

## Plant Propagation Protocol for *Cypripedium californicum*

ESRM 412 – Native Plant Production

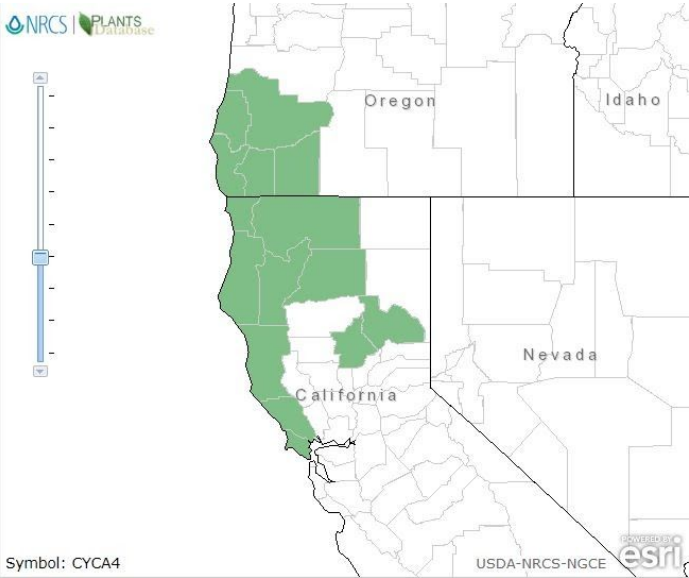
Protocol URL: <https://courses.washington.edu/esrm412/protocols/CYCA4.pdf>

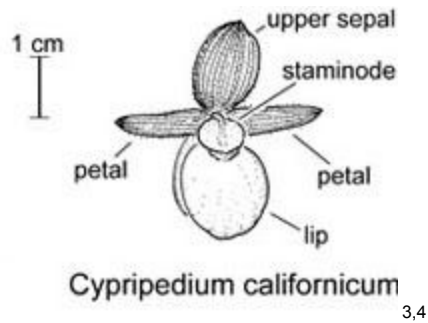


Image from Bill Bouton from San Luis Obispo, CA, USA - California Ladyslipper, *Cypripedium californicum* Uploaded by Orchi, CC BY-SA 2.0, <https://commons.wikimedia.org/w/index.php?curid=20376134>

TAXONOMY	
Plant Family	Orchidaceae
Scientific Name	<i>Cypripedium californicum</i>
Common Name	California lady's slipper; Aphrodite's Slipper
Species Scientific Name	

Scientific Name	Cypripedium californicum A. Gray
Varieties	N/A
Sub-species	N/A
Cultivar	
Common Synonym(s)	N/A
Common Name(s)	N/A
Species Code (as per USDA Plants database)	CYCA4
<b>GENERAL INFORMATION</b>	

<p>Geographical range</p>	 <p>North American Distribution</p>
<p>Ecological distribution</p>	<p>Wetland-riparian, seeps, bogs, fens, serpentine streambanks, montane mixed to coniferous forests<sup>1,2</sup></p>
<p>Climate and elevation range</p>	<p>Elevation 30 - 2750 meters, USDA climate zones 7b-9b</p>
<p>Local habitat and abundance</p>	<p>Moist slopes, partial shade to full sun, neutral to acidic soils, yellow pine forest, commonly in community with maidenhair ferns, Salal (<i>Gaultheria shallon</i>), Western Rhododendron (<i>Rhododendron occidentale</i>), and California Pitcher Plant (<i>Darlington californica</i>)</p>
<p>Plant strategy type / successional stage</p>	<p>Rhizomatous, grows in clumps, thrives in serpentine soils. Heterotrophic in early germination and seedling stages. Seeds form a mycorrhizal relationship with soil fungi to obtain nutrients until leaf formation, when the plant is able to begin photosynthesis. Blooms April through August.</p>

Plant characteristics	<p>Perennial rhizomatous herb, 8--130 cm. 5--12 elliptic--lanceolate, fuzzy, alternate leaves, 5--15 cm each. Open inflorescences with 12 flowers each. Flowers are bilaterally symmetrical. Upper parts are green to yellow-green, with a white lower lip. Upper sepals are about 15--20 mm, elliptic to ovate; lateral petals roughly 12--18 mm, lanceolate to oblong; lip is 15--20 mm; staminode is round and white with a green stripe.</p> <div data-bbox="865 594 1289 915">  <p>Cypripedium californicum<sub>3,4</sub></p> </div>
<b>PROPAGATION DETAILS</b>	
Ecotype	
Propagation Goal	<p>Protocorms (tuberous embryonic stage of orchid seedling stage), plants</p>

	 <p><i>C. reginae</i> protocorms<sup>5</sup></p>
Propagation Method	Seed
Product Type	Culture flasks, large pots (home cultivation)
Stock Type	
Time to Grow	1-3 years
Target Specifications	
Propagule Collection Instructions	Scrape slightly immature seeds from green seed pods. Harvest mature seeds before the seed capsule dehisces. Plant immature seed immediately. Mature seed can be dried, sanitized with a .05% bleach solution for around 15 mins, and then cold stored.
Propagule Processing/Propagule Characteristics	Immature seeds from green capsules germinate better <i>in vitro</i> because seed coatings have not fully developed, allowing rapid imbibing of water. For mature seeds, refrigeration, NaClO and Ca(ClO) <sub>2</sub> treatments, or mechanical damage, like ultrasound

	and vacuum infiltration, are recommended to break the coating and improve seed germination. <sup>6</sup>
Pre-Planting Propagule Treatments	Most species of <i>Cypripedium</i> require some cold moist stratification, however the temperature and duration can vary greatly between species. <sup>6</sup>
Growing Area Preparation / Annual Practices for Perennial Crops	In lab cultivation, use Curtis medium, Hyponex, or similar asymbiotic <i>Cypripedium</i> growth media. For home cultivation, sow seed one inch deep in large, well-draining pots of sandy, gritty soil. Keep moist, but prevent excess moisture by covering pots loosely with plastic sheeting. <sup>6-8</sup>
Establishment Phase Details	Light has been shown to inhibit seed germination. Keep in darkness at room temp, then transfer protocorms to light after 12 weeks. Use full or half-strength Curtis medium (a growth media specially formulated for <i>Cypripedium sp.</i> ) with a pH of 7.0–7.5 to improve germination rates. <sup>6</sup>
Length of Establishment Phase	Plant formation in <i>Cypripedium</i> occurred anywhere from 5 to 30 mo after the seeds were placed in culture <sup>7</sup>
Active Growth Phase	Seedling may form shoots first, then roots. protocorms and rhizomes form simultaneously. <sup>7</sup>
Length of Active Growth Phase	In lab test, small green plantlets were 1-2 cm tall after 1.5-2.5 years <sup>7</sup>
Hardening Phase	The rhizomes require an uninterrupted dormancy period of at least three months in order to maintain healthy growth in the following season. If full dormancy is interrupted and growth is stimulated too early, plant will die <sup>6</sup>

Length of Hardening Phase	3-4 months
Harvesting, Storage and Shipping	N/A
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	Dormant bud formation and high seedling mortality rates make transplantation challenging. Once plants are able to photosynthesize, and after dormancy is broken, transplant into moist, well-draining media, like sphagnum moss or coarse sand and perlite. <sup>6</sup>
Other Comments	Cypripedium sp. are difficult to propagate and outplant. Sowing in situ recommended.

## INFORMATION SOURCES

References	<ol style="list-style-type: none"> <li>1. Cypripedium californicum Calflora. <a href="https://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=2594">https://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=2594</a>.</li> <li>2. CNPS Inventory Plant Detail. <a href="http://www.rareplants.cnps.org/detail/544.html">http://www.rareplants.cnps.org/detail/544.html</a>.</li> <li>3. Cypripedium californicum. <a href="https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=21979">https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=21979</a>.</li> <li>4. Cypripedium californicum (California lady's slipper)   Native Plants of North America. <a href="https://www.wildflower.org/plants/result.php?id_plant=CYCA4">https://www.wildflower.org/plants/result.php?id_plant=CYCA4</a>.</li> <li>5. Propagation Methods. <a href="http://www.spanglecreeklabs.com/lab.html">http://www.spanglecreeklabs.com/lab.html</a>.</li> <li>6. Zeng, S. <i>et al.</i> Seed biology and in vitro seed germination of Cypripedium. <i>Crit. Rev. Biotechnol.</i></li> </ol>
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	<p><b>34</b>, 358–371 (2014).</p> <p>7. Oliva, A. P. &amp; Arditti, J. Seed Germination of North American Orchids. II. Native California and Related Species of <i>Aplectrum</i>, <i>Cypripedium</i>, and <i>Spiranthes</i>. <i>Bot. Gaz.</i> <b>145</b>, 495–501 (1984).</p> <p>8. Pacific Horticulture Society   Growing Hardy Orchids in the Pacific Northwest. <i>Pacific Horticulture Society</i>  <a href="https://www.pacifichorticulture.org/articles/growing-hardy-orchids-in-the-pacific-northwest/">https://www.pacifichorticulture.org/articles/growing-hardy-orchids-in-the-pacific-northwest/</a>.</p>
Other Sources Consulted	<p>CalPhotos.  <a href="https://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&amp;where-taxon=Cypripedium+californicum">https://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&amp;where-taxon=Cypripedium+californicum</a>.</p> <p>Cypripedium californicum (California Lady's Slipper): Go Orchids.  <a href="https://goorchids.northamericanorchidcenter.org/species/cypripedium/californicum/">https://goorchids.northamericanorchidcenter.org/species/cypripedium/californicum/</a>.</p> <p>Cypripedium californicum in Flora of North America @ efloras.org.  <a href="http://www.efloras.org/florataxon.aspx?flora_id=1&amp;taxon_id=242101546">http://www.efloras.org/florataxon.aspx?flora_id=1&amp;taxon_id=242101546</a>.</p> <p>Pacific Bulb Society   Cypripedium.  <a href="https://www.pacificbulbsociety.org/pbswiki/index.php/Cypripedium">https://www.pacificbulbsociety.org/pbswiki/index.php/Cypripedium</a>.</p> <p>Plants Profile for Cypripedium californicum (California lady's slipper).  <a href="https://plants.sc.egov.usda.gov/core/profile?symbol=CYCA4">https://plants.sc.egov.usda.gov/core/profile?symbol=CYCA4</a>.</p> <p>Woolhouse, S. The biology and ecology of six rare plants from Plumas National Forest, Northern California, USA. (San Jose State University, 2012).</p> <p>Cullina, W. The New England Wild Flower Society Guide to Growing and Propagating Wildflowers of the</p>



	United States and Canada. (Houghton Mifflin Harcourt, 2000).
Protocol Author	Lauren Homer
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