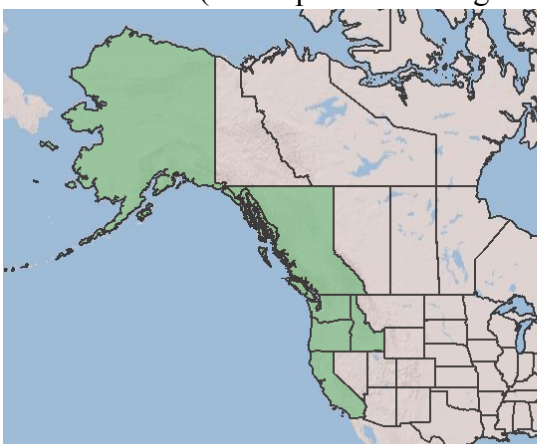
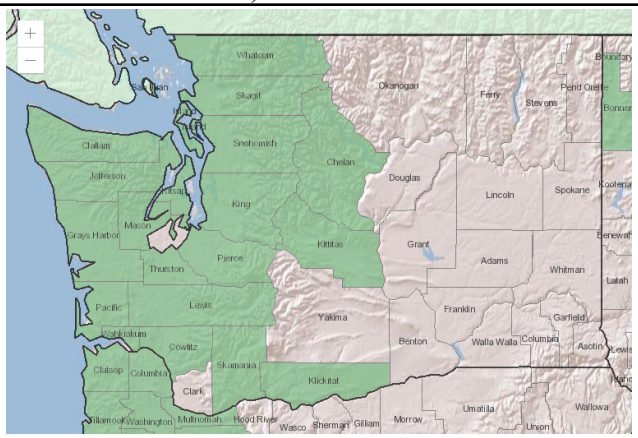
Plant Propagation Protocol for *Maianthemum dilatatum*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/*2021*/*MADI*

Photo from USDA plant database

TAXONOMY	
Plant Family	
Scientific Name	Liliaceae
Common Name	Lily family
Species Scientific Name	
Scientific Name	*Maianthemum dilatatum* (Alph. Wood) A. Nelson & J.F. Macbr. (US Department of Agriculture)
Varieties	None
Sub-species	None
Cultivar	None
Common Synonym(s)	*Maianthemum bifolium* (L.) F.W. Schmidt var. *kamtschaticum* (J.F. Gmel. ex Cham.) Trautv. & C.A. Mey. *Maianthemum bifolium* (L.) F.W. Schmidt ssp. *kamtschaticum* (J.F. Gmel. ex Cham.) A.E. Murray *Maianthemum kamtschaticum* (J.F. Gmel. ex Cham.) Nakai

Common Name(s)	False lily of the valley, two-leaf Solomon Seal
Species Code (as per USDA Plants database)	MADI
GENERAL INFORMATION	
Geographical range	Found throughout Western North America, including Alaska, British Columbia, Washington, Oregon, Idaho, and California. (US Department of Agriculture) 
Ecological distribution	Grows in forested ecosystems and can tolerate full to partial shade. Often grows in riverside areas where soil is moist (Plants for a Future, Pojar and McKinnon 103).
Climate and elevation range	Temperate climates, low to middle elevations (Pojar and McKinnon 103)
Local habitat and abundance	 Abundant in counties west of Chelan, Kittitas, and Klickitat Counties in Washington. May be found with *Asarum caudatum* (wild ginger), *Heuchera micrantha* (crevice alumroot), and ferns such as *Polystichum munitum* (western sword fern) (US Department of Agriculture, California Native Plant Society).
Plant strategy type / successional stage	Since this species requires some shade, it is most productive in seral or late successional forest. It also

	spreads via rhizomes (Washington Native Plant Society).
Plant characteristics	Forb/herb. Perennial. Grows to between 4-14 inches in height. Alternate, heart-shaped leaves. Produces white flowers and small, spherical berries (US Department of Agriculture, Washington Native Plant Society, Lady Bird Johnson Wildflower Center).
PROPAGATION DETAILS Seed germination characteristics of Maianthemum dilatatum (Wood) Nels. et Macbr. (Kawano et al., 2020)	
Ecotype	Seeds collected on October 2, 2005 in Higashikawa-town, Kamikawa-gun, Hokkaido.
Propagation Goal	Germination
Propagation Method	Seed
Product Type	Seedlings
Stock Type	Seeds
Time to Grow	Not applicable
Target Specifications	Not applicable
Propagule Collection Instructions	Seeds were collected in early October
Propagule Processing/Propagule Characteristics	Seeds were incubated for 0-9 months
Pre-Planting Propagule Treatments	Highest germination rates occurred for seeds that were placed in cold stratification at 5 degrees C for 2 months in a moist environment.
Growing Area Preparation / Annual Practices for Perennial Crops	Seeds were germinated in growth chambers on wet filter paper in a dark environment.
Establishment Phase Details	After cold stratification, seeds could germinate at 25 degrees C.
Length of Establishment Phase	Seeds took 1 month to germinate after 2 months of cold stratification.
Active Growth Phase	Not applicable.
Length of Active Growth Phase	Not applicable.
Hardening Phase	Not applicable.
Length of Hardening Phase	Not applicable.
Harvesting, Storage and Shipping	Not applicable.
Length of Storage	Not applicable.
Guidelines for Outplanting / Performance on Typical Sites	Not applicable.
Other Comments	None
PROPAGATION DETAILS (Plants for a Future)	
Ecotype	No information found
Propagation Goal	Plants
Propagation Method	Seed

Product Type	Container
Stock Type	Seeds
Time to Grow	2.5 years
Target Specifications	No information found
Propagule Collection Instructions	No information found
Propagule Processing/Propagule Characteristics	No information found
Pre-Planting Propagule Treatments	No information found
Growing Area Preparation / Annual Practices for Perennial Crops	Sow seeds thinly in a flat
Establishment Phase Details	No information found
Length of Establishment Phase	Up to 18 months
Active Growth Phase	Pot seedlings up to individual pots; provide liquid fertilizer
Length of Active Growth Phase	1 year
Hardening Phase	No information found
Length of Hardening Phase	No information found
Harvesting, Storage and Shipping	No information found
Length of Storage	No information found
Guidelines for Outplanting / Performance on Typical Sites	“Larger clumps” can be outplanted in the spring
Other Comments	None
INFORMATION SOURCES	
References	California Native Plant Society. “False Lily of the Valley.” Calscape, https://calscape.org/loc-California/Maianthemum-dilatatum-(False-Lily-Of-The-Vally)?srchcr=sc5fc711db41f12. Eflora. “False Lily-of-the-Valley - Maianthemum dilatatum.” eflora.net, https://eflora.neocities.org/Maianthemum%20dilatatum.html. Kawano, Hitomi, et al. “Seed Germination Characteristics of Maianthemum Dilatatum (Wood) Nels. et Macbr. (Asparagaceae).” Plant Species Biology, vol. 35, no. 1, 2020, pp. 38–48, doi:10.1111/1442-1984.12258. Lady Bird Johnson Wildflower Center. “Maianthemum dilatatum.” Plant database, https://www.wildflower.org/plants/result.php?id_plant=madi. Plants for a Future. “Maianthemum dilatatum - (Wood.)Nels.&MacBr.” Plants for a Future, https://pfaf.org/user/Plant.aspx?LatinName=Maianthemum+dilatatum#:~:text=Seed%20%2D%20best%

	20sown%20quite%20thinly,should%20germinate%20in%20the%20spring.&text=Larger%20clumps%20can%20be%20replanted,them%20out%20in%20the%20spring. Pojar, Jim, and Andrew McKinnon. Plants of the Pacific Northwest Coast. Auburn, Washington, Lone Pine Publishing, 1994. US Department of Agriculture. "Maianthemum dilatatum (Alph. Wood) A. Nelson & J.F. Macbr." USDA Plants Database, https://plants.usda.gov/home/plantProfile?symbol=MADI. Washington Native Plant Society. "Maianthemum dilatatum." Native Plants Directory, https://www.wnps.org/native-plant-directory/160-maianthemum-dilatatum.
Other Sources Consulted	Hermy, Martin, et al. "Consequences of Prolonged Clonal Growth on Local and Regional Genetic Structure and Fruiting Success of the Forest Perennial Maianthemum Bifolium." *Oikos*, vol. 1, no. June 2005, 2006, pp. 21–30. Lezberg, A. L., et al. "Clonal Development of Maianthemum Dilatatum in Forests of Differing Age and Structure." *Canadian Journal of Botany*, vol. 79, no. 9, 2001, pp. 1028–38, doi:10.1139/cjb-79-9-1028. Lezberg, Ann L., et al. "Belowground Traits of Herbaceous Species in Young Coniferous Forests of the Olympic Peninsula, Washington." *Canadian Journal of Botany*, vol. 77, no. 7, 1999, pp. 936–43, doi:10.1139/b99-056. Nivot, Nathalie, et al. "Vegetative Propagation of Five Northern Forest Understory Plant Species from Either Rhizome or Stem Sections." *HortScience*, vol. 43, no. 5, 2008, pp. 1531–37, doi:10.21273/hortsci.43.5.1531
Protocol Author	Alyson Bergomi
Date Protocol Created or Updated	5/4/2021

Template - Plant Propagation Protocol
ESRM 412 – Native Plant Production
JD Bakker
Spring 2007

TAXONOMY	
Family Names	
Family Scientific Name:	*Liliaceae*
Family Common Name:	Lily
Scientific Names	
Genus:	*Maianthemum*
Species:	*Dilatatum*
Species Authority:	(Wood) Nelson and McBride
Common Synonym(s)	
Genus, Species, and Species Authority	*M. bifolium ssp. kamtschaticum* (J.F. Gmel. ex Cham.) E. Murr. *M. bifolium var. kamtschaticum* (J.F. Gmel. ex Cham.) Trautv. & C.A. Mey *M. kamtschaticum*(J.F. Gmel. ex Cham.) Nakai
Species Code (as per USDA Plants database):	MADI
GENERAL INFORMATION	
General Distribution (geographical range (states it occurs in), ecosystems, etc):	Western North American forb, distributed more in the Pacific than the Cordilleran region. Occurs in cool mesothermal climates on very moist to wet nitrogen rich soils. Characteristic of alluvial floodplain forests. (Klinka et al, 1989) Alaska to northern California, east through British Columbia and northern Idaho. (Was recently excluded from the Yukon, Alaska flora. (Cody et al, 2003) Disjunct population occurs in Asia on the Kamtchatka peninsula in E. Russia to Japan. (Flora of N. America website)
Climate and elevation range	Submontane to sub alpine. It's occurrence decreases with increasing elevation and continentality. (Klinka et al, 1989)
Local habitat and abundance; may include commonly associated species	Scattered to plentiful in coniferous and broad-leaved forests on water-receiving and water collecting sites. Commonly found on stream edge sites, flood plains, and sites affected by ocean spray. Grows with *Blechnum spicant, Polystichum munitim, Tiarella trifoliata, Troutvetteria caroliniensis, and Lysichiton americanum*. (Klinka et al, 1989)
Plant strategy type / successional stage	Aggressive carpeter. (Krukeberg, 1982) Clonal rhizomatous herb which can form large patches of continuous cover. (Wilson et al, 2005)
PROPAGATION DETAILS	
Propagation Goal:	plants
Propagation Method :	Seed or vegetative
Product Type :	container
Stock Type:	plug

Time to Grow :	Seed: Two years (Potash and Aubry, 1997) Vegetative: one growing season
Target Specifications :	Product should have own root system and at least one leaf.
Propagule Collection (how, when, etc):	Seed: Berries mature from late July-September. Watch for the disappearance of green color from stem end. Propagaiton from seed would be desirable if genetic diversity is sought, i.e. in a restoration setting. Although the plant is clonal, studies have shown that it is still possible to collect seed from a relatively limited population and still achieve some measure of genetic diversity in your collection. "Within *M. dilatatum* populations, clonality is a significant factor, but the spatial structuring of genetic variation suggests that both low levels of restricted gene flow and repeated recruitment of genets occur." (Wilson et al, 2005) Rhizomes: Collect rhizomes in the fall before the deciduous leaves disappear for the season, making the plants impossible to find. (Potash and Aubry, 1997)
Propagule Processing/Propagule Characteristics :	Seed: Berries are shiny and brownish yellow with red mottling. (Potash and Aubry, 1997) Seed is comparatively small – usually about 2mm across and it's embryo is at least half the length of the seed. (Martin and Barkley, 1961)
Pre-Planting Propagule Treatments :	Rhizomes: Cut rhizomes into sections, making sure each section has roots or root buds. (Potash and Aubry, 1997)
Growing Area Preparation / Annual Practices for Perennial Crops	Rhizomes: Plant horizontally with roots down, in pots, flats, or at site. (Potash and Aubry, 1997)
Establishment Phase (from seeding to germination):	Seeds: Whole seed is planted in flats, containers, or directly on site, and left outside in natural ambient conditions. (Potash and Aubry, 1997) Cold-Warm-Cold-Warm stratification is necessary to break both root and epicotyl dormancy. (Baskin and Baskin, 1998) (Schollmeyer, pers. comm.) Rhizomes: the above ground portion of the plant dies back after dividing or salvaging due to the deep roots are easily damaged. They usually grow back in the second year. (Leigh, 1999)
Length of Establishment Phase:	Seed: emerges two years after planting
Active Growth Phase :	One growing season
Length of Active Growth Phase:	
Hardening Phase :	
Length of Hardening Phase:	
Harvesting, Storage and Shipping:	
Length of Storage :	
Guidelines for Outplanting	Each stalk comes from and underground system of vigorous

/ Performance on Typical Sites	horizontal stems. A single plant can, in time, produce hundreds of above ground triads of two leaves and one flower cluster. (Krukeberg, 1982)
INFORMATION SOURCES	
References:	Baskin, C.C. and J.M. Baskin 1998. *Seeds: Ecology, Biogeography, and evolution of dormancy and germination*. Academic Press, San Diego, CA Cody, W.J., C.E. Kennedy, B. Bennett, J. Staniforth. *New Records of Vascular Plants in the Yukon Territory*. Canadian Field-Naturalist. 117(2):278-301 Apr-Jun 2003 Flora of N. America webite. www.efloras.org/flora_page.aspx?flora_id=1 (Accessed 05/07/2007) Klinka, K., V.J. Krajina, A. Ceska, and A.M. Scagel. 1989 *Indicator Plants of Coastal British Colombia.* University of British Colombia Press, Vancouver BC. Kruckeberg, A. 1982. *Gardening with Native Plants of the Pacific Northwest.* University of Washington Press. Seattle, WA. Leigh, M. 1999 *Grow your own Native Landscape; a guide to identifiying, propagating, and landscaping with western Washington native plants*. 2nd edition. Washignton State University Extension Press Martin, A.C. and W.D. Barkley. 1961. *Seed Identification Manual*. University of California Press. Berkely, CA Native plant materials webpage from USDA Forest Service Celebrating Wildflowers website. http://www.fs.fed.us/wildflowers/nativeplantmaterials/index.shtml (Accessed 05/07/07) Schollmeyer, Jeanne. Senior Gardener and manager, Atlantic City Nursery. Seattle Parks and Recreation. Personal communication Wilson ASG, B.J. VanderKamp and C. Ritland. *Spatial genetic and clonal structure in Maianthemum dilatatum as defined by AFLP markers*. Canadian Journal of Botany 83 (9) 1126-1132 Sep 2005
First Name of Author:	Katie
Last Name of Author:	Pencke
Date Entered or Updated :	05/08/2007