

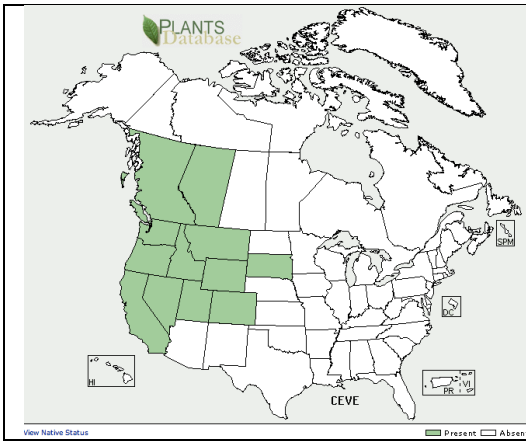
Plant Propagation Protocol for *Ceanothus velutinus*
 ESRM 412 – Native Plant Production
 Spring 2012



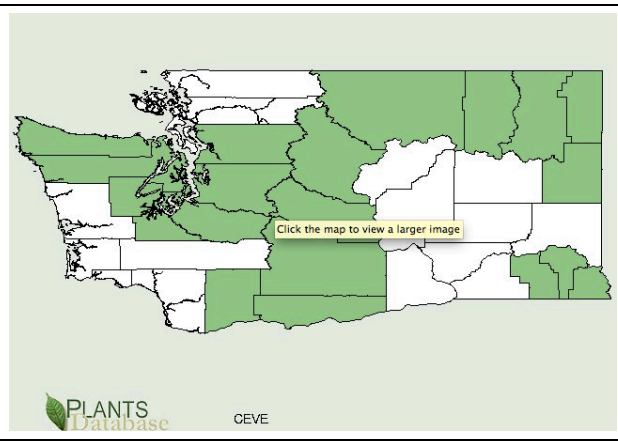
Image of mature, flowering *C. velutinus*.
<http://www.bikecarson.com/2010/06/15/ash-canyon-flower-of-the-week-2/>



Image of *C. velutinus* dried fruit (top) and seed (below). USDA FS Woody Seed Manual ; http://plants.usda.gov/java/profile?symbol=CEVE&photoID=ceve_008_ahp.tif.



United States Distribution Map¹



Washington Distribution Map¹

TAXONOMY

Family Names	
Family Scientific Name:	Rhamnaceae

Family Common Name:	Buckthorn
Scientific Names	
Genus:	<i>Ceanothus</i>
Species:	<i>velutinus</i>
Species Authority:	Douglas ex Hook.
Variety:	(see one known hybrid and four varieties below)
Sub-species:	N/A
Cultivar:	N/A
Authority for Variety/Su b-species:	N/A
Common Synonym(s) (include full scientific names (e.g., <i>Elymus glaucus</i> Buckley), including variety or subspecies information)	<i>C. velutinus</i> Douglas ex Hook. var. <i>laevigatus</i> Torre. & A. Gray (CEVEL); <i>C. velutinus</i> Douglas ex Hook. var. <i>velutinus</i> (CEVEV4). ¹ Another synonym: <i>C. velutinus</i> Douglas ex Hook. var. <i>hookeri</i> M.C. Johnst. (CEVEH4) is known but listed as unpublished, invalidly published, illegitimate, or rejected. This variety is officially listed as <i>C. velutinus</i> Douglas. ²
Common Name(s):	Snowbrush, snowbrush ceanothus, buckbrush, greasewood, greasewood, mountain balm, sticky laurel, tobacco brush, Indian tobacco, wild lilac, Hooker's ceanothus
Species Code (as per USDA Plants database):	CEVE
GENERAL INFORMATION	
Geographical range (distributio n maps for North America and	British Columbia to California, east to South Dakota, Colorado, Utah, and Nevada. ^{3, 12} Common on both sides of the Cascade Mountain Range. ³ See maps above for North American and Washington state distribution.

Washington state)	
Ecological distribution (ecosystems it occurs in, etc.):	Moist to dry open forests and slopes, low to mid-elevations in the mountains. ^{4, 12} Scattered to abundant in early-seral communities on disturbed, water-shedding sites; occurrence increases with increasing distance from coastal areas. Interior desert chaparral to moist redwood forest along the Pacific Coast., occasional in the coastal-interior ecotone. ⁴
Climate and elevation range	Occurs in continental cool temperate and cool semiarid climates at submontane to subalpine elevations. ³ Found from 1,100-3000 meters in elevation. ¹²
Local habitat and abundance; may include commonly associated species	Occurs on sunny sites with moderately dry to fresh, nitrogen-medium soils. ^{4, 5} Grows in many soil types but generally in deep, medium- to coarse-textured soils. ¹²
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	Early-seral colonizer. ⁴
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc.)	Shrub to small tree, often colonizing following fire, with a sticky leaf surface conveying a turpentine-like odor. ^{5, 6} When forming a shrub layer, it hinders natural regeneration of shade-intolerant conifers. ⁴ <i>Ceanothus</i> bear root nodules containing the nitrogen-fixing bacteria, <i>Frankia</i> , and thus accrete soil nitrogen over time. <i>Ceanothus</i> sp. are important browse for deer, elk, and cattle. In the dryer, interior regions of its range, the lower surfaces of the leaves are covered with dense silky or velvety hairs to reduce excessive water loss. ⁵ Hybridization tendencies of <i>Ceanothus</i> are highly valued in horticulture and many cultivars have been developed. ⁷

	The leaves of <i>C. velutinus</i> can be used for brewing tea. ^{5,13} All parts of the plant contain saponins. When the plant is crushed and mixed with water a soapy lather is produced that removes dirt but not oils; can be used as a gentle skin cleanser. ¹³
PROPAGATION DETAILS	
Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	N/A
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Plants, Seeds
Propagation Method (Options: Seed or Vegetative):	Seed
Product Type (options: Container (plug), Bareroot (field grown),	Container, bareroot, plug

Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	
Stock Type:	
Time to Grow (from seeding until plants are ready to be outplanted):	
Target Specifications (size or characteristics of target plants to be produced):	Flowering and seeding maturity.
Propagule Collection (how, when, etc):	<p>Flowers bloom from May to June; fruit ripens July-September.¹²</p> <p>Weak or diseased plants do not produce consistently viable seed; therefore, collection of seed from vigorous plants is recommended.⁷ Caution and consideration should be given to how this may introduce selective pressures on a propagule population.</p> <p>When fruit capsules are mature, they split and eject ripe seeds up to 9-meter distances. In order to capture seeds at the right time, cloth or paper bags can be tied over clusters of green seedpods.⁷ Tarps or sheets can also be spread on the ground to capture ejecting seeds.⁹</p> <p>If taken when immature, few seeds will germinate.⁷</p>
Propagule Processing/ Propagule Characteristics (including seed)	<p>Seeds containing milky or gelatinous substances are not mature; green seeds should be air-dried at 29 to 28 °C. Seeds can be separated from capsules by screening and blowing or passed through a mill and floated.⁷</p> <p>Average quantity of <i>C. velutinus</i> seeds per weight: 207,000/kg (94,000/lb.).⁷</p>

density (# per pound), seed longevity, etc):	Long-term storage data not available. Seeds are apparently orthodox; therefore, dry storage around 4.5 °C is best. Seeds are long-lived in wild conditions; have been found viable in the surface soil of forest stands between 200-300 years old.
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	<p>Seed coat dormancy is usually broken naturally by fire, solar heating, or mechanical scarification during forest site preparation. Physiologic or embryonic dormancy is also present in some seed and may require additional dormancy breaking treatments.⁷</p> <p>One source indicates that stored seed should be pre-soaked for 12 hours in warm water followed by 1-3 months cold stratification (1°C) followed by germination within 1-2 months at 20 1°C.¹³</p> <p>Germination has also been induced by hot water soaking or oven heating sometimes followed by cold stratification.^{7,9,12} Seeds can also be immersed in sulfuric acid for 1 hour.⁷</p> <p>Dry heat treatments may be less damaging than wet heat.⁷ Seeds may be heated up to 90-120 °C in 4 times their volume of sand for 4-5 minutes, then placed in a warm soak for 12 hours prior to sowing. Following sowing, a chilling period below 5 °C for up to 84 days may be required for germination.¹³</p> <p>In one test, 82% of seeds were germinated by soaking in hot water (at 90 °C) until room temperature, then placed in cold stratification for 63-84 days.⁷ In several tests, 70% germinated by soaking at 71 °C followed by cold stratification for 90 days. Another source indicates moist, cool stratification (1-5 °C) should occur for 60-85 days.¹² Seeds of populations found at high elevations require cold stratification for good germination. Cold stratification can be substituted by chemical treatment with gibberellin and thiourea.⁷</p> <p>Mimicking alternating outdoor conditions is successful for germination (30 °C in light and 20 °C in darkness); however, constant 10 °C or 24.5 °C has also been reported to work. Sand, a mixture of sand and soil, or filter paper have been used to germinate seed in germination tests.⁷</p>
Growing Area Preparation / Annual Practices for Perennial Crops	Seeding can be done in flats containing media of 5:4:3 parts loam, peat, and sand. Leaf mold can be substituted for peat. ¹³ <i>C. velutinus</i> are sensitive to damping off; therefore, sterilized soil should be used. ^{7,12}

(growing media, type and size of containers, etc):	
Establishment Phase (from seeding to germination):	Seedlings are sensitive to sowing depth. Pretreated <i>C. velutinus</i> seeds should be sown at a depth of 0.5-1.5 cm (0.19-0.59 inch) deep in December or January in flats. ¹² One study on <i>C. integerrimus</i> and <i>C. cuneatus</i> found optimal depth is 1.2-2.5 cm (0.5-1 inch). ⁷ Results of testing found that germination is promoted by oscillating temperatures such as those experienced during winter. ⁸
Length of Establishment Phase:	In California, seeding of <i>C. velutinus</i> is done in November to January. ⁷ <i>C. americana</i> seed was found to germinate best in outdoor treatment with half of germination occurring from September to November and the other half in March. ⁸
Active Growth Phase (from germination until plants are no longer actively growing):	When several sets of leaves have formed, seedlings can be planted into 2- or 3-inch pots with a medium of 5:3:1 parts loam, peat or leaf mold, and sand. Seedlings are susceptible to stem rot; therefore, root crowns should be just below the soil surface and kept well drained. When a loose root system has formed on the outside of the ball, the plant is ready for up-potting. Pot bound plants should be discarded. ⁷
Length of Active Growth Phase:	Information not available.
Hardening Phase (from end of active growth phase to end of growing season; primarily related to the development of cold-hardiness)	Information not available.

and preparation for winter):	
Length of Hardening Phase:	Information not available.
Harvesting, Storage and Shipping (of seedlings):	N/A
Length of Storage (of seedlings, between nursery and outplanting):	Seedling propagules should be grown then stored through winter in a greenhouse prior to shipping/outplanting the following year. ¹³
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	<i>C. velutinus</i> dislike root disturbance and should be planted out into permanent positions while small in late spring or early summer. ¹³
Other Comments (including collection restrictions or guidelines, if available):	Unknown.
PROPAGATION DETAILS	
Ecotype (this	N/A

<p>is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):</p>	
<p>Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):</p>	<p>Plants, Cuttings</p>
<p>Propagation Method (Options: Seed or Vegetative):</p>	<p>Vegetative</p>
<p>Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds,</p>	<p>Container, bareroot, plug</p>

cuttings, poles, etc.))	
Stock Type:	
Time to Grow (from seeding until plants are ready to be outplanted) :	N/A
Target Specifications (size or characteristics of target plants to be produced):	Flowering and seeding maturity.
Propagule Collection (how, when, etc.):	<p><i>C. velutinus</i> can be propagated by softwood or semi-ripe nodal cuttings (7-12 cm with a heel) taken in summer (July-August).^{12, 13}</p> <p>Cuttings of mature wood of the current year's growth can be taken in October and should be 7-12 cm long.¹³</p> <p>Semi-hardwood cuttings of <i>Ceanothus</i> cultivars can be taken at any time from spring to fall.¹¹</p>
Propagule Processing/ Propagule Characteristics (including seed density (# per pound), seed longevity, etc.):	N/A
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc.):	<p>Treat cuttings of <i>C. velutinus</i> with 0.8% IBA (indolebutyric acid), and plant in damp, well-aerated, sandy medium.</p> <p>Rooting of cultivars is enhanced with 1,000-3,000 ppm (and up to 5,000 ppm) IBA/NAA (naphthaleneacetic acid) quick-dips.</p> <p>Terminal softwood cuttings taken from vigorous plants rooted in</p>

etc.):	containers when treated with 1,000 ppm IBA. ^{10, 11}
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc.):	Either in a cold frame or greenhouse apply bottom heat to <i>C. velutinus</i> cuttings and pot immediately when rooted. ^{7,12} Cuttings of cultivars can be rooted under mist. ¹¹
Establishment Phase (from seeding to germination):	N/A
Length of Establishment Phase:	N/A
Active Growth Phase (from germination until plants are no longer actively growing):	Information not available.
Length of Active Growth Phase:	Information not available.
Hardening Phase (from end of active growth phase to end of growing	Information not available.

season; primarily related to the development of cold-hardiness and preparation for winter):	
Length of Hardening Phase:	Information not available.
Harvesting, Storage and Shipping (of seedlings):	Cutting propagules should be grown and stored through winter in a greenhouse prior to shipping/outplanting the following year. ¹³
Length of Storage (of seedlings, between nursery and outplanting):	<i>C. velutinus</i> dislike root disturbance and should be planted out into permanent positions while small in late spring or early summer. ¹³
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	Information not available.
Other Comments (including collection	Unknown.

restrictions or guidelines, if available):	
INFORMATION SOURCES	
References (full citations):	<p>¹United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) PLANTS Database. PLANTS Profile: <i>Ceanothus velutinus</i> Douglas. Accessed here: http://plants.usda.gov/. Accessed on: 4/17/12.</p> <p>²Species Account and Distribution Map. Jepson Flora Project: Jepson Interchange for California Floristics. Accessed at: http://ucjeps.berkeley.edu/cgi-bin/get_cpn.pl?CEVEH2. Accessed on: 5/19/12.</p> <p>³The Burke Museum of Natural History and Culture. Species Description. Accessed here: http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Ceanothus&Species=velutinus. Accessed on: 5/19/12.</p> <p>⁴Klinka, K., V.J. Krajina, A. Ceska, and A. M. Scagel. 1989. Indicators Plants of Coastal British Columbia. University of British Columbia Press, Vancouver, B.C.</p> <p>⁵Pojar, J. and A. Mackinnon. Editors. 1994. Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia and Alaska. British Columbia (B.C.) Ministry of Forests and Lone Pine Publishing: B.C., Canada.</p> <p>⁶Kruckeberg, A. R. 1996. Gardening with Native Plants of the Pacific Northwest, second edition, revised and enlarged. University of Washington Press, Seattle, WA.</p> <p>⁷Woody Plant Seed Manual (USDA FS Agriculture Handbook 727). 2008. United States Department of Agriculture (USDA) Forest Service, National Seed Laboratory. Accessed here: http://www.nsl.fs.fed.us/nsl_wpsm.html. Accessed on: 5/19/12.</p> <p>⁸Deno, N. C. 1993. Seed Germination Theory and Practice, Second Edition. Pennsylvania State University, PA.</p> <p>⁹Young, J. A. and C. G. Young. 1986. Collecting, Processing, and Germinating Seeds of Wildland Plants. Timber Press, Portland, OR.</p>

	<p>¹⁰Hartmann, H. T, D. E. Kester, F. T. Davies, Jr., R. L. Geneve. 2011. Hartmann & Kester's Plant Propagation Principles and Practices, 8th Edition. Prentice Hall, New York, NY.</p> <p>¹¹Blythe, G. and J. L. Sibley. 2003. Novel methods of applying rooting hormones in cutting propagation. <i>Combined Proceedings International Plant Propagators' Society</i> 53: 406-410.</p> <p>¹²Rose, R. C. E. C. Chachulski, and D. L. Haase. 1998. Propagation of Pacific Northwest Native Plants. Oregon State University Press, Corvallis, OR.</p> <p>¹³Plants for a Future Plant Database. <i>Ceanothus velutinus</i> Douglas. Accessed at: http://www.pfaf.org/user/Plant.aspx?LatinName=Ceanothus+velutinus. Accessed on: 5/19/12.</p>
Other Sources Consulted (but that contained no pertinent information) (full citations):	<p>Garry Oak Ecosystem Recovery Team (GOERT). 2012. Native Plant Propagation Guidelines. Accessed at: http://www.goert.ca/propagation_guidelines/forbs/erythronium_revolutum. Accessed on: 4/19/12.</p> <p>Leigh, M. Grow Your Own Native Landscape: A Guide to Identifying, Propagating, and Landscaping with Western Washington Native Plants. Native Plant Salvage Project, Washington State University Extension.</p> <p>Pettinger, A. and B. Costanzo. 2002. Native Plants in the Coastal Garden, Revised and Updated. Timberland Press, Portland, OR.</p>
Protocol Author (First and last name):	Rosemary Baker
Date Protocol Created or Updated (MM/DD/Y Y):	5/20/12

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