

Plant Propagation Protocol for Castilleja parviflora

ESRM 412 – Native Plant Production

Spring 2008

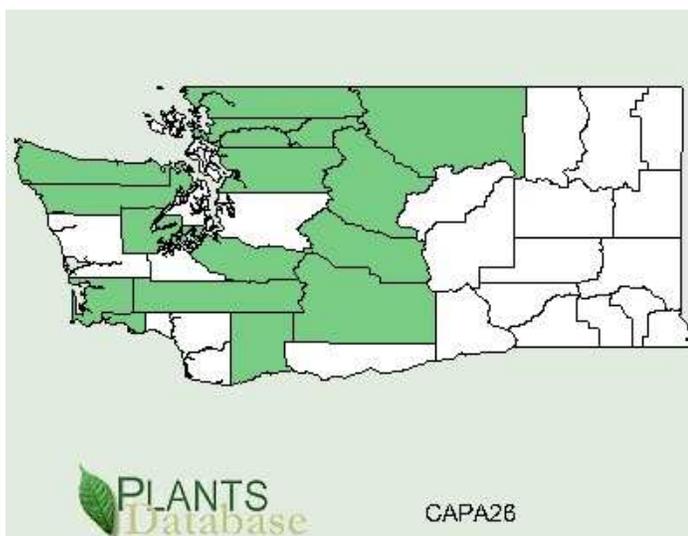
TAXONOMY	
Family Names	
Family Scientific Name:	Scrophulariaceae
Family Common Name:	Figworts
Scientific Names	
Genus:	<i>Castilleja</i>
Species:	<i>parviflora</i>
Species Authority:	Bong.
Variety:	<i>Castilleja parviflora</i> Bong. var. <i>albida</i> (Pennell) Ownbey <i>Castilleja parviflora</i> Bong. var. <i>olympica</i> (G.N. Jones) Ownbey <i>Castilleja parviflora</i> Bong. var. <i>oreopola</i> (Greenm.) Ownbey <i>Castilleja parviflora</i> Bong. var. <i>parviflora</i>
Sub-species:	none
Cultivar:	none
Common Synonym(s):	none
Common Name(s):	Common names for <i>Castilleja parviflora</i> include mountain Indian paintbrush, smallflower Indian paintbrush, Henry Indian paintbrush (USDA PLANTS).

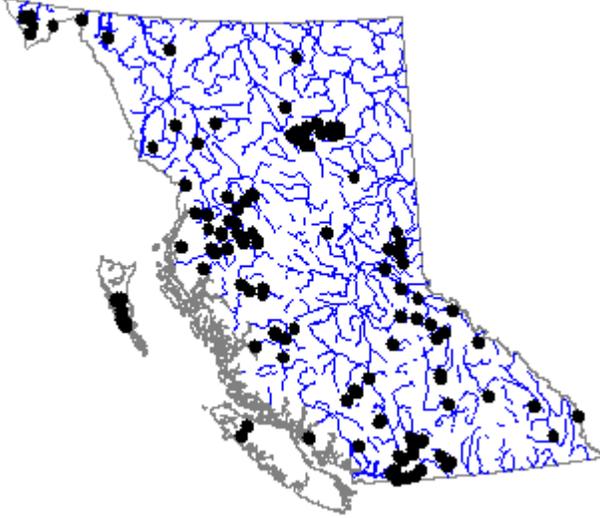
Species Code (as per
USDA Plants
database):

CAPA26

GENERAL INFORMATION

Geographical range:



	<p>Maps above from USDA PLANTS database.</p>  <p>British Columbia range map from E-Flora B.C.</p>
<p>Ecological distribution:</p>	<p><i>Castilleja parviflora</i> is found in meadows and slopes to alpine elevations (Blackwell 2000). It is common in open, dry habitats including meadows and roadsides (Biek and McDougall 2007). Common on dry slopes of the Olympics, subalpine meadows, and high elevation roadsides at Mount Rainier (Lyons and Merilees 1995).</p>
<p>Climate and elevation range</p>	<p><i>Castilleja parviflora</i> is typically found between 5,000 and 9,000 feet in the Cascades and coastal mountains (Blackwell 2000). In California it is found between 7,800 and 11,000 feet (California Native Plant Link Exchange).</p>
<p>Local habitat and abundance; may include commonly associated species:</p>	<p><i>Castilleja parviflora</i> is the most abundant <i>Castilleja</i> in high meadows of Olympics (Clark 1973).</p> <p>This species is facultatively mycorrhizal. A study of mycorrhizal associations of plants in primary succession following glacier retreat found both lightly colonized and uncolonized plants (Cazares et al. 2005).</p> <p><i>Castillejas</i> are generally pollinated by hummingbirds and perhaps by bees (COSEWIC 2005).</p>
<p>Plant strategy type / successional stage:</p>	<p>A Google image search revealed several photos of this species near glaciers, suggesting that it tolerates early successional habitats. However, in a Grime strategy, it probably rates more as a stress-tolerator because it is commonly found at high elevations. Succession in the Pacific Northwest does not follow the "typical" pathways described in old field studies from the East and Southeast United States. Perennials are much more common than weedy</p>

	annuals in primary successional habitats in the Pacific Northwest (personal observation).
Plant characteristics:	<p>"Perennial from a woody base; stems clustered, erect or ascending, usually not more than 30 cm. tall, unbranched, hairy above. Leaves alternate, oval to lance-shaped, all except few lowest ones divided into 3-5 lobes, somewhat hairy. Flowers greenish, tubular, with two lips; upper lip edged with violet-purple; inconspicuous, hidden among rose-pink to crimson or magenta (sometimes white), leafy, lobed and hairy bracts. Fruits 2-celled capsuls; seeds numerous. (pg. 257, Pojar and MacKinnon 1994)"</p> <p>Clark considers species within the genus <i>Castilleja</i> incredibly difficult to distinguish, stating, "...for even reasonable assurance of correct identification a comprehensive work such as Hitchcock, Cronquist et al. must be studied, and even this has gaps where our northern species are concerned. We desperately need a monograph on this very difficult genus. (page 448)"</p>  <p>Robert Potts © California Academy of Sciences</p>



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PROPAGATION DETAILS

No information on this species. Propagation details are reported for *Castilleja rhexiifolia*. Both species are found in subalpine and alpine meadows and slopes and co-occur.

Ecotype:	Moist forest meadows, Camas, Glacier National Park, Flathead Co., MT., 1100m elevation.
Propagation Goal:	Plants
Propagation Method:	Seed
Product Type:	Container plug
Stock Type:	172 ml conetainers
Time to Grow:	5 months
Target	5 cm with firm root plug.

Specifications:	
Propagule Collection:	Seeds are hand collected in late August when capsules begin to split and seed is easily shaken out of the seed capsule. Seeds are dark gray at maturity. Capsules are collected in paper bags and kept in a well ventilated drying shed prior to cleaning.
Propagule Processing/Propagule Characteristics:	Seeds are hand cleaned at the nursery. Seed longevity is at least 3 years at 3 to 5C in sealed containers. Seed dormancy is classified as physiological dormancy. Seeds/Kg: 10,780,000/kg % Purity: 100% % Germination: 98%
Pre-Planting Propagule Treatments:	Seeds are placed into a 150 day cold, moist stratification using moistened paper towels in an unsealed ziplock bag in a refrigerator at 2C or they can be fall sown outdoors.
Growing Area Preparation / Annual Practices for Perennial Crops:	Greenhouse and Outdoor Nursery growing facility. Sowing Method: Direct Seeding. Seeds are lightly covered with medium. Growing medium used is 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) and 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 per 172 ml container. Greenhouse temperatures are maintained at 21 to 25C during the day and 16 to 18C at night. Seedlings are hand watered and remain in greenhouse until mid May. Seedlings are then moved to outdoor nursery for the remainder of the growing season. Seedlings are irrigated with Rainbird automatic irrigation system in early morning until containers are thoroughly leached. Average growing season of nursery is from late April after snowmelt until October 15th.
Establishment Phase:	Medium is kept slightly moist during germination. Initial germination was uniform and appeared complete in 3 weeks. Germination occurred at 21C or above during the day. Host root exudates are not required for germination; the seedlings grew vigorously until they produce 4 to 8 true leaves. At this stage, 3 to 4 weeks after germination, it is necessary to companion plant a host seedling (<i>Carex hoodii</i> was used) to further growth and development of the seedling. The haustoria roots are then induced by the presence of the exudates of the host roots and the hemi-parasitic relationship is then established.
Length of Establishment	4 weeks.

Phase:	
Active Growth Phase:	Root and shoot development occur at a rapid rate after the haustoria are formed. Plants had formed 15 to 25 true leaves, were 3 cm in height and root tight in 8 weeks. It is necessary to keep the growth of the companion plant in check, so it does not out compete the <i>Castilleja</i> seedling in the container.
Length of Active Growth Phase:	8 weeks.
Hardening Phase:	Irrigation is gradually reduced in September and October. Plants are leached with clear water once before winterization.
Length of Hardening Phase:	4 weeks.
Harvesting, Storage and Shipping:	Total Time To Harvest: 5 months Harvest Date: September Storage Conditions: Overwinter in outdoor nursery under insulating foam cover and snow.
Length of Storage:	5 months.
Guidelines for Outplanting / Performance on Typical Sites:	Outplanting Site: Camas, Glacier National Park, MT. Outplanting Date: September Outplanted material produced flowers the following spring.
Other Comments:	David Joyner of Salt Lake City, UT considers this species to be “moderately difficult” to propagate, but the classification is somewhat biased as it partially reflects the ability of plants to grow in his yard (Castilleja 2005). <i>Castillejas</i> are hemi-parasites and perform better when planted with a host plant (Byrne, Kruckeberg 1996, Pojar and MacKinnon 1994). <i>Castillejas</i> should not be transplanted from the wild and are considered difficult to successfully propagate (NARGS).
INFORMATION SOURCES	
References (full citations):	Biek, D. and S. McDougall. 2007. <i>The Flora of Mount Adams, Washington</i> . Seattle, WA: Sound Books. Blackwell, L. R. 2000. <i>Wildflowers of Mount Rainier</i> . Edmonton, AB: Lone Pine.

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	Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.
Other Sources Consulted:	none
Protocol Author (First and last name):	Rachel Sewell Nesteruk
Date Protocol Created or Updated (MM/DD/YY):	06/04/08

Note: This template was modified by J.D. Bakker from that available at:

<http://www.nativeplantnetwork.org/network/SampleBlankForm.asp>