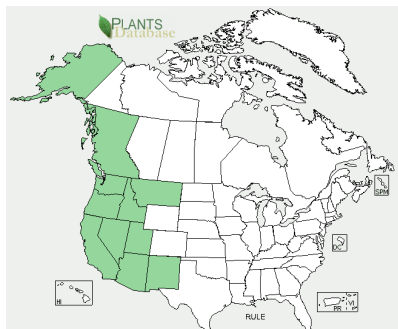


Plant Propagation Protocol for *Rubus leucodermis*

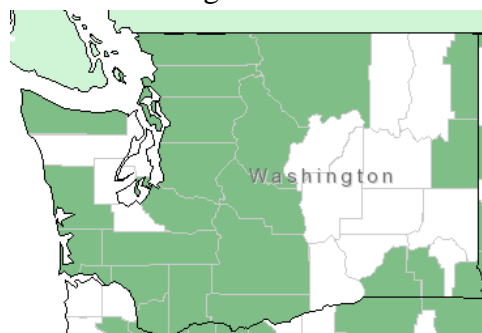
ESRM 412 – Native Plant Production

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

North America Distribution



Washington



Distribution Source: USDA PLANTS Database

TAXONOMY	
Plant Family	
Scientific Name	Rosaceae
Common Name	Rose family
Species Scientific Name	
Scientific Name	<i>Rubus leucodermis</i> Douglas ex Torrey & A. Gray
Varieties	<i>Rubus leucodermis</i> var. <i>leucodermis</i> Focke <i>Rubus leucodermis</i> var. <i>trinitatis</i> Berger <i>Rubus leucodermis</i> var. <i>bernardinus</i> Greene
Sub-species	
Cultivar	
Common Synonym(s)	<i>Rubus leucodermis</i> var. <i>leucodermis</i> Focke <i>Rubus leucodermis</i> Dougl. var. <i>trinitatis</i> Berger <i>Rubus leucodermis</i> Dougl. var. <i>bernardinus</i> Greene <i>Batidaea sandbergii</i> Greene <i>Melanobatus leucodermis</i> Greene <i>Rubus occidentalis</i> Focke <i>Melanobatus leucodermis</i> Greene <i>Rubus hesperius</i> Piper (1, 2)
Common Name(s)	Whitebark raspberry, White-stemmed raspberry, Black Raspberry, Blackcap raspberry, Blue raspberry (3)
Species Code (as per USDA Plants database)	RULE
GENERAL INFORMATION	

Geographical range	Primarily coastal W. America: S. California through Alaska, east to the Rocky Mountains (See maps above for geographical distribution.) (1, 2)
Ecological distribution	Low to moderate elevations, favoring full to partial sun; hillsides, slopes, fields, open forests, disturbed or burn sites (5). Found on both sides of the of the Cascade and Olympic mountains, and west of the Sierra Nevada mountain range Needs well-drained soil. (2, 4).
Climate and elevation range	Low to mid elevation riparian zones, from 0 to 7,000 feet in Western North America (9).
Local habitat and abundance	Associated with the Bigleaf Maple (<i>Acer macrophyllum</i>) complex. Found alongside salmonberry (<i>Rubus spectabilis</i> var. <i>spectabilis</i>), salal (<i>Gaultheria shallon</i>), Douglas-fir (<i>Pseudotsuga menziesii</i> var. <i>menziesii</i>), thimbleberry (<i>Rubus parviflorus</i>), vine maple (<i>Acer circinatum</i>), and sword fern (<i>Polystichum munitum</i>) in Puget lowland forests (7). Common in riparian zones, openings, open forests, and disturbed areas. In Northern California through the western Sierra Nevadas, it has been found associated with Giant Sequoia (<i>Sequoiadendron giganteum</i>) and Douglas-fir (4).
Plant strategy type / successional stage	Early successional species, common in disturbed areas. High fire tolerance as long as there is sufficient soil drainage (8). Has a low drought tolerance (9).
Plant characteristics	Deciduous perennial shrub with erect or arching stems 1-3 meters long, covered in thorny shoots. Thorns hooked and 6 mm long. Pinnate leaves with five leaflets in the first year and trifoliate thereafter. Leaves green and glabrous above, and white beneath, 2-8 cm long, doubly serrate (5). Reproduces sexually and asexually via sexual reproduction, parthenogenesis, pseudogamy, and parthenocarpy (12). Flowers in June, with 2-7 white-pinkish flowers per raceme. 5 petals per flower. Drupelets coherent; fruit reddening from red to purple to black in July; fruits up to 12 mm (2). Occurs in isolated individuals in partial sun or in thickets in open areas (2). Life span 5-12 years (10).

PROPAGATION DETAILS
Scarification protocols by Wada and Reed (12)

Ecotype	
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Propagules (seeds)
Stock Type	

Time to Grow	6 months
Target Specifications	Germinants
Propagule Collection Instructions	Wild seed gathered from the US in 1985 by hand, held in cold storage at the National Clonal Germplasm Repository in Corvallis, OR, for 23 years at -20°C .
Propagule Processing/Propagule Characteristics	750 seeds were tested, and were selected from the Germplasm collections after storage for 23 years. Seed weight is reported as 0.11 g/100 seed. Seed hardness rating on a scale of 1-5 was assigned after seed samples were soaked in deionized water for 2 days. <i>R. leucodermis</i> received a seed hardness rating of 3, with a seed coat thickness of 0.073 mm.
Pre-Planting Propagule Treatments	<p>Seeds were cleaned before being put into cold storage at -20°C and held for 23 years before being selected for the experiment. After removal from storage, seeds were scarified three different ways. The first group was a control and underwent no scarification. The second group was subject to concentrated sulfuric acid (98%) in ice water for 30 minutes to 3 hours, then rinsed in running water for 1 hour, then soaked for 5 min in a solution of 3 g/L $\text{Ca}(\text{ClO})_2$, 3 g/L $\text{Ca}(\text{OH})_2$, and water. After, they were rinsed for 5 minutes in running water. Seeds were then rubbed against a strainer to remove carbonized testa. The third group was subjected to sodium hypochlorite (14%) at room temperature for 2-8 hours and then rinsed in running water for 1 hour.</p> <p>Scarified seeds were placed on germination blotters and soaked with deionized water. The control seeds were only treated with deionized water. The seeds treated with sulfuric acid were also treated with gibberellic acid and potassium nitrate, or a smoke gas solution (50 seeds per treatment). Seeds treated with sodium hypochlorite were treated only with deionized water.</p> <p>Seeds were held in warm stratification at 18°C in an incubator for 1 month on plates, and received a 16 hour photoperiod. This was followed by cold stratification at 4°C for 3 months with no light.</p>
Growing Area Preparation / Annual Practices for Perennial Crops	Since the goal of this experiment was to produce germinants, this is beyond the scope of the experiment.
Establishment Phase Details	Seeds were placed in a germinator at 15°C for 8 hours of dark, and 30°C for 16 hours of light. Plates were sprayed with thiophanate methyl fungicide.

	None of the unscarified control seeds or those treated with NaOCl germinated. The seeds treated with sulfuric acid had a 32% germination rate, and those treated with H ₂ SO ₄ + GA ₃ + KNO ₃ had a 48.7% germination rate. Those treated with H ₂ SO ₄ and smoke had a 32% germination rate.
Length of Establishment Phase	6 months
Active Growth Phase	This is beyond the scope of the experiment.
Length of Active Growth Phase	Not applicable.
Hardening Phase	This is beyond the scope of the experiment.
Length of Hardening Phase	Not applicable.
Harvesting, Storage and Shipping	This is beyond the scope of the experiment.
Length of Storage	Not applicable.
Guidelines for Outplanting / Performance on Typical Sites	This is beyond the scope of the experiment.
Other Comments	
INFORMATION SOURCES	
References	See list below.
Other Sources Consulted	All sources were used and cited.
Protocol Author	Ada Beale
Date Protocol Created or Updated	05/31/2016

References

- (7): Chapel, C. B. "Upland Plant Associations of the Puget Trough Ecoregion." DNR. Washington Department of Natural Resources, 2006. Web. 27 Apr. 2016. <<http://www1.dnr.wa.gov/nhp/refdesk/communities/pdf/shrublands.pdf>>
- (3): "Comprehensive Report Species - Rubus Leucodermis." Comprehensive Report Species - Rubus Leucodermis. NatureServe, 2 Feb. 2009. Web. 27 Apr. 2016. <<http://explorer.natureserve.org/servlet/NatureServe?searchName=Rubus+leucodermis>>
- (9): Hassler, M. "Global Species : Rubus Leucodermis (western Raspberry)." Global Species. Myers Enterprises, 2013. Web. 27 Apr. 2016. <<http://www.globalspecies.org/ntaxa/2179167>>
- (8): Innes, Robin J. "Rubus Phoenicolasius." Rubus Phoenicolasius. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, 2009. Web. 27 Apr. 2016. <<http://www.fs.fed.us/database/feis/plants/shrub/rubpho/all.html>>
- (5): "Rubus Leucodermis." Mount Pisgah Arboretum. Mount Pisgah Arboretum. Web. 27 Apr. 2016. <<http://www.mountpisgaharboretum.org/habitats-and-ecology/plant-list-at-mount-pisgah-arboretum/rubus-leucodermis/>>
- (6): "Rubus Leucodermis Whitebark Raspberry." Rubus Leucodermis Whitebark Raspberry PFAF Plant Database. Plants for a Future, 2012. Web. 27 Apr. 2016. <<http://www.pfaf.org/user/plant.aspx?latinname=Rubus+leucodermis>>

(10): Schweingruber, Fritz Hans, Annett Börner, and Ernst-Detlef Schulze. "Atlas of Stem Anatomy in Herbs, Shrubs and Trees." *Forest Snow and Landscape Research* 79.3 (2005): 210. Forschungsanstalt Für Wald, Schnee Und Landschaft WSL. WSL, 2013. Web. 27 Apr. 2016. < <http://link.springer.com/book/10.1007%2F978-3-642-11638-4>>

(11): Tirmenstein, D. "Rubus Idaeus." Index of Species Information. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, 1990. Web. 27 Apr. 2016. < <http://www.fs.fed.us/database/feis/plants/shrub/rubida/all.html>>

(12): Wada, Sugae, and Barbara M. Reed. "Optimized Scarification Protocols Improve Germination of Diverse Rubus Germplasm." *Scientia Horticulturae* 130.3 (2011): 660-64. Web. 27 Apr. 2016.
<http://people.oregonstate.edu/~wadas/Wada%20and%20Reed%202011%20Sci%20Hort%20Optimizing%20Germ_Protocols.pdf>

(4): "Wild Blackberries (Rubus Spp.)." *University of California Integrated Pest Management*. Regents of the University of California, 25 Apr. 2014. Web. 31 May 2016.
<http://www.ipm.ucdavis.edu/PMG/WEEDS/wild_blackberry.html>.

Appendix

Plant Data Sheet for *Rubus Leucodermis*
Data compiled by Nancy Toenyan
April 13, 2006

Blackcap raspberry, White bark raspberry, Cut leaf Blackberry, or Western Raspberry

Rubus leucodermis



Range

Black cap raspberry (black cap hence forth) has a large distribution range that extends from British Columbia south to California reaching east to Montana and Utah.

Climate

Black cap prefers full to dappled sun and moist soil. Cannot tolerate saline or windy conditions and has a low drought tolerance.

Local occurrence

In Washington specifically, it is found in the basins as well as up along the Cascade and Olympic mountains ranges.

Habitat preferences

Black cap can be found in fields and on open or wooded hillsides from lower to more moderate elevations.

Plant strategy type/successional

Black cap is found in disturbed areas and has a high fire tolerance. If soil moisture is appropriate then this species could be a colonizer. Its specific strategy is to grow tall (up to 6') and produce an abundance of seed. This would be an early successional species.

Associated species

Black cap has been found to be associated with the Bigleaf Maple complex. This complex includes big leaf maple (*Acer macrophyllum*), salmonberry (*Rubus spectabilis*), trailing blackberry (*Rubus ursinus*), sword fern (*Polystichum munitum*) and bracken fern (*Pteridium aquilinum*). Other shrub species that may occur with varying abundance are red elderberry (*Sambucus racemosa*), devil's club (*Oplopanax horridus*), redosier dogwood (*Cornus stolonifera*), salal (*Gaultheria shallon*) and stink currant (*Ribes bracteosum*). Red alder (*Alnus rubra*) is a minor component in some stands.

Black cap has also been found in Giant Sequoia (*Sequoiadendron giganteum*) groves.

Collected

Black cap may be collected as seeds, divisions, and cuttings.

Collection restrictions or guidelines

Since conservation status is not currently tracked, there are no government collection restrictions at this time. Ideally collection for seeds would occur when seeds are ripe. Fruit period begins in summer and extends through fall. Cuttings of half-ripe wood maybe collected in July. Tip layering may be started in July to be planted out in the fall. Divisions can be collected in early spring before leaf out or before leaf drop in the fall.

Seed germination

Seeds have a cold stratification requirement of at least 30 days at 3° C. There has been some research showing that treatment with sodium hypochlorite may simplify seed germination.

Seed life

Specific information about seed life for black cap was unavailable. Since seed production is abundant and vigor is high, recommend yearly collection.

Recommended seed storage conditions

Specific information about seed storage and viability for blackcap was unavailable. Recommend dry cold storage.

Propagation recommendations

Black cap may be propagated by a variety of methods. Since seed vigor is high this would be the easiest and cheapest method. They can also be propagated from cuttings, sprigs and bare root.

Soil or medium requirements

Black cap is adapted to a variety of soil types. It has a minimum pH tolerance of 5.6 to a maximum of 7.3. No inoculum is necessary.

Installation form

Recommended installation form is seeds. This material is both easily transported and relatively cheap. Divisions and bare roots would be also be relatively cheap but would require correct timing logistics to be worked out in advance.

Recommended planting density

Recommended planting densities range from a minimum of 1200/ acre to a maximum of 4800/ acre.

Care requirements after installed

Care should be given to locate newly planted black caps in an ideal location. They have medium water requirements with low drought tolerance and a minimum of 120 frost free days. They are intolerant of anaerobic conditions as well as windy locations. If located properly, no special care is required after installation.

Normal rate of growth or spread

Black cap is a perennial arching vine. It grows at a rapid rate during both spring and summer creating dense hedges. The blossoms and fruit appear on two year old canes that die back at the end of the season.

Sources cited:

The Burke Museum of Natural History and Culture.

<http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Rubus&Species=leucodermis>

Plant for a Future: Edible, medicinal and useful plants for a healthier world. Non-profit

http://www.ibiblio.org/pfaf/cgi-bin/arr_html?Rubus+leucodermis

USDA: Natural Resources Conservation Services; Plant Characteristics

http://plants.nrcs.usda.gov/cgi_bin/plant_attribute.cgi?symbol=RULE

International Society for Horticultural Science

http://www.actahort.org/books/262/262_42.htm

Nature Conservancy

<http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Rubus+leucodermis>