Plant Propagation Protocol for *Moneses uniflora*
ESRM 412 – Native Plant Production
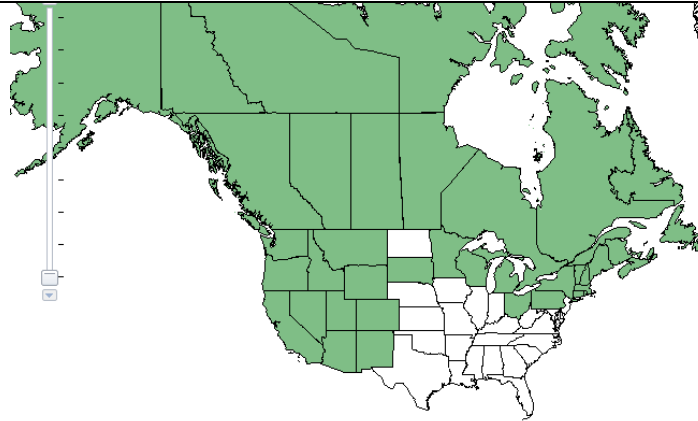Protocol URL: https://courses.washington.edu/esrm412/protocols/MOUN2.pdf

Image: Jack Armstrong, 2015, Mount Baker-Snoqualmie National Forest

TAXONOMY	
Plant Family	
Scientific Name	Pyrolaceae[11]
Common Name	Wintergreen
Species Scientific Name	
Scientific Name	*Moneses uniflora* (L) A. Gray[11]
Varieties	N/A
Sub-species	N/A
Cultivar	N/A
Common Synonym(s)	*Moneses uniflora* subsp. *reticulata* Calder & Roy L. Taylor[11] *Moneses uniflora* var. *reticulata* S.F. Blake[11] *Pyrola uniflora* L.[11]
Common Name(s)	single delight[9],wax-flower[9], one-flowered wintergreen[9], st. olaf's candlestick[6],wood nymph[6], shy maiden[6]
Species Code (as per USDA Plants database)	MOUN2[11]

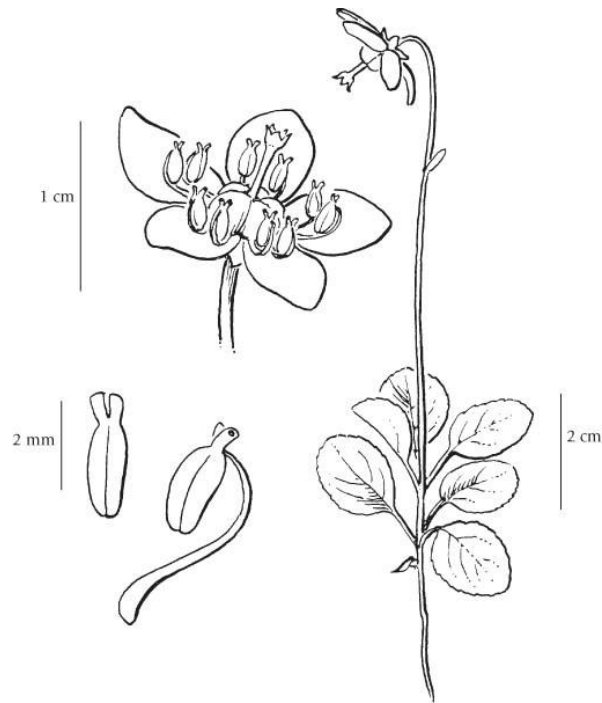| GENERAL INFORMATION	
Geographical range	North American Distribution[11] Washington Distribution[11] Globally, distributed through most of the temperate northern hemisphere in moist coniferous forests.[2]
Ecological distribution	Found on the humus rich floor of moist conifer forests at low to mid elevations in the northern hemisphere.[9] Shade tolerant.[9]
Climate and elevation range	Low to mid elevations found at maximum elevations of 2500 meters.[5] Circumboreal.[5]
Local habitat and abundance	Moist, moss covered coniferous forest floor.[9]
Plant strategy type / successional stage	Mid to late successional stage.[10]
Plant characteristics	Perennial evergreen forb with narrow creeping rhizome. Single flowering stem of 3-17 cm in height.[9] The evergreen leaves are primarily basal but can be opposite or grown as whorls of 3.[9] A single fragrant, white, waxy, flower is produced annually with diameter of 1.5-2.5 cm.[9] The flower is comprised of 5 pedals, 10
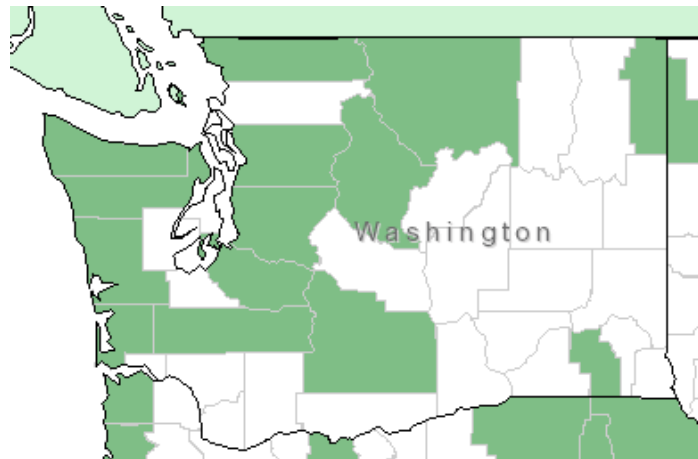
stamens, and a large style and stigma.[9] The single flower nods atop a leafless stalk with 1 or 2 bracts midlength.[9] Fruit capsule is 5-celled and 6-7 mm thick.[9]

Moneses uniflora
Source 3. Douglas (2001)

PROPAGATION DETAILS: Seed

Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container
Stock Type	N/A
Time to Grow	6-9 months
Target Specifications	3-17 cm tall
Propagule Collection Instructions	Flowering from May through August, collection of seeds occurs in Fall.[6]
Propagule Processing/Propagule Characteristics	N/A
Pre-Planting Propagule Treatments	Little information is available on the treatment of seed, though a dormancy period seems logical as this species inhabits climates that experience mild to severe winters.[8]
Growing Area Preparation / Annual Practices for Perennial Crops	Moist, sandy, slightly acidic soils that hold water well through dry periods.[7] A mycorrhizal association is required to grow, thus soil from the collection site is typically required.[7]

Establishment Phase Details	Plant seed in September with soil collected at the seed source.[7] Cover the seed with a thin layer of soil, litter collected at the seed source and vermiculite or fine grit.[7] Place the pot in a cold glasshouse and provide additional light for short low light days.[7]
Length of Establishment Phase	N/A
Active Growth Phase	N/A
Length of Active Growth Phase	N/A
Hardening Phase	Transfer pots from the cold greenhouse to a cold frame, open during the day and closed at night to harden-off.[7]
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	N/A
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	Though not threatened, this species is not overly abundant. Take care not to overharvest local populations. Pacific Northwest tribes have brewed teas from the vegetative parts of the plant for different ailments.[9] Moneses, from the Greek words monos (one) and hesia (delight).[9]
PROPAGATION DETAILS Vegetative	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Vegetative
Product Type	Container
Stock Type	N/A
Time to Grow	N/A
Target Specifications	3-17 cm tall
Propagule Collection Instructions	In Fall or early Spring divide wild plants with a small spade by severing a rhizome.[4] Remove the entire daughter plant and the soil to its deepest roots to ensure mycorrhizal relationships.[7]
Propagule Processing/Propagule Characteristics	N/A
Pre-Planting Propagule Treatments	N/A
Growing Area Preparation / Annual	Moist, sandy, slightly acidic soils that hold water well through dry periods.[7] A mycorrhizal association is required to grow, thus soil

Practices for Perennial Crops	from the collection site is typically required.[7] Transplant the daughter plant into its own container.
Establishment Phase Details	Place the pot in a shady cold frame.[7] This daughter plant will establish and produce rhizomes of its own to create further daughter plants.[4]
Length of Establishment Phase	N/A
Active Growth Phase	N/A
Length of Active Growth Phase	6-9 months
Hardening Phase	Transfer pots from the cold greenhouse to a cold frame, open during the day and closed at night to harden-off.[7]
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	Harvesting of daughter plants will occur just as the collection of the mother plant. Divide the new daughter plants by cutting the thin rhizome connecting beneath the soil.[4]
Length of Storage	
Guidelines for Outplanting / Performance on Typical Sites	Plant in moist, shady to partial sun location.[8]
Other Comments	Though not threatened, this species is not overly abundant. Take care not to overharvest local populations. Pacific Northwest tribes have brewed teas from the vegetative parts of the plant for different ailments.[9] Moneses, from the Greek words monos (one) and hesia (delight).[9]
INFORMATION SOURCES	
References	[1]Burke Museum of Natural History and Culture [Online]. *Moneses uniflora.* Available: http://biology.burke.washington.edu/herbarium/ imagecollection.php?Genus=Moneses&Species=uniflora, Accessed: April, 21, 2016. [2]California Native Plant Society [Online]. Woodnymph, *Moneses uniflora* Available : http://calscape.org/Moneses-uniflora-(Woodnymph)?srchcr=sc5720e15ca9830, Accessed April 21, 2016 [3]Douglas, G.W., D.V. Meidinger, and J. Pojar (editors). 1999. *Illustrated Flora of British Columbia. Volume 4: Dicotyledons (Orobanchaceae Through Rubiaceae).* B.C. Ministry of Environment, Lands & Parks and B.C. Ministry of Forests. Victoria. 427 p.

[1]Burke Museum of Natural History and Culture [Online]. *Moneses uniflora.* Available: http://biology.burke.washington.edu/herbarium/ imagecollection.php?Genus=Moneses&Species=uniflora, Accessed: April, 21, 2016.

[2]California Native Plant Society [Online]. Woodnymph, *Moneses uniflora* Available : http://calscape.org/Moneses-uniflora-(Woodnymph)?srchcr=sc5720e15ca9830, Accessed April 21, 2016

[3]Douglas, G.W., D.V. Meidinger, and J. Pojar (editors). 1999. *Illustrated Flora of British Columbia. Volume 4: Dicotyledons (Orobanchaceae Through Rubiaceae).* B.C. Ministry of Environment, Lands & Parks and B.C. Ministry of Forests. Victoria. 427 p.

	[4]Dumroese, R. Kasten; Luna, Tara; Landis, Thomas D., 2009. Nursery Manual for Native Plants: A guide for Tribal Nurseries - Volume 1: Nursery Management. Agriculture Handbook 730. Washington, D.C.: U.S. Department of Agriculture, Forest Service. 302 p. [5]Klinkenberg, Brian, 2015. *E-Flora BC: Electronic Atlas of the Plants of British Columbia* [eflora.bc.ca.]. Available: http://linnet .geog.ubc.ca/Atlas/Atlas.aspx?sciname=Moneses%20uniflora. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver. Accessed: April 21, 2016. [6]Lady Bird Johnson Wildflower Center, The University of Texas at Austin [Online]. *Moneses uniflora.* Available: http://www.wildflower.org/plants/result.php?id_plant=MOUN2, Accessed: April 21, 2016. [7]Plant Network: The Plant Collections Network of Britain & Ireland [Online]. Available: http://plantnetwork.org/wordpress/wp-content /uploads/4714/moneunif.pdf, Accessed April 21, 2016. [8]Plants for a Future [Online]. Available: http://www.pfaf.org/ user/Plant.aspx?LatinName=Moneses+uniflora, Accessed: April 21, 2016 [9]Pojar J., McKinnon A., 2004 Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia and Alaska, B.C. Ministry of Forests and Lone Pine Publishing, Canada. [10]Steven W. Kembel and Mark R. T. Dale, 2006, Within-stand spatial structure and relation of boreal canopy and understorey vegetation**.** Journal of Vegetation Science, Vol. 17, Issue 6, 783-790. [11]USDA NRCS Plants Database [Online], Available: http://plants.usda.gov/core/profile?symbol=MOUN2, Accessed April 21, 2016.
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	Integrated Taxonomic Information System [Online]. *Moneses uniflora.* Available: http://www.itis.gov/servlet/SingleRpt/Single Rpt?search_topic=TSN&search_value=503869, Accessed: April 21, 2016.
	Online Atlas of the British & Irish Flora [Online]. Available: http://www.brc.ac.uk/plantatlas/index.php?q=plant/moneses-uniflora, Accessed: April 21, 2016
	Rose, Robin, Chachulski, Caryn E.C., Haase, Diane L., 1998, Propagation of Pacific Northwest Native Plants. Oregon State University Press, 256 p.
Protocol Author	Jack Armstrong
Date Protocol Created or Updated	05/25/2016

Image: Jack Armstrong, 2011, Valdez, Alaska