

Plant Propagation Protocol for *Viola praemorsa*

ESRM 412 – Native Plant Production

Protocol URL: <https://courses.washington.edu/esrm412/protocols/VIPR3.pdf>

@debaraj (inaturalist.org)

@BJ Stacey (inaturalist.org)

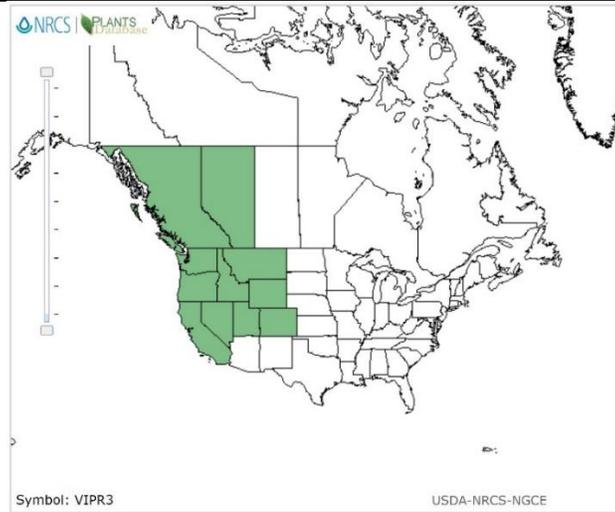
@Rick Williams (inaturalist.org)



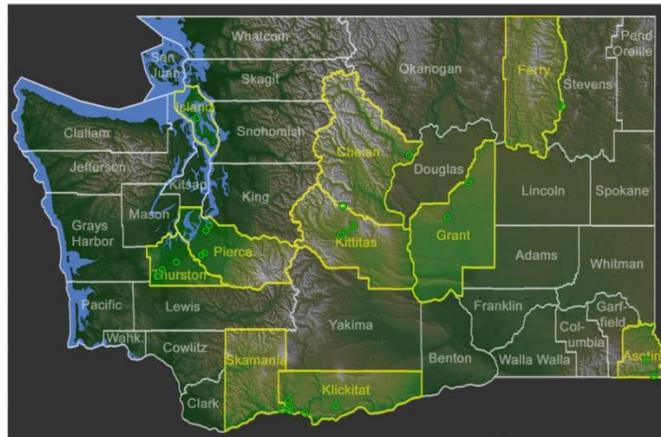
TAXONOMY	
Plant Family	
Scientific Name	Violaceae
Common Name	Violet
Species Scientific Name	
Scientific Name	<i>Viola praemorsa</i> Dougl. ex Lindl.
Varieties	None found
Sub-species	<i>Viola praemorsa</i> ssp. <i>flavovirens</i> (Pollard) <i>Viola praemorsa</i> ssp. <i>linguifolia</i> (Nutt.) <i>Viola praemorsa</i> ssp. <i>praemorsa</i> Dougl. ex Lindl. (USDA, 2018)
Cultivar	None Found
Common Synonym(s)	<i>Viola praemorsa</i> ssp. <i>praemorsa</i> has been identified as a valid subspecies of <i>Viola praemorsa</i> , and not subspecies of <i>Viola nuttallii</i> . However, it is sometimes referred to as the following: <i>Viola nuttallii</i> ssp. <i>praemorsa</i> <i>Viola nuttallii</i> var. <i>praemorsa</i> (pnwplants.com, 2018)
Common Name(s)	Canary Violet Upland Yellow Violet Astoria Violet Yellow Montane Violet Prairie Violet (USDA, 2018)
Species Code	VIPR3

GENERAL INFORMATION

Geographical range



(USDA, 2018)



(WTU, 2018)

Ecological distribution

Lowland prairies, lowland valleys, woodland understory, and drier habitats. Occur in distinct populations across the Pacific Northwest, with populations existing in Washington, Oregon, California and British Columbia (Canada). Canary violet populations in Canada are facing increasing threats from urbanization, and the species is listed as a threatened species in Canada.

(CNPS, 2018; Breen 2014)

Climate and elevation range

Sun: Part Shade
 Elevation: 362'-8502'
 Annual precipitation: 12.6''- 137.9''
 Summer precipitation: .59''- 4.01''
 Coldest Month: 26.2 °F - 45.4 °F
 Hottest Month: 50.8 °F - 71.0 °F
 Humidity: 0.43 – 20.73 vapor pressure deficit
 Drainage: Moist or dry.

	(CNPS, 2018)
Local habitat and abundance	<p>Canary violets are abundant in central Washington, and present on either side of the Cascades crest. They can be commonly found on mountain slopes, where forests and grassy meadows are present. Canary violets are shade intolerant, and are often found in habitats with very little shrub cover that would block the sunlight from reaching the violet. Gary oak ecosystems provide optimal habitat for canary violets.</p> <p>(WTU, 2018; Breen, 2014)</p>
Plant strategy type / successional stage	<p>Canary violets avoid competitive environments by growing in areas with sparse vegetation. They complete much of their growth cycle before other native plants reach their maximum biomass each year.</p> <p>(COSEWIC, 2007)</p>
Plant characteristics	<p>The canary violet is a rhizomatous perennial herb, commonly growing from 2-8 inches tall. The canary violet survives for an average of 3-6 years total, and becomes mature after 2 years of growth.</p> <p>The canary violet's distinct bright yellow flowers are its namesake. Flowers commonly have five petals, with three or more brown/purple veins creating distinct lines from the base of the petal to the center of the petal. It is possible to find individual plants with a single solitary flower, or with several flowers on individual stalks.</p> <p>The leaves are thick, coated in hairs, have long petioles, and are lanceolate or oval shaped. Leaves grow from the center of the herb, as well as the stalk that holds the flower.</p> <p>(COSEWIC, 2007)</p>
PROPAGATION DETAILS	
Ecotype	Pacific Northwest (RNGR, 2018)
Propagation Goal	Plants (RNGR, 2018)
Propagation Method	Seed (RNGR, 2018)
Product Type	Container (plug) (RNGR, 2018)
Stock Type	18ml cone-tainers (RNGR, 2018)
Time to Grow	4 Months (RNGR, 2018)
Target Specifications	Completed canary violet plugs will have well-developed crowns, roots, and rhizomes filling the soil profile in the

	<p>containers. Target plants will be one or two years old at the time of outplanting. (RNGR, 2018)</p>
<p>Propagule Collection Instructions</p>	<p>Seeds are dispersed by capsules that rupture as they dry, ripening throughout June and July. Seeds can be collected by vacuuming parent vegetation. This process is made easier if parent canary violets have a layer of material placed underneath them before releasing their seeds. Additionally, seeds can be collected by wrapping aluminum foil around green capsules and allowing the seeds to release in the aluminum foil. (COSEWIC, 2007; Deno, 1993)</p>
<p>Propagule Processing/Propagule Characteristics</p>	<p>Capsules produce about 8 seeds each, with relatively high viability. Viable seeds may be able to be identified from non-viable seeds depending on color and density, where dark, hard seeds appear to have higher rates of viability.</p> <p>Canary violets breed using both chasmogamous and cleistogamous seeds, meaning that they have flowers that open for cross pollination and flowers that remain closed and only self-pollinate. Germination of seeds are not significantly different between the two reproductive methods. Between 10 and 15 percent of seeds sown in nursery settings have been observed to successfully germinate. Seeds that have been planted in nursery settings are known to successfully germinate between % 10 and % 15. (Jones, 2011)</p>
<p>Pre-Planting Propagule Treatments</p>	<p>Canary violet seeds require 120 days of cool moist stratification (38°F) before germination. Seeds should be stored in a cool, dry environment to prevent early germination. (RNGR, 2018)</p>
<p>Growing Area Preparation / Annual Practices for Perennial Crops</p>	<p>Individuals grow best in separate containers. Provide moist soil and partial shade during both germination and establishment for best growth. As a Pacific Northwest native, typical Mediterranean climates are appropriate for this plant. (Jones, 2011)</p>
<p>Establishment Phase Details</p>	<p>Seeds were planted in fall after stratification, allowed to germinate in nursery conditions throughout winter, sent through hardening treatments, and finally placed on site in March. (Jones, 2011)</p>
<p>Length of Establishment Phase</p>	<p>After sowing, canary violets need 3-5 months to properly establish in their containers. (Jones, 2011)</p>

Active Growth	<p>March: Shoot dormancy ends, as the seedling breaks through the ground</p> <p>April/May: Plants grow and become fully leafed out</p> <p>June: Plants begin to wither as temperature increases</p> <p>July: Shoots die back as drought conditions occur</p> <p>(COSEWIC, 2007)</p>
Length of Active Growth Phase	<p>Canary violets out in the field have an active growth phase of 5 months, lasting from March to July.</p> <p>(COSEWIC, 2007)</p>
Hardening Phase	<p>Information specific to <i>Viola praemorsa</i> is unavailable due to limited literature on the species. However, conclusions drawn from a similar Washington native violet, <i>Viola adunca</i>, suggest that a gradual reduction in nursery temperatures of 2.8°F every other week for a total of 6 weeks is necessary to successfully harden and prepare the plants for dormancy. Hardening should take place at least 8 weeks before the first frost of the year. The hardening phase can be extended by keeping the plants in a freezer until it is time to take them out of dormancy.</p> <p>Canary violets typically begin overwintering in August. During this phase, canary violets will shed their above ground material and subsist as a rhizome.</p> <p>(Bartow, 2014; Breen, 2014)</p>
Length of Hardening Phase	<p>Similar violets native to Washington take 6-12 weeks to harden. Generally, the hardening phase takes place after the growth phase ends in late July or early August.</p> <p>(Bartow, 2014)</p>
Harvesting, Storage and Shipping	<p>Violets are relatively delicate plants, and should be handled with care. Their leaves and non-woody tissues are easily damaged.</p> <p>(Bartow, 2014)</p>
Length of Storage	<p>Similar violets native to Washington can be stored in the nursery for years, as they are not a space-consuming species and do not need to be up potted into containers larger than 4” pots. Washington native violets can typically be planted 4 months after germination. It is also recommended that canary violets be outplanted before they grow to maturity, as their explosive seed capsules can infiltrate nearby plant pots.</p> <p>(Bartow, 2014)</p>
Guidelines for Outplanting / Performance on Typical Sites	<p>Canary violets establish well in conditions where they do not compete with other plants in the undergrowth. Canary violets will typically not flower until the second year of growth, where chasmogamous (cross pollinated) flowers open in April and cleistogamous (self-pollinated) flowers remain closed.</p> <p>(COSEWIC, 2007)</p>

Other Comments	<p><i>Viola praemorsa</i> is listed as an endangered species in Canada. However, it is not recognized as an endangered species in America. Collection of seeds from populations in America or Canada may be restricted due to laws protecting endangered species. (COSEWIC, 2007)</p>
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INFORMATION SOURCES

References	<p>Bartow, Amy. "Propagation Protocol for Early Blue Violet (<i>Viola Adunca</i> Sm. [Violaceae])." <i>Native Plants Journal</i>, Vol. 15. (2014)</p> <p>Breen, Shannon. "Restoration of the Yellow Montane Violet Population in Summit Park, Victoria, B.C." <i>University of Victoria</i>. (2014). Available online at: http://www.urbanecology.ca/documents/Student%20Technical%20Series/Breen.pdf</p> <p>CNPS. "Canary Violet, <i>Viola Praemorsa</i>." <i>California Native Plant Society</i>. (2014). Available online at: calscape.org/Viola-praemorsa-().</p> <p>Deno, Norman. "Seed Germination Theory and Practice." <i>United States Department of Agriculture, National Agricultural Library</i>. (1993). Available online: https://naldc.nal.usda.gov/download/41278/PDF</p> <p>Fairbarns, Matt. "COSEWIC Assessment and Update Status Report on the Yellow Montane Violet <i>Viola Praemorsa</i> Ssp. <i>Praemorsa</i> Subspecies in Canada." <i>COSEWIC</i>. (2007)</p> <p>Giblin, David. "<i>Viola Praemorsa</i>: Canary Violet." <i>WTU Herbarium Image Collection, Burke Museum</i>. (2018).</p> <p>Jones, Natalie. "The Effect of Warming on a Rare Plant, the Yellow Montane Violet (<i>Viola Praemorsa</i>)." <i>University of Guelph Canada, ProQuest Dissertations Publishing</i>. (2011).</p> <p>"Propagation Protocol for Production of Container (Plug) <i>Viola Praemorsa</i> Plants." <i>Reforestation, Nurseries and Genetics Resources</i>. (2018). Available online at: rngr.net/npn/propagation/protocols/violaceae-viola-4085.</p> <p>United States Department of Agriculture. "<i>Viola Praemorsa</i> Douglas ex Lindl. Canary Violet." <i>Natural Resources Conservation Service</i>. (2018) Available online at: https://plants.usda.gov/core/profile?symbol=VIPR3</p> <p>Williams, Rick; BJ, Stacey. "<i>Viola praemorsa</i>". Available online at: https://www.inaturalist.org/taxa/79516-Viola-praemorsa/browse_photos</p>
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Other Sources Consulted	<p>Rose, Robin, and Haase, Diane. "Propagation of Pacific Northwest Native Plants." <i>Oregon State University Press</i>. (1998)</p> <p>Forest, Jessica. "Pollen limitation and cleistogamy in subalpine <i>Viola praemorsa</i>." <i>Botany</i>, Vol. 86. (2008)</p> <p>Pojar, Jim. "Plants of the Pacific Northwest Coast." <i>Lone Pine Publishing</i>. (1994)</p>
Protocol Author	Victoria Fox
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