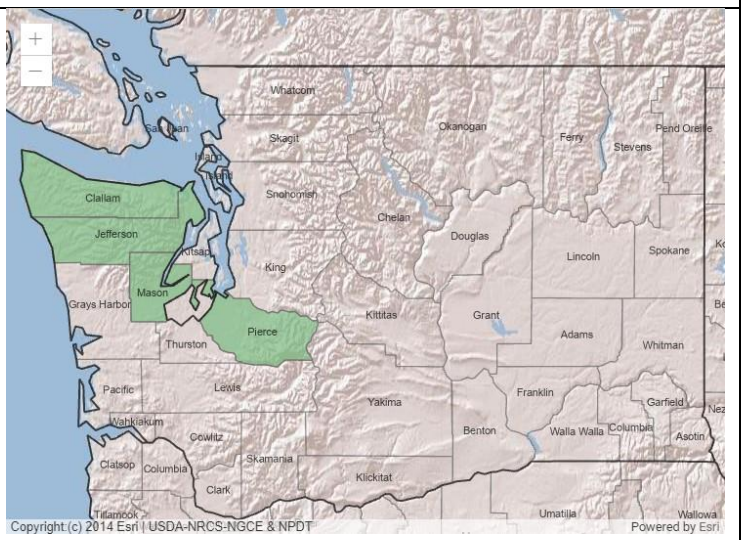
Plant Propagation Protocol for *[Campanula piperi]*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/*2024/CAPI2.pdf*

TAXONOMY	
Plant Family	
Scientific Name	Campanulaceae
Common Name	Bellflower family
Species Scientific Name	
Scientific Name	*Campanula piperi* Howell
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	*Astrocodon piperi* (Howell) A.P.Khokhr. [4]
Common Name(s)	Olympic bellflower, Olympic harebell, Piper's bellflower, Piper's harebell
Species Code (as per USDA Plants database)	CAPI2

GENERAL INFORMATION	
Geographical range	 *Campanula piperi* Distribution Map Occurs west of the Cascades in the Olympic Mountains, endemic to the Olympic Peninsula. Found exclusively in WA. [1, 3, 5, 6, 9]
Ecological distribution	Found in subalpine forests, rocky crevices, and on alpine slopes. [1, 5, 6]
Climate and elevation range	Prefers rocky, dry open areas at high elevations (4800-6800 ft). [5, 6]
Local habitat and abundance	Occurs in subalpine forests consisting mostly of *Abies lasiocarpa* with some *Pinus contorta* and *Pinus albicaulis*. [5] Found at sites alongside stonecrop, fireweed, Oregon sunshine, woodland beardtongue, western pearly everlasting, Olympic larkspur, and yellow coralbell. [5]
Plant strategy type / successional stage	Information not available.
Plant characteristics	Perennial herb, creeping growth, glabrous, lax stems up to 10cm long, flowers July through September. [6] Basal leaves are oblanceolate, 1-3 cm long, roughly 3:1 length-to-width ratio, serrate leaf margins. [6] Flowers number 1-3 on branch ends; periwinkle saucer-shaped corolla, 12-16mm long; 5 broad lobes twice the length of tube; 5 stamens. [6, 7] Fruits are 3-celled loculicidal capsules, sub-globose, 3-5cm diameter. [6, 9]

PROPAGATION DETAILS (Sourced from [10] unless stated otherwise)	
Ecotype	
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	262 ml (16 in3) container
Time to Grow	14 weeks
Target Specifications	Root system: firm plug in container
Propagule Collection Instructions	Collect seeds by hand from native plants when seed capsules are mature and begin to dehisce, usually around September. Store seeds in dry conditions until pre-planting treatment begins.
Propagule Processing/Propagule Characteristics	Seed density unknown. Seed longevity unknown.
Pre-Planting Propagule Treatments	Rub and screen seeds until clean. [8] Sow seed into trays of stabilized medium plugs (Q-plugs). Seal trays inside plastic bags and refrigerate at 1 to 3 °C for 90 days. Check trays weekly and keep moist throughout the stratification period.
Growing Area Preparation / Annual Practices for Perennial Crops	Greenhouse. Cover Q-plugs with thin layer of nursery grit. Transplant to target containers approx. 3 weeks after removal from stratification. Growth medium is 40:20:20:20 peat:composted fir bark:perlite:pumice with Nutricote controlled release fertilizer (18N:6P2O5:8K2O with minors; 180-d release rate at 21C) at the rate of 1.5 gram Nutricote per 262 ml container.
Establishment Phase Details	After germination, fertilize plants in Q-plugs with soluble 12-2-14-6Ca-3Mg at 75 to 100 ppm for 2 weeks.
Length of Establishment Phase	2 weeks
Active Growth Phase	Apply soluble fertilizer (20-9-20 NPK, 20-18-18 NPK, or 17-5-24 NPK) at 100 to 150 ppm weekly throughout the growing season.
Length of Active Growth Phase	12 weeks
Hardening Phase	Do not reduce irrigation. Move seedlings to outdoor growing area in late September.
Length of Hardening Phase	2 weeks

Harvesting, Storage and Shipping	Harvested in late October. Seedlings often outplanted in fall.
Length of Storage	Information not available.
Guidelines for Outplanting / Performance on Typical Sites	Information not available.
Other Comments	*Campanula piperi* is a species for which little research has been published. This protocol closely follows a protocol developed for *C. scouleri*—a species that exists alongside *C. piperi* in the Olympic Mountains.
INFORMATION SOURCES	
References	See below.
Other Sources Consulted	"Campanula Piperi." *Integrated Taxonomic Information System - Report*, ITIS, www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=34492#null. Accessed 23 May 2024. Wendling, Barry M., et al. "Resolving the Evolutionary History of Campanula (Campanulaceae) in Western North America." *PLoS ONE*, vol. 6, no. 9, 9 Sept. 2011, p. e23559, www.ncbi.nlm.nih.gov/pmc/articles/PMC3170292/, https://doi.org/10.1371/journal.pone.0023559. Accessed 15 June 2020.
Protocol Author	Derek Cullen
Date Protocol Created or Updated	05/23/2024

References:

[1] "Campanula Piperi." *NatureServe Explorer*, NatureServe, 1 Mar. 2024, explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.152347/Campanula_piperi. Accessed 23 May 2024.

[2] "Campanula Piperi." *SEINet Portal Network*, SEINet, swbiodiversity.org/seinet/taxa/index.php?taxon=Campanula+piperi&formsubmit=Search+Terms. Accessed 23 May 2024.

[3] "Campanula Piperi." *USDA Plants Database*, USDA, plants.usda.gov/home/plantProfile?symbol=CAPI2. Accessed 23 May 2024.

[4] "Campanula Piperi Howell." *Plants of the World Online*, Royal Botanic Gardens, Kew, powo.science.kew.org/taxon/urn:lsid:ipni.org:names:43961-2. Accessed 23 May 2024.

[5] "CPNWH Search Results." *Consortium of Pacific Northwest Herbaria*, Consortium of Pacific Northwest Herbaria,

www.pnwherbaria.org/data/results.php?DisplayAs=WebPage&ExcludeCultivated=Y&GroupBy=ungrouped&SortBy=Year&SortOrder=DESC&SearchAllHerbaria=Y&QueryCount=1&Genus1=Campanula&IncludeSynonyms1=Y&Species1=piperi&Zoom=4&Lat=55&Lng=-135&PolygonCount=0. Accessed 23 May 2024.

[6] Knoke, Don, and David Giblin. "Campanula Piperi." *Burke Herbarium Image Collection*, Burke Museum Herbarium, 2021, burkeherbarium.org/imagecollection/taxon.php?Taxon=Campanula%20piperi. Accessed 23 May 2024.

[7] Le Roy Abrams, and Roxana S Ferris. *An Illustrated Flora of the Pacific States: Washington, Oregon, and California*. 1923. *Hathi Trust Digital Library (the HathiTrust Research Center)*, vol. 4, Stanford University Press, 1960, www.biodiversitylibrary.org/bibliography/4657. Accessed 23 May 2024.

[8] Luna, Tara; Evans, Jeff; Wick, Dale. 2008. Propagation protocol for production of Container (plug) *Campanula rotundifolia* L. plants 160 ml conetainer; USDI NPS - Glacier National Park West Glacier, Montana. In: Native Plant Network. URL: https://NativePlantNetwork.org (accessed 2024/05/23). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources.

[9] "Olympic Bellflower." *Encylopedia of Life*, National Museum of Natural History, eol.org/pages/577764. Accessed 23 May 2024.

[10] Riley, Lee E.. 2018. Propagation protocol for production of Container (plug) *Campanula scouleri* Plants 262 ml (16 in3) container; USDA FS - Dorena Genetic Resource Center Cottage Grove, Oregon. In: Native Plant Network. URL: https://NativePlantNetwork.org (accessed 2024/05/23). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources.

[11] Schultz, Jan; Beyer, Patty; Williams, Julie. 2001. Propagation protocol for production of Container (plug) *Campanula rotundifolia* L. plants USDA FS - Hiawatha National Forest Marquette, Michigan. In: Native Plant Network. URL: https://NativePlantNetwork.org (accessed 2024/05/23). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources.

[12] Wershow, Samuel T, and Eric G DeChaine. "Retreat to Refugia: Severe Habitat Contraction Projected for Endemic Alpine Plants of the Olympic Peninsula." *American Journal of Botany*, vol. 105, no. 4, 1 Apr. 2018, pp. 760–778, bsapubs.onlinelibrary.wiley.com/doi/10.1002/ajb2.1042, https://doi.org/10.1002/ajb2.1042. Accessed 16 Nov. 2023.