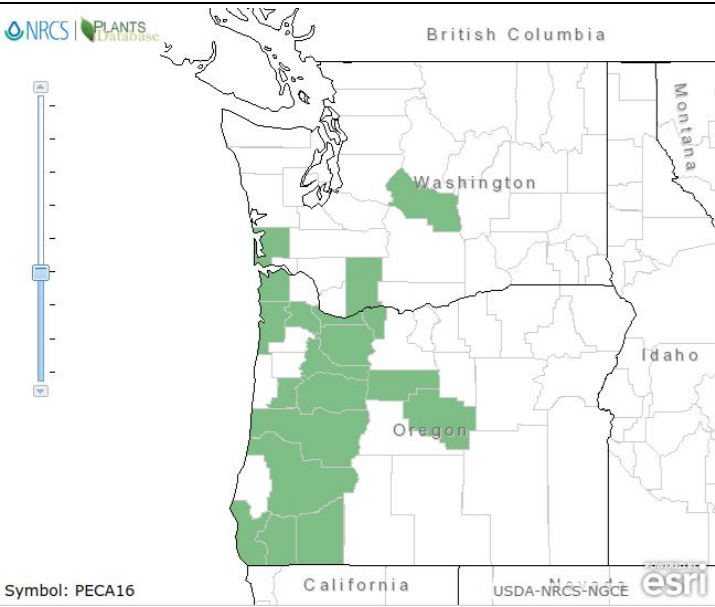


Plant Propagation Protocol for *Penstemon cardwellii*

ESRM 412 – Native Plant Production

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

TAXONOMY	
Plant Family	
Scientific Name	<i>Scrophulariaceae</i> ¹
Common Name	Figwort ¹
Species Scientific Name	
Scientific Name	<i>Penstemon cardwellii</i> Howell ¹
Varieties	N/A
Sub-species	N/A
Cultivar	Roseus
Common Synonym(s)	N/A
Common Name(s)	Cardwell's Penstemon, Cardwell's Beardtongue ²
Species Code (as per USDA Plants database)	PECA16 ¹
GENERAL INFORMATION	
Geographical range	 <p>Symbol: PECA16</p> <p>Native to Cascade mountains, Columbia River Gorge, and Coast Range of Oregon.¹</p>
Ecological distribution	Commonly found in middle to high elevations on rocky slopes and disturbed sites, as well as open forests, forest edges, and cutbanks. ^{3,4}
Climate and elevation range	Performs best in full sun with moist, well drained soils. Can tolerate partial shade and drought conditions. Elevation: 1000' - 6000' ^{4, 5, 6}
Local habitat and abundance	The Cascades, especially the western slopes, from

	Northern Skamania County in southern Washington to the Klamath region in southwestern Oregon, and west to the Coast Range up to Tillamook County, OR. Large patches occur in heavily disturbed areas of Mount St. Helens. ^{2, 3, 4}
Plant strategy type / successional stage	Late seral to climax species ⁷
Plant characteristics	Long-lived, low matting perennial forb, shrub, or subshrub up to 4-12" tall and 12" wide. Flowers in late spring - early summer. ^{2, 3, 4}
PROPAGATION DETAILS	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	½ gallon nursery pot
Time to Grow	1 year
Target Specifications	A well developed crown and root system. Roots should fill the container but not be pot bound. ¹⁰
Propagule Collection Instructions	Harvest ripe capsules in late summer - early fall and place in brown paper bag to fully dry. ⁸
Propagule Processing/Propagule Characteristics	-Seeds per pound: 700,000 - 900,000 ⁸ -Seeds will remain viable for up to 10 years when stored in cool (38F), dry conditions. ^{6, 10}
Pre-Planting Propagule Treatments	-Cleaning: Use of a hammermill or thresher can be used to separate seeds from capsules, followed by an air-screening machine to remove chaff and other organic material. ⁸ -Store seeds in cool (38F), dry conditions until ready for production. ^{6, 10} -Stratification: 90 days of cool (38F), moist conditions. Place in stratification in late winter if using artificial conditions to break dormancy. Seeds may begin to germinate in stratification. ^{6, 8, 9}
Growing Area Preparation / Annual Practices for Perennial Crops	Sow seeds in open nursery flats filled with a soilless germination mix. Lightly cover seeds with germination mix or vermiculite. ^{6, 10}
Establishment Phase Details	Sow seeds in early spring ⁶
Length of Establishment Phase	2-4 weeks ⁶
Active Growth Phase	-After germination, transplant healthy and robust seedlings into ½ gallon nursery pots filled with a well draining soilless media. After transplanting, move plants to area of partial shade to full sun. ^{6, 10} -Early spring through summer ⁶

Length of Active Growth Phase	4-6 months ^{2,6}
Hardening Phase	Late summer through fall ⁶
Length of Hardening Phase	1-2 months ⁶
Harvesting, Storage and Shipping	N/A
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	Outplanting survival rate: N/A Size at maturity: 4-12" tall and 12" wide ² Most plants will not flower during the first year ⁸
Other Comments	N/A

INFORMATION SOURCES

References	<p>1. USDA, Natural Resources Conservation Service. The PLANTS Database. http://plants.usda.gov. 2017. Accessed April 24, 2017.</p> <p>2. University of Washington Herbarium, Burke Museum of Natural History and Culture. Seattle, WA. http://biology.burke.washington.edu/herbarium. 2017. Accessed April 24 2017.</p> <p>3. Pojar, J., A. Mackinnon, and P.B. Alaback. 1994. Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia and Alaska. Redmond, WA: Lone Pine Publishing.</p> <p>4. Slichter, Paul. Penstemons of the Columbia River Gorge of Oregon and Washington. http://science.halleyhosting.com/nature/gorge/5petal/fiwort/penst/cardwell.htm. 2014. Accessed April 24, 2017.</p> <p>5. Wildflower Identification Website. http://www.wildflowersearch.com/search?&tsn=33850. 2017. Accessed April 24, 2017.</p> <p>6. Fourth Corner Nurseries. 5652 Sand Rd, Bellingham, WA 98226. http://fourthcornernurseries.com. 2017. Personal communication with Kelly Broadlick. Native Plant Propagator. Contacted 26 April 2017.</p> <p>7. Del Moral, R., Saura, J. M., & Emenegger, J. N. 2010. Primary succession trajectories on a barren plain, Mount St. Helens, Washington. <i>Journal of Vegetation Science</i>, 21(5), 857-867.</p>
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	<p>8. Native Seed Production Manual for the Pacific Northwest. USDA NRCS - Corvallis Plant Materials Center Corvallis, OR. https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/orpmcpu12768.pdf. Accessed 24 April 2017.</p> <p>9. Propagation protocol for production of Container (plug) <i>Penstemon cardwellii</i> plants. 2015. USDA NRCS - Corvallis Plant Materials Center Corvallis, OR. In: Native Plant Network. http://NativePlantNetwork.org. US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. Accessed 24 April 2017.</p> <p>10. Best Practices. Society for Ecological Restoration Native Plant Nursery. University of Washington. 2017. Personal communication with nursery managers. https://society4ecologicalrestorationuw.wordpress.com/</p>
Other Sources Consulted	<p>1. American Penstemon Society. http://apsdev.org/library/. Accessed 24 April 2017</p>
Protocol Author	Derek Allen
Date Protocol Created or Updated	<p>Updated on 04/24/17 Original created on 05/10/06 by Kelly Sutton Link to Original Protocol: http://depts.washington.edu/propplnt/Plants/Penstemon%20cardwellii.htm</p>