

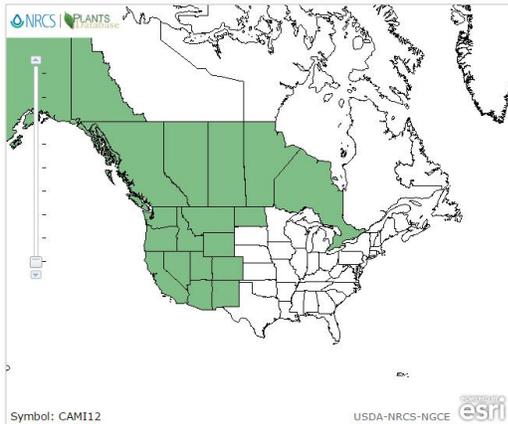
Plant Propagation Protocol for *Castilleja miniata* (Giant Red Indian Paintbrush)

ESRM 412 – Native Plant Production

Protocol URL: <https://courses.washington.edu/esrm412/protocols/CAMI12.pdf>



Above: *Castilleja miniata* [Southwest Colorado Wildflowers, *Castilleja miniata*. N.p., n.d. Web. 05 May 2017. <https://www.swcoloradowildflowers.com>]



Left: Native distribution of *Castilleja miniata* in the United States according to the USDA [1].

Right: Native distribution by county of *Castilleja miniata* in the state of Washington. Regions in yellow are counties in which the species are known to occur in. Green rings are where the species has been identified on site. Information & map provided by the burke museum [2].

| TAXONOMY | |
|--|--|
| Plant Family | |
| Scientific Name | Scrophulariaceae |
| Common Name | Figwort family |
| Species Scientific Name | |
| Scientific Name | <i>Castilleja miniata</i> Douglas. Ex Hook. |
| Varieties | N/A |
| Sub-species | The USDA Plants database recognizes 3 sub-species: <i>Castilleja miniata</i> ssp. <i>dixonii</i> (Giant Red Indian Paintbrush) <i>Castilleja miniata</i> ssp. <i>elata</i> (Siskiyou Indian Paintbrush) <i>Castilleja miniata</i> ssp. <i>miniata</i> (Giant Red Indian Paintbrush) |
| Cultivar | N/A |
| Common Synonym(s) | N/A |
| Common Name(s) | Giant Red Indian Paintbrush Siskiyou Indian Paintbrush |
| Species Code (as per USDA Plants database) | CAMI12 |
| GENERAL INFORMATION | |
| Geographical range | *See maps on first page. |
| Ecological distribution | This species occurs in open woods and meadows, thickets, grassy slopes, tidal marshes, clearings, gravel bars, roadsides [3], and clearings in foothills at mid-elevations [4]. *The U.S. Fish and Wildlife Service labels <i>Castilleja miniata</i> as a species which sometimes occurs in wetland ecosystems, though wetlands are not their primary ecosystem [1]. |
| Climate and elevation range | Occurs at low to high elevations [3]. Occurs in slightly moist climates and can occur along sandy or rocky beaches [5]. |
| Local habitat and abundance | This species is native to regions in the western United States and throughout most of Canada. As this species is a hemi-parasitic plant, some of the host species (there are many different species that work, some better than others) it selects are; <i>Leucanthemum vulgare</i> (Ox-Eye Daisy), <i>Oemleria cerasiformis</i> (Indian Plum), <i>Rubus parviflorus</i> (Thimbleberry), <i>Spiraea japonica</i> (Japanese meadowsweet), and <i>miniata</i> can also be found growing around on and around alders and willows [5]. Locally abundant in the Cascade Mountain Range [6]. |

| | |
|--|---|
| Plant strategy type / successional stage | As it mainly occurs as a parasitic plant in nature and must be grown onto a host species, this species seems to be late successional. |
| Plant characteristics | <p>This species is a hemi-parasitic herbaceous flowering perennial with few stems that are ascending from a woody base, usually 20-80 cm tall. The species can range from hairless, short-hairy, to sticky hairy. Leaves are narrow, sharp-pointed linear to lanceolate, usually entire. Leaves can have three shallow lobes and can be pubescent or glabrous. [3]</p> <p>This species blooms from March-September. [2]</p> <p>Flowers are generally greenish, tubular, and inconspicuous. Flowers are concealed by several showy, bright red-scarlet hairy bracts that are sharp toothed and pointed. Calyx lobes of the flowers are also sharply pointed [3].</p> <p>Plant is able to photosynthesize on its own but does better with a host plant and require sufficient watering [5].</p> |
| PROPAGATION DETAILS | |
| Ecotype | Based on region seeds are collected from, choose host species that are also found in the region and <i>Castilleja</i> has chosen as a host in the natural environment [6]. |
| Propagation Goal | <p>Our goal is to propagate the <i>Castilleja miniata</i> alongside a host species (both by seed), so to force the <i>Castilleja</i> species into forming a microbial relationship with the host species.</p> <p>*<i>Castilleja miniata</i> can be propagated by itself initially and transferred or simply kept without a host, although it will not grow as quickly or full alone.</p> |
| Propagation Method | Propagation by seed for both <i>C. miniata</i> and host plant. |
| Product Type | Container (Plugs, Cells, Flats) |
| Stock Type | N/A |
| Time to Grow | ~ 16 weeks once planted (after cold stratification). |
| Target Specifications | This propagation targets the <i>Castilleja</i> plant becoming hemi-parasitic on a host species. The goal is to create this relationship in the 16 weeks, and for the species to flower the following year after outplanting. |
| Propagule Collection Instructions | Collecting of seeds from <i>Castilleja miniata</i> should occur as soon as the plant has matured and seeds are about to be released. Collecting seeds too early can lead to the plant not germinating, April to May is a good time frame for collection [6] Also obtain host species seeds (recommendations include: <i>Achillea millefolium</i> , (Yarrow), <i>Carex</i> sp., or any other small statured prairie/meadow plant who's foliage will not |

| | |
|---|--|
| | grow aggressively and out-shade the <i>Castilleja miniata</i> once the two are transplanted together [6]. |
| Propagule Processing/Propagule Characteristics | N/A |
| Pre-Planting Propagule Treatments | Once seeds have been collected, make sure you have no excess materials. Seeds should be soaked in water for four to eight hours, allowing it to be cleaned and ready for stratification. Seeds should then be placed on moist blotter paper and stored in a petri dish or open plastic bag in the refrigerator at 33-36 degrees F for three months (to simulate the winter season), checking in on the seeds weekly for moisture content [6]. Cold stratification should occur in winter and planting seeds should occur in the spring. |
| Growing Area Preparation / Annual Practices for Perennial Crops | Seeds should be sown very shallowly in the soils, covered lightly with perlite mulch or chicken grit mulch to hold the seeds in place [6]. Soil media to use “2:1:1 mix of Sunshine Mix #2 (Sungro Horticulture), large grade perlite, and sharp sterile sand” [6]. Plant both <i>Castilleja</i> and the host species in separate containers (<i>Castilleja</i> should be planted in a large cells and host species can be planted in a 10*10 flat). Keep in a greenhouse for this period of time with 69-77 degrees F day temperatures and 50-60 degrees F night temperatures [6]. |
| Establishment Phase Details | It is important to keep germinants moist during this period. They have the potential to wilt quickly and recover poorly if not properly watered [6]. After <i>Castilleja</i> have four to six pairs of true leaves they can be combined with the host plant seedlings into a one gallon container, make sure plant roots are placed as close to one another as possible [6]. |
| Length of Establishment Phase | 4-6 weeks |
| Active Growth Phase | During this phase, <i>Castilleja</i> and the host species should form the parasitic relationship. Be sure to keep checking to make sure host plant isn’t shading out the <i>Castilleja</i> . Low concentration of complete fertilizer at one-quarter label recommendation should be used [6]. |
| Length of Active Growth Phase | 6-8 weeks |
| Hardening Phase | At this phase (midsummer works best) the containers with plants in them can be moved outdoors to harden for the winter prior to out-planting [6]. |
| Length of Hardening Phase | 4 weeks |
| Harvesting, Storage and Shipping | N/A |
| Length of Storage | Best results will occur if seeds are handpicked and propagated quickly. |

| | |
|---|---|
| Guidelines for Outplanting / Performance on Typical Sites | At about 16 weeks, <i>Castilleja</i> plants will be ready for out-planting. Blooming will occur the second year after germination [6]. |
| Other Comments | Other <i>Castilleja</i> sp. native to Washington are endangered and one should refrain from collecting seeds from endangered <i>Castilleja</i> plants. Make sure you follow guidelines for collecting seeds if they are from national, state, or private property. |
| INFORMATION SOURCES | |
| References | <p>[1] USDA. (n.d.). Plants Profile for <i>Castilleja miniata</i>. Retrieved April 24, 2017, from https://plants.usda.gov/core/profile?symbol=cami12</p> <p>[2] "Collections Databases." <i>Collections Databases / Burke Museum</i>. N.p., n.d. Web. 21 May 2017. http://biology.burke.washington.edu/</p> <p>[3] MacKinnon, A., Jim Pojar, and Paul B. Alaback. <i>Plants of Coastal British Columbia Including Washington, Oregon, British Columbia, & Alaska</i>. Edmonton: Lone Pine Pub., 2004. Print.</p> <p>[4] Alden, Peter. <i>National Audubon Society Field Guide to the Pacific Northwest</i>. New York: Knopf, 1998. Print.</p> <p>[5] Grey-Wilson, Christopher, ed. <i>The Alpine Gardener: Bulletin of the Alpine Garden Society (March)</i>. Comp. Vic Aspland. Vol. 73. N.p.: Alpine Garden Society, 2005. Print.</p> <p>[6] Luna, Tara. "Propagation Protocol for Indian Paintbrush (<i>Castilleja</i> Species)." <i>Native Plants Journal</i> 6.1 (2005): 62-68. Web.</p> |
| Other Sources Consulted | <p>[7] Peck, Morton Eaton. <i>A Manual of the Higher Plants of Oregon</i>. 2nd ed. Portland, OR: Oregon State U, 1961. Print.</p> <p>[8] <i>Rock Garden Quarterly: Bulletin of the North American Rock Garden Society</i>. Vol. 63 Number 2. Lawrence, KS: Allen, 2005. Print.</p> <p>[9] <i>Rock Garden Quarterly: Bulletin of the North American Rock Garden Society</i>. Vol. 65 Number 3. Lawrence, KS: Allen, 2007. Print.</p> <p>[10] Thompson, Peter, and Josie Owen. <i>Creative Propagation</i>. 2nd ed. Portland: Timber, 2005. Print.</p> <p>[11] Bewley, J. Derek, Michael Black, and Peter Halmer. <i>The Encyclopedia of Seeds: Science, Technology, and Uses</i>. Wallingford (UK): CABI, 2008. Print.</p> <p>[12] Hartmann, Hudson T., Dale E. Kester, Robert Geneve, and Fred T. Davies, Jr. <i>Hartmann & Kester's</i></p> |

| | |
|----------------------------------|--|
| | <i>Plant Propagation Principles and Practices</i> . 8th ed. Upper Saddle River: Pearson Prentice Hall, 2011. Print. [13] Jacobson, Arthur Lee. <i>Wild Plants of Greater Seattle: A Field Guide to Native and Naturalized Plants of the Seattle Area</i> . Seattle, WA: A.L. Jacobson, 2008. Print. |
| Protocol Author | Alec Roseto |
| Date Protocol Created or Updated | 5/24/2017 |

Previous Protocol



Species (common name, Latin name)
Common Red Paintbrush, *Castilleja miniata*

Range

Widely distributed from southern Alaska to Southern California, New Mexico and Arizona, missing the coast ranges of Oregon and California. This species is highly variable.

Climate, elevation

Found in moist and dry places at middle elevations in the mountains.

Local occurrence (where, how common)

Fairly common in both the Cascades and the Olympic Mountains.

Habitat preferences

Prefers meadows and slopes at medium and lower elevations in the mountains. Found in open woods and meadows (both dry and moist) thickets, grassy slopes, clearings, roadsides.

Plant strategy type/successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)

Is reported to be somewhat parasitic and requires a host plant.

Associated species

Although this plant requires a host species, it does not seem to be particularly associated with any one host plant. Composites, grasses and legumes are the most common.

May be collected as: (seed, layered, divisions, etc.)

C. miniata flowers from May to September. Allow seed pods to dry on the plant before collecting. Plants may also be divided, but be aware that they may be parasitic to roots of other plants.

Collection restrictions or guidelines

If collecting seeds or plants in national parks or forest, please refer to their guidelines for gathering and removing plant materials.

Seed germination (needs dormancy breaking?)

Cold stratification for 3 months or direct sow outside in the fall. If starting indoors, stratify first.

Seed life (can be stored, short shelf-life, long shelf-life)

Unknown

Recommended seed storage conditions

Unknown

Propagation recommendations (plant seeds, vegetative parts, cuttings, etc.)

There are conflicting reports of the viability of using divisions of the rootball for propagative purposes due to the plant's parasitic nature. Most sources recommend sowing seeds for *C. miniata* because of this. Transplanting is not recommended.

Soil or medium requirements (inoculum necessary?)

Requires open, quick-draining, but moisture retentive and deep soils of moderate fertility. Prefers a neutral Ph.

Installation form (form, potential for successful outcomes, cost)

Seeds have a high rate of germination, and therefore cost should be reasonable, especially if collecting the seeds yourself.

Recommended planting density

It is recommended that you sow seeds amongst other plants so that a relationship can be established with the host plant.

Care requirements after installed (water weekly, water once etc.)

Heavy fertilizing is highly recommended in the establishment phase. Water normally. Keep the host plants maintained so that they do not overtake *C. miniata* while it is trying to establish.

Normal rate of growth or spread; lifespan

Unknown

Photo sources

¹ http://www.ubcbotanicalgarden.org/potd/2005/05/post_2.php

² www.mnstate.edu/kienholz/mt_flowers_3.htm

Sources cited

Clark, Lewis J. Wild Flowers of the Pacific Northwest from Alaska to Northern California. Vancouver, BC: Evergreen Publishing Limited, 1976.

Dave's Garden, Plant Files. 26 April 2006. < <http://davesgarden.com/pf/go/1009/index.html>>.

Foster, H. Lincoln. Rock Gardening. A guide to Growing Alpines and Other Wildflowers in the American Garden. New York: Bonanza Books, 1968.

Glicenstein, Leon. Some Native Orchids of Northeastern USA. 26 April 2006.

<http://www.hoosierorchid.com/article_snoneusa.pdf>.

Hitchcock, C. Leo and Arthur Cronquist. Flora of the Pacific Northwest: An illustrated Manual. Seattle: University of Washington Press, 1973.

Hitchcock, Cronquist, Ownbey and Thompson. Vascular Plants of the Pacific Northwest. Parts 1-5. Seattle, Wa: University of Washington Press, 1961.

Lawrence, Beth. Studies to Facilitate Reintroduction of Golden Paintbrush

(Castilleja. Thesis. Oregon State University, December 2005. 10 May 2006

<<http://www.appliedeco.org/Reports/>

LawrenceThesis/Lawrence_Thesis_CHAPTER%205%20Growing%20Castilleja.pdf>.

Data compiled by:

Molly Deardorff

May 10, 2006