

Plant Propagation Protocol for *Arnica cernua*

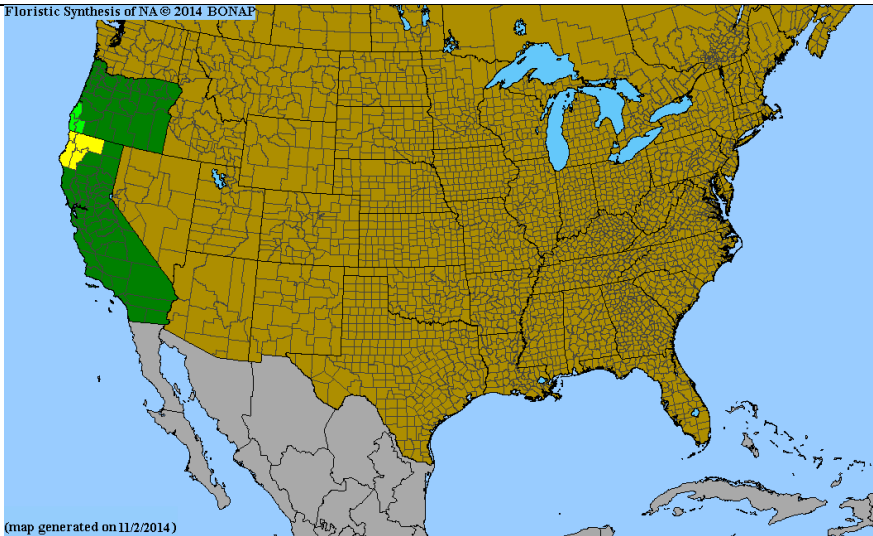
ESRM 412 – Native Plant Production

URL: <https://courses.washington.edu/esrm412/protocols/2026/ARCE.pdf>



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TAXONOMY	
Plant Family	
Scientific Name	Asteraceae Bercht. & J. Presl (4)
Common Name	Aster (Sunflower) family (4)
Species Scientific Name	
Scientific Name	<i>Arnica cernua</i> Howell (4)
Varieties	NA
Sub-species	NA
Cultivar	NA
Common Synonym(s)	<i>Arnica chandleri</i> Rydberg (4)
Common Name(s)	serpentine arnica, nodding arnica (4)

Species Code (as per USDA Plants database)	ARCE (4)
GENERAL INFORMATION	
Geographical range	 <p style="text-align: center;">Source: BONAP North American Plant Atlas</p> <p>Endemic to Klamath Mountains in northwestern California and southwestern Oregon. (4) See map above for geographic distribution, where dark green indicates presence on the state-level, light green with presence on the county-level and yellow indicating rare documentation on the state-level (present in county). (5)</p>
Ecological distribution	This species persists in montane, coniferous forests and shrublands in the Klamath-Siskiyou region, including yellow pine forests. (8)
Climate and elevation range	This species occurs in Mediterranean and cool temperate climates, inhabiting dry mineral (serpentine) soils. (9) This species occupies elevations from 500 to 1500 meters. (10, 11)
Local habitat and abundance	This species inhabits open-canopy coniferous forests at high elevations, growing in soils with igneous parent material and in rhizomatous patches. Associated species include <i>Psuedotsuga menziesii</i> , <i>Pinus ponderosa</i> , <i>Pinus jeffreyi</i> , <i>Quercus sp.</i> , <i>Arctostaphylos sp.</i> , <i>Holodiscus discolor</i> , <i>Frangula californica</i> ssp. <i>californica</i> , <i>Kalmiopsis leachiana</i> , <i>Umbellularia californica</i> , <i>Cornus nuttallii</i> , <i>Vaccinium ovatum</i> , <i>Lithocarpus densiflorus</i> , <i>Xerophyllum tenax</i> , <i>Polystichum imbricans</i> , <i>Trientalis latifolia</i> , <i>Lonicera hispidula</i> , <i>Erythronium sp.</i> , <i>Whipplea modesta</i> , <i>Prosartes hookeri</i> and <i>Maianthemum racemosum</i> . (3, 6)
Plant strategy type / successional stage	This species uses a stress-tolerator strategy due to strictly colonizing ultramafic serpentine soils, growing in harsh and nutrient-limited soils.

	Due to this environment, rapid growth by competitors is limited, allowing a slow-growing root system to establish in the understory of dry montane forests.
Plant characteristics	<p>This species is a native, perennial herb with reddish purple stems, slightly lobed and petiolate leaves, and 5-10 yellow ray florets. This species can grow up to 12 inches tall and primarily reproduces by wind-dispersed seeds and clonal rhizomes. (3, 10)</p> <p style="text-align: center;"> <i>Arnica cernua</i> <i>Arnica chamissonis</i> © Regents of the University of California Source: Jepson Herbarium (2) </p>

PROPAGATION DETAILS: FROM SEED

Ecotype	N/A
Propagation Goal	Plants (7)
Propagation Method	Seed (7)
Product Type	Container (plug) (7)
Stock Type	160 ml conetainers (7)
Time to Grow	7 months (7)
Target Specifications	Height: 7 cm, 4 to 6 true leaves, firm plug (root system) in 160 ml container (7)
Propagule Collection Instructions	Hand collect seeds in July and August when achenes are separated from receptacle (seeds grey at maturity), looking for populations in full sun or in open areas. Place seeds in paper bags and keep them in a well-ventilated drying shed until seeds are sufficiently dry (typically 1-2 weeks). (7)
Propagule Processing/Propagule Characteristics	Clean seeds using hammermill and office clipper. Longevity is 3 to 5 years at 1°C to 3 °C in sealed containers. Seed density is 990,000 per kg with 80% to 90% germination. (7)

Pre-Planting Propagule Treatments	Imbibe seeds in water for 4 hours, then place seeds in fine mesh bag with moist peat moss in ventilated containers at refrigeration of 1 to 3°C. Keep bags in fridge for 60 days for cold, moist stratification. (7)
Growing Area Preparation / Annual Practices for Perennial Crops	Use growing media of Promix growing media 6:1:1 sphagnum peat:vermiculite:perlite with Osmocote controlled release fertilizer (13N:13P2O5:13K2O). Fertilizer runs for 8 to 9 months with a release rate of 1 g per 172 ml container at 21 °C. Alternatively, Micromax fertilizer can be used with release rate of 0.20 gram per 172 ml container. Containers are irrigated thoroughly after sowing. (7)
Establishment Phase Details	Seedlings germinate at 22 °C and medium is kept slightly moist during germination through misting twice per day. Expect true leaves to emerge 2 weeks after germination and thin seedlings at this time. (7)
Length of Establishment Phase	4 weeks (7)
Active Growth Phase	Once seedlings are established, rapid shoot and root growth take place for 2 to 4 weeks after germination. Seedlings are fertilized with 20-20-20 liquid NPK at 100 ppm weekly during growing season. (7)
Length of Active Growth Phase	12 weeks (7)
Hardening Phase	Seedlings continue to be fertilized with 10-20-20 liquid NPK at 200 ppm in early fall. Containers are leached with water and irrigation is gradually reduced from September and October. (7)
Length of Hardening Phase	4 weeks (7)
Harvesting, Storage and Shipping	Seedlings are harvested during September and allowed to overwinter in outdoor nursery under insulating foam cover. (7)
Length of Storage	5 months (7)
Guidelines for Outplanting / Performance on Typical Sites	N/A
Other Comments	This protocol is targeted towards <i>Arnica cordifolia</i> Hook., a congener to <i>Arnica cernua</i> with similar environmental requirements (growing in high elevations).
PROPAGATION DETAILS: VEGETATIVE	
Ecotype	N/A

Propagation Goal	Plants
Propagation Method	Vegetative
Product Type	Propagules (seeds, cuttings, poles, etc.)
Stock Type	4 in. containers
Time to Grow	N/A
Target Specifications	N/A
Propagule Collection Instructions	Lift clump of rhizomes out of soil, shake off excess soil and separate sections by hand. Select plump young rhizomes with healthy roots and discard old rhizomes. Collect rhizomes every three years during early spring or fall to keep flowering well. (1)
Propagule Processing/Propagule Characteristics	N/A
Pre-Planting Propagule Treatments	Cut rhizomes into small sections about 2-4 in (5-10 cm) using a sharp knife, ensuring each contains a bud and has a healthy fan of leaves at one end. Trim any slender fibrous roots by one-third of their original length. Trim leaves to about 6 in (15 cm) long. (1)
Growing Area Preparation / Annual Practices for Perennial Crops	Set rhizomes in soil with slender fibrous roots buried and rhizome is buried no more than half its depth. Have containers either in coldframe or greenhouse environment. (1)
Establishment Phase Details	N/A
Length of Establishment Phase	2 to 3 weeks (1)
Active Growth Phase	Keep soil media moist with misting during growing period. (1)
Length of Active Growth Phase	N/A
Hardening Phase	Ensure roots harden before outplanting seedlings. (1)
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	As of the time of this protocol, there are no available vegetative propagation guidelines for <i>Arnica cernua</i> or its congeners. This species propagates naturally through rhizomes, and clonal division is

	recommended for nursery settings, with this protocol created towards the division of rhizomatous perennials, which includes <i>Arnica cernua</i> .
INFORMATION SOURCES	
References	<ol style="list-style-type: none"> 1) Arbury, James. (1997). <i>The Complete Book of Plant Propagation</i>. The Tauton Press. ISBN: 9781561582341, pp.29-30. 2) <i>Arnica cernua</i>. <i>Jepson eFlora</i>, The University and Jepson Herbaria, University of California, Berkeley. ucjeps.berkeley.edu/eflora/eflora_display.php?tid=1113 3) Jennings, Linda; Mosquin, Daniel; Hine, Brent; DesCamp, Wendy; Hitchin, Randall. <i>Arnica cernua</i> Howell (ID: 3126920). <i>Consortium of Pacific Northwest Herbaria</i>, University of Washington Herbarium. www.pnwherbaria.org/index.php. 4) Kartesz, John T. (n.d.). <i>Arnica cernua</i> Howell. <i>USDA NRCS, PLANTS Database, Biota of North America Program</i> . plants.sc.egov.usda.gov/plant-profile/ARCE/sources 5) Kartesz, J.T., The Biota of North America Program (BONAP). 2014. North American Plant Atlas. Chapel Hill, N.C. [maps generated from Kartesz, J.T. 2015. Floristic Synthesis of North America, Version 1.0. Biota of North America Program (BONAP). (in press) 6) Chambers, Kenton (n.d.). <i>Arnica cernua</i> Howell. <i>Flora of Oregon</i>, vol. 2, pp. 183. oregonflora.org/taxa/index.php?tid=2956 7) 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: <i>Native Plant Network</i>. NativePlantNetwork.org. US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. 8) Lindstrand III, Len (2023). Oregon State University Vascular Plant Collection (OSC:V), <i>OregonFlora</i>, Oregon State University. oregonflora.org/collections/individual/index.php?occid=6335185 9) Reed, William R. 1993. <i>Arnica cordifolia</i>, heartleaf arnica. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). research.fs.usda.gov/feis/species-reviews/arncor 10) Wolf, Steven J. (1980). <i>Arnica cernua</i> Howell. <i>Flora of North America</i>, vol. 21. www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=250066108 11) Wolf, Steven J. & Barkley, Theodore M. (2012). <i>Arnica cernua</i>, in <i>Jepson Flora Project</i> (eds.) <i>Jepson eFlora</i>, ucjeps.berkeley.edu/eflora/eflora_display.php?tid=1113

Other Sources Consulted	<i>Arnica cernua</i> (n.d.). Lady Bird Johnson Wildflower Center, University of Texas at Austin. www.wildflower.org/plants/result.php?id_plant=ARCE
Protocol Author	Luciana Calle
Date Protocol Created or Updated	06/04/2026