Plant Propagation Protocol for *Dactylorhiza viridis*
ESRM 412 – Native Plant Production
http://courses.washington.edu/esrm412/protocols/DAVI6.pdf
Spring 2015

North America Distribution

Washington Distribution

Source: USDA PLANTS Database[6]

TAXONOMY	
Plant Family	
Scientific Name	Orchidaceae
Common Name	Orchid Family
Species Scientific Name	
Scientific Name	*Dactylorhiza viridis* (L.) R.M Bateman, A.M. Pridgeon & M.W. Chase
Varieties	
Sub-Species	*Coeloglossum viride* (L.) Hartm. subsp. *bracteatum* (Muhl. ex Willd.) Hultén
Cultivar	
Common Synonym(s)	*Coeloglossum viride* (L.) Hartman *Coeloglossum bracteatum* (Muhl. ex Willd.) Parl. *Habenaria viridis* (L.) R. Br. *Coeloglossum viride* (L.) Hartm. var. *islandicum* (Lindl.) M. Schulze

	Coeloglossum viride (L.) Hartm. var. *virescens* (Muhl. ex Willd.) Luer *Coeloglossum viride* (L.) Hartm. var. *viride* *Habenaria viridis* (L.) R. Br. var. *bracteata* (Muhl. Ex Willd). *Habenaria viridis* (L.) R. Br. var. *bracteata* (Muhl. ex Willd.) Rchb. ex A. Gray *Habenaria viridis* (L.) R. Br. var. *interjecta* Fernald
Common Name(s)	Longbract frog orchid, Longbract green orchid
Species Code (as per USDA Plants database)	DAVI6
GENERAL INFORMATION	
Geographical range	Native to Eurasia, Canada, United States from Alaska to North Carolina. See maps above for distribution in North America and Washington State. [1,6]
Ecological distribution	Due to wide distribution range over North America and Europe *Dactylorhiza viridis* has broad environmental tolerance from moist to wet coniferous forests, hardwood forests, tundra, prairies, meadows, thickets, coastal heaths, bogs, and open shorelines.[4,6] Often found growing beneath small shrubs and along roadsides and trails.
Climate and elevation range	1170 – 1340 m (3840 – 4400 ft)[2]
Local habitat and abundance	The only known population of this orchid in Washington State is found in Okanogan County consisting of 15 mature plants.[2,3] Washington Heritage Program has listed this orchid as Threatened, likely to become endangered within the near future in Washington if the factors contributing to population decline or habitat loss continue.[5] Associated species include Engelmann spruce (*Picea engelmannii*), Sitka alder (*Alnus viridis*), Quaking Aspen (*Populas tremuloides),* Snowberry (Symphoricarpos albus) and pinegrass (*Calamagrostis rubescens*).[5] Threats include livestock grazing and timber management practices.[5]
Plant strategy type / successional stage	Seral

7 Plant characteristics	 Photo citation: USDA PLANTS Database[6] Forb/Herbaceous, Perennial 6 – 80 cm tall depending upon region, 2-3 leaves alternately positioned along hairless stem.[2,9] Flowers June and July in most areas but well into August at higher elevations.[1,2] Inconspicuous plants frequently found growing under and around small woody vegetation or nested in alpine grasses and sedges. Green flowers often suffused with purple especially in exposed areas.[1] Fruits are ellipsoid capsules 7-14 mm long containing dust sized seeds [5,9] A research study in the Netherlands discovered this orchid is pollinated by wasps and small beetles. Reproduction is primarily by seed rather than vegetative. This orchid is a short lived terrestrial species, living between 1-2.4 years. The short life span prompts seedlings to reach mature flowering stage during first year of growth.[10]

PROPAGATION DETAILS

Ponert, J., Vosolsobˇe, S., Kmecová, K. & Lipavská, H. (2011).European orchid cultivation – from seed to mature plant. *European Journal of Environmental Sciences* 1: 95–107.[7]

Notes: The research paper cited above conducted germination protocols on several species within *Dactylorhiza* genus. Due to low germination rate of seeds, researchers were not able to grow *Dactylorhiza viridis* mature plants. Their attempts to grow other species from *Dactylorhiza* genus from seed to mature plants were successful.

Ecotype	Terrestrial
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container

Stock Type	
Time to Grow	12+ months
Target Specifications	The purpose of the experiment was to attempt to grow mature *Dactylorhiza viridis* plants from collected seed stock.[7]
Propagule Collection Instructions	Whole seedpods were collected from mature plants in Montenegro, specific date was not noted in article. After collection, seeds were stored in paper bags in dark and dry conditions at room temperature.[7]
Propagule Processing/Propagule Characteristics	No description of seed characteristic in article.[7]
Pre-Planting Propagule Treatments	After drying seeds were separated from pod residues and impurities and stored again in paper bags in dark, dry conditions at room temperature until sowing. Seeds were sterilized with 70% ethanol solution then rinsed with distilled water. After rinsing seeds were soaked in a 5% $Ca(OCl)_2$ for 10 minutes. Several hundred seeds were sowed in petri dishes containing an in-vitro medium of Michl-15 and stored in dark location at 23 degrees C until protocorms developed. The in-vitro medium did not contain glucose due to inhibitory effect and seed germination of some orchid species.[7]
Growing Area Preparation / Annual Practices for Perennial Crops	For *Dactylorhiza viridis* only 1% of seeds germinated and these seeds did not reach maturity. Other species within *Dactylorhiza* genus reached maturity. *Dactylorhiza* genus seeds remained in petri dishes until seedlings developed 2-7 mm protocorms, then transplanted into Erlenmayer flasks. After period of 3-12 months when seedlings exceed flask capacity seedlings outplanted into plastic pots with peat and pumice substrate.
Establishment Phase Details	No description in article.[7]
Length of Establishment Phase	N/A
Active Growth Phase	N/A
Length of Active Growth Phase	N/A
Hardening Phase	N/A
Length of Hardening Phase	Mature *Dactylorhiza* genus plants were cultivated in glasshouse under same conditions are mature wild plants.
Harvesting, Storage and Shipping	*Dactylorhiza viridis* plants are not currently propagated for retail as the inconspicuous, non-showy flowers have no appeal for consumers.
Length of Storage	N/A
Guidelines for Outplanting / Performance on	N/A

Other Comments	Terrestrial orchid species are difficult to germinate because the tiny seeds provide no support for embryos.[8] Seedlings rely on mycorrhizal fungi for carbohydrates and nutrients.[8] The symbiotic relationship with mycorrhizal fungi makes it difficult to reliably germinate *Dactylorhiza viridis* seeds.[8]
INFORMATION SOURCES	
References	See Below
Other Sources Consulted	See Below
Protocol Author	Jacqueline Watts
Date Protocol Created or Updated	April 11, 2015

References MLA Format:

[1]Brown, P. *Wild Orchids of the Pacific Northwest and Canadian Rockies*. University Press of Florida, 2006. Print.

[2]Flora of North America Editorial Committee. "*Flora of North America North of Mexico: Vol 26: Magnoliophyta: Liliidae: Liliales and Orchidales*" New York and Oxford, 2002. Print.

[3]"*Herbarium Specimens from the Pacific Northwest*" Consortium of Pacific Northwest Herbaria & Burke Museum of Natural History and Culture (2013). Web. Accessed 26, April 2015. http://www.pnwherbaria.org/index.php

[4]Hitchcock, C. & Cronquist, A. *Flora of the Pacific Northwest* University of Washington Press, 1973. Print

[5]*"List of Vascular Plants Tracked by Washington Natural Heritage Program"* Washington Department of Natural Resources. Web. Accessed 25, April 2015 http://www1.dnr.wa.gov/nhp/refdesk/lists/plantrnk.html

[6] "*Plant Profile*" USDA Natural Resources Conservation Service, Web. Accessed 26, April 2015 http://plants.usda.gov/core/profile?symbol=DAVI6

[7]Ponert, J., Vosolsobˇe, S., Kmecová, K. & Lipavská, H. (2011). "European orchid cultivation – from seed to mature plant". *European Journal of Environmental Sciences* 1: 95–107.

[8]Rasmussen, H. *Terrestrial Orchids: From Seeds to Mycotrophic Plants*. Cambridge University Press, 1995. Print.

[9]"*Vascular Plant Herbarium"* University of Alberta Museums (2015). Web. Accessed 11, April 2015. http://vascularplant.museums.ualberta.ca/details_species.aspx?key=4640

[10]Willems, J. H. & Melser, C. (1998) "Population Dynamics & Life History of *Coeloglossum viride* (L.) Hartm.: An Endangered Orchid Species in the Netherlands" *Botanical Journal of the Linnean Society* 126:83-93

Other Sources Consulted (but that contained no pertinent information):

Chalker-Scott, L. "*Washington's Native Orchids*" Master Gardener (2008). Web. Accessed 25, April 2015. http://www.wanativeorchids.com/MasterGarderners2008.pdf

Fay, M. F., Sayers, B. and Taylor, I. (2015), "DACTYLORHIZA VIRIDIS." *Curtis's Botanical Magazine*, 32: 33–41