

## Plant Propagation Protocol for *Dasiphora fruticosa*

ESRM 412 – Native Plant Production

Protocol URL: <https://courses.washington.edu/esrm412/protocols/DAFR.pdf>

Figure 1: Distribution in North America<sup>7</sup>

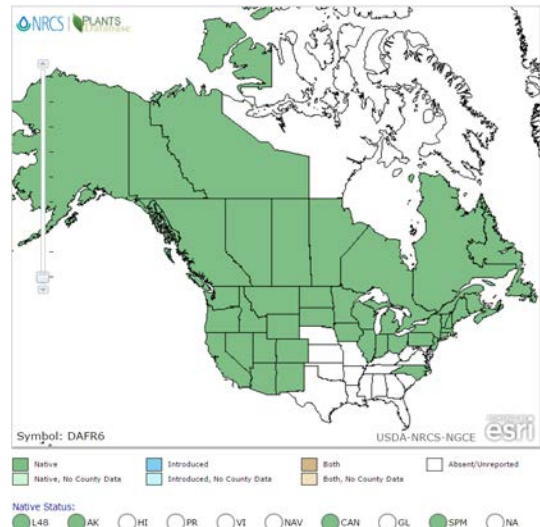
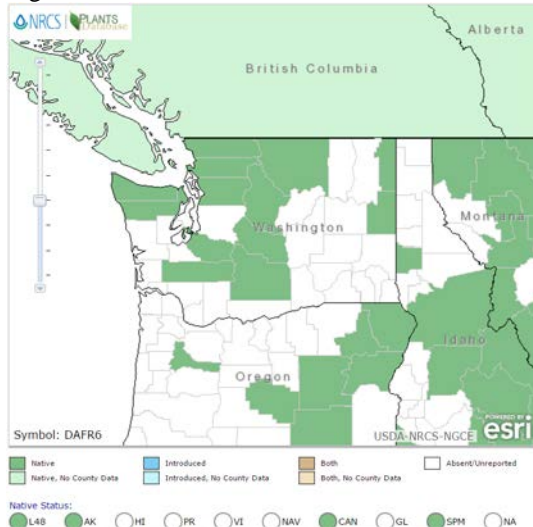


Figure 2: Distribution in Washington State<sup>7</sup>

<b>TAXONOMY<sup>7,8</sup></b>	
<b>Plant Family</b>	
Scientific Name	Rosaceae
Common Name	Rose family
<b>Species Scientific Name</b>	
Scientific Name	<i>Dasiphora fruticosa</i> (L.) Rydb.
Varieties	
Sub-species	<i>Dasiphora fruticosa</i> (L.) Rydb. subsp. <i>fruticosa</i> <i>Dasiphora fruticosa</i> (L.) Rydb. ssp. <i>floribunda</i> (Pursh) Kartesz
Cultivar	Dozens of cultivars have been created for variations in flower shape and color, foliage appearance, and shrub form. <sup>9</sup>
Common Synonym(s)	<i>Dasiphora floribunda</i> (Pursh) Raf. <i>Potentilla fruticosa</i> L.
Common Name(s)	Shrubby cinquefoil, bush cinquefoil, golden hardhack, widdy
Species Code (as per USDA Plants database)	DAFR6

<b>GENERAL INFORMATION</b>	
Geographical range	North America (Canada and United States), Europe, Asia. <sup>9,10</sup> See maps above for detailed distribution in N. America and Washington State. <sup>7</sup>
Ecological distribution	Mid to high-elevation meadows, rocky slopes, open forest, riparian areas and swamps. <sup>3,11</sup>
Climate and elevation range	Temperate and subarctic. <sup>9,11</sup>
Local habitat and abundance	Locally found in Washington counties bordering the Cascades, the Olympic peninsula, and in the northeast bordering Idaho. <sup>7</sup>  Commonly associated in the wild with <i>Carex</i> , <i>Penstemon</i> , <i>Elymus</i> , and <i>Potentilla</i> species. <sup>3</sup>
Plant strategy type / successional stage	Colonizer, early seral species. <sup>12</sup>
Plant characteristics	Perennial shrub able to withstand harsh environmental conditions, including cold temperatures, strong wind, full sun, and drought. <sup>5,9,11</sup> Can tolerate a wide pH range. <sup>11</sup> Adapted to grow in a range of soil conditions, including variable texture and calcareous soils, but grows best in sandy and loamy soil. <sup>5,9</sup>  This short slow-growing rounded shrub can grow up to 1m tall and 1m wide with numerous small, narrowly oblong green leaves <sup>3,9</sup> . Bright yellow flowers bloom from May through August and produce achenes in the late summer <sup>3,16</sup> . Leaves are evergreen depending on locale; deciduous individuals leaf out in early Spring <sup>3,9</sup> . The species is slow-growing and may take 5-10 years to reach its ultimate height. <sup>5</sup> Individuals have been recorded to live up to 36 years. <sup>13</sup>  Hymenoptera and diptera insect species have been observed as pollinators. <sup>14</sup>  The species is colonized by endomycorrhizal fungi at a high rate in its natural environment. <sup>15</sup>
<b>PROPAGATION DETAILS</b>	
<b>Vegetative propagation with cuttings</b>	
Ecotype	N/A
Propagation Goal	Cuttings
Propagation Method	Vegetative
Product Type	Propagules (cuttings)
Stock Type	Rooted cuttings
Time to Grow	Three weeks <sup>16</sup>
Target	Cuttings with developed roots

Specifications	
Propagule Collection Instructions	Take 7.5cm softwood cuttings in early summer, June and July. <sup>16</sup> Hardwood cuttings may be used but are more difficult to root. <sup>2,16</sup>
Propagule Processing/Propagule Characteristics	No atypical woody species cutting processing protocol appears to be necessary.
Pre-Planting Propagule Treatments	75-80% rooting for hardwood cuttings can be achieved by treating cuttings with Seradix #3 and placing in the media mix mentioned in the following section. <sup>17</sup>  80-90% rooting for softwood cuttings can be achieved by treating cuttings with Seradix #2 or 1,000ppm IBA and placing in the media mix mentioned in the following section. <sup>16</sup>
Growing Area Preparation / Annual Practices for Perennial Crops	For hardwood cuttings, place cuttings in 1:1:1 mixture of peat, sand, and reground Styrofoam chips with 16°C bench heat. <sup>17</sup>  For softwood cuttings, place cuttings in 1:1 peat and perlite or peat and sand mixture. <sup>16</sup>
Establishment Phase Details	Misting cuttings will encourage successful propagation. <sup>16</sup>
Length of Establishment Phase	Rooting will occur in approximately three weeks if following the treatments stated in the previous sections. <sup>16</sup>
Active Growth Phase	
Length of Active Growth Phase	Unknown
Hardening Phase	
Length of Hardening Phase	Unknown
Harvesting, Storage and Shipping	No atypical woody species cutting harvest and shipping protocol appears to be necessary.
Length of Storage	No atypical woody species cutting storage protocol appears to be necessary.
Guidelines for Outplanting / Performance	Easily transplanted and soil adaptable. <sup>13</sup> Excellent for stabilizing unstable slopes. <sup>13</sup> High biomass production once established. <sup>13</sup>

on Typical Sites	
Other Comments	
<b>Seed propagation</b>	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	Plugs
Time to Grow	Five months, including up to 30 days cold-moist stratification and 16 weeks of growth and establishment in the greenhouse before out-planting. <sup>16</sup> Plants can be overwintered for planting in the spring or fall. <sup>16</sup>
Target Specifications	Plugs with significant root development. <sup>16</sup>
Propagule Collection Instructions	Seeds mature in August-September. <sup>16</sup> Cut flowers and place into bags, or shake flowering branches onto tarps. <sup>16</sup>
Propagule Processing/Propagation Characteristics	Seeds are generally 1.0-1.5mm long. <sup>14</sup> Seed weight is 0.1808g per 1,000 seeds. <sup>16</sup>  Germination can be achieved after seed storage in -18°C for up to seven years. <sup>16</sup> Stored at 1-5°C, seeds can be stored for up to five years. <sup>18</sup>
Pre-Planting Propagule Treatments	Collect seeds in paper bags and keep in a well-ventilated drying shed prior to cleaning. <sup>1,16</sup> Air-dry seeds at temperatures of 15-25°C. <sup>16</sup> Remove large chaff and stem pieces and crush remaining material, sieving or winnowing to remove seeds from chaff. <sup>16</sup>  After-ripening of seeds for a period of 30-45 days increases emergence rate. <sup>2,16</sup>  Sources conflict on stratification requirements, with some sources stating no stratification is required and others utilizing a range of cold-moist stratification periods. <sup>1,11,16,18</sup> Stratification appears to be useful for high-elevation seed sources, and a period of 90 days of cold moist stratification in a refrigerator results in a high germination rate. <sup>1</sup> A cold moist stratification period of 10 days results in moderate germination rates. <sup>6</sup> When grown for greenhouse setting, 0-30 days of cold-moist stratification may be used. <sup>16</sup>
Growing Area Preparation / Annual Practices for Perennial Crops	Plant in 6:1 milled sphagnum peat, perlite. <sup>1</sup> Seeds should be planted as soon as ripe on moist soil media mix. <sup>11</sup>

Establishment Phase Details	Germination occurs at 18°C. <sup>1</sup> Seeds take approximately nine days to germinate. <sup>6</sup>
Length of Establishment Phase	Unknown
Active Growth Phase	
Length of Active Growth Phase	Unknown
Hardening Phase	
Length of Hardening Phase	Unknown
Harvesting, Storage and Shipping	One may feasibly up-pot established plugs into larger containers and allow the individual plants to grow larger before transplanting, or transplant and plant immediately as plugs.
Length of Storage	As a hardy native shrub, one may expect the species to survive well in the greenhouse or in outdoor conditions until they are ready for transport and planting.
Guidelines for Outplanting / Performance on Typical Sites	Easily transplanted and soil adaptable, but slow growth rate. <sup>13</sup> Seedlings are persistent and durable once established. <sup>13</sup>
Other Comments	

### INFORMATION SOURCES

References	<p><sup>1</sup> Baskin, Jerry M. &amp; Baskin, Carol C. (2002). <i>Propagation protocol for production of Container (plug) Dasiphora floribunda</i>. US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. In: Native Plant Network. Retrieved from <a href="http://NativePlantNetwork.org">http://NativePlantNetwork.org</a>.</p> <p><sup>2</sup> Davidson, C. G. (1986). <i>Experimental Taxonomy, Propagation And Models Of Inheritance For Flower Colour And Extra Petals In Potentilla Fruticosa L</i> (Order No. NL33985).</p> <p><sup>3</sup> Knoke, D. &amp; D. Giblin. (2017). <i>Dasiphora fruticosa: shrubby cinquefoil</i>. Burke Museum of Natural History and Culture, University of Washington. Retrieved from <a href="http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Dasiphora&amp;Species=fruticosa">http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Dasiphora&amp;Species=fruticosa</a></p> <p><sup>5</sup> <i>Potentilla fruticosa</i> (2017). Royal Horticultural Society. Retrieved from</p>
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<https://www.rhs.org.uk/Plants/94920/Potentilla-fruticosa-Abbotswood/Details>.

<sup>6</sup>Jivoff, B. (2014, April). *Environmental and Ecological Limits on Native Stress-Tolerant Plant Species on Calcareous Restoration Sites*. Retrieved from ProQuest Digital Dissertations. (1560871422)

<sup>7</sup> *Dasiphora fruticosa* (L.) Rydb. shrubby cinquefoil (n.d.). USDA Natural Resources Conservation Service PLANTS database. Retrieved from <https://plants.usda.gov/core/profile?symbol=DAFR6>

<sup>8</sup> *Taxon: Dasiphora fruticosa* (L.) Rydb. (n.d.). U.S. National Plant Germplasm System. Retrieved from <https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?413500>.

<sup>9</sup>Brand, M.H. (2015). *Potentilla fruticosa*. University of Connecticut Plant Database. Retrieved from <http://www.hort.uconn.edu/plants/detail.php?pid=346>.

<sup>10</sup> Johnson, D., L. Kershaw, A. MacKinnon & J. Pojar. (1995). *Plants of the Western Boreal Forest and Aspen Parkland*. Lone Pine Publishing and the Canadian Forest Service. Edmonton, Alberta. 392 pp.

<sup>11</sup> Hardy BBT Limited. (1989). *Manual of plant species suitability for reclamation in Alberta - 2nd Edition*. Alberta Land Conservation and Reclamation Council Report No. RRTAC 89-4. 436 pp.

<sup>12</sup> Gerling, H.S., M.G. Willoughby, A. Schoepf, K.E. Tannas & C.A Tannas (1996). *A Guide to Using Native Plants on Disturbed Lands*. Alberta Agriculture, Food and Rural Development and Alberta Environmental Protection, Edmonton, Alberta. 247 pp.

<sup>13</sup> Anderson, M.D. (2001). *Dasiphora floribunda*. IN: Fischer, W.C. (compiler). States Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory, Missoula, Montana. Retrieved from <http://www.fs.fed.us/database/feis/plants/shrub/dasflo/introductory.html>

<sup>14</sup> Elkington, T.T. & S.R.J. Woodell. (1963). *Potentilla fruticosa* L. (*Dasiphora fruticosa* (L.) Rydb.). *Journal of Ecology* 51: 769-781.

<sup>15</sup> Van Hoewyk, D., C. Wigand & P.M. Groffman (2001). *Endomycorrhizal colonization of Dasiphora floribunda, a native plant species of calcareous wetlands in eastern New York State, USA*. *Wetlands* 21(3): 431-436.

<sup>16</sup> Rose, R., C.E.C. Chachulski & D.L. Haase (1998). *Propagation of Pacific northwest native plants*. Oregon State University Press, Corvallis, Oregon. 248

	<p>pp.</p> <p><sup>17</sup> McTavish, B. and T. Shopik, 1983. <i>Propagation and use of native woody plants in northern latitudes</i>. IN: Reclamation of lands disturbed by mining. Proceedings of the Seventh Annual British Columbia Mine Reclamation Symposium. Technical Research Committee on Reclamation, Mining Association of British Columbia, Victoria. pp. 159-181.</p> <p><sup>18</sup> Walsh, D.G.F., S. Waldren &amp; J.R. Martin (2003). <i>Monitoring seed viability of fifteen species after storage in the Irish threatened plant gene bank</i>. Biology and Environment: Proceedings of the Royal Irish Academy 103B(2): 59-67.</p>
Other Sources Consulted	<p><sup>4</sup>Shaughnessy, B. E. (2010). <i>Natural recovery of upland boreal forest vegetation on a hummocky peat-mineral mix substrate in the athabasca oil sands region, Alberta</i>. Retrieved from ProQuest Dissertations &amp; Theses Global. (MR56679).</p> <p><sup>19</sup>Remm, K. &amp; Remm, L. (2017). <i>Shrubby cinquefoil (Dasiphora fruticosa (L.) Rydb.) mapping in Northwestern Estonia based upon site similarities</i>. BMC Ecol. 17:7. Retrieved from Springer Link International Publishing.</p> <p><sup>20</sup>Yuichiro, Y., Y. Shizu, M. Hirota, A. Shimono, &amp; T. Ohtsuka. (2010) <i>The role of shrub (Potentilla fruticosa) on ecosystem CO2 fluxes in an alpine shrub meadow</i>. <i>Journal of Plant Ecology</i>. 3 (2): 89-97. Retrieved from Oxford University Press.</p>
Protocol Author	Cecilia Henderson
Date Protocol Created or Updated	04/26/17

Appendix:  
Original protocol

## Plant Data Sheet



Image © 2004, Ben Leoler

**Species**

*Dasiphora floribunda* (*Potentilla fruticosa*, *Pentaphylloides*) Shrubby cinquefoil.<sup>4</sup>

**Range**

Shrubby cinquefoil grows from Alaska<sup>12</sup> to New Foundland and southward to the middle of the USA, south along the mountains to California and New Mexico border and eastward to the Atlantic coast. Shrubby cinquefoil grows throughout northern latitudes and high elevations of Europe and Asia.<sup>6,7,11,12</sup>

**Climate, elevation**

Foothills to subalpine<sup>13</sup>

**Local occurrence**

West and East of the Cascades<sup>10</sup>

**Habitat preferences**

Meadows, moist rocky slopes<sup>4</sup>

**Plant strategy type/successional stage**

Shrubby cinquefoil is a colonizer and is an early seral species in many forest habitats<sup>7</sup>

**Associated species**

*Potentilla*, *Carex*, *Penstemon*, *Elymus*<sup>10</sup>



**May be collected as**

Seed, division or stem cutting<sup>9</sup>

**Collection restrictions or guidelines**

Flowering begins in June, and can continue until temperatures are below freezing. Seeds mature in August to September.<sup>6,7,8</sup>  
Summer softwood stem cutting collected in June and July.<sup>2</sup>

**Seed germination**

Seeds were sown outdoors to undergo a 5 month cold moist stratification. Seeds from lower elevation sources also germinate to high percentages using a 90 day cold moist stratification in a refrigerator. Stratification is used for high elevation seed sources.<sup>2</sup>

**Seed life**

Seed longevity is unknown<sup>2</sup>

**Recommended seed storage conditions**

Seeds are collected in paper bags and kept in a well ventilated drying shed prior to cleaning.<sup>2</sup>

**Propagation recommendations**

The broad ecological amplitude and circumboreal distribution of this species is indicative of its ease of propagation, establishment, and ability to withstand severe environmental conditions.<sup>2</sup>

**Soil or medium requirements**

6:1:1 milled sphagnum peat, perlite<sup>2</sup>

**Installation form**

1 gallon pots<sup>2</sup>

**Recommended planting density**

Unknown

**Care requirements after installed**

Potentillas prefer well-drained, reasonably rich soil, but will tolerate clay, rocky, or slightly alkaline soils as well. They are a quite durable plant, tolerating drought, flooding, extreme cold, and will easily survive transplanting.<sup>3</sup>

**Normal rate of growth or spread; lifespan**

Root tight 3L (1 gallon) containers can be produced in 1 year from cuttings<sup>2</sup>  
A deciduous Shrub growing to 1.2m by 1.2m at a medium rate.<sup>14</sup>

**Sources cited**

<sup>11</sup><http://www.botany.wisc.edu/garden/db/speciesdetail.asp?genus=Potentilla&species=fruticosa>

<sup>2</sup>Wick, Dale; Johnson, Kathy; Evans, Jeff; Luna, Tara. 2001. Propagation protocol for vegetative production of container *Dasiphora floribunda* Kartesz., comb., nov. ined. plants (3L containers); Glacier National Park, West Glacier, Montana. In: Native Plant Network. URL: <http://www.nativeplantnetwork.org> (accessed 17 April 2006).

<sup>3</sup><http://www.thegardenhelper.com/Potentilla.htm>

<sup>4</sup>Turner, Mark and Phyllis Gustafson. 2006. *Wildflowers of the Pacific Northwest*. Oregon: Timber Press, p231.

<sup>5</sup><http://www.usask.ca/agriculture/plantsci/classes/range/potentilla.html>

- <sup>6</sup>Davidson, C.G. and L.M. Lenz. 1989. Experimental taxonomy of *Potentilla fruticosa*. *Can. J. Bot.* 67: 3520-3528.
- <sup>7</sup>Elkington, T.T. and S.R., J.Wood. 1963. *Potentilla fruticosa* L. *J. Ecol.* 51:769-781.
- <sup>8</sup>USDA Forest Service. 1937. Range plants handbook, Dover edition. Washington, DC
- <sup>9</sup><http://www.botany.wisc.edu/garden/db/speciesdetail.asp?genus=Potentilla&species=fruticosa>
- <sup>10</sup><http://biology.burke.washington.edu/herbarium/imagecollection.php>
- <sup>11</sup>Klackenberg, J. 1983. The holarctic complex *Potentilla fruticosa* (Rosaceae). *Nord. J. Bot.* 3: 181-191.
- <sup>12</sup>Orlaci, L. and W. Stanek. 1979. Vegetation survey of the Alaska Highway, Yukon Territory: Types and gradients. *Vegetatio* 41:1-56.
- <sup>13</sup>[http://www.wnps.org/plants/potentilla\\_fruticosa.html](http://www.wnps.org/plants/potentilla_fruticosa.html)
- <sup>14</sup><http://www.pfaf.org/database/plants.php?Potentilla+fruticosa>

Plant data compiled by Scott Havill 4/19/2006

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