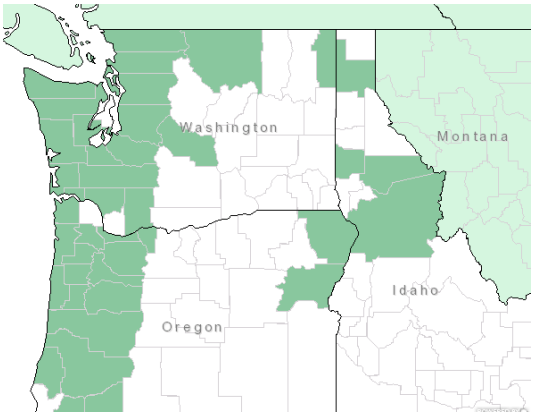
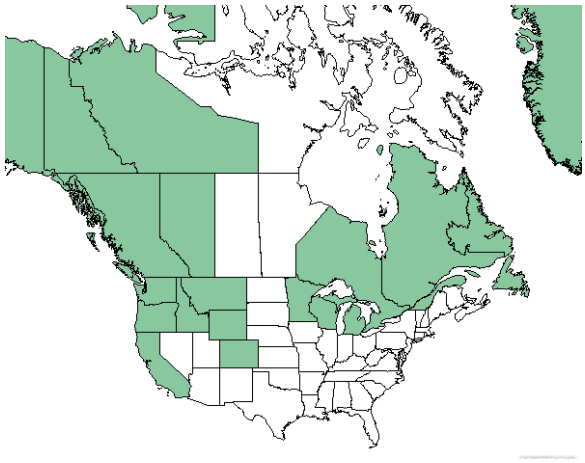
Plant Propagation Protocol for *[Dryopteris expansa]*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/drex2





TAXONOMY	
Plant Family	
Scientific Name	Dryopteridaceae
Common Name	Wood ferns
Species Scientific Name	
Scientific Name	*Dryopteris expansa* (C. Presl) Fraser-Jenkins & Jermy
Varieties	N/A
Sub-species	N/A
Cultivar	N/A
Common Synonym(s)	*Dryopteris assimilis* S. Walker *Dryopteris dilatata* (Hoffm.) A. Gray *Dryopteris dilatata* (Hoffm.) A. Gray subsp. *americana* (Fisch.) Hultén *Dryopteris spinulosa* (O.F. Müll.) Watt var. *dilatata* (Hoffm.) Underw.
Common Name(s)	Spreading woodfern
Species Code (as per USDA Plants database)	DREX2
GENERAL INFORMATION	
Geographical range	Native to northern Asia, North America, and Europe (see maps). [1]
Ecological distribution	Woodland, Riparian, Alpine.[1]
Climate and elevation range	50--1500 m. [2]
Local habitat and abundance	Found in moist forests and on loose stone slopes. *Athyrium felix-femina* often grows on the same sites.[3] It is sexually diploid and is one of the parents of *D.*

	campyloptera.[4]
Plant strategy type / successional stage	Spreads via rhizomes; fronds form erect clusters. Does not tolerate dry summers.[4]
Plant characteristics	*D. expansa* is a forb that can grow up to 1 meter tall. Fronds are 30- 90 cm long. The stipe (supporting stalk) is 1/2 to 1/3 as long as the blade and brown at the base, with light brown scales. The blade lacks glands and is broadly triangular to triangular-ovate. Pinnae are lanceolate-oblong and board at base. Sori are rounded, medial (clustered towards center of blade), and partially covered by indusium.[4]
PROPAGATION DETAILS **Seed Germination in Artificial Media**	
Ecotype	Harvested from natural populations in Great Britain.[5]
Propagation Goal	Gametophytes
Propagation Method	Seed
Product Type	Flask
Stock Type	N/A
Time to Grow	N/A
Target Specifications	N/A
Propagule Collection Instructions	N/A
Propagule Processing/Propagule Characteristics	Spores collected and stored dry in glass vials at 4 degrees Celsius for two years.[5]
Pre-Planting Propagule Treatments	All spores were sieved through a fine nylon mesh (45 micrometer pore size) to separate them from sporangial debris. Spores were weighed and kept in plastic vials containing 10 ml distilled water with one drop of detergent (wetting agent) at room temperature for 18-24 hours. Spores were then surface sterilized with 2.5% aqueous sodium hypochlorite solution (10-14% available chlorine, BDH) for 2 minutes, then rinsed three times in sterile distilled water. Spores were Suspended in sterile 0.5% high viscosity carboxymethyl cellulose (BDH) to allow even distribution of the spores in suspension for inoculation.[5]
Growing Area Preparation / Annual Practices for Perennial Crops	Liquid medium with .2m sucrose in 250 ml conical flasks.[5]
Establishment Phase Details	Flasks stored at a temperature of 20 degrees celcius, illuminated by daylight florescent tubes with 16 hour light and 8 hour dark cycles.[5]
Length of Establishment Phase	7-14 days.
Active Growth Phase	N/A
Length of Active Growth Phase	N/A
Hardening Phase	N/A

Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	N/A
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	This study only tested the effect of sucrose on germination. Authors advised root media without sucrose for subsequent growth.
Seed Propagation	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container
Stock Type	N/A
Time to Grow	N/A
Target Specifications	N/A
Propagule Collection Instructions	Collect fronds when sori have a granular appearance and are dark brown and shiny. Cleanse fronds with a 5-10% bleach solution to remove foreign contaminants.[6]
Propagule Processing/Propagule Characteristics	Place fronds on sheet of paper, sporangia-side down. Keep in warm dry atmosphere for at least three days. Properly stored, the spores will retain viability for 3-5 years.[6]
Pre-Planting Propagule Treatments	Sieve material with very fine meshed sieves. Alternately, place material on a folded piece of paper and tap gently at an angle to separate spores from the larger grain detritus. Disinfect spores in solutions of sodium or calcium hypochlorite.[6]
Growing Area Preparation / Annual Practices for Perennial Crops	Sow in plastic or terra cotta pots, 3-6 inches in diameter. Growing media may be one part peat moss: two parts fly-ash or coarse sand. Seal container as soon as possible using polythene film.[6]
Establishment Phase Details	Water spores from the bottom by standing pot in tray or container of water.[6]
Length of Establishment Phase	N/A
Active Growth Phase	Prothalli appear after germination as a green scum on the surface of the medium. Eventually edges lift, showing distinguishable prothallus. After the first few leaves appear, the plants become sporelings. Subsequent development is varies- spores sown in spring will develop much faster.[6]
Length of Active Growth Phase	N/A
Hardening Phase	N/A
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	Plants which have developed true fronds may be

	transplanted into containers or trays with sterile media.
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	This method is a general guide for propagating ferns.
Vegetative Propagation	
Ecotype	N/A
Propagation Goal	Plant
Propagation Method	Vegetative
Product Type	Container
Stock Type	N/A
Time to Grow	N/A
Target Specifications	N/A
Propagule Collection Instructions	Divide during active growth period, usually in spring or early summer. Move soil to expose rhizomes; active tips are green or covered in young scales. Cut rhizome with knife or spade. Surfaces of rhizome exposed to cut should be sealed by rubbing with garden lime.[6]
Propagule Processing/Propagule Characteristics	N/A
Pre-Planting Propagule Treatments	N/A
Growing Area Preparation / Annual Practices for Perennial Crops	N/A
Establishment Phase Details	N/A
Length of Establishment Phase	N/A
Active Growth Phase	N/A
Length of Active Growth Phase	N/A
Hardening Phase	N/A
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	N/A
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	This is a general guide for propagating ferns with creeping rhizomes.
INFORMATION SOURCES	
References	See below.
Other Sources Consulted	See below
Protocol Author	Colleen Brennan
Date Protocol Created or Updated	Updated 04/21/15

References

1) "Plants Profile for Dryopteris Expansa (spreading Woodfern)." USDA. Accessed April 22, 2015. http://plants.usda.gov/core/profile?symbol=drex2.

2) "Dryopteris Expansa." Taxon Page. Accessed April 22, 2015. http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=200004420.

3) Vitt, Dale H., and Janet E. Marsh. *Mosses, Lichens & Ferns of Northwest North America*. Edmonton, Alta.: Lone Pine ;, 1988.

4) Hoshizaki, Barbara Joe, and Kenneth A. Wilson. "The Cultivated Species of the Fern Genus Dryopteris in the United States." *American Fern Journal*: 1. Accessed April 22, 2015. http://www.jstor.org/stable/1547452.

5) Sheffield, E., G. E. Douglas, S. J. Hearne, S. Huxham, and J. M. Wynn. "Enhancement of Fern Spore Germination and Gametophyte Growth in Artificial Media." *American Fern Journal*, 2001, 179-86. Accessed April 22, 2015. http://www.jstor.org/stable/1547405.

6) Jones, David L. "Propagation and Hybridization of Ferns." In *Encyclopaedia [i.e. Encyclopedia] of Ferns: An Introduction to Ferns, Their Structure, Biology, Economic Importance, Cultivation, and Propagation*. Melbourne: Lothian Pub., 1987.

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