

Plant Propagation Protocol for *Cryptogramma cascadensis*

ESRM 412 – Native Plant Production

Protocol URL: <https://courses.washington.edu/esrm412/protocols/CRCA23.pdf>



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*Cryptogramma cascadensis*²

TAXONOMY

Plant Family	
Scientific Name	<u>Pteridaceae</u> ¹
Common Name	Maidenhair fern family ¹
Species Scientific Name	
Scientific Name	<i>Cryptogramma cascadensis</i> E.R. Alverson ¹
Varieties	n/a
Sub-species	n/a
Cultivar	n/a
Common Synonym(s)	n/a
Common Name(s)	Cascade rockbrake ¹

Species Code (as per USDA Plants database)	CRCA23 ¹
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GENERAL INFORMATION

Geographical range	Washington, Oregon, California, Idaho, Montana, British Columbia ¹
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Map of *Cryptogramma cascadensis* distribution³



Map of *Cryptogramma cascadensis* distribution in Washington⁸

Ecological distribution	Moist subalpine talus slopes ⁵ , crevices, often granite or volcanic rock ²
Climate and elevation range	1800-3650m ²
Local habitat and abundance	Mesic subalpine habitats ³
Plant strategy type / successional stage	Stress-tolerater; <i>Cryptogramma cascadensis</i> is often found growing on volcanic rock and endures cold winters with heavy snow, as it

	lives primarily on north-facing slopes. However, it is not equipped to tolerate drought. ⁵
Plant characteristics	Deciduous ⁵ herb/forb ¹ with hardened, persistent leaf bases ³
PROPAGATION DETAILS (from Spores)	
Ecotype	n/a
Propagation Goal	Plant
Propagation Method	Spore
Product Type	Container
Stock Type	n/a
Time to Grow	20 weeks to several months ^{4*}
Target Specifications	Stems 4-8mm in diameter, scales 6x2mm, sterile leaves 3-20cm, fertile leaves 5-25cm, petioles green to straw colored ³
Propagule Collection Instructions	Spores mature in late summer and autumn. ³ Collect pieces of fronds with mature, dark, sori. Lay each piece of frond in an envelope or between two pieces of paper and wait 1-2 days for the spores to fall onto the paper. Be sure to maintain sanitation every step of the way. ^{4*}
Propagule Processing/Propagule Characteristics	1000 spores weight approximately 10 mg in the closely related species <i>Cryptogramma crispera</i> . ^{7*} Spores may be stored up to 5 years in airtight containers at 0°C and 10% humidity. ^{6*}
Pre-Planting Propagule Treatments	Spores can be sterilized in a 2-5% bleach solution, then collected on filter paper and thoroughly rinsed with distilled water for 2 minutes before planting. ^{4*}
Growing Area Preparation / Annual Practices for Perennial Crops	Propagation flats at least 2" deep with clear plastic lids (a clear, plastic, watertight shoebox is adequate), spores, peat cubes or pellets or sterilized clay brick ^{4*}
Establishment Phase Details	Sow spores, irrigate with distilled water, and immediately cover with plastic lid to maintain moisture and sanitation. Spores should be kept in temperatures 60-86°F with 8-24 hours of light a day. ^{4*}
Length of Establishment Phase	10-20 days ^{4*}
Active Growth Phase	Ferns may be transplanted into individual containers once they have true leaves and a developing root system. ^{4*} Once prothalli appear, keep them covered with a thin layer of distilled water at all times. When antheridia wither, clear plastic lid may be removed and flats may be moved into a shaded greenhouse. Should mold occur, stop overhead watering and ensure that water is not dripping or pooling anywhere. Then remove infected areas and at least half an inch of tissue or media surrounding the area. A mild fungicide may be applied if the issue persists. ^{4*}
Length of Active Growth Phase	Several months (Prothalli appear ~20 days after sowing, antheridia structures appear ~10 weeks after, then disappear after ~4 weeks, then young sporophytes appear a few weeks to a few months after and can be transplanted elsewhere. ^{4*})

Hardening Phase	Information not found.
Length of Hardening Phase	Information not found.
Harvesting, Storage and Shipping	Ferns can be fall planted in September. If they must be held until the following spring, they will require repotting into larger 1-gallon containers. ^{6*}
Length of Storage	Approximately six months ^{6*}
Guidelines for Outplanting / Performance on Typical Sites	Ferns will reach sexual maturity 2 years after original spore production. ^{6*} Fronds of <i>Cryptogramma cascadenis</i> are deciduous and will quickly wither and decay in the autumn. ⁵
Other Comments	*Please note that not all sources are specific to this species. Sources 4 and 6 offer guidance on fern propagation generally, with source 6 referring more specifically to the maidenhair fern family. Source 7 references another fern within the <i>Cryptogramma</i> genus.
PROPAGATION DETAILS (from Rhizomes)	
Ecotype	n/a
Propagation Goal	Plant, rhizome
Propagation Method	Vegetative
Product Type	Container
Stock Type	n/a
Time to Grow	Approx. 1 year ^{6*}
Target Specifications	Stems 4-8mm in diameter, scales 6x2mm, sterile leaves 3-20cm, fertile leaves 5-25cm, petioles green to straw colored ³
Propagule Collection Instructions	Gather rhizome divisions from ferns in spring before or immediately after appearance of fiddleheads. ^{6*}
Propagule Processing/Propagule Characteristics	Rhizomes typically have bicolored scales, are 4-8mm wide, and are decumbent to erect. ⁵
Pre-Planting Propagule Treatments	Remove 1/3 of fronds from rhizome. Rhizome should be divided into thick, short segments with at least one non-dormant bud each. ^{6*}
Growing Area Preparation / Annual Practices for Perennial Crops	One should use a coarse growing media (2:2:1:1 peat moss:sand:perlite:vermiculite) and raised outdoor beds. ^{6*}
Establishment Phase Details	Rhizomes should be planted 1.5" below the surface of the soil. Each rhizome segment should be planted in an individual container. ^{6*}
Length of Establishment Phase	10-20 days ^{4*}
Active Growth Phase	Ferns may be transplanted into individual containers once they have true leaves (root system should already be developed in this case). ^{4*} Should mold occur, stop overhead watering and ensure that water is not dripping or pooling anywhere. Then remove infected areas and

	at least half an inch of tissue or media surrounding the area. A mild fungicide may be applied if the issue persists. ^{4*}
Length of Active Growth Phase	Several months (Prothalli appear ~20 days after sowing, antheridia structures appear ~10 weeks after, then disappear after ~4 weeks, then young sporophytes appear a few weeks to a few months after and can be transplanted elsewhere. ^{4*})
Hardening Phase	Information not found.
Length of Hardening Phase	Information not found.
Harvesting, Storage and Shipping	Ferns can be fall planted in September. If they must be held until the following spring, they will require repotting into larger 1-gallon containers. Rhizomes may be harvested again the following year. ^{6*}
Length of Storage	Approximately six months ^{6*}
Guidelines for Outplanting / Performance on Typical Sites	Ferns will reach sexual maturity 2 years after original spore production. ^{6*} Fronds of <i>Cryptogramma cascadiensis</i> are deciduous and will quickly wither and decay in the autumn. ⁵
Other Comments	*Please note that not all sources are specific to this species. Sources 4 and 6 offer guidance on fern propagation generally, with source 6 referring more specifically to the maidenhair fern family.

INFORMATION SOURCES

References	<p>USDA NRCS National Plant Data Team. (n.d.). <i>Cryptogramma cascadenis</i> E.R. Alverson Cascade rockbrake. https://plants.usda.gov/core/profile?symbol=CRCA23, accessed on April 26, 2020.</p> <p>²Ruth E.B. Kirkpatrick, Alan R. Smith, Thomas Lemieux & Edward Alverson 2012, <i>Cryptogramma cascadenis</i>, in Jepson Flora Project (eds.) Jepson eFlora, Retrieved May 29, 2020, from https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=21330</p> <p>³eFloras.org. (n.d.). 2. <i>Cryptogramma cascadenis</i> E. R. Alverson, Amer. Fern J. 79: 95. 1989. Retrieved April 26, 2020, from http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=233500453</p> <p>⁴Wilkinson, K. M. et al. (2014). <i>Tropical nursery manual: a guide to starting and operating a nursery for native and traditional plants</i>. Washington, D.C.: U.S. Department of Agriculture, Forest Service.</p> <p>⁵Alverson, E. (1989). <i>Cryptogramma cascadenis</i>, a New Parsley-Fern from Western North America. <i>American Fern Journal</i>, 79(3), 95-102. doi:10.2307/1547291</p> <p>⁶Luna, T. (2000). Native Fern Propagation in Glacier National Park's Native Plant Nursery. Retrieved April 27, 2020, from www.jstor.org/stable/43309593</p> <p>⁷Kew Royal Botanic Gardens. (n.d.). Seed Information Database. Retrieved April 30, 2020, from https://data.kew.org/sid/SidServlet?ID=58907&Num=Tzb</p> <p>⁸WTU Herbarium, Burke Museum, & University of Washington. (2020). <i>Cryptogramma cascadenis</i>. Retrieved May 28, 2020, from http://biology.burke.washington.edu/herbarium/imagecollection/taxon.php?Taxon=Cryptogramma cascadenis</p>
Other Sources Consulted	<p>Kruckeberg, A. R. et al. (2019). <i>Gardening with native plants of the Pacific Northwest</i> (Third Edition). Seattle: University of Washington Press. doi: MUSE.muse.jhu.edu/book/64259</p> <p>Woolson, G. A. (1905). <i>Ferns and How to Grow Them</i>. Doubleday, Page & Company.</p> <p>Mestzgar, J. S., Alverson, E. R., Chen, S., Vaganov, A. V., & Ickert-Bond, S. M. June 2013. Diversification and reticulation in the circumboreal fern genus <i>Cryptogramma</i>. <i>Molecular Phylogenetics and Evolution</i>, 67(3), 589–599. doi: https://doi.org/10.1016/j.ympev.2013.02.020</p> <p>Cascade Rockbrake — <i>Cryptogramma cascadenis</i>. Montana Field Guide. Montana Natural Heritage Program. Retrieved on May 29, 2020, from http://fieldguide.mt.gov/speciesDetail.aspx?elcode=PPADI0B040</p> <p>Montana Fish, Wildlife & Parks Montana Wild Center. (2018). Tenth Montana Plant Conservation Conference. In <i>Tenth Montana Plant Conservation Conference</i>. Helena, MT. Retrieved from https://www.mtnativeplants.org/wp-content/uploads/2018/07/Conservation-Conf-2018-Proceedings.pdf</p>
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