Plant Propagation Protocol for *Festuca viridula*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/2024/FEVI.pdf

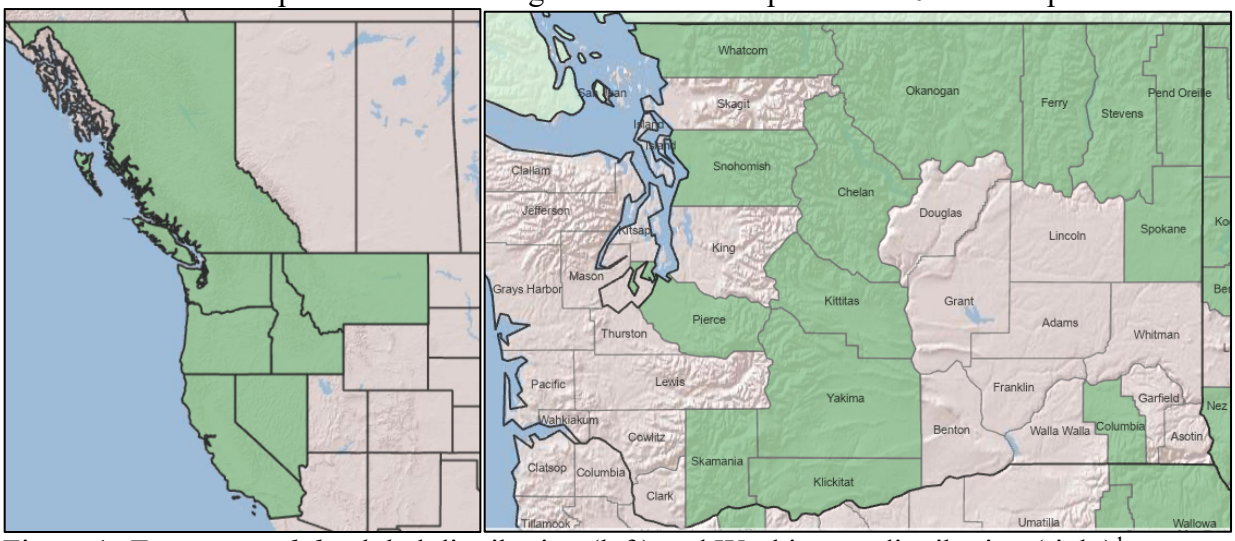

Figure 1. *Festuca viridula* global distribution (left) and Washington distribution (right)[1]


Figure 2. Photos of *F. viridula* habit (left) and inflorescence (right)[2]

TAXONOMY	
Plant Family	
Scientific Name	Poaceae
Common Name	Grass family
Species Scientific Name	
Scientific Name	*Festuca viridula* Vasey
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	

Common Name(s)	Greenleaf fescue, green-leaf fescue,
Species Code (as per USDA Plants database)	FEVI
GENERAL INFORMATION	
Geographical range	See Figure 1. Found in California, Idaho, Montana, Nevada, Oregon, and Washington. Also found in British Columbia. In Washington, it is found in subalpine habitats in Skamania, Klickitat, Yakima, Pierce, Kittitas, Chelan, Snohomish, Whatcom, Okanagan, Ferry, Stevens, Pend Oreille, Spokane, and Columbia counties[1].
Ecological distribution	Flat to steeply sloped, subalpine to alpine meadows and rocky moraines[2,3].
Climate and elevation range	1500-3000 m[3]
Local habitat and abundance	Locally abundant in open meadows with *Phyllodoce* spp., *Cassiope mertensiana*, *Vaccinium deliciosum*, *Castilleja parviflora*, *Carex* spp., *Lupinus latifolius*, *Veronica cusickii*, *Antennaria lanata*, and *Erigeron peregrinus* between stands of *Abies lasiocarpa* and *Pseudotsuga menziesii*[4].
Plant strategy type / successional stage	Late successional[5] generalist[6]
Plant characteristics	Perennial grass, see Figure 2.
PROPAGATION DETAILS – Plugs from seed	
Ecotype	NA
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container/plug
Stock Type	No sources specified a preferred container size for this species.
Time to Grow	About 4 months from seeding to outplanting. Plants for restoration outplantings at Mt. Rainier National Park are produced by sowing seeds (after cold stratification is complete) in mid-May to produce plants by mid-September (J. Drown, pers. comm).
Target Specifications	NA
Propagule Collection Instructions	Seed can ripen from June to September[7], and specific seed ripeness dates will depend on region and climate. However, Steinfeld and Archibald[8] note *Festuca viridula* tends to develop before most other grass species.
Propagule Processing/Propagule Characteristics	Barner[9] produced a seed lot with 381,170 seeds per pound and a purity of 99.3% and a 90% viability (determined by x-ray). Seeds were dried to 7.23% and

	stored at 33-38°F. Link[10] reports 750,000 seeds per pound.
Pre-Planting Propagule Treatments	**Seed cleaning:** Barner[9] used a three-phase cleaning process to pass seeds through a brush machine, air-screen machine, and a gravity separator. First, seeds were processed using a brush machine (Westrup Model HA 400) with the following settings: row brushes: 3, mantel: #18, and speed: 6. Second, using an air-screen machine (Clipper Eclipse, Model 324) using medium to high air speed with three screen levels: the first and second both had 1/18 x 1/4 slots, and the third 1/24 round slots. The last phase removes chaff and nonviable seeds using a gravity separator (Oliver Model 30) with a speed of 55, air set to 40, and hopper speed of 1[9]. **Seed germination:** Cold stratification required for germination[8,11]. Stratification of at least 60 days used for production at Mt. Rainier National Park (J. Drown, Mt. Rainier National Park Horticulturist, pers. comm. 25 April 2024), 90 days at 38°F[11] has been used successfully, and Link[10] reports stratification of up to 140 days resulted in 45% germination. Pre-stratification treatments can also help break dormancy, including sandpaper scarification, a 6-hour cold water soak, or GA treatment[8], though Link[10] found that only 28% of seeds scarified using a Forsberg Huller scarifier germinated compared to 45% of non-scarified seeds.
Growing Area Preparation / Annual Practices for Perennial Crops	No published information on this topic.
Establishment Phase Details	Therrell and others[7] recommend sowing seeds in the greenhouse after stratification then transplanting the seedlings. This species grows best in sandy or loam soils in the wild and is intolerant of clay[12]; although the optimal media mix has not been published for this species, it may perform best in a mix that is well-draining.
Length of Establishment Phase	No published information on this topic.
Active Growth Phase	No published information on this topic.
Length of Active Growth Phase	No published information on this topic.
Hardening Phase	No published information on this topic.
Length of Hardening Phase	No published information on this topic.
Harvesting, Storage and Shipping	No published information on this topic.
Length of Storage	Viability may decrease over time. Link[10] found that germination rates decreased after the first year of storage, although storage conditions are not noted.

Guidelines for Outplanting / Performance on Typical Sites	*Festuca viridula* tends to persist when outplanted, even into poor soils. Frappier[6] found that *F. viridula* increased from 2% the year after outplanting to 11% 6 years after outplanting at Sunrise in Mt. Rainier National Park.
Other Comments	None.
PROPAGATION DETAILS – Bareroot from seed	
Ecotype	NA
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Bareroot
Stock Type	NA
Time to Grow	No published information on this topic.
Target Specifications	Field-grown bareroot plants using direct-sown seeds to lift for nearby site restoration[13]
Propagule Collection Instructions	Collect seeds from the restoration location[13].
Propagule Processing/Propagule Characteristics	See "Propagation Details – Plugs from Seed" above.
Pre-Planting Propagule Treatments	See seed cleaning treatments described above. Seeds sown in fall will experience cold, moist stratification *in situ*, and therefore seed treatments may not be necessary.
Growing Area Preparation / Annual Practices for Perennial Crops	Prepare raised beds filled with native soil or a soil mix near the restoration site[13].
Establishment Phase Details	Sow seeds in fall and press the seeds into the soil to ensure good seed-soil contact without burring the seeds[13]. Cover the bed with a biodegradable excelsior erosion control blanket (remove plastic netting)[13]. After snow melts the spring after sowing, cover the site with plastic sheeting (over the excelsior blanket) in order to increase the soil temperature to 85°F and promote germination. Vent the plastic if soil temperature exceeds 85°F. Remove the plastic sheeting once germination occurs[13].
Length of Establishment Phase	No published information on this topic.
Active Growth Phase	Water seedlings deeply and fertilize through summer to encourage strong root establishment[13].
Length of Active Growth Phase	No published information on this topic.
Hardening Phase	No published information on this topic.
Length of Hardening Phase	No published information on this topic.
Harvesting, Storage and Shipping	No published information on this topic.
Length of Storage	Same as above.
Guidelines for Outplanting / Performance on Typical Sites	Frank and Del Moral[5] indicate recruitment from seed tends to be poor in natural settings for this species.

Other Comments	Soil moisture availability and duration is critical to seedling establishment[10].
INFORMATION SOURCES	
References	See below.
Other Sources Consulted	
Protocol Author	Alexandra M. Howell
Date Protocol Created or Updated	04/28/2024

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Personal Communications:

Drown, Josh S. Horticulturist, Mount Rainier National Park. 25 April 2024.