Plant Propagation Protocol for *Viola orbiculata*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/*VIOR.pdf*

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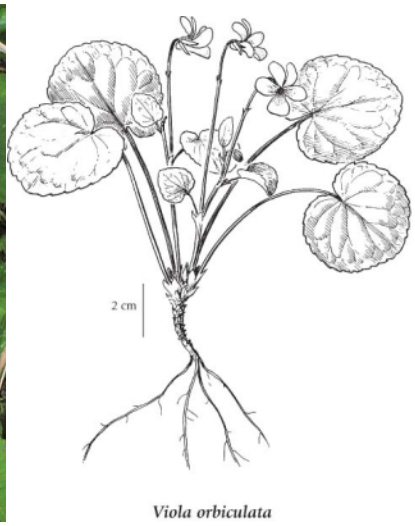
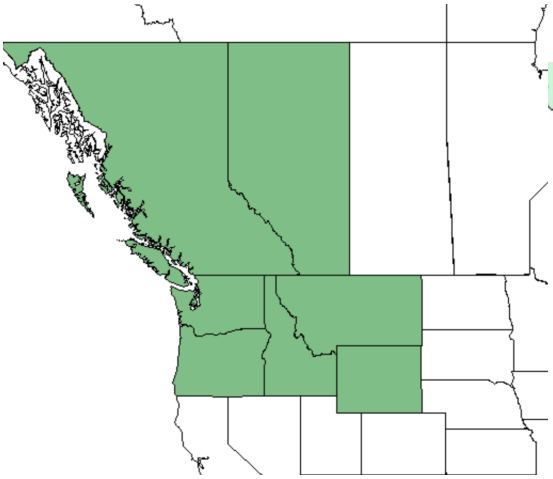
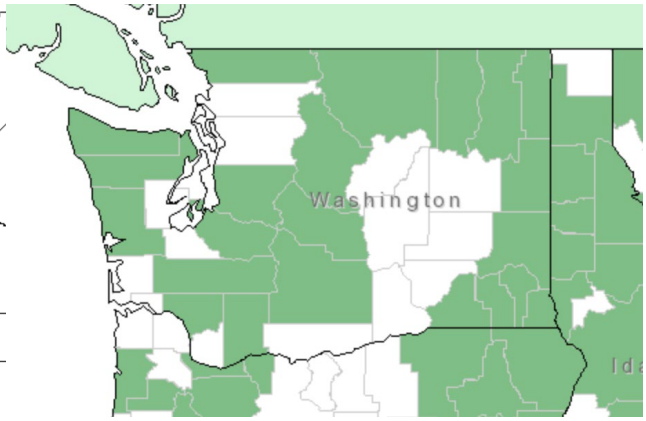


Illustration of V. orbiculata[9]



Distribution through Canada (BC, AB) and United States (WA, OR, ID, MT, WY)[1]



Distribution throughout WA[1]

TAXONOMY	
Plant Family	
Scientific Name	Violaceae
Common Name	Violet Family

Species Scientific Name	
Scientific Name	*Viola orbiculata* Geyer ex Holz.1
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	*Viola sempervirens* Greene var. *orbiculata* (Geyer ex Holz.) J.K. Henry, *Viola sempervirens* Greene var. *orbiculoides* M.S. Baker[1]
Common Name(s)	Darkwoods Violet, Roundleaf Violet[2]
Species Code (as per USDA Plants database)	VIOR[1]
GENERAL INFORMATION	
Geographical range	Native to Canada and NW United States: E. and W. sides of the Cascade Mountains from British Columbia to N. Oregon and Olympic Mountains.[1,2] See maps above for distribution through Canada (BC, AB) and United States (WA, OR, ID, MT, WY)
Ecological distribution	Moist woods to subalpine meadows[2] Mesic to moist meadows and forests (montane to alpine zones)[4]
Climate and elevation range	Mid to high elevations in mountains[3]
Local habitat and abundance	Shade- tolerant/intolerant, moderately dry to fresh nitrogen-medium soils within boreal, wet cool temperate, and cool mesothermal climates. Occurrence decreases with increasing latitude. Common in mossy understories on water-shedding sites.[4]
Plant strategy type / successional stage	
Plant characteristics	Perennial from a scaly rhizome, no stolons, stems erect, smooth, 3-5 cm tall. Leaved: Basal, evergreen, round, bases deeply heart-shaped, toothed, smooth, stalks up to 5 cm long, stipules lanceolate Flowers: Inflorescence of single axillary flowers, 5 petals, yellow, the lower petal 0.5-1.5 cm long including the 1- to 2-mm long spur, the lower 3 purplish-pencilled, the lateral pair yellow-bearded; sepals 5, lanceolate, style heads short-bearded. Fruit: Smooth capsules Seed: Brown[4]
PROPAGATION DETAILS * indicates reference to other species of Viola (species listed)	
Ecotype	
Propagation Goal	Plants
Propagation Method	Seed

Product Type	Container (plug)[5]
Stock Type	
Time to Grow	Ready to transplant plugs after one growing season (V. adunca)[7]
Target Specifications	*Well-developed crowns, roots and rhizomes filling soil profile in container (V. adunca)[6]
Propagule Collection Instructions	*Seed is collected by hand. Seed is harvested from August to October (V. canadensis)[5] *Production fields can be harvested by vacuuming shattered seed from the surface of weed fabric before fall rains begin. Fields are crawled and harvested using a shop vacuum (V. adunca)[7]
Propagule Processing/Propagule Characteristics	*Dry seeds for 1-2 weeks in open paper bags or open Rubbermaid-style bins, shaking or turning seed heads. Seed is not cleaned. Once seeds have dried begin stratification. Cold store until planted (up to 3yrs). (V. canadensis)[5] *Following drying, an air screen machine can be used to separate seed from empty seed pods, chaff, and dirt. If necessary, a brush machine or thresher can be used to break up seed pods that have not fully opened (V. adunca)[7]
Pre-Planting Propagule Treatments	*Stratification: mix the seeds with an equal amount of moist perlite or vermiculite. Put mixture into a Ziploc-style bag or a Rubbermaid-style container. Seal the container and proceed with at least three months of moist cold stratification in a cool dry place (refrigerator or cold garage) (V. canadensis)[5] *120 days of cool(38F)/moist stratification is best to break dormancy to allow germination to occur (V. adunca)[6]
Growing Area Preparation / Annual Practices for Perennial Crops	*Propagation Environment: Greenhouse film made of Standard U.V. 3HL Clear 6 mil (J.R. Johnson's Greenhouse Supply Inc.) Fans run continuously to circulate the air. Vents open during the summer months to allow for cooling. Container Type: grows best in 24 cell (2" diameter) 14"x8.5"x4" deep flats. Can be grown in virtually any size plug. Sowing Media: Scotts Redi-earth Plug and Seedling Mix. Contains vermiculite and sphagnum peat moss. Soil is sterile. Thoroughly moisten the soil with water, mixing in the water with a trowel. Cover the holes in the bottom/sides of the plug tray cells with newspaper so

	that the soil does not fall out. Fill cells with damp soil and press soil down with a spoon. Refill the cell plugs with soil to the top, this time not pressing it down. Water the soil in the plug cells again. Sow the seeds by hand at a rate of about 2 seeds in each cell. Cover the seeds with a thin amount of soil. Sow year-round due to low variable success rates (V. canadensis)[5]
Establishment Phase Details	* From Jan. until Aug. the greenhouse thermostat is set at 65 degrees F both day and night. Ambient greenhouse temperatures may reach 100 degrees F during the day in the summer. From Sept. through Dec. the thermostat is set at 55 degrees F. During this season ambient greenhouse temperatures may reach 75 degrees F during the day. Soil is kept consistently damp during germination. Water using a fine mist or light hose setting only. Newly planted trays are placed on the south side of the greenhouse. No artificial light is used (V. canadensis)[5]
Length of Establishment Phase	
Active Growth Phase	*The soil does not need to be consistently moist. The greenhouse holds plants at all stages of growth so the temperature setting stays the same for all plants at all stages of growth. Plant trays are moved to cooler north greenhouse tables. No fertilizers are used (V. canadensis)[5]
Length of Active Growth Phase	
Hardening Phase	*In early-late spring, mature plants can be moved into a cold frame with a cover of material that diffuses sunlight to prevent scorching of the plants. When danger of frost has passed leave plants outside. Water less frequently. (V. canadensis)[5]
Length of Hardening Phase	
Harvesting, Storage and Shipping	*Flats are transplanted into the field from late May to early October. Flats that are not planted in the summer remain in the greenhouse for another season. (V. canadensis)[5]
Length of Storage	
Guidelines for Outplanting / Performance on Typical Sites	Transplanting into fields covered in weed fabric containing holes on a 1 foot by 1 foot spacing is most efficient for weed control and ease of seed harvest. Irrigation is not necessary, and weed control is primarily accomplished through the use of weed fabric on seed production fields (V. adunca)[7]

Other Comments	Division can be done in autumn or just after flowering. Best to pot up smaller divisions and grow them in light shade in a greenhouse or cold frame until the are established (V. glabella)[8]
INFORMATION SOURCES	
References	See below
Protocol Author	Jacob Stephens
Date Protocol Created or Updated	05/29/19

References:

[1]Viola orbiculata Geyer ex Holz. Show Tabs darkwoods violet. (n.d.). Retrieved May 28, 2019, from https://plants.usda.gov/core/profile?symbol=VIOR

[2] Viola orbiculata. (n.d.). Retrieved May 28, 2019, from https://www.wnps.org/native-plant-directory/72-viola-orbiculata

[3] WTU Herbarium, Burke Museum, & University of Washington. (n.d.). Viola orbiculata. Retrieved May 28, 2019, from http://biology.burke.washington.edu/herbarium/imagecollection/taxon.php?Taxon=Viola orbiculata

[4] Viola orbiculata Geyer ex Holz. (n.d.). Retrieved from http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Viola orbiculata

[5]Schultz, Jan; Beyer, Patty; Williams, Julie. 2002. Propagation protocol for production of Container (plug) *Viola canadensis* L. plants USDA FS - Hiawatha National Forest Marquette, Michigan. In: Native Plant Network. URL: http://NativePlantNetwork.org (accessed 2019/05/30). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources.

[6]2015. Propagation protocol for production of Container (plug) *Viola adunca* plants USDA NRCS - Corvallis Plant Materials Center Corvallis, Oregon. In: Native Plant Network. URL: http://NativePlantNetwork.org (accessed 2019/05/30). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources.

[7]Hoffman, R. 2012. Plant guide for hookedspur violet (Viola adunca). USDA-Natural Resources Conservation Service, Plant Materials Center, Corvallis, OR.

[8]Viola glabella - Nutt. (n.d.). Retrieved May 29, 2019, from https://pfaf.org/user/Plant.aspx?LatinName=Viola glabella

[9]Douglas, G. W. (1998). *Illustrated flora of British Columbia*. Victoria: British Columbia, Ministry of Environment, Lands and Parks.

[10]Viola orbiculata. (n.d.). Retrieved June 10, 2019, from http://web.ewu.edu/ewflora/Violaceae/Viola orbiculata.html