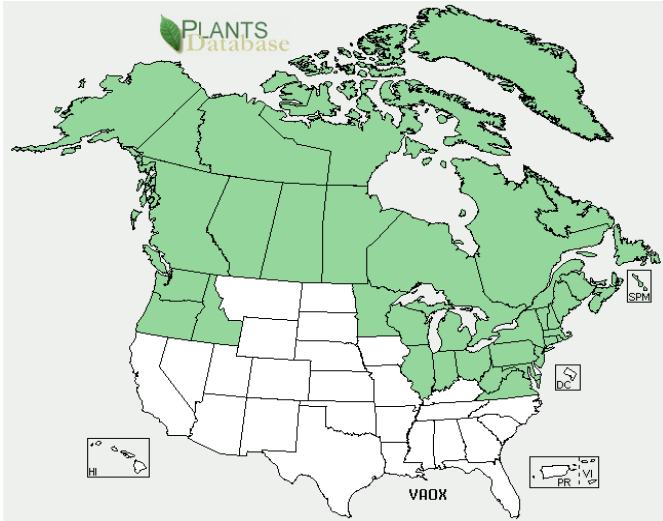
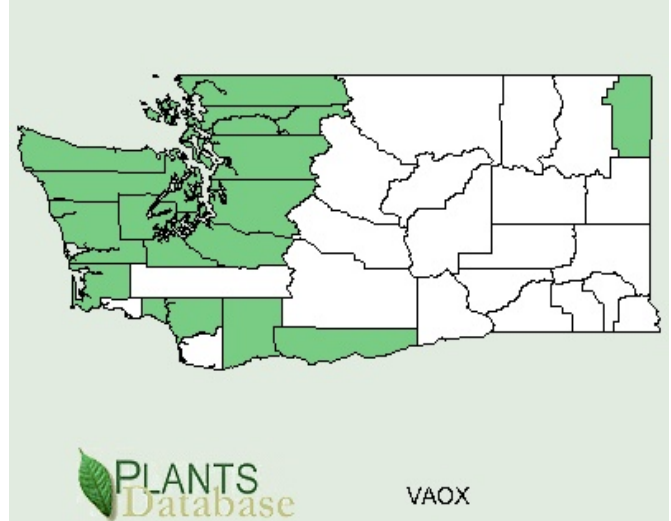


**Plant Propagation Protocol for *Vaccinium oxycoccos* L.**  
 ESRM 412 – Native Plant Production  
 Spring 2009

Distribution in the US and Canada<sup>iii</sup>



Distribution in Washington State<sup>iii</sup>



**TAXONOMY**

<b>Family Names</b>	
Family Scientific Name:	Ericaceae
Family Common Name:	heather
<b>Scientific Names</b>	
Genus:	<i>Vaccinium</i>
Species:	<i>oxycoccos</i>
Species Authority:	L.
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	
Common Synonym(s) (include full scientific names (e.g., <i>Elymus glaucus</i> Buckley), including variety or subspecies information)	<i>Oxycoccus hagerupii</i> A. & D. Love, <i>O. intermedius</i> (Gray) Rydb., <i>O. microcarpos</i> Turcz. Ex Rupr., <i>O. ovalifolius</i> (Michx.) Porsild, <i>O. oxycoccos</i> (L.) Adolphi, <i>O. oxycoccos</i> (L.) MacM., <i>O. palustris</i> Pers., <i>O. palustris</i> var. <i>intermedius</i> (Gray) T.J. Howell, <i>O. palustris</i> ssp. <i>Microphyllum</i> (Lange) A. & D. Love, <i>O. palustris</i> var. <i>ovalifolius</i> (Michx.) Seymour, <i>O. quadripetalus</i> Gilib., <i>O. quadripetalus</i> var. <i>microphyllum</i> (Lange) Porslid, <i>Vaccinium microcarpos</i> (Turcz. Ex rupr.) Schmalh., <i>V. microcarpus</i> (Turcz ex Rupr.) Schmalh., <i>V. oxycoccos</i> var. <i>intermedium</i> Gray, <i>V. oxycoccos</i> var. <i>microphyllum</i> (Lange) Rouss. & Raymond, <i>V. oxycoccos</i> var. <i>ovalifolium</i> (Michx.), <i>V. palustre</i> (Salisb.) <sup>i</sup>
	Frequently misspelled as <i>Vaccinium oxycoccus</i> L.
Common Name(s):	bog cranberry, small cranberry, wild cranberry, swamp

	cranberry, moss cranberry, mossberry, spiceberry, buckberry, moorberry
Species Code (as per USDA Plants database):	VAOX
<b>GENERAL INFORMATION</b>	
Geographical range (distribution maps for North America and Washington state)	From northern temperate through subarctic regions in northern North America, Europe, and Asia (including the western coast of Greenland and Japan). <sup>ii</sup> See maps above for distribution in North America and Washington State. <sup>iii</sup>
Ecological distribution (ecosystems it occurs in, etc):	Like many members of <i>Vaccinium</i> , it has very specific habitat requirements: acidic soils (pH of 2.9 to 3.8), high soil moisture, and colder temperatures than the American cranberry ( <i>V. macrocarpon</i> ). As a result, <i>V. oxycoccus</i> is distributed widely across the northern latitudes in swamps, bogs, fens, and wet subalpine meadows. <sup>iv</sup> The species quickly recolonizes appropriate wetland sites after burning. <sup>v</sup>
Climate and elevation range	Grows in low to mid-elevations, sometimes up to alpine habitats. <sup>vi</sup> Tolerates cold temperatures due to its trailing growth form, reaching subarctic latitudes. <sup>vii</sup>
Local habitat and abundance; may include commonly associated species	<p>Locally, <i>V. oxycoccus</i> is most frequently found in covered in <i>Sphagnum</i> moss in low-elevation bogs; frequently, it is partially covered by moss.<sup>viii</sup></p> <p>Associated species in the Midwest distribution include typical wetland plants: <i>Betula alleghaniensis</i>, <i>B. papyrifera</i>, <i>B. pumila</i>, <i>Fraxinus nigra</i>, <i>Populus balsamifera</i>, <i>P. tremuloides</i>, <i>T. occidentalis</i>, <i>Andromeda glaucophylla</i>, <i>Chamaedaphne calyculata</i>, <i>Kalmia polifolia</i>, <i>Ledum groenlandicum</i>, <i>Drosera rotundifolia</i>, <i>Eriophorum virginatum</i>, <i>E. angustifolium</i>, <i>Carex</i> spp., <i>Sarracenia purpurea</i>, <i>Sphagnum</i> spp., <i>Cladina</i> spp., and <i>Cladonia</i> spp.<sup>ix</sup></p> <p>Pojar and MacKinnon (1994) note that the Fraser River Valley was “a prime area for native harvest of cranberries.”<sup>x</sup></p>
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	As an early colonizer following fires and a shade-intolerant species <sup>xi</sup> , <i>V. oxycoccus</i> can be described as seral and probably intolerant to overstory canopy closure.
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	<i>V. oxycoccus</i> is an “evergreen creeping shrub with fine woody stems and young growth that is reddish brown,” <sup>xii</sup> a diminutive and “vine-like” version of some of its lower-latitude congeners. <sup>xiii</sup>

	<p>Stems are generally only several cm in height (but can reach 10-40 cm), bearing 5 mm by 3 mm ovate or elliptical leaves with a dark green proximal surface, a lighter, waxy distal surface, and distinctive curled margins.<sup>xiv</sup> Flowers are borne either singly or in groups of up to four flowers. They are either white or pink, with red bracts and reflexed corollas.<sup>xv</sup> Flowers appear between May and July and the reflexed corolla and protruding androecium give the impression of a “shooting star.”<sup>xvi</sup></p> <p>Pojar and MacKinnon (1994) note that the small (5-10 mm), pink to red, juicy berries may look “oversized” on the plant. Berries are edible.</p> <p><i>V. oxycoccos</i> can be distinguished from <i>V. macrocarpon</i> by its generally smaller size and its leaf morphology.<sup>xvii</sup></p>
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### PROPAGATION DETAILS<sup>1</sup>

Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Plants
Propagation Method (Options: Seed or Vegetative):	Seed
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container
Stock Type:	
Time to Grow (from seeding until plants are ready to be outplanted):	Indeterminate, roughly nine or ten months for a late summer seed harvest and springtime outplanting.
Target Specifications (size or characteristics of target plants to be produced):	Hardy seedling able to survive outplanting
Propagule Collection (how, when,	After fruits ripen in the late summer or early fall,

<sup>1</sup> Several authors (Schopmeyer 1974, Everett 1981, Kruckeberg 1996, and Pettinger 1996) note that cranberries in general and *V. oxycoccos* specifically can easily be propagated through cuttings (woody or leafy), division of suckers, and layering. However, none of these authors provide specific information about asexual propagation. Therefore, I will focus on seed production for this protocol and recommend standard practices for propagation of the species by cuttings and other asexual means.

etc):	harvest them by hand picking and allow them to chill at 50° F for several days, to make them easier to clean. <sup>xviii</sup> Then use a blender to macerate the fruits, and rinse the resulting slurry with water. Remove unviable seeds and detritus by flotation and retain the viable seeds, which will sink. <sup>xix</sup> Afterward, the seeds should be dried at a warmer temperature (Schopmeyer [1974] recommends 60-70° F) for several days.
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	Following cleaning, seeds are ready to plant or can be stored under cool, dry conditions for many years. <sup>xx</sup>
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	Though some species of <i>Vaccinium</i> require treatments to break dormancy, <i>V. oxycoccos</i> seeds can be planted immediately after cleaning/drying – they do not require cold-moist stratification. <sup>xxi</sup>  One study found that germination rates of untreated seeds can be improved through a variety of treatments, including cold-moist stratification for one month, dry storage for six months, exposure to 14 hours of light per day, and a 24-hour soak in 10% sodium carbonate. <sup>xxii</sup>
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	Above all, it is important to remember that <i>Vaccinium</i> species are very sensitive to edaphic conditions. The growing medium must be acidic and must retain water. Everett (1981) recommends sowing in “flats of sandy, peaty soil.”
Establishment Phase (from seeding to germination):	Place the seeds on the surface of the growing medium and cover flats in clear plastic until seedlings emerge from the medium. Moderate light is required for germination and naturally fluctuating temperatures may also facilitate it. <sup>xxiii</sup>
Length of Establishment Phase:	Not documented
Active Growth Phase (from germination until plants are no longer actively growing):	When of a suitable size or when environmental conditions are right, seedlings can be transplanted from containers to suitable outdoor conditions. <sup>xxiv</sup>
Length of Active Growth Phase:	Not documented
Hardening Phase (from end of active growth phase to end of growing season; primarily related to the development of cold-hardiness and preparation for winter):	<i>V. oxycoccos</i> is cold-hardy and requires no special care.
Length of Hardening Phase:	Not documented
Harvesting, Storage and Shipping (of seedlings):	

Length of Storage (of seedlings, between nursery and outplanting):	
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	Due to picky habitat requirements, the best way to choose a site for outplanting is to find one where <i>Vaccinium</i> species may have grown in the past or currently grow (e.g. <i>Sphagnum</i> bogs). <sup>xxv</sup>
Other Comments (including collection restrictions or guidelines, if available):	
<b>INFORMATION SOURCES</b>	
References (full citations):	See Below
Other Sources Consulted (but that contained no pertinent information) (full citations):	See Below
Protocol Author (First and last name):	Jake J. Grossman
Date Protocol Created or Updated (MM/DD/YY):	05/19/2009

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

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- <sup>iv</sup> “Ethnobotany – Shrubs/Trees.” Environment-Cultural Resources (<http://wsdot.wa.gov/Environment/CulRes/ShrubsTrees.htm>, 19 May 2009). Washington State Department of Transportation, Seattle, WA.
- <sup>v</sup> “*Vaccinium oxycoccos* Small cranberry.” The Swanson Party BWCA Home Page (<http://www.rook.org/earl/bwca/nature/shrubs/index.html>, 19 May 2009).
- <sup>vi</sup> Trehane 2004; Robson, K.A., A. Richter, and M. Filbert. 2008. *Encyclopedia of northwest native plants for gardens and landscapes*. Portland, OR: Timber Press, pp. 499-500.
- <sup>vii</sup> Trehane 2004
- <sup>viii</sup> Pojar, J. and A. MacKinnon. 1994. *Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia, & Alaska*. Vancouver, BC: Lone Pine, pp. 59; Pettinger, A. 1996. *Native plants in the coastal garden: a guide for gardeners in British Columbia and the Pacific Northwest*. Vancouver, B.C.: Whitecap Books, pp. 70-71.
- <sup>ix</sup> “*Vaccinium oxycoccos* Small cranberry” 2009
- <sup>x</sup> Pojar and MacKinnon 1994
- <sup>xi</sup> Everett 1981
- <sup>xii</sup> Trehane 2004
- <sup>xiii</sup> Pettinger 1996
- <sup>xiv</sup> Everett 1981; Pojar and MacKinnon 1994; Pettinger 1996; Trehane 2004
- <sup>xv</sup> Trehane 2004
- <sup>xvi</sup> Pettinger 1996
- <sup>xvii</sup> Everett 1981
- <sup>xviii</sup> Schopmeyer, C.S. 1974. *Seeds of woody plants of the United States*. Washington, D.C.: Forest Service, USDA, pp. 840-841; Young, J.A. and C.G. Young. 1986. *Collecting, processing, and germinating seeds of wildland plants*. Portland, OR: Timber Press, pp. 135; Young, J.A. and C.G. Young. 1992. *Seeds of woody plants in North America*, revised and enlarged ed. Portland, OR: Dioscorides Press, pp. 350-352.
- <sup>xix</sup> Schopmeyer 1974; Young and Young 1992; Dirr, M.A. and C.W. Heuser, Jr. 2006. *The reference manual of woody plant propagation*, 2<sup>nd</sup> ed. Cary, NC: Varsity Press, Inc. pp. 361-362.
- <sup>xx</sup> Schopmeyer 1974; Young and Young 1992
- <sup>xxi</sup> Dirr and Heuser 2006
- <sup>xxii</sup> Jacquemart, A. *Vaccinium oxycoccos* L. (*Oxycoccus palustris* Pers.) and *Vaccinium microcarpon* (Turcz. ex Rupr.) Shmalh. (*Oxycoccus microcarpus* Turcz. ex Rupr.). *Journal of Ecology* 85:381-396.
- <sup>xxiii</sup> Young and Young 1992
- <sup>xxiv</sup> Young and Young 1992
- <sup>xxv</sup> Everett 1981

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## Appendix: Previous Propagation Protocol

### Plant Data Sheet

#### *Vaccinium oxycoccus*

(bog cranberry, small cranberry, wild cranberry, swamp cranberry)



#### Range

This species can be found from Alaska east to Labrador, Greenland, and Newfoundland. It can also south through New England, the northern portions of the Great Lakes States, and western Washington and Oregon.

#### Climate, elevation

Found in cool temperate climates. It is found in coniferous swamps.

#### Local occurrence (where, how common)

May be found in a bog garden, woodland, sunny edge, dappled shade, or as a ground cover.

#### Habitat preferences

It thrives in moist coastal and boreal forests, and requires a moist or wet soil. The soil is usually very poorly drained. In the boggy areas the soil ph is very acidic, 2.9-4.7. Where as in the fen areas the soil ph is more alkaline, 6.0-7.5.



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Plant strategy type/successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)

It can be an early colonizer of secondary succession. Fire is a very important aspect. It is the first to colonize a burned bog area. The abundance increases with frequent fires. This species is shade intolerant, so mostly is related to having a coniferous overstory establish.

#### Associated species

*Tsuga canadensis*, *Tsuga heterophylla*, *Thuja occidentalis*, *Thuja plicata*, *Chamaecyparis nootkatensis*, *Chamaecyparis thyoides*, *Populus tremuloides*, *Populus balsamifera*, *Betula pumila*, *Betula glandulosa*, *Betula papyrifera*, *Betula alleghaniensis*, *Fraxinus nigra*, *Chamaedaphne calyculata*, *Andromeda glaucophylla*, *Kalmia polifolia*, *Sarracenia purpurea*, *Ledum groenlandicum*, *Rubus chamaemorus*, *Rhododendron canadense*, *Rhamnus frangula*, *Drosera* spp., *Eriophorum virginatum*, *Eriophorum angustifolium*, *Carex* spp., *Cladina* spp., and *Cladonia* spp.

May be collected as: (seed, layered, divisions, etc.)

Seeds, cuttings, layering, or the division of suckers may be collected.

#### Collection restrictions or guidelines

Fruits ripen from August to October, and may persist through the winter.

#### Seed germination (needs dormancy breaking?)

Cold stratification is necessary to break dormancy. The suggested period of cold stratification is 2-3 months. Then store seeds at 32 degrees F for 6-7 months, allowing germination to take place at 77 degrees F.

Seed life (can be stored, short shelf-life, long shelf-life)

No information found

#### Recommended seed storage conditions

No information found

Propagation recommendations (plant seeds, vegetative parts, cuttings, etc.)

Vegetative propagation is recommended.

#### Soil or medium requirements (inoculum necessary?)

If seeds are sown, it is recommended to have a lime-free soil mix. Mature plants like highly acidic soil, pH 2.9 - 4.7.

Installation form (form, potential for successful outcomes, cost)

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Seeds are the cheapest, but are very rare. Vegetative cuttings are common but are slow and difficult. Layering can take up to 18 months. Division of suckers is the easiest and best chance of success.

#### Recommended planting density

If planted as a ground cover, it is recommended to plant 1 meter apart; it will form a thick carpet when they are thriving.

#### Care requirements after installed (water weekly, water once etc.)

The like very soggy, wet conditions, so water until established continuing to keep a boggy type soil.

#### Normal rate of growth or spread; lifespan

Very fast establisher. It regenerates quickly from sprouts of the rhizomes. 0.1 – 1 meter in full height.

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- 1.) [http://www.scs.leeds.ac.uk/cgi-bin/pfaf/arr\\_html?Vaccinium+oxycoccos&CAN=LATIND](http://www.scs.leeds.ac.uk/cgi-bin/pfaf/arr_html?Vaccinium+oxycoccos&CAN=LATIND)
- 2.) <http://www.fs.fed.us/database/feis/plants/shrub/vacoxy/all.html>
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Data compiled by: Kevin Klein, 26 May 2003.