Washington Native Plant Society¹

TAXONOMY	
Plant Family	
Scientific Name	<i>Ranunculaceae</i>
Common Name	Buttercup family
Species Scientific Name	
Scientific Name	<i>Pulsatilla occidentalis</i>
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	<i>Anemone occidentalis</i>
Common Name(s)	Western Anemone, Western Pasqueflower, White Pasqueflower, Old man of the Mountain, Tow-headed Baby
Species Code (as per USDA Plants database)	PUOC
GENERAL INFORMATION	
Geographical	British Columbia south to Cascade and Olympic Mountains to California. ¹ See

range	map above ⁸
Ecological distribution	<i>P. occidentalis</i> occurs in mid montane to alpine meadows, ⁶ and rocky slopes ¹
Climate and elevation range	5500-10000 ft ⁹
Local habitat and abundance	Plant communities include those found in Yellow Pine Forests, Red Fir Forests, Lodgepole Forests, Subalpine Forests ⁴ Some commonly associated species are Arrow-leaved Groundsel, Indian Hellebore, Mountain Arnica, Subalpine Daisy and Sitka Valerian
Plant strategy type / successional stage	No information
Plant characteristics	A hairy, branched, woody based ³ herbaceous perennial, grows to be anywhere from 6-24 in, ⁷ with leaves light green and similar in shape to a fern, ⁵ 2-3 times pinnate and basal. ³ Produces flowers in late spring and early summer following the emergence from snowmelt. ^{1,7} Single flowers are 1-2 in width. The flowers are creamy white in color, with a pale blue tinged underside. ⁷ Stamens and pistils are numerous. ³ Petals covered with fine hairs like the rest of the plant. ⁵ A plumed seedhead follows the flowering ⁵ ripening in August, ² with silky feathery hairs attached to the seed. These achenes come out of cylinder shaped stalks. ⁷
PROPAGATION DETAILS – Information from Native Plant Network⁶ unless otherwise noted	
Ecotype	Subalpine meadows, Logan Pass, 2032m elev.
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	160 ml containers
Time to Grow	10 months
Target Specifications	Height of 6 cm, strong root system
Propagule Collection Instructions	Collect seeds in mid to late August. Strip seeds from receptacles when mature (tan in color). Seeds are present in achenes which are feathery in nature.

Propagule Processing/Propagule Characteristics	<p>Longevity is unknown</p> <p>Seed exhibits morpho-physiological dormancy</p> <p>Seeds/Kg: ~ 136,363 seeds/kg</p> <p>Purity for these seeds was 100%</p> <p>Germination rate is 25%</p>
Pre-Planting Propagule Treatments	<p>Clean seeds with an office clipper⁶ and dry the seed in an oven to break off the long, plumose tails.²</p> <p>Use 2 year old seed, since this genus has a rudimentary embryo at the time of seed dispersal, and after-ripening is necessary for adequate germination, usually 6 months in dry conditions before stratification. For stratification, perform in outdoor conditions for 5 months.⁶ Cold-moist stratification for 30-90 days recommended.²</p>
Growing Area Preparation / Annual Practices for Perennial Crops	<p>Outdoor nursery growing facility. Grow seeds in an outdoor nursery, sow directly, and cover with the medium 6:1:1 milled sphagnum peat, perlite, and vermiculite. Use 1 gram of Osmocote (8-9 month release rate at 21 degrees Celsius) and 0.2 g of Micromax fertilizer per 172 ml conetainer. Fill conetainers ahead of time and sow in late fall, with thorough irrigation.</p> <p>Seedlings germinate in spring. Grow in full sun under natural temperature fluctuation. Seedlings can be irrigated with Rainbird automatic irrigation system in early morning to thoroughly leach containers. Growing season mimics that in the natural environment: late April to mid-October.</p>
Establishment Phase Details	Seedlings germinate over one month under fluctuating temperatures during the early spring after snowmelt.
Length of Establishment Phase	4 months
Active Growth Phase	Once seedlings are established, root growth is rapid in the 2 to 4 weeks following germination. Plants should become root tight in containers with only 4 leaves at week 5. Fertilize plants with 13-13-13 liquid NPK twice a week. Plants can be produced after germination at about 9 weeks.
Length of Active Growth Phase	5 weeks
Hardening Phase	Fertilize plants with 10-20-20 liquid NPK in early fall. Leach pots with water, and reduce irrigation gradually through September and October.
Length of Hardening Phase	4 weeks
Harvesting, Storage and Shipping	<p>Total Time To Harvest: 10 months</p> <p>Harvest in August</p> <p>Store over winter in outdoor nursery beneath insulating foam cover and snow.</p>
Length of	5 months

Storage	
Guidelines for Outplanting / Performance on Typical Sites	Outplanting Site: Logan Pass, Glacier National Park, MT. Outplant after snow melt at high elevations Outplanting survival at 3 years was 26%
Other Comments	
INFORMATION SOURCES	
References	<ol style="list-style-type: none"> 1. Anemone occidentalis - Washington Native Plant Society. (2013, January 1). Anemone occidentalis - Washington Native Plant Society. Retrieved May 21, 2014, from http://www.wnps.org/plants/anemone_occidentalis.html 2. Appendix B—Propagation and Establishment of Requirements for Selected Plant Species. Retrieved May 18, 2014, from http://www.fs.fed.us/t-d/pubs/pdfpubs/pdf06232815/pdf06232815dpi72pt17.pdf 3. Giblin, D. (2014). Anemone occidentalis, western pasqueflower. Retrieved from http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Anemone&Species=occidentalis 4. Calflora: Information on California plants for education, research and conservation, with data contributed by public and private institutions and individuals, including the Consortium of Calif. Herbaria. [web application]. 2014. Berkeley, California: The Calflora Database [a non-profit organization]. Available: http://www.calflora.org/ (Accessed: May 18, 2014). http://www.calflora.org/cgi-bin/species_query.cgi?where-taxon=Anemone+occidentalis 5. Lady Bird Johnson Wildflower Center. (2014). Pulsatilla occidentalis. Retrieved from http://www.wildflower.org/plants/result.php?id_plant=PUOC 6. Luna, Tara; Evans, Jeff.; Wick, Dale. 2001. Propagation protocol for production of container Pulsatilla occidentalis (S. Wats.) Freyn plants (160 ml containers); USDI NPS - Glacier National Park, West Glacier, Montana. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 18 May 2014). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery. 7. Turner, M. (2013). Anemone occidentalis. Retrieved from http://www.pnwflowers.com/flower/anemone-occidentalis

	<p>8. USDA Plants. General information for <i>Pulsatilla occidentalis</i>. Natural Resources Conservation Service. Retrieved May 18, 2014, from http://plants.usda.gov/core/profile?symbol=PUOC</p> <p>9. California Native Plant Link Exchange. (2012). Plant information: <i>Anemone occidentalis</i>, Western pasqueflower. Retrieved from http://www.cnplx.info/nplx/species?taxon=Anemone+occidentalis</p>
Other Sources Consulted	<p>Hitchcock, C. L., & Cronquist, A. (1973). <i>Flora of the Pacific Northwest</i>; an illustrated manual,. Seattle: University of Washington Press.</p> <p>Kaye, T. N., Liston, A., Love, R. N., Luoma, D. L., Meinke, R. J., & Wilson, M. V. (1997). Seed dormancy in high elevation plants: implications for ecology and restoration. <i>Conservation and management of native plants and fungi</i>. Native Plant Society of Oregon, Corvallis, OR.</p> <p>Plants for a future. (2012). Retrieved from http://www.pfaf.org/user/default.aspx http://www.pfaf.org/user/DatabaseSearchResult.aspx</p> <p>Pojar, J., Mackinnon, A. 1994. <i>Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia, and Alaska</i>. Lone Pine Publishing: Vancouver, British Columbia. 527p.</p> <p>Western Pasqueflower — <i>Anemone occidentalis</i>. <i>Montana Field Guide</i>. Montana Natural Heritage Program. Retrieved on May 20, 2014, from http://FieldGuide.mt.gov/detail_PDRAN0K010.aspx</p>
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