

Plant Propagation Protocol for *Aquilegia flavescens*
 ESRM 412 – Native Plant Production
 Protocol URL: <https://courses.washington.edu/esrm412/protocols/AQFL>

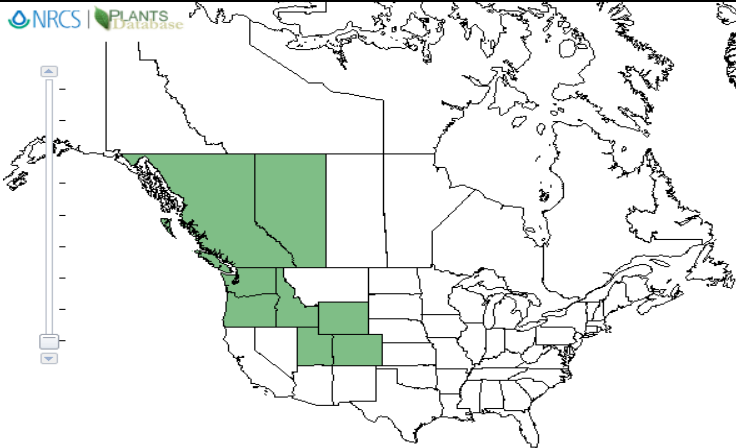



(3)

TAXONOMY	
Plant Family	
Scientific Name	Ranunculaceae (1)
Common Name	Buttercup family (1)
Species	
Scientific Name	<ul style="list-style-type: none"> • <i>Aquilegia flavescens</i> S. Watson (1)
Varieties	<ul style="list-style-type: none"> • <i>Aquilegia flavescens</i> S. Watson var. <i>flavescens</i> • <i>Aquilegia flavescens</i> S. Watson var. <i>miniata</i> A. Nelson & J.F. Macbr. • <i>Aquilegia flavescens</i> S. Watson var. <i>rubicunda</i> (Tidestr.) S.L. Welsh • <i>Aquilegia flavescens</i> fo. <i>minor</i> Tidestr.

		(6)
Sub-species	N/A	
Cultivar	N/A	
Common Synonym	<i>Aquilegia formosa</i> Fisch. ex DC. var. <i>flavescens</i> (S. Watson) M. Peck	(1)
Common Name(s)	<ul style="list-style-type: none"> • Yellow Mountain Columbine • Golden Columbine • Yellow Columbine 	(2)
Species Code (as per USDA Plants database)	AQFL	(1)

GENERAL INFORMATION

Geographical range	 	(1) (10)
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Ecological distribution	<ul style="list-style-type: none"> • Moist meadows • Alpine slopes • Cold climate 	(2)(4)(9)
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Climate and elevation range	Elevation of 1300-3500 meters	(2)
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Local habitat and abundance	<ul style="list-style-type: none"> • Moist meadows • Alpine slopes • Open woods • Slopes • Rock slides 	(7)(2)
Plant strategy type / successional stage	<ul style="list-style-type: none"> • Has a tendency to cross pollinate with other Aquilegia species • Seeds spread on their own annually 	(5)
Plant characteristics	<ul style="list-style-type: none"> • Ranges in height 20 to 70 centimeters • Forb/herb • Perennial • 20-70 centimeters tall • Sepals are yellow, possibly with pink • Blades are white or cream 	(3)(1)
PROPAGATION DETAILS		
Ecotype	N/A	
Propagation Goal	Plants	(7)
Propagation Method	Seed	(7)
Product Type	Container (plug)	(7)
Stock Type	172 milliliter container	(7)
Time to Grow	4-5 months	(7)
Target Specifications	<ul style="list-style-type: none"> • Height of plant should be 9 cm • Container seedling 	(7)
Propagule Collection Instructions	<ul style="list-style-type: none"> • Puts out many seeds on its own as a perennial, new plants will grow every year • Sow seeds outdoors in fall • Sow seeds in containers in spring or fall • Can divide plants in spring but plants will not be as vivacious as with seeds • Seeds may be collected in late August from green follicles with shiny black seeds 	(7)
Propagule Processing/ Propagule Characterist	<ul style="list-style-type: none"> • When seeds are black and shiny they are ready to collect • Follicles should be brown but can still be green in color • Cut the stalk and keep dry in a plastic bag or drying shed for 3 days 	

ics	<ul style="list-style-type: none"> • After 3 days, seeds should shake free out of opened capsules. • In a sealed container at 5 degrees C, seeds will remain viable at least 2 to 3 years • Morphological dormancy • Seeds per Kg is 880,000 • Purity is 100% • Germination is 27-55% <p style="text-align: right;">(2)(7)</p>
Pre-Planting Propagule Treatments	<ul style="list-style-type: none"> • Treat seeds with 1,000 ppm gibberellic acid for 24 hours • Rinse seeds in running water for 10 minutes • Stratification of seeds in a cold (1-3 degrees C) and moist environment for 60 days • Place seeds on moist paper towels in a plastic bag which is left open and refrigerate <p style="text-align: right;">(7)</p>
Growing Area Preparation / Annual Practices for Perennial Crops	<ul style="list-style-type: none"> • Can grow in greenhouse and outdoor nursery • Use a 172-milliliter container • Keep temperature at 21-25 degrees C in daytime and 16-18 degrees C at night. • Keep seedlings in the greenhouse until mid-May and then to the outdoor nursery for the rest of the growing season • Use a ratio of 6:1:1 milled sphagnum peat, perlite, and vermiculite with Osmocote controlled release fertilizer (13N:13P2O5:13K2O; 8 to 9 month release rate at 21C) • Also use Micromax fertilizer (12%S, 0.1%B, 0.5%Cu, 12%Fe, 2.5%Mn, 0.05%Mo, 1%Zn) at the rate of 1 gram of Osmocote and 0.20 gram of Micromax • Thoroughly irrigate containers every morning • Growing season is from later April until mid-October <p style="text-align: right;">(7)</p>
Establishment Phase Details	<ul style="list-style-type: none"> • Aquilegia species 2-4 weeks to germinate • Germinates in 2 to 4 weeks • Seedlings must be slightly dried between irrigations • Thin seedlings during true leaf stage <p style="text-align: right;">(7)(8)</p>
Length of Establishment Phase	4 weeks
Active Growth Phase	<ul style="list-style-type: none"> • After seeds germinate, rapid shoot and rapid root growth will occur • During active growth phase, fertilized seedlings weekly with 20-20-20 liquid NPK <p style="text-align: right;">(7)</p>
Length of Active Growth	8 weeks

Phase		
Hardening Phase	<ul style="list-style-type: none"> • In August, fertilize with 10-20-20 liquid NPK • Leach pots with water • Reduce irrigation gradually from September to October 	(7)
Length of Hardening Phase	4 weeks	(7)
Harvesting, Storage and Shipping	<ul style="list-style-type: none"> • Harvest in July after 4.5 months of growth • Storage in winter includes insulation and cold temperature 	(7)
Length of Storage	5 months	(7)
Guidelines for Outplanting / Performance on Typical Sites	<ul style="list-style-type: none"> • Germination is 27-55% • Can outplant at 9 centimeters 	(7)
Other Comments	Do not eat or consume. <i>Aquilegia</i> species are frequently toxic	(2)

INFORMATION SOURCES

References	<p>(1) USDA Natural Resources Conservation Service. (n.d.). Retrieved April 21, 2017, from https://plants.usda.gov/core/profile?symbol=AQFLF</p> <p>(2) Lady Bird Johnson Wildflower Center. (n.d.). Plant Database. Retrieved April 22, 2017, from http://www.wildflower.org/plants/result.php?id_plant=AQFL</p> <p>(3) USDA Forest Service. (n.d.). Aquilegia Express: Yellow Columbines. Retrieved April 22, 2017, from https://www.fs.fed.us/wildflowers/beauty/columbines/aquilegia_flavescens.shtml</p> <p>(4) Robson, K. A., Richter, A., & Filbert, M. (2008). <i>Encyclopedia of northwest native plants for gardens and landscapes</i>. Portland, Or.: Timber Press.</p> <p>(5) Flora of North America. (n.d.). Retrieved April 23, 2017, from http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=233500104</p> <p>(6) (n.d.). Retrieved April 23, 2017, from http://www.tropicos.org/namesearch.aspx?name=aquilegia%2Bflavescens</p>
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	<p>(7) RNGR. (n.d.). Ranunculaceae (Aquilegia). Retrieved April 24, 2017, from https://npn.rngr.net/npn/propagation/protocols/ranunculaceae-aquilegia-138/?searchterm=Aquilegia flavescens</p> <p>(8) Hill, L. (1985). <i>Secrets of plant propagation: starting your own flowers, vegetables, fruits, berries, shrubs, trees, and houseplants</i>. Pownal, VT: Storey Communications.</p> <p>(9) Portland Nursery. (n.d.). Natives. Retrieved April 24, 2017, from http://portlandnursery.com/plants/natives/aquilegia.shtml</p> <p>(10) Aquilegia flavescens golden columbine Wildflowers of the Pacific Northwest. (n.d.). Retrieved April 25, 2017, from https://www.pnwflowers.com/flower/aquilegia-flavescens</p>
Other Sources Consulted	(1) Duffy, C. Fragments of the Rocky Mountains: Conference 2011.
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Date Protocol Created or Updated	04/26/2017