***Arctostaphylos uva-ursi* - Plant Propagation Protocol**
ESRM 412 – Native Plant Production

TAXONOMY

Family Names

Family Scientific Name:	Ericaceae
Family Common Name:	Heath Family

Scientific Names

Genus:	*Arctostaphylos*
Species:	*uva-ursi*
Species Authority:	(Linnaeus) Sprengel
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	

Common Synonym(s)

Genus:	*Arctostaphylos*
Species:	*uva-ursi*
Species Authority:	(Linnaeus) Sprengel
Variety:	var. *adenotricha* Fern. & J.F. Macbr. var. *coactilis* Fern. & J.F. Macbr. var. *leobreweri* J.B. Roof var. *marinensis* J.B. Roof var. *pacifica* Hultén var. *stipitata* (Packer & Denford) Dorn var. *suborbiculata* W. Knight
Sub-species:	ssp. *adenotricha* (Fern. & J.F. Macbr.) Calder & Taylor ssp. *coactilis* (Fern. & J.F. Macbr.) A.& D. Löve & Kapoor ssp. *longipilosa* Packer & Denford ssp. *monoensis* J.B. Roof ssp. *stipitata* Packer & Denford
Cultivar:	
Authority for Variety/Sub-species:	
Genus:	*Arctostaphylos*
Species:	*adenotricha*
Species Authority:	(Fern. & J.F. Macbr.) A.& D. Löve & Kapoor
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	
Genus:	*Uva-Ursi*
Species:	*uva-ursi*
Species Authority:	(Linnaeus) Sprengel
Variety:	*suborbiculata*
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	(Linnaeus) Britt.

Common Name(s):	kinnikinnick, bearberry, bear-grape, hog-cranberry, mealberry, mountain-box, sandberry, upland-cranberry, gayuba[i]
Species Code:	ARUV

GENERAL INFORMATION

General Distribution:	World: Caucasus, Siberia, Soviet Far East, Throughout Europe, Guatemala[ii] US: AZ, CA, CO, CT, DE, ID, IL, IN, MA, ME, MI, MN, MT, ND, NH, NJ, NM, NV, NY, OH, OR, PA, RI, SD, UT, VA, VT, WA, WI, WY
Climate and elevation range	West side from sea level[iii] to the Cascades (decreasing with elevation) and east side in middle montane forests.[iv]
Local habitat and abundance:	PNW: Open woods, rocky glades, prairies.[v]
Plant strategy type:	Early successional species, responds well to fire quickly reestablishing from underground organs.[vi] Reported elsewhere to respond well to mechanical injury.[vii]

PROPAGATION DETAILS

Ecotype:	
Propagation Goal:	Plants
Propagation Method:	Vegetative. Micropropagation also possible.[viii]
Product Type:	Container
Stock Type:	5in. rootrainer
Time to Grow:	12-18 months.
Target Specifications:	Well developed root plug with high root:shoot ratio.
Propagule Collection (how, when, etc):	2-6 inch tip or runner cuttings with retained leaves, including only current year's growth. Rooting potential is greatest for samples collected between mid-September and mid-October or during the month of March.[ix] This protocol assumes collection during Fall, but recognizes access to high elevation plants under snow may not be possible, and growth and hardening treatments may need to be modified for populations collected earlier in the year. Cuttings should be maintained cool and moist until returned to the greenhouse.[x]
Propagule Characteristics:	Plants measured in the black hills were found to have higher growth rates for individuals with red stems, moderate for pink stems, and low for green stems.[xi] While these results have not been documented elsewhere, segregation of cuttings by color and measurement may lead to site specific guidelines for future collections.
Pre-Planting Propagule Treatments:	Strip cuttings of leaves on the lower third and maintain in fresh water before treatment.[xii] Immediately prior to

	treatment disinfect the lower third with 10% solution of sodium hypochlorate for 20 minutes and then rinse with water. Treat with 3000mg/L Woods Hormone Solution for 5 sec, and place into rooting medium with mycorrhizal innoculum. (Kinnikinnick is an extremely unspecific host for mycorrhizae,[xiii] but no significant differences were found between using a commercially available innoculum such as *Glomus intraradices* or an innoculum prepared by blending cleaned root cuttings of *A. uva-ursi* collected in the field. Both treatments were found to produce longer roots and a greater root biomass than no treatment or rooting hormone alone.[xiv])
Growing Area Preparation:	Remove old rooting medium and plant materials from the greenhouse and disinfect/sterilize all media and surfaces. Growth media should be a well drained mixture located over bottom heat.[xv]
Establishment Phase:	Cuttings are stuck at a 1in. by 1in. or 1in. by 1/2in. spacing, and maintained with a high bottom heat (as high as 72degrees F.)[xvi] Cuttings should be monitored and treated for foliar pests and fungal infections during this period.
Length of Establishment Phase:	Three to Six Months.
Active Growth Phase:	Transplantation to roottainers should occur in March. Pour the well drained rooting mixture around the roots of the seedling held in the container, and do not tamp.[xvii] Frequency and nature of fertilization is not well tested, although recommendations do favor a slightly N heavy preparation. If transplanted early, overwinter in a heated greenhouse with full sun. A second flush of growth has been observed in bearberry, suggesting that manipulation of temperatures and light to push a second growth could be possible for plants which rooted well and were transplanted early.[xviii]
Length of Active Growth Phase:	Spring and Summer.
Hardening Phase:	Finish in a hoophouse, shifting from shade to plastic in the early fall, ensuring 30-60 days of hardening prior to a killing frost.
Length of Hardening Phase:	One to Two Months.
Harvesting, Storage and Shipping:	Ship dormant for early spring planting. Plant while dormant, or transplant to larger containers for second year's growth and larger plantings.
Length of Storage:	Three Months.
Guidelines for Outplanting / Performance on Typical Sites:	As Manzanitas are particularly associated with acidic soils, it will tolerate a range of water availability.[xix] Samples propagated from coastal dune populations

have proven to be salt tolerant.[xx] Slow growing, to form a dense mat, kinnikinnick[xxi] can be held for an additional growing season in containers for more substantial plantings where larger individuals are needed. Matting and trailing forms are particularly well suited for plantings where erosion control is important as the plants will continue to root from their prostrate stems.[xxii]

Other Comments: Recovery after fire or mechanical disturbance by means of rapid resprouting makes this plant particularly suitable for sites prone to disturbance.[xxiii]

INFORMATION SOURCES

Other Sources: Unable to locate Rey, C. Essais de multiplication du raisin d'ours (Arctostaphylos uva-ursi) in Revue suisse de viticulture, arboriculture, horticulture. (12) Mar/Apr. 1980 p71-80.

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[i] USDA. *Arctostaphylos uva-ursi* (L.) Spreng. in USDA Germplasm Resources Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?3866 last accessed Apr. 20, 2007.

[ii] USDA. USDA Germplasm Resources Information Network.

[iii] Personal observation.

[iv] Kruckenberg, Arthur R. Gardening with Native Plants of the Pacific Northwest; Second Edition. University of Washington Press, Seattle WA 1997.

[v] Kruckenberg, Arthur R.

[vi] Calvo, Leonor et al. *The dynamics of Mediterranean shrubs species over 12 years following perturbations*. In Plant Ecology. (160) 2002 p. 25-42.

[vii] Mediea, David. *Field Notes: Arctostaphylos uva-ursi*. in American Nurseryman. August 15, 1989.

[viii] M'Kada, J. et al. "In vitro micropropagation of *Arctostaphylos uva-ursi* (L.) Sprengel.: Comparison between two methodologies." in Plant Cell, Tissue, and Organ Culture. (24) 1991 p. 217-222.

[ix] Holden, Verl. "Propagation of Arctostaphylos uva-ursi by cuttings." in The International Plant Propagators' Society; Combined Proceedings. (25) 1975 74-77.

[x] USDA Forest Service. *Arctostaphylos uva-ursi*. in Umatilla National Forest Native Plant Notebook. http://www.fs.fed.us/r6/uma/native last accessed April 22, 2007.

[xi] Severson, Kieth E. and E. Chester Garrett. "Growth Characteristics of Bearberry in the Black Hills." in USDA Forest Service Research Note RM-254. Feb, 1974.

[xii] Holden, Verl.

[xiii] Muhlmann, O. "Mycorrhiza of the host-specific *Lactarius deterrimus* on the roots of *Picea abies* and *Arctostaphylos uva-ursi*. in Mycorrhiza. (16) 2006. 245-250.

[xiv] Scagel, C.F. "Enhanced Rooting of Kinnikinnick Cuttings using Mycorrhizal Fungi in Rooting Substrate." in HortTechonology (14) July/September 2004 p. 1-9.

[xv] Holden, Verl.

[xvi] Holden, Verl.

[xvii] Holden, Verl.

[xviii] Remphrey, W.R. and T.A. Stevens. "Stoot ontogeny in *Arctostaphylos uva-ursi* (bearberry): the annual cycle of apical activity." in Canadian Journal of Botany. (62) 1984 p. 1925-1932.

[xix] USDA Forest Service. *Arctostaphylos uva-ursi*. in Fire Effects Information System. http://www.fs.fed.us/database/feis/plants/shrub/arcuva/all.html last accessed April 18, 2007.

[xx] Kruckenberg, Arthur R

[xxi] Larson, Mary and Judy Lester. Drought Tolerant Landscape Ground Cover for Amador County (East of Highway 49). http://ucce.ucdavis.edu/files/filelibrary/40/959.pdf last accessed April 19, 2007.

[xxii] Kruckenberg, Arthur R

[xxiii] Del Barrio, J. et al. "Vegetative response of *Arctostaphylos uva-ursi* to experimental cutting and burning." in Plant Ecology. (145) 1999 191-195.

Plant Data Sheet

Species (common name, Latin name)
Bearberry, *Arctostaphylos uva-ursi*

Range
Coastal Northern California to Canada. (nmsu.edu)

Climate, elevation
Tolerates cold winters and dry summers; found from sea level to 11,000'. (nmsu.edu)

Local occurrence (where, how common)
Dry open mountainsides; frequently occurring. (nmsu.edu)

Habitat preferences
Prefers sunny and dry locations with sandy or gravely acidic soil. (nmsu.edu)

Plant strategy type/successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)
Tolerates limited trampling, difficult to repopulate after logging disturbances. (fs.fed.us)

Associated species
Grand fir, Lodge pole pine, Juniperus. (fs.fed.us)

May be collected as: (seed, layered, divisions, etc.)
Best propagated by cuttings. (Hartmann & Kester's)

Collection restrictions or guidelines
Take terminal cuttings in late winter or early spring. (Hartmann & Kester's)

Seed germination (needs dormancy breaking?)
Seed has a double-dormancy that requires breaking. Three to six hours scarification in sulfuric acid or insertion into boiling water and then removed from heat to cool in the water for twenty four hours. (Hartmann & Kester's)

Seed life (can be stored, short shelf-life, long shelf-life)
A hard seed coat and dormant embryo make for a long shelf-life.

Recommended seed storage conditions
Probably best attained by cool dry storage.

Propagation recommendations (plant seeds, vegetative parts, cuttings, etc.)
Cuttings should be submerged in a solution of 5% to 10% Clorox, then IBA talc form at 8000 ppm. Intermittent mist and bottom heat of 21° C. (Hartmann & Kester's)

Soil or medium requirements (inoculum necessary?)
Any slightly acidic soil (ecy.wa.gov)

Installation form (form, potential for successful outcomes, cost)
Good ground cover in sunny locations. Grows 6"-12" in height with a spread of up to 12'. (ucdavis.edu)

Recommended planting density

Plant 8’ apart from each other, and about 8’ away from fences, paths, ditches, ect. (dot.ca.gov) Plant only 2’ apart (ecy.wa.gov)

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

Water deeply weekly, more frequent in hot weather. Best if planted in fall. Once established deep watering every two to three weeks will give best appearance. (ucdavis.edu)

Normal rate of growth or spread; lifespan

Slow grower (ucdavis.edu) Lifespan of 25 years (ecy.wa.gov)

Sources cited

http://medplant.nmsu.edu/ursi.htm
http://www.ecy.wa.gov/programs/sea/pubs/93-30/table3.html
http://www.fs.fed.us/r6/uma/native/ts15.htm
http://ucce.ucdavis.edu/files/filelibrary/40/959.pdf
http://www.dot.ca.gov/dist4/airspace/documents/plant_list.pdf
Hartmann & Kester’s Plant Propagation Principles and Practices. 2002 Pearson Educatin, Inc., Upper Saddle River, New Jersey.

Data compiled by (student name and date)

Wednesday, April 30, 2003
Rob Wines