

Plant Propagation Protocol for *Cardamine californica*

ESRM 412 – Native Plant Production

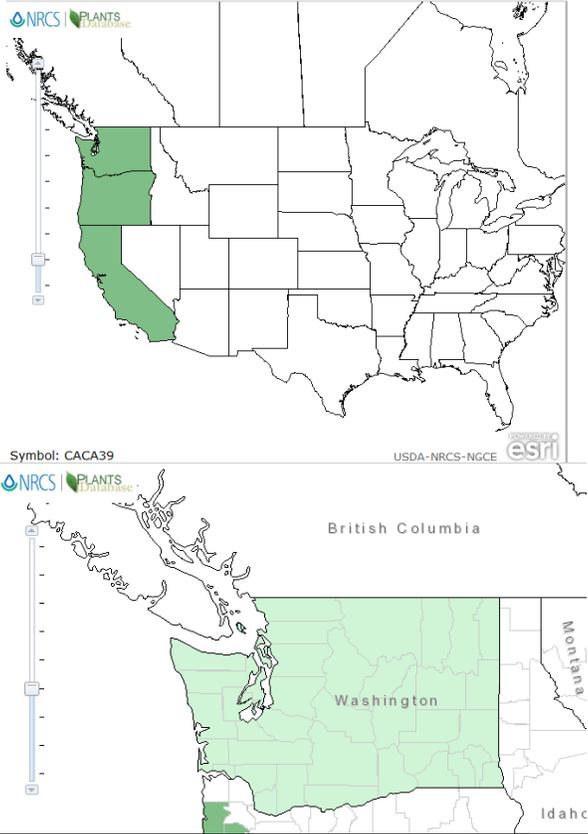
Protocol URL: <https://courses.washington.edu/esrm412/protocols/CACA39.pdf>



TAXONOMY	
Plant Family	
Scientific Name	Brassicaceae/Cruciferae
Common Name	Mustards
Species Scientific Name	
Scientific Name	<i>Cardamine californica</i> (Nutt.) Greene
Varieties	<i>Cardamine californica</i> (Nutt.) Greene var. <i>californica</i> <i>Cardamine californica</i> (Nutt.) Greene var. <i>cardiophylla</i> (Greene) Rollins <i>Cardamine californica</i> (Nutt.) Greene var. <i>cuneate</i> (Greene) Rollins

	<p><i>Cardamine californica</i> (Nutt.) Greene var. <i>integrifolia</i> (Nutt.) Rollins</p> <p><i>Cardamine californica</i> (Nutt.) Greene var. <i>sinuata</i> (Greene) O.E. Schulz</p>
Sub-species	N/A
Cultivar	N/A
Common Synonym(s)	<p><i>Dentaria californica</i> Nutt.</p> <p><i>Dentaria californica</i> Nutt. var. <i>cardiophylla</i> (Greene) Detling</p> <p><i>Dentaria californica</i> Nutt. var. <i>cuneata</i> (Greene) Detling</p> <p><i>Dentaria californica</i> Nutt. var. <i>integrifolia</i> (Nutt.) Detling</p> <p><i>Dentaria californica</i> Nutt. var. <i>sinuata</i> (Greene) Detling</p>
Common Name(s)	Milkmaids, bitter cress, toothwort
Species Code (as per USDA Plants database)	CACA39

GENERAL INFORMATION

Geographical range	<p>Distribution in North America includes California, Oregon, and Washington⁶</p>  <p>The top map is a map of the United States with the states of California, Oregon, and Washington shaded in green. The bottom map is a detailed map of the Pacific Northwest region, showing British Columbia, Washington, Oregon, and Idaho. The states of Washington and Oregon are shaded in green. The map includes labels for 'British Columbia', 'Washington', 'Oregon', and 'Idaho'. Logos for NRCS, PLANTS Database, and Esri are visible on both maps.</p>
--------------------	--

Ecological distribution	This plant occurs in many different communities including Foothill Woodland, Redwood Forest, Mixed Evergreen Forest, Coastal Prairie, Northern Oak Woodland. ³ They grow in woodland or shaded areas and moist woods.
Climate and elevation range	They grow from 0 to 2770 meters in elevation. ³
Local habitat and abundance	Milkmaids grow in open meadows, hill slopes, streambanks, forest floors, wooded ravines, and canyons ⁴ . Species that can often be found with milkmaids are <i>Eriophyllum lanatum</i> (Woolly Sunflower), <i>Nemophila menziesii</i> (baby blue eyes), <i>Eriodictyon californicum</i> (yerba santa), <i>Monardella villosa</i> (Coyote mint), <i>Sidalcea malviflora</i> (Wild hollyhock), <i>Mimulus aurantiacus</i> (sticky monkeyflower), and <i>Frangula californica</i> (California coffeeberry). ⁷
Plant strategy type / successional stage	This species is shade and drought tolerant. ²
Plant characteristics	Milkmaids are a perennial dicot forb ³ . They grow from rounded tubers and slender rhizomes, with fleshy leaves. Stems grow to about 1ft ⁸ , and are usually glabrous ⁴ . The leaves are cauline and usually compound with dentate margins. ⁴ They bloom from February to April, and are often one of the earliest wildflowers to bloom ¹ . Flowers are pale pink to white with 4 petals in a cross shape, and grow in a raceme. ⁸ 10-18 small seeds are contained in a long, slim seed pod (silique) that splits open when mature. ⁵
PROPAGATION DETAILS	
Ecotype	
Propagation Goal	Plants ⁹
Propagation Method	Seed ⁹
Product Type	Container (plug) ⁹
Stock Type	2 inch pot ⁹
Time to Grow	
Target Specifications	Root system: firm plug in container ⁹
Propagule Collection Instructions	Seeds are collected between May 4th and May 25th. Mature fruits begin to turn yellowish-brown and become stiff; eventually fruits split from the top. ⁹
Propagule Processing/Propagule Characteristics	Hand-pollinating milkmaids can increase seed set from 8% to 85%. ¹
Pre-Planting Propagule Treatments	Seed Cleaning: Seed is cleaned by hand or can be rubbed over a screen to remove chaff. Storage Conditions: Seeds are kept dry and stored in a refrigerator.

	Seeds are stratified for 1 month. ⁹
Growing Area Preparation / Annual Practices for Perennial Crops	Growing media: Sunshine Mix #4 Aggregate Plus (peat moss, perlite, major and minor nutrients, gypsum, and dolomitic lime) ⁹ Seeds are mixed with media to sow and are lightly covered. Flats are watered in with an automatic irrigation system and placed on a heated bench. ⁹
Establishment Phase Details	Seedlings are transplanted 30 days after germination to individual containers 2"x7" tubes (Deepot 16) containing standard potting mix of peat moss, fir bark, perlite, and sand. ⁹ Transplant survival is usually 80%. ⁹
Length of Establishment Phase	Seeds germinate 30 days after sowing. ⁹
Active Growth Phase	After seedlings are well established, they can be moved to a shadehouse for continued growth. ⁹
Length of Active Growth Phase	2 months ⁸
Hardening Phase	
Length of Hardening Phase	
Harvesting, Storage and Shipping	
Length of Storage	
Guidelines for Outplanting / Performance on Typical Sites	
Other Comments	

INFORMATION SOURCES

References	<p>¹Ariyoshi, Kazuki, Emily Magnaghi, and Mark Frey. "Project MUSE - Hand-Pollination of Cardamine Californica Improves Seed Set." <i>Project MUSE - Hand-Pollination of Cardamine Californica Improves Seed Set</i>. Web. 10 May 2016.</p> <p>²"Cardamine Californica." <i>California Flora Nursery</i>. 2016. Web. 12 May 2016.</p> <p>³"Cardamine Californica." <i>Calflora</i>. 2015. Web. 10 May 2016.</p> <p>⁴"Cardamine Californica." <i>Flora of North America (eFloras.org)</i>. Web. 22 May 2016.</p> <p>⁵"Plant Guide: Milkmaids." <i>San Elijo Lagoon Conservancy</i>. 2016. Web. 22 May 2016.</p>
------------	---

	<p>⁶"Plants Profile for Cardamine Californica (milkmaids)." <i>Plants Profile for Cardamine Californica (milkmaids)</i>. Web. 10 May 2016.</p> <p>⁷Plants That Grow with Cardamine Californica-Bitter Cress" <i>CNPLX: California Native Plant Link Exchange</i>. Web. 22 May 2016</p> <p>⁸Robson, Kathleen A., Alice Richter, and Marianne Filbert. <i>Encyclopedia of Northwest Native Plants for Gardens and Landscapes</i>. Portland, Or.: Timber, 2008. Print.</p> <p>⁹Young, Betty. "Brassicaceae (Cardamine)." <i>RNGR (Reforestation, Nurseries, and Genetics Resources)</i>. 2007. Web.</p>
Other Sources Consulted	<p>Connelly, Kevin. <i>Gardener's Guide to California Wildflowers</i>. Sun Valley, CA: Theodore Payne Foundation for Wild Flowers and Native Plants, 1991. Print.</p> <p>Emery, Dara E. <i>Seed Propagation of Native California Plants</i>. Santa Barbara, CA: Santa Barbara Botanic Garden, 1988. Print.</p> <p>Stokes, Donald W., and Lillian Q. Stokes. <i>The Wildflower Book: From the Rockies West: An Easy Guide to Growing and Identifying Wildflowers</i>. Boston: Little, Brown, 1993. Print.</p>
Protocol Author	Bonnie Henwood
Date Protocol Created or Updated	05/25/2016