

Plant Propagation Protocol for *Castilleja elmeri*
 ESRM 412 – Native Plant Production

Protocol URL: [https://courses.washington.edu/esrm412/protocols/\[USDA Species Code.pdf\]](https://courses.washington.edu/esrm412/protocols/[USDA Species Code.pdf])



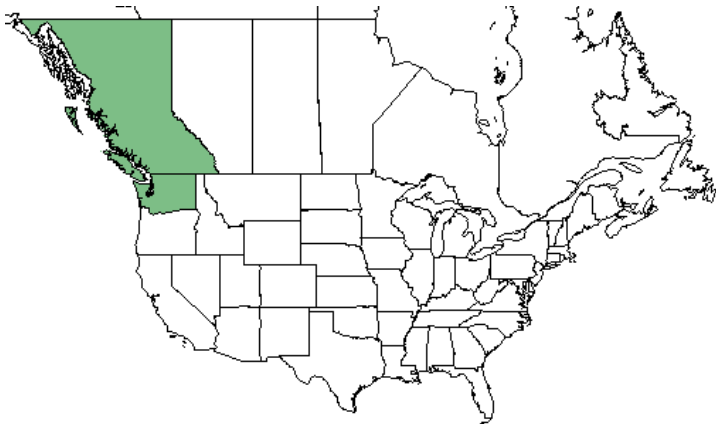
Castilleja elmeri, Wenatchee Indian paintbrush (Source: Walter Siegmund¹)

TAXONOMY	
Plant Family	
Scientific Name	Scrophulariaceae
Common Name	Figwort family
Species Scientific Name	
Scientific Name	<i>Castilleja elmeri</i> (Fernald)
Varieties	N/A
Sub-species	N/A
Cultivar	N/A
Common Synonym(s)	<i>Castilleja angustifolia</i> (G. Don) var. <i>whitedii</i> Piper ²
Common Name(s)	Wenatchee Indian paintbrush ³ , Elmer's paintbrush ²
Species Code (as per USDA Plants database)	CAEL7

GENERAL INFORMATION

Geographical range

North America Distribution



Washington State Distribution



Source: USDA Plants Database³

Wenatchee Mountains and the east slope of the Cascades, Kittitas County, Washington; north into British Columbia²

Ecological distribution

Moist, open slopes at mid-elevations in the mountains²

Climate and elevation range

Mid-elevation⁴

Local habitat and abundance

Found near sedges and fescues, commonly using them as hosts for hemi-parasitic roots⁵

Plant strategy type / successional stage

Hemi-parasitic⁵ (capable of manufacturing their own food and obtaining water/ nutrients from soil, but also form specialized roots—haustoria roots—that attach to a host plant to take up additional water); herb³

Plant characteristics	Perennial species; blooms June-August ² ; some reports that <i>Castilleja</i> seed is difficult to germinate and that chemical exudate from the roots of host species (<i>Castilleja</i> are parasitic) are needed to induce germination, however this pattern is not always observed ⁶ ; pollinated by insects and hummingbirds ⁵
PROPAGATION DETAILS	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	N/A
Time to Grow	16 weeks ⁵
Target Specifications	Hardened 16-wk-old plants
Propagule Collection Instructions	Seeds can be collected in midsummer for early spring flowering species and in late summer for mid-elevation species. High elevation species are collected during fall. In general, the dry dehiscent seed capsules ripen 8 to 10 w following pollinator activity; many tiny seeds per capsule (grayish to tan in color with a somewhat wrinkled or pitted surface) ⁵
Propagule Processing/Propagule Characteristics	Unknown
Pre-Planting Propagule Treatments	Seeds of several other <i>Castilleja</i> species that were dormant at harvest responded positively to moist chilling ⁷ Imbibe freshly collected seeds in water for 4 to 8 h, pour off the water and any fine debris. Place imbibed seeds into cold moist stratification for 30 to 150 d, depending on species, between layers of blotter paper in either open plastic bags or in Petri dishes in the refrigerator at 1 to 2 °C (33 to 36 °F) ⁵
Growing Area Preparation / Annual Practices for Perennial Crops	Sow seeds very shallowly into containers and cover lightly with perlite mulch; grow in pure Sunshine Mix #2 commercial growing medium; grow in 116 ml (7.0 in ³) Ray Leach TM containers. Sow flat of host plants separately (host not required for germination). ⁵
Establishment Phase Details	Some species of <i>Castilleja</i> have germinated on paper towels moistened only with water ⁶
Length of Establishment Phase	4-6 weeks
Active Growth Phase	Seedlings can develop 4 to 6 sets of true leaves in about 4 to 6 wk after germination. At this point the fine, unbranched haustoria roots will be well developed and will seek out host roots (pair Wenatchee paintbrush with its host at this time); seedlings can be fertilized with a low concentration of complete fertilizer at one-quarter the label recommended rate ⁵

Length of Active Growth Phase	6-8 weeks
Hardening Phase	During midsummer, seedlings grown in the greenhouse are moved outdoors to undergo hardening for at least 4 weeks prior to outplanting ⁵
Length of Hardening Phase	4 weeks ⁵
Harvesting, Storage and Shipping	Care should be given so that paintbrush stems, which can be somewhat brittle, are not snapped off during extraction from the container ⁵
Length of Storage	Missing information
Guidelines for Outplanting / Performance on Typical Sites	Seedlings of eight other species of <i>Castilleja</i> were readily produced in container culture, but outplanting success was greatly enhanced by potting the seedlings with a potential host plant for 6 to 8 weeks prior to transplanting outdoors ⁷
Other Comments	<i>Castilleja elmeri</i> is a hemi-parasitic plant that thrives best when provided with a host plant. Select a host plant for companion planting that occurs in the same habitat as the paintbrush; fresh seeds of high elevation seed sources tend to have low germination percentages (need to collect, stratify, and sow enough seeds to meet target numbers the first year) ⁵

INFORMATION SOURCES

References	See below
Other Sources Consulted	See below (⁸ , ⁹ , ¹⁰)
Protocol Author	Carter Johnson
Date Protocol Created or Updated	05/16/18

REFERENCES

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5. Luna, T. Propagation protocol for Indian paintbrush (*Castilleja* species). *Native Plants J.* **6**, 62–68 (2005).
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7. Meyer, S. E. & Carlson, S. L. Comparative Seed Germination Biology and Seed Propagation of Eight Intermountain Species of Indian Paintbrush. *USDA For. Serv. Proc.* (2004).

OTHER SOURCES CONSULTED (but contained no pertinent information)

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