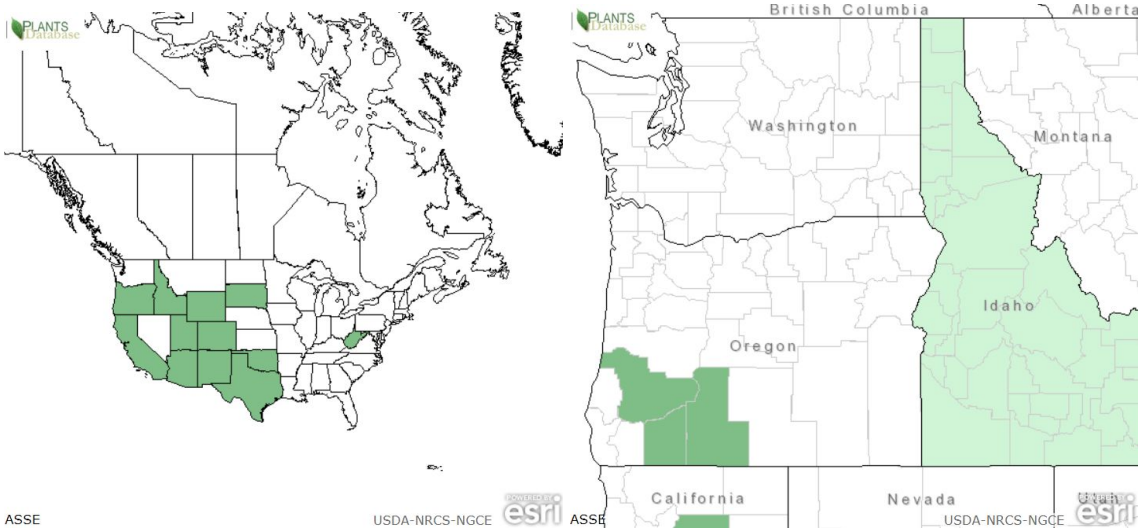
Plant Propagation Protocol for *[Asplenium septentrionale]*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/*[ASSE.pdf]*



(10)

TAXONOMY	
Plant Family	
Scientific Name	Aspleniaceae
Common Name	Spleenwort
Species Scientific Name	
Genus	*Asplenium*
Species	*septentrionale*
Species Authority	(L.) Hoffm. (10)
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	Amesium sepentrionale (L.) Newman Acrostichum septentrionale L. (7)
Common Name(s)	Forked Spleenwort Northern spleenwort (7)
Species Code (as per USDA Plants database)	ASSE
GENERAL INFORMATION	
Geographical range	Native to western United States: AZ , CA , CO , ID , NM , OK , OR , SD , TX , UT , WV , WY (10)(4) Native to Europe and western Asia (4)(8) see maps above
Ecological distribution	Rocky well drained substrates, found on cliffs and rock cracks(3)

	Found mostly in crevices or vertical surfaces of dark colored rocks which are often hard and base poor. (5)
Climate and elevation range	700-2900m (3) Average of 55-64 degree fahrenheit (2) Annual precipitation average of 40.9-70.4 inches (8) Sunny dry conditions, shade tolerant and drought tolerant (2)
Local habitat and abundance	Associated with metalliferous mines and mortared walls along with the following species: *Agrostis capillaris, Asplenium ruta-muraria, A. trichomanes subsp. trichomanes, Athyrium filix-femina, Festuca ovina, Teucrium scorodonia, Thymus polytrichus, Ulex europaeus, U. gallii* and, *Racomitrium lanuginosum* (5)
Plant strategy type / successional stage	Spreads readily in metalliferous soils but rarely spreads on rock surfaces and crevices (5) Tolerant to acidic and exposed soils (2)
Plant characteristics	Perennial Fern (10) Reproduces via spores (3) Simple pinnate leaf, it is often forked on the end and heavily clustered with other leaves. Leaves are grass like, 5-15 cm long and 2.5 cm wide. They are red-brown and more narrow and cylindrical at the base, and as they widen they become green and flatten out. (9)  (2)

	Does not have proliferous roots (3) Usually 2 sori per pinna (3) Sporangia are 5-15mm, 1-4 per segment (9) 64 spores per sporangia, chromosomes 2n=144 (3)
PROPAGATION DETAILS	
Ecotype	Spores collected from 4 species, *A. septentrionale*, *A. adulterinum*, *A. cuneifolium*, and *Polypodium vulgare* for this experiment and were collected from their natural habitat (6)
Propagation Goal	Plants
Propagation Method	Spores
Product Type	Container
Time to Grow	3 years
Target Specifications	Mature fern with sporophylls, usually around 15 cm long (9)(6)
Propagule Collection Instructions	Spores were collected from A. septentrionales in their natural habitats (6)
Propagule Processing/Propagule Characteristics	N/A
Pre-Planting Propagule Treatments	Spores from developed sporangia were collected and stored in envelopes then dried for 7-10 days in room temperature (6) Spores after drying were transferred to blotting paper filter bags and soaked in disinfectant: 70% ethanol for 3 minutes, followed by 0.1% NaClO for 10 minutes(6) Spores are then washed with distilled water three times and are ready to be sown (6)
Growing Area Preparation / Annual Practices for Perennial Crops	Aseptic spores are sown in 100ml flasks containing 35ml of solid medium: ¼ MS microelements, 30 g L^-1 sucrose, solidified with 8 g L^-1 agar the medium is adjusted to 6.2 ph and then sterilized with 2 mL of distilled water (6) Flasks are incubated under white fluorescent lamps at 18-20 degrees celsius (6)
Establishment Phase Details	Gametophyte to sporophyte establishment As gametophytes germinate in the culture medium, 2-3 mL of distilled water should be added every culture

	period to maintain moisture and increase fertilization and trigger the diploid phase (6) Once sporophytes begin to for, they should be separated from gametophytes and subcultured in ½ MS medium with KIN and 0.1 mg/L^-1 NAA in 100 ml flasks Once sporophytes grow fronds they can be removed, wounded along the main nervation, and inoculated horizontally onto the ½ MS medium
Length of Establishment Phase	40 days germination to gametophyte, mature gametophyte after 4 months of culture, and gametophyte to sporophyte after 8 months of culture (6)
Active Growth Phase	Once sporophytes have developed roots after being inoculated, they can be transferred from the agar to a liquid solution with perlite. 7 more days of culture are required to develop more roots before transferring flasks with liquid solution to a greenhouse (6) Once flasks are moved to a greenhouse they should be covered with aluminum foil for 5 days (6) After the 5 days the sporophytes can be taken out of the flasks and potted in containers with commercial potting mix ph 6.5 or 7. Containers should be covered with polyethylene foil which can be removed gradually to aid acclimation to the greenhouse environment for 2 weeks (6) After 5 weeks containers should be moved to a hot bed(6)
Length of Active Growth Phase	5-7 weeks (6)
Hardening Phase	N/A
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	Must be kept in humid conditions and shade, and should be misted daily (1) It will take 3 years for propagated *A. septentrionale* to produces sporophylls (6)
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	Grow best at the edge of concrete frames and in rocky substrates (6)

Other Comments	not commonly propagated for restoration (1) Considered a rare plant species in California (2)
INFORMATION SOURCES	
References	1. “Asplenium Nidus (Bird's Nest Fern).” *Hawaii Native Plant Propagation Database* , University of Hawaii at Manoa , 2000, www.ctahr.hawaii.edu/hawnprop/plants/asp-nidu.htm.[1] 2. “Asplenium Septentrionale (L.) Hoffm.” *Calflora Taxon Report* , The Calflora Database , 2019, www.calflora.org//cgi-bin/species_query.cgi?where-taxon=Asplenium%2Bseptentrionale. 3. “Asplenium Septentrionale.” Flora of North America, www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=200004170. 4. “Asplenium Septentrionale.” Lady Bird Johnson Wildflower Center, The University of Texas at Austin, 14 Nov. 2018, www.wildflower.org/plants/result.php?id_plant=ASSE. 5. “Asplenium Septentrionale.” Online Atlas of the British and Irish Flora, Biological Records Centre, 2004, www.brc.ac.uk/plantatlas/plant/asplenium-septentrionale. 6. Fernandez, Helena, et al., editors. Working with Ferns: Issues and Applications. Springer, 2011. 7. NBN Atlas. “Asplenium Septentrionale (L.) Hoffm.” *NBN Atlas*, 2017, species.nbnatlas.org/species/NBNSYS0000002051#overview. 8. “Northern Spleenwort, Asplenium Septentrionale.” *California Native Plant Society*,

[1] it should be noted that this source is for a different Asplenium species, *Aspenlium nidus*

	calscape.org/Asplenium-septentrionale-(Northern-Spleenwort)?srchcr=sc593074189d8a4. 9. Smith, Alan R. "Asplenium Septentrionale." The Jepson Herbarium, University of California, Berkeley, 2017, ucjeps.berkeley.edu/eflora/eflora_display.php?tid=14601 10. USDA NRCS National Plant Data Team, editor. "Asplenium septentrionale (L.) Hoffm. forked spleenwort". *Plants Database*, USDA, https://plants.usda.gov/core/profile?symbol=ASSE
Other Sources Consulted	Arbury, Jim, et al. *The Complete Book of Plant Propagation*. Reed International Books, 2006. "Asplenium Septentrionale." *Wikipedia*, Wikimedia Foundation, 17 Dec. 2019, en.wikipedia.org/wiki/Asplenium_septentrionale.
Protocol Author	Mia Niikkonen
Date Protocol Created or Updated	05/27/2020