

**Plant Propagation Protocol for *Fragaria virginiana***  
 ESRM 412 – Native Plant Production  
 Spring 2008



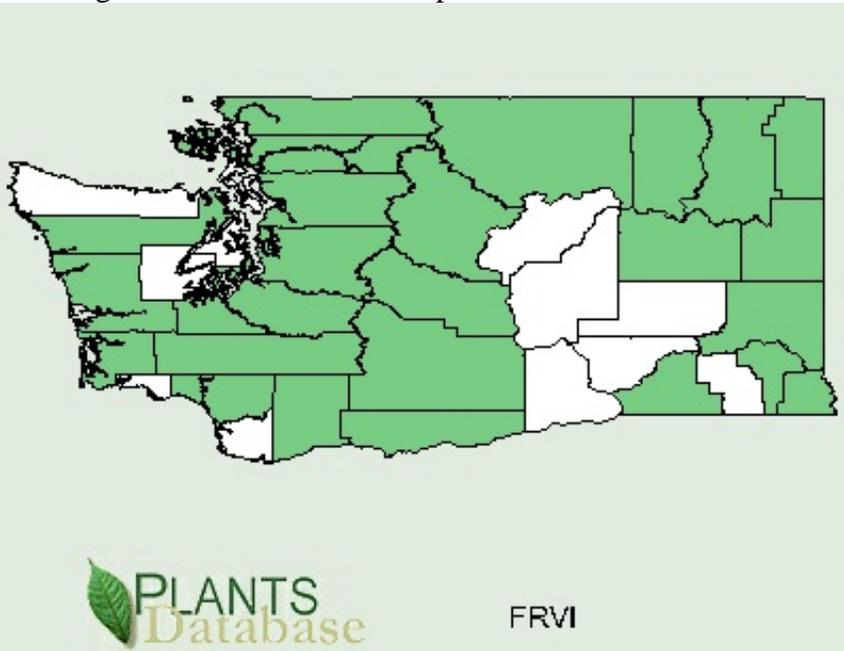
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<b>TAXONOMY</b>	
Family Names	
Family Scientific Name:	<i>Rosaceae</i>
Family Common Name:	Rose family
Scientific Names	
Genus:	<i>Fragaria</i>
Species:	<i>virginiana</i>
Species Authority:	Duchesne
Species Code:	FRVI
Sub-species:	<i>Fragaria virginiana</i> Duchesne ssp. <i>glauca</i>
Authority for Sub-species:	(S. Watson) Staudt
Species Code:	FRVIG2
Variety:	<i>Fragaria virginiana</i> Duchesne var. <i>glauca</i>
Authority for Variety:	S. Watson
Species Code:	FRVIG4
Variety:	<i>Fragaria vriginiana</i> Duchesne var. <i>ovalis</i>
Authority for Variety:	(Lehm.) R.M. Davis
Species Code:	FRVIO2
Variety:	<i>Fragaria vriginiana</i> Duchesne var. <i>terra-novae</i>
Authority for Variety:	(Rydb.) Fernald & Wiegand
Species Code:	FRVIT
Sub-species:	<i>Fragaria virginiana</i> Duchesne ssp. <i>grayana</i>
Authority for Sub-species:	(Vilm. Ex J. Gay) Staudt
Species Code:	FRVIG3
Variety:	<i>Fragaria vriginiana</i> Duchesne var. <i>illinoensis</i>
Authority for Variety:	A. Gray
Species Code:	FRVII
Sub-species:	<i>Fragaria vriginiana</i> Duchesne ssp. <i>platypetala</i>

Authority for Sub-species:	(Rydb.) Staudt
Species Code:	FRVIP2
Variety:	<i>Fragaria vriginiana</i> Duchesne var. platypetala
Authority for Variety:	(Rydb.) H.M. Hall
Species Code:	FRVIP3
Sub-species:	<i>Fragaria virginiana</i> Duchesne ssp. <i>virginiana</i>
Authority for Sub-species:	None listed
Species Code:	FRVIV
Variety:	<i>Fragaria vriginiana</i> Duchesne var. <i>australis</i>
Authority for Variety:	Rydb.
Species Code:	FRVIA
Variety:	<i>Fragaria vriginiana</i> Duchesne var. <i>canadensis</i>
Authority for Variety:	(Michx.) Farw.
Species Code:	FRVIC
Common Name(s):	Virginia strawberry thickleaved wild strawberry wild strawberry Mountain strawberry Scarlet strawberry Blueleaf strawberry Broadpetal strawberry

**GENERAL INFORMATION**

General Distribution:	<p>Alaska to California and east to the Atlantic Coast (Hitchcock and Cronquist, 1976). National Distribution Map:</p> 
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	<p>Washington State Distribution Map:</p>  <p>Map source: <a href="http://plants.usda.gov/java/profile?symbol=FRVI">http://plants.usda.gov/java/profile?symbol=FRVI</a></p>
<p>Climate and elevation range:</p>	<p>Found at low- to mid- and sub-alpine elevations (WNPS, 2008). Occurrence decreases as elevation increases. Shade-intolerant. Occurs within boreal, temperate, cool semiarid, and cool mesothermal climates (Klinkenberg, 2007).</p>
<p>Local habitat and abundance; may include commonly associated species:</p>	<p>Open woods and meadows to streambanks, plains and mountains (Hitchcock and Cronquist, 1976). Common in grassy communities. Less frequent in open-canopy forests (Klinkenberg, 2007).  Examples of community/species associations:  <i>Pinus contorta</i>/<i>Danthonia californica</i> community – <i>Danthonia</i>, <i>Carex</i> spp., <i>Deschampsia elongata</i>, <i>Juncus</i> spp., <i>Koeleria cristata</i>, <i>Muhlenbergia filiformis</i>, <i>Antennaria corymbosa</i>, <i>Achillea millefolium</i>, <i>Aster</i> spp., <i>Trifolium</i> spp. (Franklin and Dyreness, 1988).  <i>Pinus-Abies</i>/<i>Festuca</i> community – <i>Festuca idahoensis</i>, <i>Carex rossii</i>, <i>Stipa occidentalis</i>, <i>Poa nervosa</i>, <i>Sitanion hystrix</i>, <i>Arnica cordifolia</i> (Franklin and Dyreness, 1988).</p>
<p>Plant strategy type / successional stage:</p>	<p>Listed as weedy or invasive (USDA, 2008).</p>
<b>PROPAGATION DETAILS</b>	
<p>Propagation Goal</p>	<p>Plants (Johnson et al, 2008)</p>
<p>Propagation Method</p>	<p>Vegetative (Johnson et al, 2008)  Seed (Rose et al, 2008)</p>
<p>Product Type</p>	<p>Bareroot (Johnson et al, 2008)  Container (Rose et al, 2008).</p>
<p>Time to Grow:</p>	<p>1 Year (Johnson et al, 2008).</p>
<p>Target Specifications:</p>	<p>For bareroot transplants target height is 5 cm and root system should be well developed (Johnson et al, 2008).</p>

Propagule Collection:	Vegetative propagules: In late summer or early fall, collect newly rooted runners from the parent plant and transplant. For spring to midsummer propagule collection, select and cut runners from the parent plant with at least two nodes (Rose et al, 1998). Seed collection: Collect seeds when fruits turn red in mid-summer (Johnson et al, 2008).
Propagule Characteristics:	Seed can be stored and will remain viable for up to 20 years (Rose et al, 1998). Although Johnson et al (2008) estimates the seed longevity at 3 years.
Propagule Preparation:	Cleaning seeds: Macerate seeds for 12 seconds and allow place in water to allow the pulp and seeds to separate (Rose et al, 1998). Johnson et al (2008) suggests using a Dybvig seed cleaner and washing the macerated seeds using a screen. Dormancy treatments: Stratification is necessary to break dormancy of seed. Rose et al (1998) suggest that germination increases with cold treatment and exposure to light for 2 to 3 months. Johnson (2008) suggests a minimum of 85 days of cold/moist stratification. To simplify stratification process, plant into flats in the fall and leave outside to over winter (Robson, 2008).
Growing Area Preparation:	Growing media: To grow in raised beds, mix equal parts well-rotted cow manure, sand, and soil mix (Johnson et al, 2008). For flats, use equal parts perlite and vermiculate. Vegetative propagules may see increased success if treated with a mild rooting hormone (Rose et al, 1998). Growing hint: To keep the crown of the selected propagule in the soil during planting, use an unbent paperclip (Pettinger and Costanzo, 2002).
Establishment Phase:	Transplants establish in raised beds in 2 weeks (Johnson et al, 2008) Whereas germination may take several months (Rose et al, 1998). Germination occurs at 21C (Johnson et al, 2008).
Active Growth Phase:	Length: 16 weeks (Johnson et al, 2008).
Hardening Phase:	6 weeks for seeds transplanted at 6 weeks after germination (Rose et al, 1998).
Harvesting, Storage and Shipping (of seedlings):	Harvest: 1 year to harvest, harvest in spring or fall (Johnson et al, 2008) Storage: May over-winter outdoors in raised beds (Johnson et al, 2008). May store in regular potting soil placed in heavy shade in greenhouse (Rose et al, 1998).
Length of Storage:	1 month (Johnson et al, 2008)
Guidelines for Outplanting / Performance on Typical Sites:	Survival Rates: Plants transplanted at Logan Pass in Glacier National Park saw a 45% survival rate after 3 years. A higher rate of transplant survivorship may be achievable using container plants (Johnson et al, 2008).
Other Comments:	No collection restrictions (USDA, 2008)
<b>INFORMATION SOURCES</b>	
References:	Franklin, J.F., and C.T. Dyrness. 1988. <i>Natural vegetation of Oregon and Washington</i> . Oregon State University Press, Portland, OR.  Hitchcock and Cronquist. 1976. <i>Flora of the Pacific Northwest</i> .

	<p>University of Washington Press, Seattle, WA.</p> <p>Johnson, K., Potter, R., Wick, D., Luna, T., Evans, J., Corey, S. 2008. <i>Propagation protocol for vegetative production of field-grown Fragaria virginiana Duchesne plants</i>. USDI NPS - Glacier National Park, West Glacier, Montana. In: Native Plant Network. Accessed 15 April 2008. <a href="http://www.nativeplantnetwork.org">http://www.nativeplantnetwork.org</a>.</p> <p>Klinkenberg, Brian. 2007. E-Flora BC: Electronic Atlas of the Plants of British Columbia Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver. Accessed 16 April 2008. <a href="http://www.eflora.bc.ca">www.eflora.bc.ca</a>.</p> <p>Pettinger, A. and B. Costanzo. 2002. <i>Native Plant in the Coastal Garden</i>. Whitecap, North Vancouver, BC.</p> <p>Robson, K.A., Richter, A., Filbert, M. 2008. <i>Encyclopedia of Northwest Native Plants for Gardens and Landscapes</i>. Timber Press, Portland, OR</p> <p>Rose, R., Chachulski, C., Hasse, D. 1998. <i>Propagation of Pacific Northwest Native Plants</i>. Oregon State University Press, Corvallis, OR.</p> <p>Washington Native Plant Society. "Native Plants for Western Washington Gardens and Restoration Projects". Accessed 15 April 2008. <a href="http://www.wnps.org/landscaping/herbarium/pages/fragaria-virginiana.html">http://www.wnps.org/landscaping/herbarium/pages/fragaria-virginiana.html</a></p> <p>United States Department of Agriculture. "Plant Database". Accessed 15 April 2008. <a href="http://plants.usda.gov/">http://plants.usda.gov/</a>.</p>
Other Sources Consulted:	<p>The Browse-shrub and Forb Committee of the Association of Official Seed Analysts. "Handbook on Seeds of Browse-Shrubs and Forbs". Accessed on 15 April 2008. <a href="http://www.nsl.fs.fed.us/">http://www.nsl.fs.fed.us/</a></p> <p>King County. "Northwest Native Plant Landscape Guide". Accessed 15 April 2008. <a href="http://dnr.metrokc.gov/wlr/pi/go-native">http://dnr.metrokc.gov/wlr/pi/go-native</a>.</p> <p>King County Surface Water Management Division. 1994. <i>Northwest native plants : identification and propagation for revegetation and restoration projects</i>. King County Public Works, Seattle, WA</p> <p>Kruckeberg, Arthur R. 1982. <i>Gardening with Native Plants of the Pacific Northwest</i>. University of Washington Press, Seattle, WA</p> <p>Lady Bird Johnson Wildflower Center. "Native Plant Database". Accessed 15</p>

	<p>April 2008.  <a href="http://www.wildflower.org/plants/result.php?id_plant=frvi">http://www.wildflower.org/plants/result.php?id_plant=frvi</a>.</p> <p>Leigh, Michael. 1996. <i>Grow Your Own Native Landscape: A Guide to Identifying, Propagating, and Landscaping with Western Washington Native Plants</i>. Native Plant Salvage Project, Washing State University Cooperative Extension, Thurston County, Olympia, WA</p> <p>Plants for A Future. Accessed 15 April 2008.  <a href="http://www.ibiblio.org/pfaf/cgi-bin/arr_html?Fragaria+virginiana">http://www.ibiblio.org/pfaf/cgi-bin/arr_html?Fragaria+virginiana</a></p> <p>Sound Native Plants. "Species descriptions: groundcovers, perennials, and herbaceous plants". Accessed 15 April 2008.  <a href="http://www.soundnativeplants.com/catalogherbs.htm#FRCH">http://www.soundnativeplants.com/catalogherbs.htm#FRCH</a>.</p> <p>Washington State University Extension. "Native Plants: Identifying, Propagating, and Landscaping". Accessed 15 April 2008.  <a href="http://gardening.wsu.edu/NWnative/">http://gardening.wsu.edu/NWnative/</a>.</p> <p>University of Washington Burke Museum Herbarium. "WTU Image Collection: Plants of Washington". Accessed 16 April 2008.  <a href="http://biology.burke.washington.edu/herbarium/imagecollection.php">http://biology.burke.washington.edu/herbarium/imagecollection.php</a>.</p>
Protocol Author:	Lisa Ciecko
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<http://www.nativeplantnetwork.org/network/SampleBlankForm.asp>

## 2003 Protocol:

### Plant Data Sheet

Species (common name, Latin name)  
Wild Strawberry, *Fragaria virginiana*

#### Range

From East coast to Rocky Mountains and from New Mexico to Alaska (Flora of the Pacific Northwest)

#### Climate, elevation

?

#### Local occurrence (where, how common)

Occurs in open woods and meadows to streambanks, plains and mountains (Flora of the Pacific Northwest)

#### Habitat preferences

Open woods, fields, fens, prairies, and dry soils (Flora of the Pacific Northwest)

#### Plant strategy type/successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)

?

#### Associated species

Rose family

#### May be collected as: (seed, layered, divisions, etc.)

Seed. Spring or fall divisions. (Seeds: Ecology, Biogeography, and Evolution of Dormancy and Germination)

#### Collection restrictions or guidelines

Seed is collected when the fruits turn red in mid summer.

#### Seed germination (needs dormancy breaking?)

A minimum of an 85 day stratification is recommended for this species. Germination occurs at 21C. Seed is cleaned by maceration using a Dyb-vig cleaner, and is washed and screened. Seed dormancy is classified as physiological dormancy (native plant network website)

#### Seed life (can be stored, short shelf-life, long shelf-life)

Seed longevity is estimated at 3 years (native plant network website)

#### Recommended seed storage conditions

?

#### Propagation recommendations (plant seeds, vegetative parts, cuttings, etc.)

Bareroot

#### Soil or medium requirements (inoculum necessary?)

Outdoor nursery in raised bed that is equal parts: well rotted cow manure, sand, and soil mix (native plant network website)

Installation form (form, potential for successful outcomes, cost)  
Bareroot (native plant network website)

Recommended planting density  
12-15 in. (30-38 cm) (the plant data base website)

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

Normal rate of growth or spread; lifespan  
Grow 1 year to 5cm in height (native plant network website)

#### Sources cited

Flora of the Pacific Northwest, Hitchcock and Cronquist, 7th edition, University of Washington Press, 1973.

Seeds: Ecology, Biogeography, and Evolution of Dormancy and Germination, Baskin and Baskin, Academic Press, 1998.

Glacier National Park, West Glacier, Montana. In: Native Plant Network. URL:  
<http://www.nativeplantnetwork.org> (accessed 8 April 2003). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

The Plant Database <http://plantsdatabase.com/go/31464/> (accessed 8 April 2003)

Data compiled by  
Roger Whalley 04-08-03