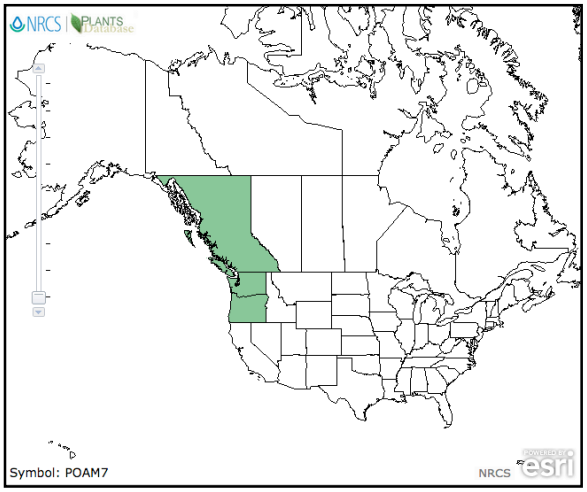
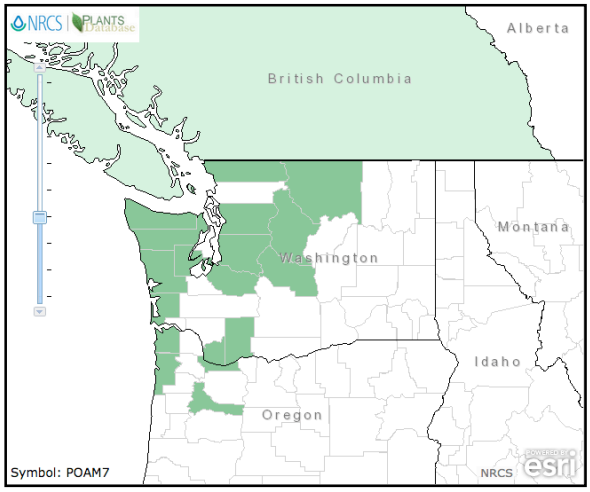
Plant Propagation Protocol for *Polypodium amorphum*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/POAM7.pdf

North American Distribution



Washington Distribution



Source: USDA PLANTS Database[1]

TAXONOMY	
Plant Family	
Scientific Name	Polypodiaceae
Common Name	Polypod Fern Family
Species Scientific Name	
Scientific Name	*Polypodium amorphum* Suksd.
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	*Polypodium montense* F.A. Lang
Common Name(s)	Irregular Polypody, Pacific Polypody, Mountain Polypody
Species Code (as per USDA Plants database)	POAM7
GENERAL INFORMATION	
Geographical range	See maps above. *P. amorphum* is found in British Columbia south to Washington and Oregon.[1] It has also been noted in California and in isolated populations in Wyoming and Colorado.[2,3] In Washington, *P. amoprhum* is present in 14 counties.[1]
Ecological distribution	*P. amorphum* is a rare species found in montane habitats in rocky areas, particularly in areas with igneous material. It can be found draped from crevices over cliff faces and tucked in amongst crevices on rock ledges on dry to mesic rock fissures.[2, 3,4,5]

Climate and elevation range	*P. amorphum* is found from sea level to montane elevations in zones 6-8 of the U.S Department of Agriculture's hardiness map. These zones are based on temperature; zones 6-8 represent average annual lows from 0° to -10° F in zone 6 to 10° to 20° F in zone 8.[2] In British Columbia, it ranges from the lowland to subalpine zones.[5]
Local habitat and abundance	Little is known on the local abundance of *P. amorphum*. It is often found in similar habitats to *P. hesperium*, which is a hybrid offspring of *P. amorphum* and *P. glycyrrhiza*.[2, 6] *P. amorphum* was observed in the Koeleria macrantha- (Agrostis pallens) vegetation association, which occurs only in the Southern Cascade Mountains on dry areas of balds. These areas occur on slopes facing east to west and are with small rock outcrops and are predominately grass-dominated. Vegetation includes *Koeleria macrantha* and *Agrostis pallens* as the dominant species.[7] *P. amorphum* is also noted as occurring in the Phlox diffusa – (Lomatium martindalei – Penstemon subserratus) Association, which occurs in the Cascades and Olympic Ranges on dry sites with steep slopes and rock outcrops present. It is found in small patches within balds. Vegetation in these areas is often dominated by forb and grass species, including *Phlox diffusa*, *Juniperus communis*, *Arctostaphylos nevadensis*, and *Symphoricarpos hesperius*.[7]
Plant strategy type / successional stage	Unknown
Plant characteristics	*P. amorphum* is a small fern, with fronds up to 30 cm, and blades up to 20 cm.[2,4] Fronds arise from from a thin, creeping, and acrid, or unpleasant tasting rhizome. They are concolorous, with a brown stripe one-third the length of the frond. The margins are a pale orangish-brown. Blades are ovate and up to 20 cm, and erose-toothed. Fronds are wider in the middle, with 6-12 oblong or obovate segments, and are glabrous on the midrib.[2,3,8] Sori on *P. amorphum* lack indusial and are closer to the margins than the midrib.[2] Sori have modified sporangia; the young sori on *P. amorphum* are round, distinguishing it from *P. hesperium*.[8] *P. amorphum* hybridizes freely with *P. glycyrrhiza* to form a tetraploid hybrid offspring *P. hesperdium,* and can be difficult to distinguish from its hybrid offspring. It is

	more leathery and stiff than *P. hesperdium* and has more rounded sori and segments.[2, 8] It can also be distinguished by scales that cover the creeping stem, and the presence of sterile structures, called sporangiasters, in the sori.[9] Unlike *P. glycyrrhiza*, the rhizome of *P. amorphum* is acrid tasting.[4] *P. amorphum* is not a species known to be cultivated.[3]
PROPAGATION DETAILS – SPORE PROPAGATION	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Spores
Product Type	Plants
Stock Type	Unknown
Time to Grow	Unknown for *P. amorphum*, but can be 1-2 years for some fern species.[10]
Target Specifications	Unknown
Propagule Collection Instructions	Fern frond spore clusters darken from a green to a deep rust color when they become fertile. Collection should be undertaken when spores are mature but the sporangia have not yet opened.[10] When frond is ready for collection, detach a piece of the fertile frond and place carefully into a bag or envelope. Keep the envelope for a few days in a dry room; during this time spore will release from sporangia and fall to the bottom of the bag.[10]
Propagule Processing/Propagule Characteristics	While no information is available on *P. amorphum* specifically, fern spores are known to decrease in viability with an increased duration of storage, and spore viability varies among species, from just days to decades.[11] The spores of many species can be stored for several years, though more immediate propagation will yield greater success.[10]
Pre-Planting Propagule Treatments	Once the containers and media have been sterilized, spores should be distributed on the surface of the soil. The containers should then be covered with glass to prevent contamination and placed in a dark place or covered to exclude light.[10] While the germination details for *P. amorphum* are unknown, many spores germinate at temperatures between 65-70°C and must be kept moist.[10]
Growing Area Preparation / Annual Practices for Perennial Crops	Containers selected for propagation of ferns by spores should allow for good drainage and should be sterilized before use. A fine compost suitable for ferns should be used, and should also be sterilized before use.[10]
Establishment Phase Details	Once spores have been sown and stored in the conditions mentioned above, a green covering

	resembling mold should appear on the soil surface in a few weeks, depending on species. This indicates germination. The light cover on the container can be removed but keep the glass lid on the container. Once leaves have developed the glass covering can be removed, usually after several months.[10]
Length of Establishment Phase	As noted above, the establishment phase length is unknown for *P. amorphum*, but in other fern species this can take a few weeks for initial germination, and several months for leaf development. If overcrowding occurs at this point, germinants can be replanted in containers with the same media, then grown out for 1-2 years.[10]
Active Growth Phase	Unknown
Length of Active Growth Phase	Unknown
Hardening Phase	Unknown
Length of Hardening Phase	Unknown
Harvesting, Storage and Shipping	Unknown
Length of Storage	Unknown
Guidelines for Outplanting / Performance on Typical Sites	*P. amorphum* requires specific conditions under cultivation. This species should be planted in a medium of gritty rubble with a small amount of organic matter (humus). It should be placed in an area with adequate light out of direct sunlight.[2]
Other Comments	This species is considered difficult to cultivate, requiring good air circulation, drainage, and moist soils.[2]
PROPAGATION DETAILS – VEGETATIVE PROPAGATION: DIVISIONS	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Vegetative
Product Type	Container
Stock Type	N/A
Time to Grow	Planted divisions should be kept in a nursery bed for at least a year.[10]
Target Specifications	Unknown
Propagule Collection Instructions	Divisions of *Polypodium* species can be undertaken at any time of the year, though early spring conditions when rootstock and crowns are highly visible is a good time. If parent fern is in a pot, the fern should be removed, and the ancillary growths should be separated with a sharp knife. Ferns in soil should be carefully removed from the soil, and the soil should be gently taken off the roots.[10] Take divisions from mature plants

	that have grown for 2-3 years.[10]
Propagule Processing/Propagule Characteristics	A healthy donor or parent fern can often yield 3-4 small plants or divisions.[10]
Pre-Planting Propagule Treatments	If taking multiple divisions or using several parent plants, plants should be covered with moss or other moist material to prevent drying out before divisions or while work is being done.[10] Pot a divided section that includes a portion of root in a small pot with the crown planted just above the soil level. Divided sections should be treated with fungicide and planted to same depth as the parent plant in boxes or pans. Soil should have one part grit and one part leafmould. Pan should be covered with a clear glass or plastic cover to maintain high humidity and kept in a shady area.[10]
Growing Area Preparation / Annual Practices for Perennial Crops	Divisions can be potted in a small pot. Suitable substrate includes a sieved leafmould and sand to allow for drainage and moisture retention.[10] Ferns should be kept moist but not wet, with adequate ventilation and humidity. [10]
Establishment Phase Details	Unknown
Length of Establishment Phase	Unknown
Active Growth Phase	Unknown
Length of Active Growth Phase	Unknown
Hardening Phase	Unknown
Length of Hardening Phase	Unknown
Harvesting, Storage and Shipping	Unknown
Length of Storage	Unknown
Guidelines for Outplanting / Performance on Typical Sites	*P. amorphum* requires specific conditions under cultivation. This species should be planted in a medium of gritty rubble with a small amount of organic matter (humus). It should be placed in an area with adequate light out of direct sunlight.[2] While less is known about *P. amorphum, Polypodium* species can be planted on shaded walls, and are also well suited to plantings in baskets or rafts due to their creeping rhizomes. Some hardier *Polypodium* species are also suitable for use as houseplants.[10]
Other Comments	This species is considered difficult to cultivate, requiring good air circulation, drainage, and moist soils.[2]
PROPAGATION DETAILS – VEGETATIVE PROPAGATION: RHIZOMES	
Ecotype	N/A

Propagation Goal	Plants
Propagation Method	Vegetative (Rhizomes)
Product Type	Container
Stock Type	N/A
Time to Grow	Planted divisions should be kept in a nursery bed for a year.[10]
Target Specifications	Unknown
Propagule Collection Instructions	Ferns with creeping rhizomes, such as *P. amorphum,* can be divided by cutting the rootstock into several pieces. Each piece should include1-2 growing tips. Approximately 2-inch sections can be removed using a sharp knife, and should ideally contain some portion of root material.[10]
Propagule Processing/Propagule Characteristics	A healthy donor or parent fern can often yield 3-4 small plants or divisions.[10]
Pre-Planting Propagule Treatments	Removed sections of the parent plant should be treated with fungicide and planted to same depth as the parent plant in boxes or pans.[10] If taking multiple divisions or rhizomes or using several parent plants, plants should be covered with moss or other moist material to prevent drying out before divisions or while work is being completed.[10]
Growing Area Preparation / Annual Practices for Perennial Crops	Soil should have one part grit and one part leafmould. Pan should be covered with a clear glass or plastic cover to maintain high humidity and kept in a shady area.[10]
Establishment Phase Details	Unknown
Length of Establishment Phase	Unknown
Active Growth Phase	Unknown
Length of Active Growth Phase	Unknown
Hardening Phase	Unknown
Length of Hardening Phase	Unknown
Harvesting, Storage and Shipping	Unknown
Length of Storage	Unknown
Guidelines for Outplanting / Performance on Typical Sites	*P. amorphum* requires specific conditions under cultivation. This species should be planted in a medium of gritty rubble with a small amount of organic matter (humus). It should be placed in an area with adequate light out of direct sunlight.[2] While less is known about *P. amorphum, Polypodium* species can be planted on shaded walls, and are also well suited to plantings in baskets or rafts due to their creeping rhizomes. Some hardier *Polypodium* species are also suitable for use as houseplants.[10]
Other Comments	This species is considered difficult to cultivate,

	requiring good air circulation, drainage, and moist soils.[2]
INFORMATION SOURCES	
References	See below
Other Sources Consulted	See below
Protocol Author	Kathryn Cerny-Chipman
Date Protocol Created or Updated	05/19/2015; updated 06/08/15

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