Plant Propagation Protocol for *Ledum groenlandicum*
ESRM 412 – Native Plant Production
Spring 2008

TAXONOMY	
Family Names	
Family Scientific Name:	Ericaceae
Family Common Name:	Heath family
Scientific Names	
Genus:	*Ledum*
Species:	*groenlandicum*
Species Authority:	Oeder
Common Synonyms	
Genus:	*Ledum*
Species:	*palustre*
Species Authority:	Hultén
Variety:	
Sub-species:	*groenlandicum*
Genus:	*Ledum*
Species:	*palustre*
Species Authority	Linnaeus
Variety:	*latifolium*
Authority for Variety	Michx.
Genus:	*Rhododendron*
Species:	*groenlandicum*
Species Authority:	K.A. Kron & W.S. Judd
Common Name(s):	Bog Labrador tea, Labrador tea
Species Code (as per USDA Plants database):	LEGR
GENERAL INFORMATION	
General Distribution:	Ranges from Alaska east across Canada to Greenland, South to the northeast US, as well as south to Oregon and Idaho on the west coast. (USDA, 2008) Inhabits mostly swamps and bogs, (Hitchcock) and places with acidic and nutrient poor soils (Pojar and MacKinnon, 2004). Also grows in interdunal swales, mossy conifer forest, shaded sandy bluffs. (Schultz) Prefers soils saturated during the growth season, and intolerant of shade. (Cooke 1997) Grows in soils low in nitrogen in boreal cool mesothermal climates. (Klinka et al 1995)
Climate and elevation range:	Occurs in middle elevations (Pojar and MacKinnon, 2004)

Local habitat and abundance:	Associated Species: *Thuja plicata*, *Pinus contorta*, *Darlingtonia californica*, *Lysichiton americanus*, *Blechnum spicant*. (Franklin and Dyrness, 1998) Associates with many other species over its range. (Gucker, 2006)
Plant strategy type / successional stage:	Can tolerate and resprout readily after fires of low severity. (Chapin et al, 2006) *Ledum groenlnadicum* is a fire adapted chamaephyte. It likely colonizes disturbed sites and is part of mid-stage primary succession communities in bogs and late primary succession communities on floodplains. Persists into stable community composition. (Gucker, 2006)
PROPAGATION DETAILS	
Ecotype:	Plants were from Eastern Central Upper Peninsula and harvested from June until August for Schultz et al in 2001.
Propagation Goal:	Plants.
Propagation Method:	Seed. Vegetative.
Product Type:	Container (plug).
Stock Type:	Not specified in any source consulted.
Time to Grow:	Not found.
Target Specifications:	Not found.
Propagule Collection:	Collect seed from capsules when ripe in fall. Store in a cool, dry place. (Robson et al, 2007) Remove pulp directly after collecting by hand or by pressing on a sieve and floating pulp away. Dry seeds one week. (Schultz et al, 2001) Cuttings or layers may be made in late summer or early fall. (Robson et al, 2007)
Propagule Processing/Propagule Characteristics:	Seed longevity is up to 3 years when stored cold and dry in Ziploc-style bags. (Schultz et al, 2001)
Pre-Planting Propagule Treatments:	None. (Schultz et al 2001) Studies from 1976 and 1977 report high germination rates without stratification in 25-30 days, but others report improved germination with stratification. One study with 30 day stratification achieved 98% germination in some batches. (Gucker, 2006) Thus, stratification should be recommended.
Growing Area Preparation / Annual Practices for Perennial Crops:	Schultz et al used Standard U.V. 3 HL Clear 6 mil greenhouse film from J.R. Johnson's Greenhouse Supply Inc. Fans were run continuously and vents were open in summer. Grows best in 2" diameter cells with 4" or more of depth when filled with sterile soil mix of vermiculite and sphagnum peat moss (Scotts Redi-earth Plug and Seedling Mix). (Schultz et al,

	2001) Moisten soil with water by mixing together with trowel. Fill cells and press down with a spoon. Refill cells to the top. Water again then sow 1 seed per 2" cell. Cover seeds with a thin layer and press in. Can be sown all year because germination is unpredictable. (Schultz et al, 2001) Another author recommends sowing into finely sifted peat moss and shading. (Sheat, 1948) Somewhat contradictorily, full sun, high soil moisture and pH of about 5.5 are recommended by another author. (Baskin and Baskin, 1998) Seeds from fall usually germinate in spring at temperatures greater than 16 degrees C daily maximum and 5 degrees C daily minimum. (Gucker, 2006) Each seed was treated with a very small amount of gibberellic acid in one experiment to achieve 63% germination in 2 to 4 weeks. (Deno, 1993) Cuttings should be treated with hormones and placed in pumice or other medium and kept humind. (Robson et al 2007)
Establishment Phase:	Jan – Aug: never let go below 65 degrees F, but daytime summer temperatures may reach 100 degrees F. Sept- Dec: never let go below 55 degrees F, may reach 75 degrees F. Soil is kept moist during germination and watered with a gentle setting. New planted trays should be kept on the south side with no extra lighting. (Schultz et al, 2001) Sheats recommends moving ¾" seedlings to a shaded frame in summer and moving those seedlings to a 2:1:1 mix of peat moss, fibrous loam, and coarse sand, respectively. (Sheat, 1948) Young and Young recommend placing sown seed under a cover of clear plastic film (Young and Young, 1992), but Dir specifically instructs to leave uncovered under high humidity. (Dirr 1987)
Length of Establishment Phase:	One year. (Schultz et al, 2001)
Active Growth Phase:	Soil need not be consistently damp. Plants should be kept on cooler north tables. No fertilizer is necessary. (Schultz et al 2001)
Length of Active Growth Phase:	Not found.
Hardening Phase:	Mature plants can be kept in a covered cold frame with

	diffusing light only to prevent scorching and watered less frequently. After frost danger, plants can be moved outside. (Schultz et al, 2001)
Length of Hardening Phase:	Not found.
Harvesting, Storage and Shipping:	Storage in greenhouse. (Schultz et al, 2001)
Length of Storage:	Not found.
Guidelines for Outplanting / Performance on Typical Sites:	Seedlings grow slowly and establish best in moist areas with discontinuous moss cover. (Gucker, 2006)
Other Comments:	The species is threatened in Connecticut, endangered in Ohio, and rare in Pennsylvania. (USDA, 2008) Tea from leaves is used as a beverage or medicine for colds, sore throats, and relaxation. The plant contains toxic alkaloids and is deadly to livestock, and in humans it can be a strong diuretic or cathartic and cause intestinal disturbances. (Pojar and MacKinnon, 2004) It is a multi-branched shrub to 2.5 m, with dense rusty or white hairs and flowers densely clustered on stem. A tea is also reportedly used for headache, heart problems and indigestion. (Cooke, 1997) Is an indicator for contaminated sites and for easily reforested sites. (Gucker, 2006)  photo credit: UW Library Digital Collection, Plants of Western Washington Collection http://content.lib.washington.edu/pww/plants-copyright.html
INFORMATION SOURCES	
References:	Baskin, Carol C., and Jerry M. Baskin. Seeds: Ecology Biogeography, and Evolution of Dormancy and Germination. San Diego, CA: Academic Press, 1998. Chapin, Francis S., *et al*. Alaska's Changing Boreal Forest. Oxford University Press, 2006. Cooke, Sarah Spear. A Field Guide to the Common Wetland

	Plants of Western Washington & Northwestern Oregon. Seattle, WA: Seattle Audubon Society, 1997. Deno, Norman C. Seed Germination Theory and Practice. Pennsylvania State University, 1993. Dirr, Michael A, and Charles W. Heuser Jr. The Reference Manual of Woody Plant Propagation. Athens, Georgia: Varsity Press, Inc., 1987. Franklin, Jerry and C.T. Dyrness. Natural Vegetation of Oregon and Washington. Corvalis, OR: Oregon State University Press, 1988. Gucker, Corey L. 2006. Ledum groenlandicum. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2008, January 29]. Accessed April 14, 2008. Klinka, K., V.J Krajina, A. Ceska, and A.M Scagel. Indicator Plants of Coastal British Columbia. Vancouver, BC: UBC Press Vancouver B.C., 1995. Pojar, Jim, and Andy MacKinnon. Plants of the Pacific Northwest Coast. Lone Pine Publishing: Canada, 2004. Robson, Kathleen, Alice Richter, and Marianne Filbert. Encyclopedia of Northwest Native Plants for Gardens and Landscapes. Portland, OR: Timber Press, 2007. Schultz, Jan; Beyer, Patty; Williams, Julie. 2001. Propagation protocol for production of container *Ledum groenlandicum* Oeder plants; USDA FS - Hiawatha National Forest, Marquette, Michigan. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 14 April 2008). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery. Sheats, Wilfrid, G. Sheat. Propagation of Trees Shrubs & Conifers. London: MacMillan and Co, limited, 1948. USDA, NRCS. 2008. The PLANTS Database (http://plants.usda.gov, 14 April 2008). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Young, James A., and Cheryl G. Young. Seeds of Woody Plants in North America. Portland, OR: Dioscorides Press, 1992.
Protocol Author:	Anna O'Brien
Date Protocol Created or Updated (MM/DD/YY):	04/14/08

Plant Data Sheet

Species:

Labrador tea, *Ledum groenlandicum*

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http://content.lib.washington.edu/cdm4/item_viewer.php?CISOROOT=/plants&CISOPTR=196&CISOBOX=1&REC=3

Range:

Alaska to Oregon in the western United States, east across Canada and Greenland, northern great lake states, and New England (Coladonato, 1993)

Climate, elevation:

Tundra and boreal climates, low elevation to mid elevation in Cascade mountains, higher elevation in Northern Rockies (Coladonato, 1993)

Local occurrence:

Somewhat uncommon due to reduction of habitat.

Habitat preferences:

Sphagnum bogs, muskegs and tundra, with low nutrients and low flow of subsurface water. Can tolerate range from wet to dry. Can tolerate some shade. (Coladonato, 1993)
Also in forested or shrub swamps, but generally intolerant of shade (Cooke, 1997)
Wet, stable, interdunal wetlands on the coast of Oregon (Franklin and Dyrness, 1988)
Wet to very wet soil, low in nitrogen, shade intolerant (Klinka et al, 1995)

Plant strategy type/successional stage:

Stress tolerator. Seral species in woodland understory, dominant species in open bogs (Coladonato, 1993)

Reported to naturally recolonize disturbed powerline corridors in boreal bogs (Coladonato, 1993), and was recommended for use in reclamation of following peat-mining projects (Famous and Spencer, 1989).

Associated species:

Kalmia microphylla , Vaccinium oxycoccus, Sphagnum spp., Cladonia sp. (Coladonato, 1993)
Thuja plicata, Pinus contorta (Franklin and Dyrness, 1988)

May be collected as:

Seed (Schultz et al, 2001)
naturally reproduces from rhizomes or seed (Coladonato, 1993)

Collection restrictions or guidelines:

Flowers May through June, fruits ripen August through fall (Coladonato, 1993)
Seed is an elliptical capsule (Schultz et al, 2001)

Seed germination:

not found

Seed life:

store up to 3 years (Schultz et al, 2001)

Recommended seed storage conditions:

Cool dry, refrigerator or cool garage (Schultz et al, 2001)

Propagation recommendations:

The following protocol for cuttings is from, Schultz et al, (2001) working in Michigan:
Macerate by hand with sieve to remove pulp immediately after collection, and separate pulp from seed by floating pulp
Dry seeds for one week
Sow into plug trays with the following cell dimensions: 2" diameter by 4" depth
Plug trays are filled with moistened and firmed media (see below)
Sow one seed per cell, cover with thin layer of soil
Sown at all times of year due to unpredictable germination
Watered using mist, no additional light, no fertilizers
Greenhouse conditions set for 65° F day and night January through August, summer highs may reach 100° F
September through December greenhouse set to 55°F but may reach 75°F
Plants are hardened off in outdoor cold frame, reduce water, and protect from frost and sun-scorching

Soil or medium requirements:

Scotts Redi-earth Plug and Seedling mix (vermiculite/sphagnum peat moss) (Schultz et al, 2001)

Installation form:
Plugs (Schultz et al, 2001)

Recommended planting density:
not found

Care requirements after installed:
install into acid bogs, conifer swamps, moist conifer woods and peaty soil (Schultz et al, 2001)

Normal rate of growth or spread; lifespan:
Slow, long-lived

Sources cited:

Coladonato, Milo. 1993. Ledum groenlandicum. In: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2003, May). Fire Effects Information System, [Online]. Available: http://www.fs.fed.us/database/feis/
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Cooke, Sarah Spear. 1997 A Field Guide to the Common Wetland Plants of Western Washington & Northwestern Oregon. Seattle Audubon Society, Seattle, WA 415 p.

Famous, Norman C.; Spencer, M. 1989. Revegetation patterns in mined peatlands in central and eastern North America studied. Restoration and Management Notes. 7(2): 95-96.

Franklin, Jerry and C.T. Dyrness. 1988 Natural Vegetation of Oregon and Washington. Oregon State University Press, Corvalis, OR 452 p.

Klinka, K., V.J Krajina, A. Ceska, and A.M Scagel. 1995 Indicator Plants of Coastal British Columbia. UBC Press Vancouver B.C. 288p

Schultz, Jan; Beyer, Patty; Williams, Julie. 2001. Propagation protocol for production of container Ledum groenlandicum Oeder plants; Hiawatha National Forest, Marquette, Michigan. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 14 May 2003). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

Data compiled by:
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