

***CASTILLEJA EXSERTA* (A.A. HELLER) CHUANG  
& HECKARD SSP. *EXSERTA***

**COMMON NAMES: EXSERTED INDIAN  
PAINTBRUSH, PURPLE OWL'S CLOVER**

**FAMILY: SCROPHULARIACEAE**

**GROWTH FORM: ANNUAL HERB**



**PLANTING**

Ideally, seeds of this species would be planted during October, before the winter monsoonal period of November through March. However, we have planted the species as late as December. Seeds were hand-sown onto mounded planting beds, and a thin layer of soil was then raked over them. *Castilleja exserta* ssp. *exserta* is a hemi-parasitic species. Therefore, we typically sow *C. exserta* seeds along with seeds of *Hemizonia pungens*, *Hordeum depressum*, or *Lasthenia chrysantha*.

**PHENOLOGY**

When growing in the San Joaquin Valley, *C. exserta* germinates during late January to early February and will begin flowering in early March. Seeds begin to mature in early April. The peak time for seed collection is from mid-April through early May. Fruits are retained fairly well on plants, and therefore a small amount of seed can potentially be collected several months after the plants have senesced. However, a decrease in seed viability may occur over time.

**SEED HARVESTING**

We typically wait for all the fruits on a given plant to mature and then collect the entire plant. Plants are ready for collection when the fruits (capsules) are dry and brown in color. It is ideal to minimize the amount of soil that is collected along with the plants; soil particles that are of a similar size and weight as the seeds can be very difficult to remove during seed processing. We would transport the harvested plant material to a warehouse and spread it out on tarpaulins to air dry, before seed processing.

**SEED PROCESSING METHODS**

We would begin by rubbing the harvested plant material over a screen or a wire mesh sieve, to break open the fruits and release the seeds. Seeds can then be separated from chaff (e.g., pieces of stems, leaves, floral structures) using wire mesh sieves with various screen sizes or an air screen cleaner such as a Clipper Office Tester (A.T. Ferrell Company). An air separator (Seed Tech Systems, LLC.) can be used to remove additional lightweight chaff.

Seeds per gram = **7292<sup>1</sup>** and **5324<sup>2</sup>**

Based on the above measurements, seed size of *C. exserta* can be quite variable. The two seed collections were made during the same year, within a few days of each other. We did not observe any apparent differences in plant size or plant vigor between the two populations.

**CULTIVATION OVERVIEW**

*C. exserta* was sown in the nursery for seven consecutive years, and we were able to collect seed during three of the years. The species does not germinate reliably and we do not know whether this is due to lack of appropriate soil moisture, lack of an appropriate host plant, low seed viability, seed dormancy, or other factors. We have not treated seeds prior to planting, but perhaps germination could be improved with cold, moist stratification (Luna, 2005). In areas of native habitat, we have observed *C. exserta* growing in proximity to *Hemizonia pungens* ssp. *pungens*, *Amsinckia menziesii*, *Lupinus bicolor*, *Camissonia strigulosa*, *Erodium botrys*, and *Bromus* species. Further investigation into a preferred host plant for *C. exserta* would be useful in developing propagation techniques. This species is susceptible to browsing by jackrabbits and desert cottontails.

<sup>1</sup> This figure (n = 5; standard deviation = 742) is derived from a seed lot harvested in 2008 from the Kerman Ecological Reserve (managed by the California Department of Fish and Game) in western Fresno County.

<sup>2</sup> This figure (n = 5; standard deviation = 703) is derived from a seed lot harvested in 2008 from a vacant lot with a high level of weed invasion, also in Fresno County.

**ADDITIONAL INFORMATION ABOUT CASTILLEJA  
EXSERTA SSP. EXSERTA:**

*Internet Resources*

Species profile from the Ladybird Johnson Wildflower  
Center at the University of Texas:  
[http://www.wildflower.org/plants/result.php?id\\_plant=CAEXE](http://www.wildflower.org/plants/result.php?id_plant=CAEXE)

Species profile from the Ransom Seed Laboratory:  
[http://www.ransomseedlab.com/genus/c/castilleja\\_exserta.htm](http://www.ransomseedlab.com/genus/c/castilleja_exserta.htm)

Seed photos from the Rancho Santa Ana Botanic Garden:  
<http://www.hazmac.biz/020904b/020904bCastillejaExserta.html>

*Literature*

Luna, T. 2005. Propagation protocol for Indian paintbrush  
(*Castilleja* species). *Native Plants Journal* 6: 62-68.

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**PHOTOS**







*C. exserta* seeds. Scale shown is millimeters.



*C. exserta* at the Kerman Ecological Reserve



*C. exserta* seed. Scale shown is millimeters.



*C. exserta* at the Kerman Ecological Reserve