

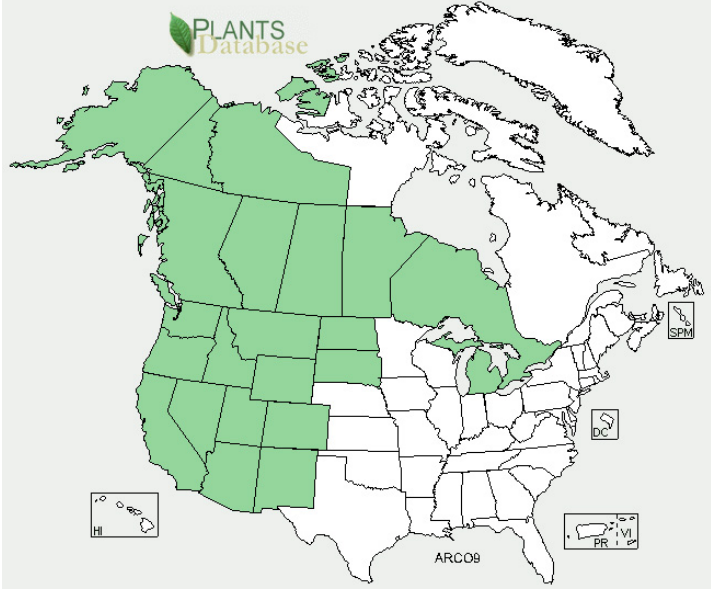
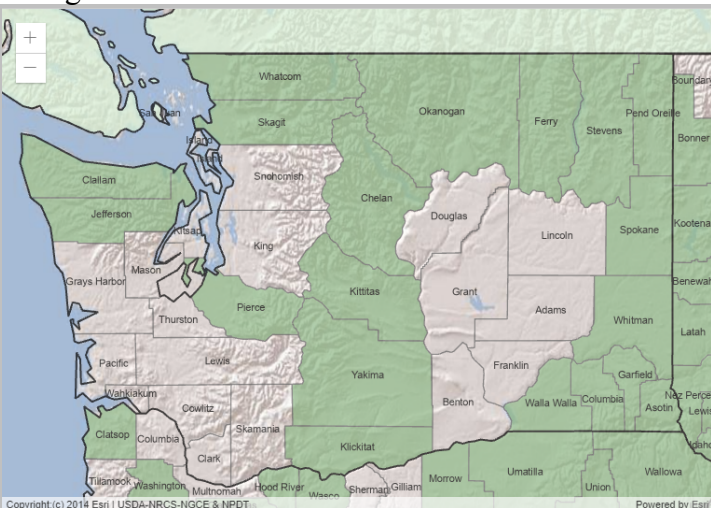
Plant Propagation Protocol for *Arnica cordifolia*

ESRM 412 – Native Plant Production

URL: <https://courses.washington.edu/esrm412/protocols/2023/ARCO.pdf>

<https://plants.usda.gov/home/plantProfile?symbol=ARCO9>

TAXONOMY	
Plant Family	
Scientific Name	Asteraceae
Common Name	Aster family
Species Scientific Name	
Scientific Name	Genus: <i>Arnica</i> L. Species: <i>Arnica cordifolia</i> Species Authority: Hook
Varieties (Authority)	Variety: <i>humilis</i> (Rydb), <i>pumila</i> (Rydb), <i>whitneyi</i> (Fernald) Authority: Maguire
Sub-species	Subspecies: <i>Genuina</i> Authority: Maguire
Cultivar	
Common Synonym(s)	<i>Arnica cordifolia</i> Hook. ssp. <i>genuina</i> Maguire <i>Arnica cordifolia</i> Hook. var. <i>humilis</i> (Rydb.) Maguire <i>Arnica cordifolia</i> Hook. var. <i>pumila</i> (Rydb.) Maguire <i>Arnica cordifolia</i> Hook. var. <i>whitneyi</i> (Fernald) Maguire
Common Name(s)	Heartleaf arnica, heart-leaved arnica
Species Code (as per USDA Plants database)	ARCO
GENERAL INFORMATION	
Geographical range	Distribution includes, Western US, Alaska, Canada. North America Distribution

	 <p>Washington Distribution</p> 
Ecological distribution	Woodlands in masic to dry forests and meadows at low to moderate elevations in the northern interior (1,2)
Climate and elevation range	Occurs in boreal and cool temperate climates, at an elevation of 5,000-11,000 ft. (4)
Local habitat and abundance	Open-canopy coniferous forests on high elections. Inhabits exposed, moderately dry mineral soils (6).
Plant strategy type / successional stage	Full sun to intermediate shade tolerance and adapted to coarse textured soils (4,5), dominant ground cover in forest communities (6); seen as early succession plants after clear cutting (7). It is also moderately fire resistant (6).
Plant characteristics	Perennial herb from long, slender, creeping rhizomes, with upright stems of 6-24 inches. (4,6). Lifespan of <i>A. cordifolia</i> is about 12 years (6)

	<p>Has heart-shaped basal leaves, opposite stem leaves; yellow ray and disk flowers (2).</p> <p>Flowering may begin as early as May until early June in some locations (6). Seeds dispersed through wind and through rhizomes (4).</p>
SEED PROPAGATION DETAILS - Glacier National Park (8)	
Ecotype	Subalpine meadows, Logan Pass, Glacier National Park.
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	160 ml conetainers
Time to Grow	7 months
Target Specifications	<p>Height: 7cm, 4 to 6 true leaves;</p> <p>Root system: firm plug in 160 ml conetainer.</p>
Propagule Collection Instructions	Locate populations with full sun or open forest or meadows for seed collection. Hand collected in July and August when achenes are easily separated from receptacles. Collected in paper bags and kept in a well ventilated dry place prior to cleaning.
Propagule Processing/Propagule Characteristics	<p>Seed longevity: 3 to 5 years at 1-3C in sealed containers.</p> <p>Non-deep physiological dormancy.</p> <p>Seeds/kg: 990,000/kg</p> <p>% purity: 100%</p> <p>% germination: 80-90%</p>
Pre-Planting Propagule Treatments	60 day cold/moist stratification. Imbibed with water for 4 hours and placed in fine mesh bags, buried in moist peat moss in ventilated containers in refrigeration at 1-3 C
Growing Area Preparation / Annual Practices for Perennial Crops	<p>Growing media: Promix 6:1:1 sphagnum peat: vermiculite:perlite.</p> <p>160 ml conetainers.</p>
Establishment Phase Details	Arnica seeds germinate uniformly at 22C. Thin seed coat susceptible to insect damage and rot. Medium kept slightly moist through misting twice a day. True leaves emerge 2 weeks after initial germination.
Length of Establishment Phase	4 weeks
Active Growth Phase	Once established, plants have rapid shoot and root growth (2-4 weeks post germination). Plants fertilized with 20-20-20 liquid NPK at 100 ppm weekly.
Length of Active Growth Phase	12 weeks
Hardening Phase	Plants fertilized with 10-20-20 liquid NPK at 200 ppm in early fall. Irrigation gradually reduced through september/october.
Length of Hardening Phase	4 weeks

Harvesting, Storage and Shipping	Harvest date: September Storage: overwinter in outdoor nursery with insulating foam cover
Length of Storage	5 months
Guidelines for Outplanting / Performance on Typical Sites	
Other Comments	
INFORMATION SOURCES	
References	<p>(1) Plants for a Future. 2011. Arnica cordifolia. Plants for a Future https://pfaf.org/user/Plant.aspx?LatinName=Arnica+cordifolia</p> <p>(2) Burton, C.M., and P.J. Burton. 2003. A Manual for Growing and Using Seed From Herbaceous Plants Native to the Interior of Northern British Columbia. Symbiosis Research & Restoration, Smithers, B.C. 168 p. https://www.env.gov.bc.ca/fia/documents/native_seed_manual/29arnica_cordifolia.pdf</p> <p>(3) USDA, NRCS. 2023. Arnica cordifolia Hook. The PLANTS Database. National Plant Data Team, Greensboro, NC USA. https://plants.usda.gov/home/plantProfile?symbol=ARCO9</p> <p>(4) Range Plants of Utah. n.d. Heartleaf Arnica. Utah State University. https://extension.usu.edu/rangeplants/forbs-herbaceous/heartleaf-arnica#:~:text=It%20occurs%20in%20boreal%20and,of%205%2C000%20to%2011%2C000%20feet.</p> <p>(5) Schweitzer, M. 2005. Plant Data Sheet for Arnica latifolia, mountain arnica. University of Washington. https://depts.washington.edu/propplnt/Plants/ARLA.htm</p> <p>(6) USDA. n.d. SPECIES: arnica cordifolia. Fire effects information system (FEIS) https://www.fs.usda.gov/database/feis/plants/forb/arncor/all.html</p> <p>(7) Crouch, Glenn L. 1985. Effects of clearcutting a subalpine forest in central Colorado on wildlife habitat. Res. Pap. RM-258. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 12 p. [8225]</p>

	<p>(8) Luna, Tara; Corey, Susan; Evans, Jeff; Wick, Dale; Hosokawa, Joy. 2008. Propagation protocol for production of Container (plug) <i>Arnica cordifolia</i> Hook. plants 160 ml conetainers; USDI NPS - Glacier National Park West Glacier, Montana. In: Native Plant Network. URL: https://NativePlantNetwork.org (accessed 2023/05/03). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources.</p>
Other Sources Consulted	<p>(9) M.R. Penskar and S.R. Crispin. 2009. Special Plant Abstract for heart-leaved arnica (<i>Arnica cordifolia</i>). Michigan Natural Features Inventory. Lansing, MI. 4 pp.</p> <p>(10) Appendix B - Propagation and Establishment of Requirements for Selected Plant Species. N. d. University of Montana. https://winapps.umt.edu/winapps/media2/wilderness/toolboxes/documents/restoration/pdf06232815dpi72pt17.pdf</p> <p>(11) Barner, Jim. 2009. Propagation protocol for production of Propagules (seeds, cuttings, poles, etc.) <i>Arnica cordifolia</i> Hook. seeds USDA FS - R6 Bend Seed Extractory Bend, Oregon. In: Native Plant Network. URL: https://NativePlantNetwork.org (accessed 2023/05/03). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources.</p> <p>(12) Fertig, W. n.d. Plant of the Week Heartleaf Arnica (<i>Arnica cordifolia</i>). United States Forest Service. https://www.fs.usda.gov/wildflowers/plant-of-the-week/arnica_cordifolia.shtml</p>
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