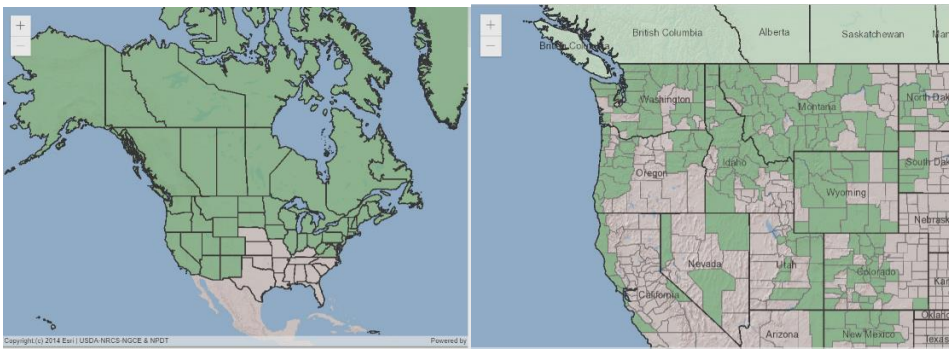
Plant Propagation Protocol for *Arctostaphylos uva-ursi*

ESRM 412 – Native Plant Production

URL: https://courses.washington.edu/esrm412/protocols/*[2021]*/*[ARUV.pdf]*

TAXONOMY	
Plant Family	
Scientific Name	Ericaceae[9]
Common Name	Heath
Species Scientific Name	
Scientific Name	*Arctostaphylos uva-ursi* (L.) Spreng[9]
Varieties	*adenotricha* (Fernald & J.F. Macbr.)[9] *coactilis* (Fernald & J.F. Macbr.)[9] *leobreweri* J.B. Roof[9] *marinensis* J.B. Roof[9] *pacifica* Hultén[9] *stipitata* (Packer & Denford) Dorn[9] *suborbiculata* W. Knight[9]
Sub-species	*adenotricha* (Fernald & J.F. Macbr.) Calder & Roy L. Taylor[9] *coactilis* (Fernald & J.F. Macbr.) Á. Löve & D. Löve & Kapoor[9] *longipilosa* Packer & Denford[9] *monoensis* J.B. Roof[9] *stipitata* Packer & Denford[9]
Cultivar	
Common Synonym(s)	*A. adenotricha* (Fernald & J.F. Macbr.) Á. Löve & D. Löve & Kapoor[9] *Uva-ursi uva-ursi* (L.) Britton[9]
Common Name(s)	Kinnikinnik, bearberry, pinemat manzanita
Species Code (as per USDA Plants database)	ARUV[9]

GENERAL INFORMATION

Geographical range	 Pictures: 9
Ecological distribution	Broad ranging; coastal, chaparral, gravelly or sandy exposed sites, dry/rocky slopes, forest margins and clearings.[2]
Climate and elevation range	USDA zones 2-6 (7) | Cold-hardy | Sea level - 12,226' [2] Annual precipitation: 11.8-115.1" | Summer: 0.22" – 3.07" [2] Coldest Month: 22.1°F – 50.3°F Hottest Month: 44.3°F – 76.2°F [2]
Local habitat and abundance	Prefers acidic, dry to moderate moisture, sandy or gritty soils in full sun or light shade. Found in high local abundance on dry, open mountainsides.
Plant strategy type / successional stage	Tolerant of fires – regenerates easily by sprouting from underground growth.[3] Less tolerant of cutting/grazing[3,5] Spreads easily; will root where stems touch the soil.[2]
Plant characteristics	Short, creeping, slow-growing evergreen shrub. Leaves (up to 1") are dark green with a waxy, leathery texture, oval in shape, arranged alternately on the stem. Kinnikinnik blooms from April to July (depending on elevation) and produces clusters of pink, bell-shaped flowers.[10] Green fruits develop and ripen to red late in the season (June-Sept), remaining on the plant into winter.[2] Seeds (6-8) are embedded on a tough stone in the fruit. Kinnikinnik palatable to browsing species and birds and other small animals feed on the fruits.[10]

PROPAGATION DETAILS

Ecotype	unknown
Propagation Goal	Plants

Propagation Method	Seed
Product Type	Container
Stock Type	unspecified
Time to Grow	8-12 months (seeds can take 2 years to germinate)8
Target Specifications	unspecified
Propagule Collection Instructions	Seeds mature in June-Aug and fruits can be hand collected from plants or from the ground. [10]
Propagule Processing/Propagule Characteristics	~58000 seeds per pound. 12 pounds of seed per 100 pounds of fruit.[8] Dormancy is difficult to break – physical and chemical dormancy.[8] Poor germination (30-60%, usually around 50%)[8]
Pre-Planting Propagule Treatments	The seeds can be removed from the fleshy fruit by macerating with water. The seeds can be separated from the pulp by water or air screening. Seeds should be scarified with acid to dissolve the slightly softer material filling a channel in the woody seed coat. Seeds require acid scarification, followed by warm and cool stratification to break dormancy.[8] Seeds should be immersed in H_2SO_4 for 30 minutes to 5 hours (best germination rates were achieved with acid scarification of 3 – 5 hours). Determining duration is difficult because of the variability in durability of the material in the seed coat channel. Sufficient duration to dissolve all the seed coats will invariably kill some seeds, while short enough duration to avoid mortality will fail to break some seeds' physical dormancy.[7] Best germination rates (76%) were achieved by directly sowing whole 3-5 hour acid-scarified stones into flats that were placed outdoors in a mulched frame in June and left to germinate the following spring.[7] If stratifying indoors, the following periods should be used for the warm (20-30 $^{\circ}$C) and cool (4-10 $^{\circ}$C) periods.[7] Warm stratification: 60 – 120 days | Cold stratification: 60-90 days
Growing Area Preparation / Annual Practices for Perennial Crops	Flats outdoors on frames, covered with straw mulch.[8] Otherwise unspecified.
Establishment Phase Details	Germination is more successful in seeds sown outside, that are allowed to summer and overwinter in natural conditions. Seeds will germinate naturally in spring.[8]
Length of Establishment Phase	Variable depending on when seeds are sown. Up to 2 years from sowing to germination.[8]
Active Growth Phase	Unspecified
Length of Active Growth Phase	Unspecified
Hardening Phase	Unspecified – unnecessary if sown outdoors
Length of Hardening Phase	Unspecified
Harvesting, Storage and Shipping	Unspecified
Length of Storage	Unspecified

Guidelines for Outplanting / Performance on Typical Sites	Unspecified
Other Comments	Propagation from seed is very difficult
PROPAGATION DETAILS	
Ecotype	Glacier National Park, Yellowstone National Park, and Oregon[6] also European populations[4]
Propagation Goal	Plants
Propagation Method	Vegetative
Product Type	Container[6] or Bareroot[4]
Stock Type	Unspecified
Time to Grow	Unspecified
Target Specifications	Unspecified
Propagule Collection Instructions	Hardwood or softwood cuttings should be collected and struck in Spring or Fall. Timing is critical to rooting success in the Oregon population (struck Sept 15 – Oct 15, 85% rooting). Glacier NP: Hardwood: April Softwood: May-June (65-100% rooting)[6]
Propagule Processing/Propagule Characteristics	Cuttings, 6-8 inches, hardwood or softwood[6]
Pre-Planting Propagule Treatments	Cuttings should be stripped of leaves and kept cool and moist following collection.[6]
Growing Area Preparation / Annual Practices for Perennial Crops	Cuttings should be struck in well-drained media, success with 1:1 perlite:sand and a sand based rooting mix. Treatment with IBA or mychorrizal fungus[11] innoculants may increase root growth. Bottom heat (70 F) can produce faster rooting.[6] Use of a mist bench can prevent dessication.[6]
Establishment Phase Details	Unspecified
Length of Establishment Phase	Rooting occurs in 4 weeks.
Active Growth Phase	For semi-natural cultivation, rooted cuttings can be planted out in suitable field conditions (prefers low nutrient, sandy soil) [4]
Length of Active Growth Phase	Unspecified
Hardening Phase	Plants should be gradually 'weaned' off the mist bench as roots are produced.
Length of Hardening Phase	Unspecified
Harvesting, Storage and Shipping	Unspecified
Length of Storage	Unspecified
Guidelines for Outplanting / Performance on Typical Sites	High recruitment at outplanting site – 80% survival [4]
Other Comments	

INFORMATION SOURCES	
References	1. "*Arctostaphylos* (Manzanita) Evaluation in Western Oregon" Oregon State University (https://agsci.oregonstate.edu/osu-nursery-greenhouse-and-christmas-trees/arctostaphylos-manzanita-evaluation-western-oregon) 2. Calscape, California Native Plant Society "Southern Kinnikinnik" (https://calscape.org/Arctostaphylos-uva-ursi-()) 3. Calvo, L., Tárrega, R. & De Luis, E. The dynamics of mediterranean shrubs species over 12 years following perturbations. Plant Ecology 160, 25–42 (2002). https://doi.org/10.1023/A:1015882812563 4. Gawlowska "Seminatural Cultivation of Economically Important Plant Species Growing in a Wild State" Nature Conservation Research Center, Krakow Poland 5. Peek, Johnson, Pence "Successional Trends in a Ponderosa Pine/Bitterbrush Community Related to Livestock, Wildlife, and to Fire" University of Arizona (https://journals.uair.arizona.edu/index.php/jrm/article/viewFile/6788/6398) 6. Rupp, Larry and Wheaton, Adrea, "Nurturing Native Plants: A Guide to Vegetative Propagation of Native Woody Plants in Utah" (2014). CWEL Extension Fact Sheets. Paper 8. 7. Smreciu, Gould 2017 "Seed Viability, Germination, and Longevity of Selected Boreal Species: A Literature Review" Prepared for COSIA (OSVC) Wild Rose Consulting, Inc. (https://www.cclmportal.ca/sites/default/files/2020-04/Lit%20Rev%20Final%20May%2030%2C%202017_0.pdf) 8. USDA, Forest Service "*Arctostaphylos uva-ursi*" 2021 (https://www.fs.usda.gov/detailfull/umatilla/learning/nature-science/?cid=stelprdb5251290&width=full) 9. USDA, NRCS. 2021. The PLANTS Database (http://plants.usda.gov, May 20, 2021) 10. Washington Native Plant Society "*Arctostaphylos uva-ursi*" https://www.wnps.org/native-plant-directory/43-arctostaphylos-uva-ursi) 11. Scagel "Enhanced Rooting of Kinnikinnik Cuttings using Mycorrhizal Fungi in Rooting Substrate" USDA Agricultural Research Service (https://www.ars.usda.gov/ARSUserFiles/4947/PDFs/Scagel1st/Scagel2004ArctoHortTech.pdf)
Other Sources Consulted	Lady Bird Johnson Wildflower Center "*Arctostaphylos uva-ursi*" University of Texas (https://www.wildflower.org/plants/result.php?id_plant=ARUV) Missouri Botanical Garden "*Arctostaphylos uva-ursi*" (https://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=j380) Kruckenberg, Arthur R. Gardening with Native Plants of the Pacific Northwest; Second Edition. University of Washington Press, Seattle WA 1997. Calvo, Tarrega, et al "Differences in the Response to Fire of Mediterranean Shrubland" 2005 New Research on Forest Ecosystems ed: A.R. Burk. Pp 21-35 Ch. 2' W. R. Remphrey and T. A. Steeves. Shoot ontogeny in Arctostaphylos uva-ursi (bearberry): origin and early development of lateral vegetative and floral buds. Canadian Journal of Botany. 62(9): 1933-1939. https://doi.org/10.1139/b84-264 Invalid URLs: https://www.fs.usda.gov/Internet/invalidurl https://ecology.wa.gov/programs/sea/pubs/93-30/table3.html https://dot.ca.gov/dist4/airspace/documents/plant_list.pdf

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Date Protocol Created or Updated	05/26/2021