Plant Propagation Protocol for Vaccinium Uliginosum

ESRM 412 – Native Plant Production

Spring 2009

Figure 1: Bog Blueberry, United States, Washington State, Mount Washington (courtesy of Smithsonian Institution, Richard A. Howard Photograph Collection)

(United States Department of Agriculture, 2009)

TAXONOMY	
Family Names	
Family Scientific Name:	Ericaceae
Family Common Name:	heaths
Scientific Names	
Genus:	*Vaccinium*
Species:	*uliginosum*

Species Authority:	Matthews, Robin F. (Rocky Mountain Research Station, 2009)
Variety:	*V. uliginosum* var. *alpinum* Bigel. *V. uliginosum* var. *salicinum* (Cham.) *V. uliginosum* var. *uliginosum* Linnaeus (Rocky Mountain Research Station, 2009)
Sub-species:	*V. uliginosum* ssp. *alpinum* (Bigel.) *V. uliginosum* ssp. *microphyllum* Lange *V. uliginosum* ssp. *pubescens* (Wormsk. ex Hornem.) *V. uliginosum* ssp. *occidentale* (Gray) *V. uliginosum* ssp. *pedris* (Harshberger) *V. uliginosum* ssp. *gaultherioides* (Bigel.) *V. uliginosum* ssp. *gaultherioides* (Rocky Mountain Research Station, 2009)
Cultivar:	
Authority for Variety/Sub-species:	*Vaccinium occidentale* A. Gray *Vaccinium uliginosum* L. ssp. *alpinum* (Bigelow) Hultén *Vaccinium uliginosum* L. ssp. *gaultherioides* (Bigelow) S.B. Young *Vaccinium uliginosum* L. ssp. *microphyllum* Lange *Vaccinium uliginosum* L. ssp. *occidentale* (A. Gray) Hultén *Vaccinium uliginosum* L. ssp. *pedris* (HarshA. Berger) S.B. Young *Vaccinium uliginosum* L. ssp. *pubescens* (Wormsk. ex Hornem.) S.B. Young *Vaccinium uliginosum* L. var. *alpinum* Bigelow *Vaccinium uliginosum* L. var. *occidentale* (A. Gray) H. Hara *Vaccinium uliginosum* L. var. *salicinum* (Cham.) Hultén (United States Department of Agriculture, 2009)
Common Synonym(s) (include full scientific names (e.g., *Elymus glaucus*	*Bot. syn.: Myrtillus uliginosa (L.) Drejer*, *Vaccinium gaultherioides Bigelow*, *Vaccinium occidentale Gray* *Deu.:* Rauschbeere.

Buckley), including variety or subspecies information)	*Suom.:* juolukka. *Sven.:* odon, slinnon, vanligt odon. (Kress, 2009)
Common Name(s):	bog blueberry bog bilberry alpine blueberry alpine bilberry bog huckleberry bog whortleberry western-huckleberry
Species Code (as per USDA Plants database):	VAUL
GENERAL INFORMATION	
Geographical range (distribution maps for North America and Washington state)	Bog blueberry is distributed in the northern part of the Earth throughout Alaska, Canada, Greenland, Japan, other parts of Asia, and in Europe, as well as in New England, the northern portions of the Great Lakes States, and western Washington and Oregon. (Rocky Mountain Research Station, 2009) Map of distribution in North America

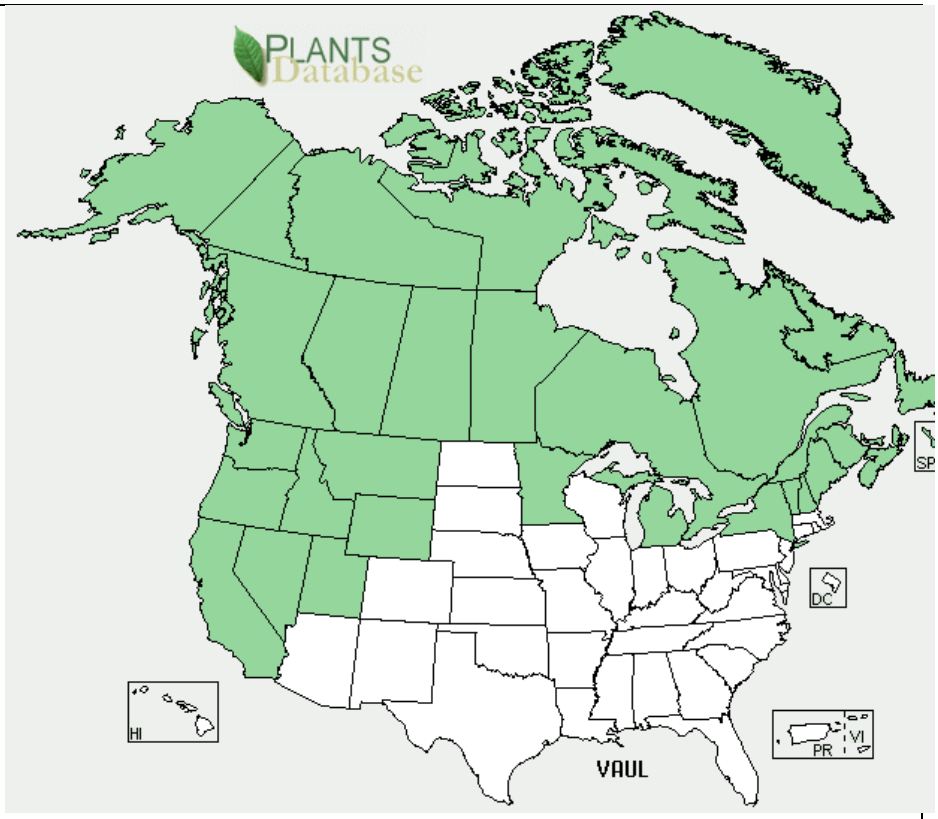
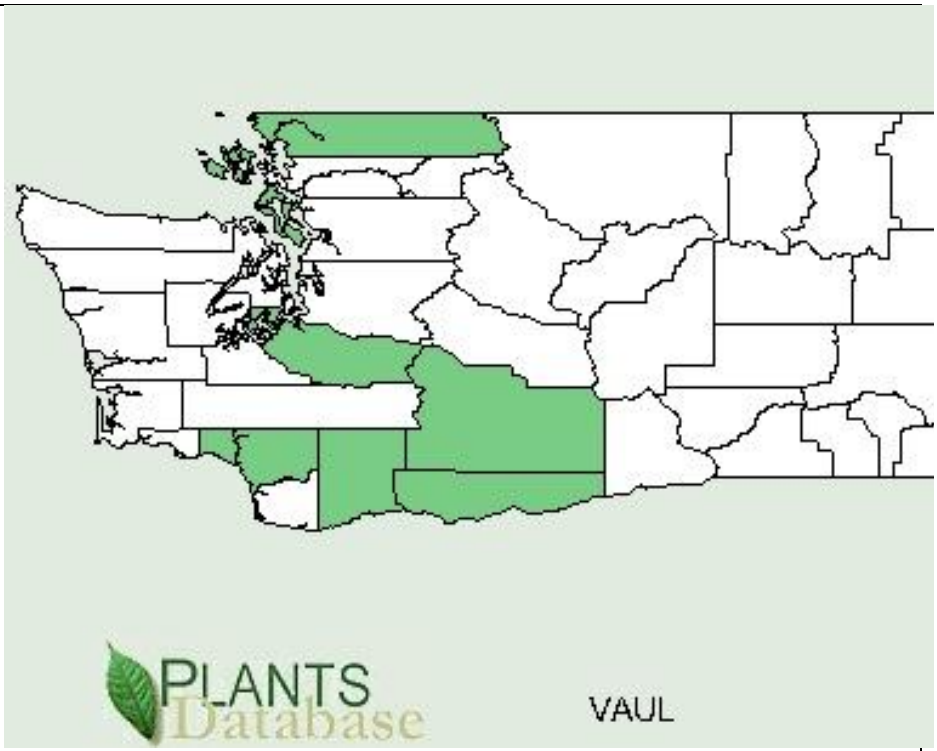


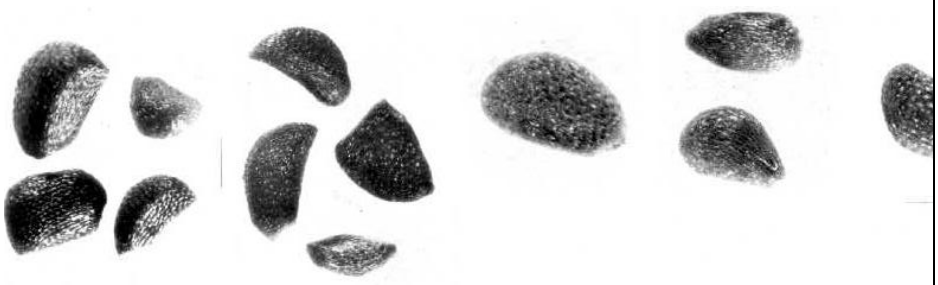
Figure 2: Map of distribution in United states. Shaded – present, non-shaded –not present. (United States Department of Agriculture, 2009)

Map of distribution in Washington State

	 **Figure 3: Map of distribution in Washington State. Shaded – present, non-shaded –not present. (United States Department of Agriculture, 2009)**
Ecological distribution (ecosystems it occurs in, etc):	Bog blueberry can be in a variety of different habitats within its range: open or closed forest habitats, primarily with black or white spruce, bogs or muskegs, and on open tundra. It commonly associated (grows along) with the following trees: Alaska-cedar (*Chamaecyparis nootkatensis*), quaking aspen (*Populus tremuloides*), balsam poplar (*P. balsamifera*), and paper birch (*Betula papyrifera*).The understory species *Vaccinium uliginosum* is commonly associated with include: willows (*Salix* spp.), alders (*Alnus* spp.), bog birch (*Betula glandulosa*), dwarf arctic birch (*B. nana*), Labrador tea (*Ledum groenlandicum and L. palustre*), lignonberry (*Vaccinium vitis-idaea*), bunchberry dogwood (*Cornus canadensis*), rustyleaf menziesia (*Menziesia ferruginea*), crowberry (*Empetrum nigrum*), red fruit bearberry

	(*Arctostaphylos rubra*), leatherleaf (*Chamaedaphne calyculata*), bog laurel (*Kalmia polifolia*), cloudberry (*Rubus chamaemorus*), bog rosemary (*Andromeda polifolia*), salal (*Gaultheria shallon*), fireweed (*Epilobium angustifolium*), Labrador lousewort (*Pedicularis labradorica*), entire leaf mountain avens (*Dryas integrifolia*), Mt. Washington mountain avens (*D. octopetala*), bluejoint reedgrass (*Calamagrostis canadensis*), altai fescue (*Festuca altaica*), cottonsedge (*Eriophorum vaginatum and E. angustifolium*), and various sedges (*Carex spp.),* feathermosses (*Hylocomium, Pleurozium, and Stereocaulon* spp.), clubmosses (*Lycopodium* spp.), sphagnum mosses (*Sphagnum* spp.), and lichens (*Cladonia and Cladina* spp.). (Rocky Mountain Research Station, 2009)
Climate and elevation range	Bog blueberry occupies a very wide range of sites from sea level to alpine zones with characteristic of cool-temperate to cool-mesothermal climates. It occurs in organic or inorganic soils that are generally acidic (pH 3.5 to 6.2). Bog blueberry can tolerate soil moisture conditions very well and thus is it found from well-drained to poorly drained sites. (Rocky Mountain Research Station, 2009)
Local habitat and abundance; may include commonly associated species	Bog blueberry occurs in a wide variety of habitats, such as coastal and interior bogs; cottongrass tussock tundra; low shrub tundra; sedge meadows; black or white spruce woodlands; forested areas; rocky or sandy shores of lakes and streams; rock outcrops; and barrens. (Rocky Mountain Research Station, 2009)
Plant strategy type / successional stage (stress-tolerator, competitor,	Bog blueberry is very important for the forest fire management. It can sprout from underground plant parts following fire and thus remains important throughout successional stages. Bog blueberry is well adapted for nutrient uptake in the cold, poorly aerated,

weedy/colonizer, seral, late successional)	nitrogen-poor soils. Bog blueberry is tolerant of high concentrations of heavy metals in the soil. Thus leaf tissues of *Vaccinium uliginosum* can accumulate uranium, copper, lead, zinc, nickel, and iron in large quantities with no apparent detrimental effects to the plant. This ability to inhabit soils with high concentrations of these metals makes bog blueberry very favorable to use in certain revegetation programs. (Rocky Mountain Research Station, 2009)
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	Bog blueberry is a low, highly branched, deciduous shrub. It generally reaches 8 to 16 inches (20-40cm) in height. The leaves: oval and leathery. The twigs: slender. The flowers: white to pink and are borne singly or in clusters at the ends of stems. The fruit: blue to black berry
PROPAGATION DETAILS	
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Plants

Propagation Method (Options: Seed or Vegetative):	Seed Blueberry seeds are diverse: variously angled, ellipsoid, compressed-elliptic, compressed-oval. The color of seeds may very from brown to dark brown. The seeds are usually 1-2 mm long and have linear embryo. (Martin & Barkley, 1961)  **Figure 4: Various seeds of Vaccinium. (Courtesy of (United States Department of Agriculture, 2009)**
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):	Seedlings grown in the greenhouse can be transplanted in the 6-7 weeks after emergence. Nonetheless the plants should not be transferred to the field until after the first growing season.
Target Specifications (size or characteristics of target plants to be produced):	8 to 16 inches (20-40 cm) in height.
Propagule Collection (how, when, etc):	Seeds should be collected when ripe, that is in July and August. Blueberries are easily collected by hand-picking of by bending the bush over a large container and beating the bush with a short hose or stick (US Deparment of Agriculture, 1974).
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	Seed viability of most *Vacciniums* is short. A pound of clean seeds contains about 2,000,000 seeds (Dirr & Heuser, 1987).
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	The berries should be chilled for several days at 50 F after collection. The seeds could be extracted using food blender for 30 seconds. Then sound seeds are settle out, while pulp and unsound seeds may be floated off. Then seeds should be dried for 48 hours at 60-70 F. The seeds may be stored in refrigerator for up to 12 years (US Deparment of Agriculture, 1974). Seeds of most Vacciniums are not dormant and require no pretreatment for germination. Based on work of the Arnold Arboretum, seeds of Vaccinium uliginosum do not require

	germination inducing treatment(Dirr & Heuser, 1987). In the other study, however, bog blueberry seeds exhibited shallow dormancy, and a 30-day cold stratification at 35 degrees Fahrenheit (2 deg C) increased germination success (Rocky Mountain Research Station, 2009) . The seeds poorly germinate at temperatures below 59 degrees Fahrenheit (15 deg C), regardless of any stratification preparation.
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	
Establishment Phase (from seeding to germination):	The seedlings begin to emergence in a month after seeding, and will continue to emergence for quite long period thereafter (US Deparment of Agriculture, 1974).
Length of Establishment Phase:	
Active Growth Phase (from germination until plants are no longer actively growing):	
Length of Active Growth Phase:	
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):	
Length of Hardening Phase:	
Harvesting, Storage and Shipping (of seedlings):	
Length of Storage (of seedlings, between nursery and outplanting):	The seedlings may by set out in the field after the first growing season.
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	Blueberries are exacting in their site requirements and are difficult to establish on sites that do not meet their specific needs. They usually require an acid soil (a mixture of sand and peat), plenty of moisture, satisfactory drainage and aeration. When once established, the plants survive indefinitely (United States Department of Agriculture, 1988).
Other Comments (including collection restrictions or guidelines, if available):	
PROPAGATION DETAILS	

Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Plants (cuttings)
Propagation Method (Options: Seed or Vegetative):	Vegetative
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container (pots)
Stock Type:	
Time to Grow (from seeding until plants are ready to be outplanted):	About half to one year, depending on the time the cuttings were taken. Could be left in the nursery for longer period of time.
Target Specifications (size or characteristics of target plants to be produced):	
Propagule Collection (how, when, etc):	The best times to take cutting are in late spring or early summer, when from actively growing shoots which root well; or in early

	spring, or late summer and autumn, avoiding the midsummer rest period of the rhizome buds (Hudson T. Hartman, 2002)
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	As a growing media the best to use 1:1 mixture of sand and peat moss.
Establishment Phase (from seeding to germination):	
Length of Establishment Phase:	
Active Growth Phase (from germination until plants are no	

longer actively growing):	
Length of Active Growth Phase:	
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):	
Length of Hardening Phase:	
Harvesting, Storage and Shipping (of seedlings):	
Length of Storage (of seedlings, between nursery and outplanting):	After the cuttings are rooted, they are transferred to peat pots for further growth and overwintering.
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before	Growing shoots root well. Some clones give almost 100% rooting (Hudson T. Hartman, 2002).

flowering):	
Other Comments (including collection restrictions or guidelines, if available):	Vegetative propagation of bog blueberry has been more successful with root or rhizome cuttings than with stem cuttings. The data available states that 52% of rhizome cuttings produced shoots when planted immediately after collection (Rocky Mountain Research Station, 2009). Rhizomes are dug, cut into 4 inch length and placed in vermiculite at a constant temperature of 70 F (Dirr & Heuser, 1987).
INFORMATION SOURCES	
References (full citations):	See Below
Other Sources Consulted (but that contained no pertinent information) (full citations):	See Below
Protocol Author (First and last name):	Yana Kazak
Date Protocol Created or Updated (MM/DD/YY):	5/2/2009

Works Cited

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- ✓ Rocky Mountain Research Station, F. S. (2009, June 2). *U.S. Department of Agriculture, Forest Service*. Retrieved June 2, 2009, from Vaccinium uliginosum: http://www.fs.fed.us/database/feis/plants/shrub/vaculi/all.html
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