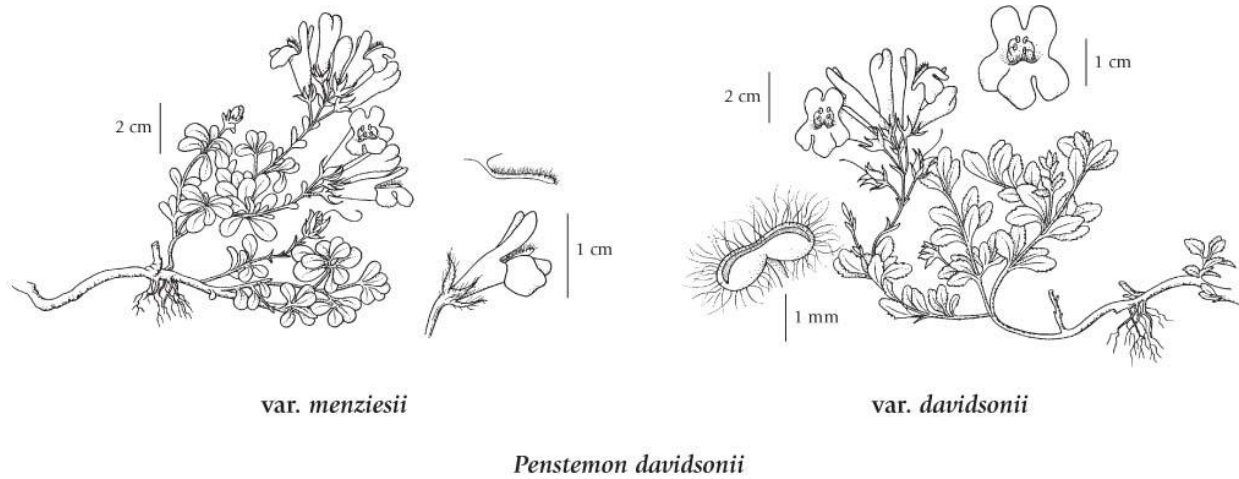


Plant Propagation Protocol for *Penstemon davidsonii*

ESRM 412 – Native Plant Production

Protocol URL: <https://courses.washington.edu/esrm412/protocols/PEDA2.pdf>

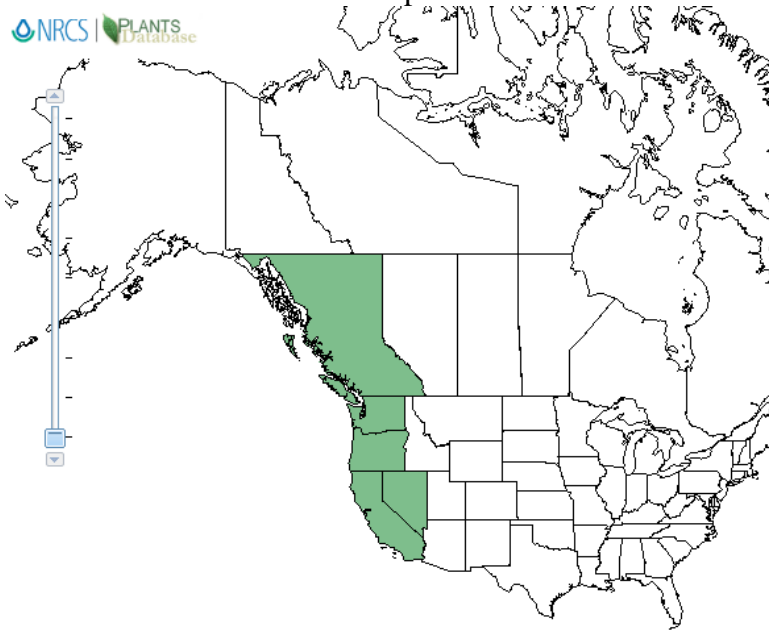
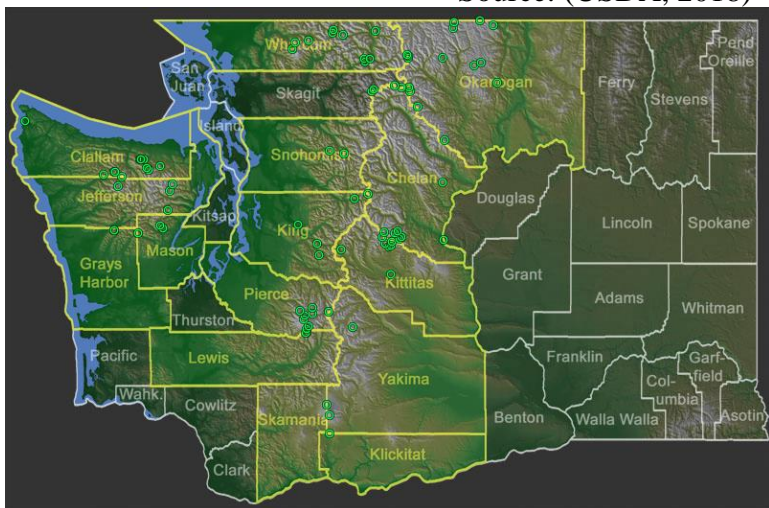


Source: (Douglas et al., 1999)⁴

TAXONOMY	
Plant Family	
Scientific Name	Scrophulariaceae ¹⁸ [Newly listed in Plantaginaceae] ^{2, 3}
Common Name	Figwort Family ¹⁸ [Plantain Family] ^{2, 3}
Species Scientific Name	
Scientific Name	<i>Penstemon davidsonii</i> Greene ¹⁸
Varieties	<i>Penstemon davidsonii</i> Greene var. <i>davidsonii</i> <i>Penstemon davidsonii</i> Greene var. <i>menziesii</i> (D.D. Keck) Cronquist <i>Penstemon davidsonii</i> Greene var. <i>praeteritus</i> Cronquist ¹⁸
Sub-species	None ¹⁸
Cultivar	‘Albus’ compact form of var. <i>menziesii</i> , white flowers ‘Broken Top’ 4”x18”, spreading, layering, purple flowers ‘Microphyllus’ form of var. <i>menziesii</i> with small round leaves and violet-blue flowers ‘Minnie’ floriferous form of var. <i>menziesii</i> , blue flowers ‘Parma’ trailing form of var. <i>menziesii</i> with glaucous, toothed leaves and dark purple flowers. ‘Serpillifolius’ prostrate form of var. <i>menziesii</i> with toothed leaf margins and lilac colored flowers ‘Mt. Adams Dwarf’ smaller form of type variety ⁹
Common Synonym(s)	None
Common Name(s)	Davidson’s Penstemon, Davidson’s Beardtongue, Creeping Penstemon ^{10, 21}

Species Code (as per USDA Plants database)	PEDA2 ¹⁸
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GENERAL INFORMATION

Geographical range	<p>Native to British Columbia, Washington, Oregon, California and Nevada. See maps below for distribution.</p>  <p>Symbol: PEDA2 USDA-NRCS-NGCE</p> <p align="right">Source: (USDA, 2018)¹⁸</p>  <p align="right">Source: (Burke Museum, 2018)²</p>
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Ecological distribution	<p>This species is commonly found grasping to the surface of cliffs, rocky ledges, slabs, and talus slopes.^{9, 10} It primarily occurs in subalpine ecosystems from British Columbia south through Vancouver Island along the Olympics and Cascades of Washington and into Sierra Nevada and California.^{8, 18}</p>
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Climate and elevation range	<p><i>P. davidsonii</i> prefers Boreal ecosystems and alpine elevations ranging from 5,600 to 12,000 feet.^{5,9}</p> <p>The Sunset Western Garden Book states this species grows best in zones 1-7, 14, and 15 according to its Climate Zone System.²¹</p>
Local habitat and abundance	<p>While the <i>Penstemon davidsonii</i> var. <i>davidsonii</i> occurs within the species' entire range, the <i>P.d.</i> var. <i>menziesii</i> occurs only in the northwestern portion of this range, and the <i>P.d.</i> var. <i>praeteritus</i> is native to Nevada and Oregon.¹¹</p>
Plant strategy type / successional stage	<p>Drought-tolerant, and associated with pollinator wildlife such as hummingbirds and bees.^{13, 17}</p>
Plant characteristics	<p><i>Penstemon davidsonii</i> is a dense, low-growing perennial herb that is mat-forming due to its creeping shrubby growth characteristics and reaches a height of 4-6 inches.^{9, 10, 11, 21}</p> <p>Leaves: Small (5-15mm), evergreen, opposite, hairless but not glaucous, entire or shallowly toothed margin, and blunt apex.^{7, 10}</p> <p>Flowers: Summer blooming tubular flowers that are 25-35mm long and violet-purple to blue-lavender in color with densely woolly anthers.^{10, 11}</p> <p>Fruits: Angled seeds ripen within narrowly winged leathery capsules (8-10mm long).^{10, 11}</p> <p>Subgenera: Dasanthera Tribe.^{9, 19}</p>
PROPAGATION DETAILS	
Kimball, S., & Campbell, D. (2009). Physiological differences among two <i>Penstemon</i> species and their hybrids in field and common garden environments.⁶	
Ecotype	<p>This research focused on hybridization of <i>Penstemon davidsonii</i> and <i>Penstemon newberryi</i> along two elevation transects on the eastern slope of the Sierra Nevada in California. Specifically, their samples were collected along the Piute Pass trail (from 37°14'22"N 118°36'24"W to 37°14'44"N 118°40'36"W) and east of Yosemite National Park, in Lee Vining Canyon (from 37°56'08"N 119°10'42"W to 37°58'15"N 119°11'27"W).</p>
Propagation Goal	Plants
Propagation Method	Vegetative propagation through cuttings.
Product Type	Container (pots)
Stock Type	

Time to Grow	2 years Data collection on these species was measured two years after stem cutting collection. The article does not specify why data was collected two years after propagation began and not one year.
Target Specifications	In flower for data collection on hybridization.
Propagule Collection Instructions	300 stem cuttings were collected in the Summer of 2003 along the Piute transect.
Propagule Processing/Propagule Characteristics	N/A
Pre-Planting Propagule Treatments	Cuttings were placed in water until they rooted.
Growing Area Preparation / Annual Practices for Perennial Crops	Creation of a growing medium that consists of a 1:1 mixture of pumice and potting soil (Sunshine Soil Mix from Sun Gro Horticulture). Purchasing of Miracle Grow fertilizer from The Scotts Company. Use of 4-inch pots for initial propagation and 1-gallon pots for transplanting.
Establishment Phase Details	Cuttings were struck into 4-inch pots filled with the above growing medium.
Length of Establishment Phase	1 month
Active Growth Phase	After one month, the seedlings were transplanted into 1-gallon pots, placed outside (University of California, Irvine), watered regularly, and fertilized with Miracle Grow every three weeks.
Length of Active Growth Phase	N/A
Hardening Phase	N/A
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	N/A
Length of Storage	N/A
Guidelines for Outplanting / Performance on Typical Sites	N/A
All Available Literature 1, 4, 8, 9,10, 13, 16, 18, 19	
Ecotype	N/A
Propagation Goal	Plants
Propagation Method	Seed The majority of literature on <i>Penstemon</i> Propagation discusses the use of vegetative propagation and cuttings as the primary technique. ^{8, 18} However, outside of the research presented above there is an absence of protocol information for vegetative propagation for <i>P. davidsonii</i> specifically.
Product Type	Container (pots)
Stock Type	
Time to Grow	5 to 7 months ^{9, 19}
Target Specifications	In flower by early to mid-summer of first year. ¹⁹

Propagule Collection Instructions	The seeds can be harvested in late summer to early fall. The angled seeds of <i>P. davidsonii</i> are enclosed in a narrowly winged leathery hard capsule. The seeds can be harvested by using a pair of pliers to lightly crush the capsule. Afterwards, the seed will fall out by rolling the crushed capsule in the hand and opening its contents into a container. ⁴ Additionally, seeds can be obtained through the American Penstemon Society along with commercial seed collectors. ⁹
Propagule Processing/Propagule Characteristics	<i>P. davidsonii</i> seed is inferred to be physiological dormant. ¹
Pre-Planting Propagule Treatments	The best method for seed cleaning to shake the mixture in a cupped sheet of smooth paper. The larger size chaff rises to the top and the seed settles to the bottom. Once the seeds have settled from the debris, lay the paper flat and brush aside the debris using a half inch wide soft brush. For best results, repeat this several times with small sample sizes. ⁴ These seeds can be stored in a paper envelope in a cool, dry location for up to five years after collection. ^{9, 19}
Growing Area Preparation / Annual Practices for Perennial Crops	Create a growing medium by mixing two parts horticulture perlite with two parts sharp sand, and one-part peat moss. ¹⁹ Alternatively, proprietary seed compost from a commercial horticulture supply store can be used. ¹⁹ Seeds can be sown into either flats or small pots (7 cm ²) and transplanted into sequentially larger pots as they mature. Additionally, general purpose water-soluble fertilizer will be used during the Active Growth Phase. ^{9, 19}
Establishment Phase Details	Harvested seed should be surface sown into the growing medium described above for 4 weeks at 40°F (4°C) under a light source. As germination begins, move the seeds to 70°F (21°C) for the remainder of the establishment phase. ¹⁶ However, multiple authors state that <i>P. davidsonii</i> germinates readily at 70°F (21°C) without the need stratification. ^{4, 9, 19}
Length of Establishment Phase	4 to 8 weeks ¹⁹
Active Growth Phase	Once the plant has germinated and developed true leaves, it should be watered with general purpose water-soluble fertilizer and be moved into larger pots as needed. ^{9, 19}
Length of Active Growth Phase	3 to 5 months ^{9, 19}
Hardening Phase	N/A
Length of Hardening Phase	N/A
Harvesting, Storage and Shipping	N/A
Length of Storage	N/A

Guidelines for Outplanting / Performance on Typical Sites	<i>P. davidsonii</i> should be outplanted 1-2 feet apart in areas with full sun exposure and well drained, porous, gravelly soil. ^{9, 11} At planting, and during the first summer this species should be water 3-4 times deeply. Drought-tolerant species at 20-30 inches of water needed annually. ¹³ Thrives in rock gardens, embankments and as a border plant. ^{9, 12} Flowers in early to mid-summer and grows to be 4-6 inches tall and 1-2 feet wide. ¹⁰
Other Comments	<i>P. davidsonii</i> is classified in the Dasanthera subgenera/tribe. This grouping of <i>Penstemons</i> is characterized by woody, long-lived montane species. Because the majority of propagation literature is written for herbaceous <i>Penstemons</i> , the slower growing <i>P. davidsonii</i> may benefit from longer growing periods and by not being outplanted within its first year of growth. ^{9, 19} Davidson's Penstemon is named for Dr. George Davidson (1825-1911), an astronomer and plant collector who collected the first <i>P. davidsonii</i> specimen in California ^{9, 10}

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Protocol Author	Ellison Heil
Date Protocol Created or Updated	04/25/18

Note: This template was modified by J.D. Bakker from that available at:
<http://www.nativeplantnetwork.org/network/SampleBlankForm.asp>

Previous *Penstemon davidsonii* Protocol created in 2008

Plant Data Sheet



Menzies' penstemon,
Penstemon davidsonii var. *menziesii*

Range :

Olympic and North Cascade Mountains.

Climate, elevation:

Middle to high elevations.

Local occurrence

Frequent on cliffs and talus slopes usually above 5000'.

Habitat preferences

Talus slopes. Full sun.

Plant strategy type/successional

P. Davidsonii var *menziesii* is a colonizer as it prefers rocky slopes and cracks with poor soil where few other plants could establish themselves.

Associated species

Aquilegia spp, *Cassiope mertensiana*, *Poa arctica*, *Vahlodea atropurpurea*, *Carex nardina*, *Plox* spp, *Erigeron humilis*.

May be collected as:

Seed

Collection restrictions or guidelines

Careful! Alpine plants can be delicate!

Seed germination (needs dormancy breaking?)

Unknown

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.)

Propagates easily from seed.

Soil or medium requirements (inoculum necessary?)

Needs a sandy, acidic, well-drained soil.

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

Best if used in a rock garden with other alpine flowering plants. While propagation from seed would be cheaper, the success of transplanting a 1 gallon specimen would be better.

1 gallon - \$6.99

Seed Packets \$3 from http://www.hillkeep.ca/2001_seed_list.htm

Recommended planting density

No more than 16 inches, in perfect conditions *P. davidsonii* only will reach about a 1 ft diameter.

Care requirements after installed

Water weekly, keep pH low.

Normal rate of growth or spread; lifespan

Very slow growing.

Sources cited

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Data compiled by Christer Lundstrom