

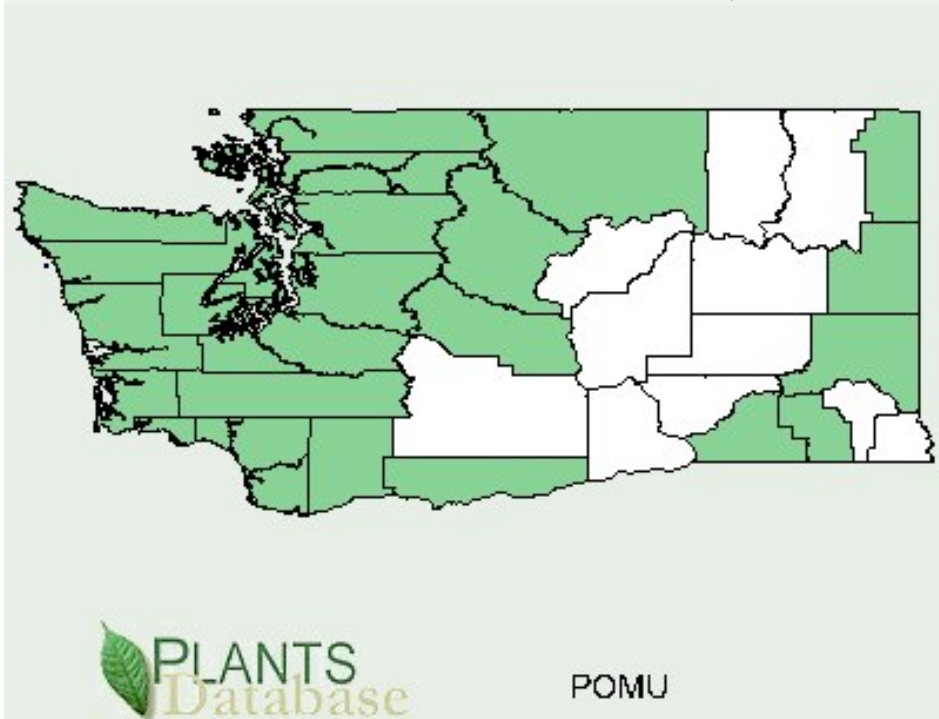
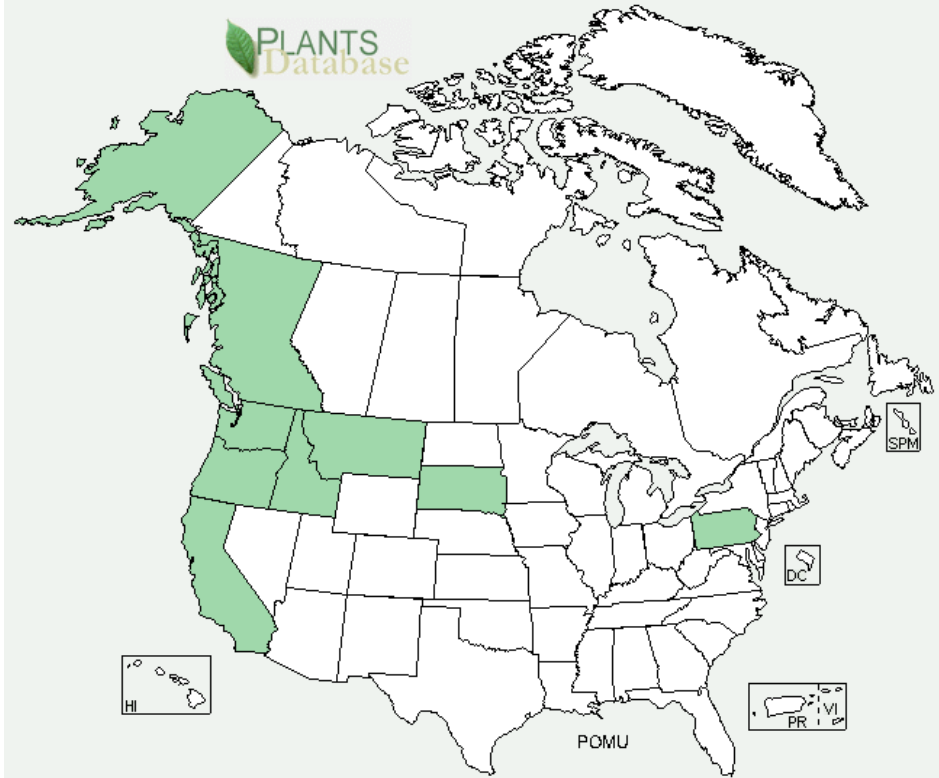


<http://www.beatymuseum.ubc.ca/herbarium/prints/printPmunitum.jpg>

**Plant Propagation Protocol for *Polystichum munitum* (western swordfern)**  
ESRM 412 – Native Plant Production

<b>TAXONOMY</b>	
Family Names	
Family Scientific Name:	Dryopteridaceae
Family Common Name:	Wood Fern Family <sup>1</sup>
Scientific Names	
Genus:	<i>Polystichum</i> Roth
Species:	<i>P. munitum</i>
Species Authority:	(Kaulf.) C. Presl
Variety:	NA
Sub-species:	<u>curtum</u> , <u>imbricans</u> , <u>munitum</u> , <u>nudatum</u> , <u>imbricans</u> , <u>incisoserratum</u> <sup>3</sup>
Cultivar:	NA
Authority for Variety/Sub-species:	NA
Common Synonym(s) (include full scientific names (e.g., <i>Elymus glaucus</i> Buckley), including variety or subspecies information)	<i>Polystichum munitum</i> (Kaulfuss) K. Presl <i>incisoserratum</i>
Common Name(s):	Western Swordfern <sup>1</sup> , Common Sword Fern <sup>1</sup> , Western Sword Fern <sup>3</sup> , Pineland Swordfern <sup>6</sup> , Giant Holly Fern <sup>9</sup>
Species Code (as per USDA Plants database):	POMU
<b>GENERAL INFORMATION</b>	

Geographical range  
(distribution maps for North America and Washington state)



<http://plants.usda.gov/maps/large/PO/POMU.png>

Grows along the west coast from southeastern Alaska to Santa Barbara County, California, and eastward through Washington and northern Idaho into northwest Montana. Disjunct populations have been found in South Dakota and on Guadalupe Island off Baja California.<sup>1, 5</sup>

Ecological distribution (ecosystems it occurs in, etc):	Terrestrial, coniferous forest floor, mixed evergreen forests, shrubby or grass spaces, and at higher elevations growing among rocks. Also, occasionally found in wetlands. <sup>6, 8</sup>
Climate and elevation range	Moist forest, Western sword fern grows from sea level to mid-elevations in the mountains throughout its range, primarily below 2500 feet elevation. <sup>1, 2</sup>
Local habitat and abundance; may include commonly associated species	Can be found extensively in Western Washington and one of the most abundant ferns in the western flora; It is also extensively used in landscaping with the trade being mainly in wild-collected plants. <sup>1</sup>
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	Facultative Seral Species <sup>4</sup>
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	Fern
<b>PROPAGATION DETAILS</b>	
Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	Muir Woods, California <sup>10</sup>
Propagation Goal (Options: Plants, Cuttings,	Plants <sup>10</sup>

Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	
Propagation Method (Options: Seed or Vegetative):	Seed (spores) <sup>10</sup> Division: Sword ferns may be divided in spring if the rhizome is large and the roots are well developed in the Spring. <sup>4</sup>
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container (plug) <sup>10</sup>
Stock Type:	4 inch pots <sup>10</sup>
Time to Grow (from seeding until plants are ready to be outplanted):	2 Years <sup>10</sup>
Target Specifications (size or characteristics of target plants to be produced):	Height: N/A Caliper: N/A Root System: Firm plug in container <sup>10</sup>
Propagule Collection (how, when, etc):	Spores are collected between June 1st and August 30th. Mature spores are brown and are collected when the indusium folds back. <sup>10</sup>
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	Spore Cleaning: All chaff must be carefully cleaned from the spores. Storage Conditions: Spores are kept dry and stored in a refrigerator. <sup>10</sup> Spore viability highly variable, usually low after 1 year. <sup>4</sup> Store spores in glassine envelopes or in packets or waxed paper. Store packets in 1-4 degrees C, in moisture-tight and air-tight containers. <sup>5</sup>

Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	No dormancy breaking requirements. <sup>5</sup> Carefully sterilize growing media, flats and flat coverings before sowing spores. <sup>10</sup>
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	Greenhouse. Spores are sown on petri plates with distilled water and sealed in a sterile ziplock bag. <sup>10</sup>
Establishment Phase (from seeding to germination):	After spores germinate, the prothalli are placed on sterile 3:1 Peat/Perlite mix in rectangular flats. Flats are covered with glass to seal in moisture. Water only with distilled water. <sup>10</sup>
Length of Establishment Phase:	NA
Active Growth Phase (from germination until plants are no longer actively growing):	Once fertilization occurs and the developing sporophytes at least 1 true leaf, they are potted into individual containers (2 or 4 inch) containing standard potting mix of peat moss, fir bark, perlite, and sand. Plants should be grown in shade. <sup>10</sup>
Length of Active Growth Phase:	Evergreen, fast growing/ spreading. <sup>4</sup>
Hardening Phase (from end of active growth phase to end of growing season; primarily related to the development of cold-hardiness and preparation for winter):	Plants grown from spores should be 1.5-2 years old before planting to ensure survival. <sup>5</sup>
Length of Hardening Phase:	NA
Harvesting, Storage and	NA

Shipping (of seedlings):	
Length of Storage (of seedlings, between nursery and outplanting):	NA
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	Recommended planting density 18-24 in. Average Water Needs; Water regularly; do not overwater. Soil pH 6.1 to 6.5 (mildly acidic). <sup>5</sup>
Other Comments (including collection restrictions or guidelines, if available):	NA
<b>INFORMATION SOURCES</b>	
References (full citations):	<ol style="list-style-type: none"> <li>1. Pojar, Jim, A. MacKinnon, and Paul B. Alaback. <i>Plants of the Pacific Northwest coast: Washington, Oregon, British Columbia &amp; Alaska</i>. Redmond, Wash.: Lone Pine Pub., 1994. Print.</li> <li>2. " Calflora: Polystichum munitum ." <i>Calflora - Search for Plants</i>. N.p., n.d. Web. 20 Apr. 2011. &lt;<a href="http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=6793">http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=6793</a>&gt;.</li> <li>3. Houston, M., student in Geography 316, and Fall 2000. "Biogeography of swordfern (Polystichum munitum)." <i>redirect</i>. N.p., n.d. Web. 20 Apr. 2011. &lt;<a href="http://bss.sfsu.edu/geog/bholzman/courses/Fall00Projects/swordfern.html">http://bss.sfsu.edu/geog/bholzman/courses/Fall00Projects/swordfern.html</a>&gt;.</li> <li>4. Jones, David Lloyd. <i>Encyclopaedia of ferns: an introduction to ferns, their structure, biology, economic importance, cultivation, and propagation</i>. Portland, Or.: Timber Press, 1987. Print.</li> <li>5. Kruckeberg, Arthur R.. <i>Gardening with native plants of the Pacific Northwest: an illustrated guide</i>. Seattle: University of Washington Press, 1982. Print.</li> <li>6. "PLANTS Profile for Polystichum munitum (western swordfern)   USDA PLANTS." <i>Welcome to the PLANTS Database   USDA PLANTS</i>. N.p., n.d. Web. 20 Apr. 2011. &lt;<a href="http://plants.usda.gov/java/profile?symbol=POMU">http://plants.usda.gov/java/profile?symbol=POMU</a>&gt;.</li> <li>7. "Polystichum munitum." <i>US Forest Service - Caring for the land</i></li> </ol>

	<p><i>and serving people.</i>. N.p., n.d. Web. 20 Apr. 2011. &lt;<a href="http://www.fs.fed.us/database/feis/plants/fern/polmun/all.html">http://www.fs.fed.us/database/feis/plants/fern/polmun/all.html</a>&gt;.</p> <p>8. "Polystichum munitum (Western swordfern)   NPIN." <i>Lady Bird Johnson Wildflower Center - The University of Texas at Austin</i>. N.p., n.d. Web. 20 Apr. 2011. &lt;<a href="http://www.wildflower.org/plants/result.php?id_plant=POMU">http://www.wildflower.org/plants/result.php?id_plant=POMU</a>&gt;.</p> <p>9. "Polystichum munitum in Flora of North America @ efloras.org." <i>eFloras.org Home</i>. N.p., n.d. Web. 20 Apr. 2011. &lt;<a href="http://www.efloras.org/florataxon.aspx?flora_id=1&amp;taxon_id=200004619">http://www.efloras.org/florataxon.aspx?flora_id=1&amp;taxon_id=200004619</a>&gt;.</p> <p>10. "Untitled Page." <i>Protocol Information</i>. N.p., n.d. Web. 20 Apr. 2011. &lt;<a href="http://www.nativeplantnetwork.org/network/ViewProtocols.aspx?ProtocolID=662">http://www.nativeplantnetwork.org/network/ViewProtocols.aspx?ProtocolID=662</a>&gt;.</p>
Other Sources Consulted (but that contained no pertinent information) (full citations):	
Protocol Author (First and last name):	Jonathan Jue
Date Protocol Created or Updated (MM/DD/YY):	04/19/2011

Note: This template was modified by J.D. Bakker from that available at:  
<http://www.nativeplantnetwork.org/network/SampleBlankForm.asp>