Protocol Information

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United States Department of Agriculture
Natural Resources Conservation Service

Corvallis
Plant Materials Center
Corvallis, Oregon

Family Scientific Name:	**Ranunculaceae**
Family Common Name:	**Buttercup**
Scientific Name:	***Aquilegia formosa* Fisch. ex DC.**
Common Name:	**western columbine**
Species Code:	**AQFO**
Ecotype:	**Crater Lake National Park, 6,300 to 6,600 ft elevations**
General Distribution:	**Pacific coast states, great basin states, Utah and Nevada. In Crater Lake NP, grows at moderate elevations in partially open to wooded areas; not abundant but widely scattered in areas where soil retains moisture.**
Propagation Goal:	**Plants**
Propagation Method:	**Seed**
Product Type:	**Container (plug)**
Stock Type:	**1-yr plugs (10)**
Target Specifications:	**Well-developed crown growth, roots filling length of cone**
Propagule Collection:	**Hand harvested - uniquely shaped seed pods are easily identifiable in field; but only small and scattered quantities available in park.**
Propagule Processing:	**Follicles normally dry and split open at maturity. Gently crush dried seed heads to release remaining seeds; cleaned with "office clipper" air-screen machine. The papery, light pod chaff is easily separated from seed.**
Pre-Planting Treatments:	**Fairly long moist pre-chill improved germination;**

	seeded cones stored for 6 months in a cold walk-in cooler with soil surface kept moist, produced more than 15% germination. Germination tests at Oregon State University seed lab were reported at just 8% with a 3-day moist prechill treatment.
Growing Area Preparation/ Annual Practices for Perennial Crops:	**Three to five seeds each were sown into Ray Leach SC-10 super cells filled with Fisons' Sunshine #1 potting mix, amended with 3-month slow-release Osmocote NPK fertilizer and small amounts of Micromax trace elements. Cones were well-watered and placed in to a walk-in cooler at 40°F for 6 months cold stratification. (Seed could also be stratified in moist peat moss and sown into cones after stratification, if desired).**
Establishment Phase:	**Cones were moved outdoors to shadehouse in mid-spring to germinate. Initial germination is spotty, and initial growth is quite slow. Seedlings need light but fairly frequent watering to keep soil moist but not soggy.**
Length of Establishment Phase:	**slow; about 3 months**
Active Growth Phase:	**Crown development is fairly slow and steady throughout the season. Plants were fertilized in July with half-strength Peter's 9-45-15 NPK fertilizer. Root growth is also fairly slow - roots did not reach bottoms of containers for about 3 months. By mid-summer, extensive foliage development made it somewhat difficult to use overhead sprinkling - the cones were hand-watered, moving the watering wand through the foliage to reach the relatively small cone surfaces. Plants did not recover easily from becoming too dried out.**
Length of Active Growth Phase:	**June to August**
Hardening Phase:	**No fertilizer is applied in August, and watering intervals are gradually lengthened once adequate root development has occurred.**
Length of Hardening Phase:	**August - September.**
Harvesting, Storage and Shipping:	**Well-watered plants were shipped in their containers by refrigerated van in August to the park, up to a holding facility at the where they were maintained in a shadehouse for an additional 2 weeks prior to outplanting in September.**
Length of Storage:	**Cones could be held over winter, but spring regrowth at the PMC was slow and spotty; plants were easily overgrown by liverworts / mosses in**

cool wet spring weather.

Outplanting performance on typical sites: **Care is needed when removing the rather delicate root systems from their cones; in some cases cones were cut open to avoid disturbing the roots too much. Crowns need to be placed carefully at soil surface.**

Other Comments: **Seeds stored at Corvallis PMC in cold, dry conditions (34 to 38°F, low humidity) remained viable for at least 3 years; longer-term tests were not conducted.**

The use of manufacturer and trade names in this document is for clarification only. No discrimination is intended and no endorsement is given by the USDA NRCS.

References:

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