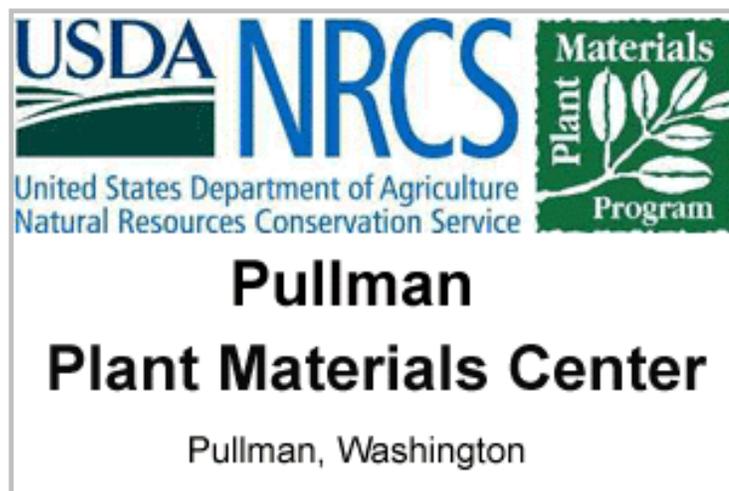


Protocol Information

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Family Scientific Name: **Asteraceae**
Family Common Name: **Sunflower**
Scientific Name: ***Helianthella uniflora* (Nutt.) Torr. & Gray var. *douglasii* (Torr. & Gray) W.A. Weber**
Common Name: **false sunflower, Rocky Mountain helianthella, oneflower helianthella, Douglas' helianthella, little sunflower**
Species Code: **HEUND**
Ecotype: **Paradise Creek drainage near Pullman, Washington.**
General Distribution: **Shrub-steppe to open pine forests east of the Cascade Mountains of southern British Columbia, Washington, Oregon, Idaho, and Montana. For the species, mean annual precipitation range is from 10-35 inches (USDA NRCS 2007).**
Known Invasiveness: **not invasive**
Propagation Goal: **Plants**
Propagation Method: **Seed**
Product Type: **Container (plug)**
Stock Type: **10 cu. in.**
Time To Grow: **4 Months**
Target Specifications: **Tight root plug in container.**

Propagule Collection: Fruit is an achene which ripens from mid July to mid August. Seed is dark grayish-brown to nearly black in color. The pappus is reduced to two unequal awns and the achene is not windborne. Seed will hold in the inflorescence longer than the seed of many other members of Asteraceae, but will shatter within a week or so of ripening. Flowering and seed maturity are indeterminate and seed should be collected every 3-4 days to maximize volume. Seed is easily collected by stripping it from the inflorescence by hand. It is stored in paper bags at room temperature until cleaned.

Propagule Processing: Small amounts are rubbed to free the seed, then cleaned with an air column separator. Larger amounts are threshed with a belt thresher, then cleaned with air screen equipment. Clean seed is stored in controlled conditions at 40 degrees Fahrenheit and 40% relative humidity. 52,500-72,300 seeds/lb for the species (Hassell et al 1996).

We determined 41,087 seeds/lb or 91 seeds/gram for this ecotype (USDA NRCS Pullman Plant Materials Center 2005).

Pre-Planting Treatments: While some seed will germinate without pretreatment, for this ecotype 45 days of cold moist stratification results in the highest germination.

Link (1993) reports that pretreatment is not needed. The Association of Official Seed Analysts suggests that laboratory germination be carried out at 15°C with alternating light or at alternating 20-30°C in the dark (Chirco & Turnoer 1986). However, they based that suggestion on work by Maguire and Overland (1959) which resulted in only 8% germination for either treatment. While that was the highest germination Maguire and Overland achieved for any combination of

temperature and light, they did not try stratifying the seed beforehand. Working with seed collected from the Palouse Prairie of eastern Washington and northern Idaho, Nauman (2002) found that seed germinated best with 120 days of cold moist stratification and exposure to light.

Unpublished data from trials conducted at the Pullman Plant Materials Center revealed that 45% emergence occurred without stratification. 45 days of cold, moist stratification resulted in 80% emergence. 90 days of cold, moist stratification resulted in 60% emergence. Seed sown in containers in November and left outdoors under cool, fluctuating spring temperatures began emerging in mid-March but only reached 2.5% emergence.

Untreated seed required 10-12 days to emerge while seed stratified for 45 days began emerging in 5 days and seed stratified for 90 days began emerging within 1 day of the end of the stratification period. Since it was sown covered, we were unable to observe the seed, but this suggests that seed is able to begin the germination process under cool temperatures. Work by Nauman (2002) confirms that seed of this species is able to germinate at low temperatures. This could have contributed to the extremely low emergence for the seed left outside to germinate in cool early spring conditions. Those seeds were subjected to a cold period of several days duration in late February when night temperatures dropped to near 0°F after all the other treatments had been moved into the greenhouse. It is surmised that the extreme cold killed the seeds after they had begun to germinate but before they emerged. Due to the large seed size and the difficulty of keeping surface sown seed hydrated in a greenhouse, we did not investigate the effects of light on germination.

Other work conducted by the Pullman

Plant Materials Center outside this particular trial indicates that 30 days of cold moist stratification is not sufficient to increase germination above that of untreated seed.

Growing Area Preparation/
Annual Practices for Perennial Crops:

In late November or early December seed is sown in 10 cu. in. Ray Leach Super cell conetainers filled with Sunshine #4 and covered lightly. A thin layer of coarse grit is applied to the top of the planting soil to prevent seeds from floating during watering. Conetainers are watered deeply and placed outside. Alternately, seed can be moist stratified in a refrigerator for 45 days before sowing in the greenhouse.

Establishment Phase: Containers are moved to the greenhouse in January. Emergence usually begins in 5 days and is complete in 12 days. Unstratified seed will take 10-23 days to emerge and total emergence will be lower. Seed stratified for longer periods will emerge sooner, but total emergence is not increased. A few seeds will emerge as much as 3-4 weeks after being placed in the greenhouse under any pretreatment.

Length of Establishment Phase: 2 weeks

Active Growth Phase: Plants are watered deeply every other day and fertilized once per week with a complete, water soluble fertilizer containing micro-nutrients. Plants may require water every day during the final part of the active growth period.

Length of Active Growth Phase: 3 months

Hardening Phase: Plants are moved to the cold frame in late March or early April, depending on weather conditions. They are watered every other day if the weather is cool, and every day during hot, dry spells.

Length of Hardening Phase: 2-4 weeks

Outplanting performance on typical sites: **Transplanting is done in early May by using an electric drill and portable generator to drill 1.5 inch diameter holes at the planting site. Because *H. uniflora* is taprooted, plants must be handled carefully to keep the root intact during transplanting. Survival in seed increase plantings without competing vegetation averages 60%. Transplanting into sites with existing vegetation may reduce survival and vigor depending on weather conditions following planting. A few plants will flower the year following outplanting, but most require 2 years to produce seed.**

Other Comments: **Plants continue to produce good seed crops in increase plantings for at least 5 years. The larva of an unidentified insect feeds in the developing seed. Preliminary data from direct seeding trials in the field suggest that fall seedings are better than spring seedings, but none of the treatments has resulted in high or consistent success rates.**

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