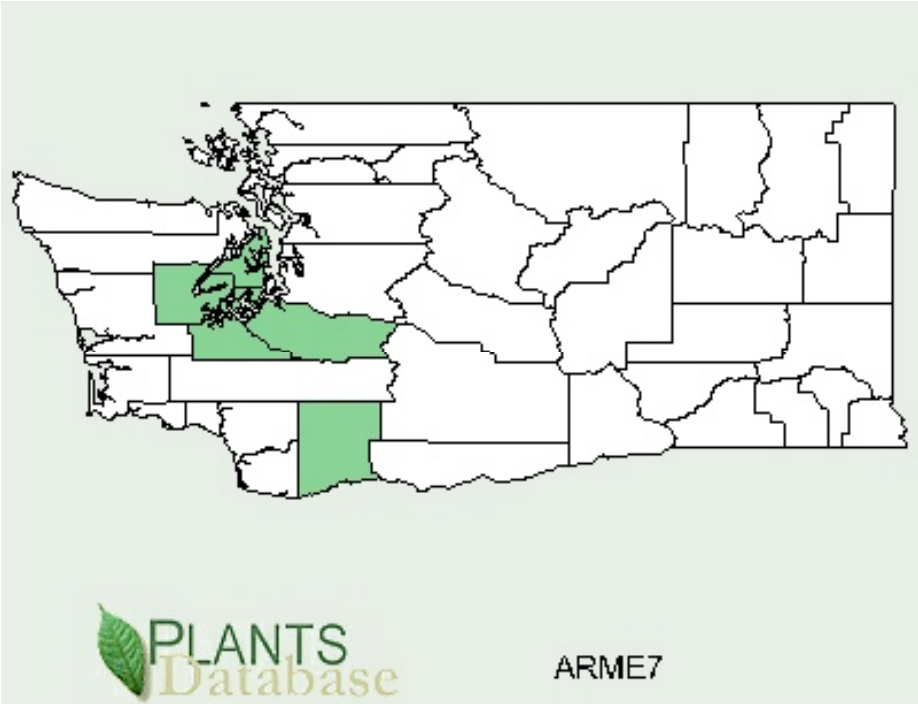
Plant Propagation Protocol for *Arctostaphylos ×media*
ESRM 412 – Native Plant Production
Spring 2008

TAXONOMY	
Family Names	
Family Scientific Name:	Ericaceae (USDA Plants)
Family Common Name:	Heath family (USDA Plants)
Scientific Names	
Genus:	*Arctostaphylos* (USDA Plants)
Species:	*Arctostaphylos xmedia* (USDA Plants)
Species Authority:	Greene (USDA Plants)
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	
Common Synonym(s):	
Common Name(s):	Hybrid Manzanita (KING County)
Species Code:	ARME7 (USDA Plants)

GENERAL INFORMATION	
Geographical range:	 (USDA Plants)  (USDA Plants)
Ecological	Dry, sunny, exposed areas. (KING County)

distribution:	
Climate and elevation range:	Full sun. (KING County)
Local habitat and abundance; may include commonly associated species:	 Picture of habitat plant found in. (USFWS) Steep slope with dry sunny conditions. (KING County)
Plant strategy type / successional stage:	No information
Plant characteristics:	Bluish-green leaves and pink flowers. Evergreen groundcover that rarely grows above 3 feet in height. Naturally occurring hybrid between bristly manzanita and kinnikinnick. (KING County)

Please note no information was found on propagation of *Arctostaphylos ×media* so the information below is on propagation of *Arctostaphylos uva-ursi*.

PROPAGATION DETAILS

(Scianna, Joe)

Ecotype:	Firehole area of Yellowstone National Park.
Propagation Goal:	Plants
Propagation Method:	Vegetative
Product Type:	Container (plug)
Stock Type:	Five-inch azalea pots
Time to Grow:	1 year
Target Specifications:	No information
Propagule Collection:	Collect stem cuttings in mid-summer in Yellowstone National Park. Time of collection reflects poor access to this ground cover in the winter months more than anything else. Collect 6- to 10-inch cuttings and place them in a ziplock bag

	moistened with water. Store immediately in a cooler with ice until they can be refrigerated. Minimize storage to assure the quality of the cuttings.
Propagule Processing/Propagule Characteristics:	No information
Pre-Planting Propagule Treatments:	Trim cuttings to a uniform size (5 to 8 inches), re-cut base, wound, treat with 1,000 ppm to 3,000 ppm IBA in talc. Cuttings often have small roots at time of collection that will continue to grow if handled, stored, and placed in propagation bench properly.
Growing Area Preparation / Annual Practices for Perennial Crops:	Use an excessively drained propagation media containing sand, perlite, or vermiculite, as this species is susceptible to rot in the bench. Spray the entire bench with a broad spectrum fungicide prior to sticking the cuttings. Use 75°F bottom heat and intermittent mist during propagation.
Establishment Phase:	Transplant rooted cuttings to a very well drained media containing sand, vermiculite, and/or perlite with a very small percentage of peat added for water holding and nutrient exchange.
Length of Establishment Phase:	No information
Active Growth Phase:	No information
Length of Active Growth Phase:	No information
Hardening Phase:	When rooted summer cuttings are not adequately developed in time to harden off for winter. Keep them in the greenhouse through the winter months and then move them to a hoophouse in April or May of the following year. Move containerized material to an outdoor hoophouse in late spring/early summer (i.e. “finish” the plants in the hoophouse). The hoophouse is ventilated but not cooled, and the containers are usually exposed to full sunlight for 2 to 4 weeks early in the season. The hoophouse is then covered with a 50% shade cloth until temperatures cool in the fall. Another option is to finish container plants and rooted cuttings in the greenhouse and then move them to the shadehouse in late summer, allowing 30 to 60 days of hardening prior to winter. The shade is usually removed in late summer/early fall and replaced with clear plastic. The plants harden-off gradually in the hoophouse prior to winter. In the

	case of premature and severely cold weather, a small propane heater is used at keep temperatures above freezing.
Length of Hardening Phase:	As a standard practice, allow a minimum of 30 days of hardening off prior to killing frost, 60 days is preferred.
Harvesting, Storage and Shipping (of seedlings):	Overwinter containers in an unheated hoophouse. The hoophouse is ventilated when temperatures reach 35 to 40°F and heated to maintain a temperature of 5 to 10°F. The containers are placed on 2 inches of pea gravel and arranged in a side-by-side pattern. The stock is watered over the fall and winter as needed. If temperatures in the spring are too warm to assure dormancy, plant material that is designated for dormant spring planting is moved to a walk-in cooler (34 to 37°F, 80+% relative humidity) until shipping. Plants may be shipped with or without containers in heavy waxed boxes by priority ground mail.
Length of Storage:	Stores well for several weeks in a walk-in cooler as previously described.
Guidelines for Outplanting / Performance on Typical Sites:	No information
Other Comments:	Propagation by seed reportedly requires specific durations of acid scarification followed by cold moist chilling. This species needs to be propagated, cultivated, and outplanted in very well drained sites.

PROPAGATION DETAILS
(Luna et al. 2008)

Ecotype:	Open Lodgepole pine forest, West Glacier, Glacier National Park, 1100 m.
Propagation Goal:	Plants
Propagation Method:	Seed
Product Type:	Container (plug)
Stock Type:	172 ml conetainer
Time to Grow:	1 year
Target Specifications:	Stock Type: Conetainer seedling Height: 3 cm Caliper: 7 mm of main stem Root System: Firm plug in container
Propagule Collection:	Seeds are collected in late fall when fruit turns dark red. Seeds are tan at maturity. Fruit is collected in plastic bags and kept under refrigeration prior to cleaning.
Propagule	Seeds are cleaned by maceration using a Dyb-vig seed cleaner and are

Processing/Propagule Characteristics:	screened and dried. Seed longevity: up to 20 years at 3 to 5 c in sealed containers. Seed dormancy is classified as physical-physiological dormancy. Seeds/Kg: 80,400 %Purity: 100% %Germination: 80%
Pre-Planting Propagule Treatments:	Sulfuric acid scarification for 30 minutes to 2 hours depending on thickness of seed coats of the seed lot. Once seedcoats have softened to be cut with a sharp knife, the acid bath must be terminated immediately. Seeds must be thoroughly rinsed in running water for at least 30 minutes after treatment. Seeds are then placed in a 48 hour water soak followed by a 60 day warm, moist stratification and a 90 day cold moist stratification in moistened peat moss. Length of acid scarification and subsequent germination varies widely between seed sources. At the base of each nutlet there is a channel through which the radicle is forced during germination. The channel is plugged at seed maturity with a hard material that is slightly softer than the woody covering of the nutlet. Acid scarification dissolves this plug so that germination can proceed. The polymorphic nature of the seeds makes optimum duration of acid scarification difficult to determine. Some seeds coalesce together and are more resistant to scarification than single seeds. Acid scarification of a given duration to induce germination with seeds will kill some seeds and fails to remove the plug in other seeds within the same seed lot. An alternative scarification method is use of heat and smoke from fire; this has not been tried at Glacier. Seed is placed in a flat containing dry soil at 0.5 cm planting depth with 7 to 10 cm of pine needles covering the surface, and the needles are burned. Flats are left outside overwinter. This method has been effective for greenleaf manzanita and should be tried with this species.
Growing Area Preparation / Annual Practices for Perennial Crops:	Greenhouse and Outdoor Nursery growing facility. Sowing Method: Direct Seeding. Seeds are covered with media. Growing media used is 70% 6:1:1 milled sphagnum peat, perlite, and vermiculite and 30% sand with Osmocote controlled release fertilizer (13N:13P2O5:13K2O; 8 to 9 month release rate at 21C) and Micromax fertilizer (12%S,0.1%B,0.5%Cu,12%Fe,2.5%Mn, 0.05%Mo,1%Zn) at the rate of 1 gram of Osmocote and 0.20 gram of Micromax per 172 ml conetainer. Greenhouse temperatures are maintained at 21 to 25C during the day and 16 to 18C at night. Seedlings are hand watered and remain in greenhouse until mid May. Seedlings are then moved to outdoor nursery for the remainder of the growing season. Seedlings are irrigated with Rainbird automatic irrigation system in early morning until containers are thoroughly leached. Average growing season of nursery is from late April after snowmelt until October 15th.

Establishment Phase:	Germination is usually complete in 4 weeks. True leaves appear 2 weeks after germination.
Length of Establishment Phase:	4 weeks
Active Growth Phase:	After establishment, seedlings grow at a moderate rate. Plants are fertilized with 20-20-20 NPK liquid fertilizer at 100 ppm during the active growth stage.
Length of Active Growth Phase:	17 weeks
Hardening Phase:	Plants are fertilized with 10-20-20 liquid NPK at 200 ppm during August and September. Irrigation is gradually reduced in September and October. Plants were given one final irrigation prior to winterization.
Length of Hardening Phase:	8 weeks
Harvesting, Storage and Shipping:	Total Time To Harvest: 1 year Harvest Date: September and October Storage Conditions: Overwinter in outdoor nursery under insulation foam cover and snow.
Length of Storage:	5 months
Guidelines for Outplanting / Performance on Typical Sites:	Outplanting Site: Saint Mary, Glacier National Park Outplanting Date: Fall
Other Comments:	*A. uva-ursi* is a shade intolerant species; sometimes a pioneer species at higher elevations. It is useful for planting on steep slopes for erosion control. Foliage and stems are browsed by deer, elk, moose and bighorn sheep. Berries are eaten by birds, small mammals, deer, elk, and bears.
INFORMATION SOURCES	
References (full citations):	"FOD Plant Guide - Entire List by Family." USFWS. 3 June 2008 <http://www.fws.gov/humboldtbay/plantguide/family-ericaceae.html>. "Hybrid Manzanita : Arctostaphylos X. Media - Native Plant Guide." King County. 3 June 2008 <http://dnr.metrokc.gov/wlr/PI/GO-NATIVE/PlantDisplay.aspx?PlantID=142>. Luna, Tara; Evans, Jeff; Wick, Dale. 2008. Propagation protocol for production of container Arctostaphylos uva-ursi (L.) Spreng

	plants (172 ml conetainer); USDI NPS - Glacier National Park, West Glacier, Montana. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 3 June 2008). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery. "PLANTS Profile for Arctostaphylos ×Media." USDA Plants. 3 June 2008 <http://plants.usda.gov/java/profile?symbol=ARME7>. Scianna, Joe. 2006. Propagation protocol for vegetative production of container Arctostaphylos uva-ursi (L.) Spreng. plants (Five-inch azalea pots); USDA NRCS - Bridger Plant Materials Center, Bridger, Montana. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 3 June 2008). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery. 'Streissguth Gardens - Photo: Arctostaphylos X Media." 3 June 2008 <http://www.streissguthgardens.com/Expand_Photo.asp?pname=Arctostaphylos%C2%A0x%C2%A0media&cname=&fname=Arctostaphylos_x_media>.
Other Sources Consulted (but that contained no pertinent information) (full citations):	"Calflora: Arctostaphylos Xmedia." C. 3 June 2008 <http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=528>. 'CalPhotos." 3 June 2008 <http://calphotos.berkeley.edu/cgi/img_query?where-

	genre=Plant&testing=123&query_src=photos_flora_index&rel-taxon=contains&where-taxon=Arctostaphylos+%D7media&rel-namesoup=matchphrase&where-namesoup=&where-lifeform=any&rel-location=matchphrase&where-location=&rel-country=eq&where-country=any&rel-state=eq&where-state=any&where-county=any&where-collectn=any&rel-photographer=eq&where-photographer=any&rel-kwid=equals&where-kwid=>. "ITIS Standard Report Page: Arctostaphylos X Media." ITIS. 3 June 2008 <http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=23497>. "WTU Herbarium Image Collection." Burke Museum. 3 June 2008 <http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Arctostaphylos&Species=X
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