Plant Propagation Protocol for *Lupinus albicaulis*, Pine Lupine

ESRM 412 – Native Plant Production

Taxonomy

Family Name:	Fabaceae, Pea Family
Genus:	Lupinus
Species:	albicaulis
Species Authority:	Douglas
Common Synonym(s):	*Lupinus falcifer* Nutt. Ex Torr. & A. Gray (pro syn.) *Lupinus quercetorum* A. Heller *Lupinus wolfianus* C.P. Sm.
Common Name(s):	Sickle-keeled lupine, pine lupine
Species Code (USDA):	LUAL3
Varieties:	*Lupinus albicaulis* Douglas var. *albicaulis*- sicklekeel lupine *Lupinus albicaulis* Douglas var. *shastensis* (A.Heller) C.P. Sm. –Shasta lupine
Sub-species:	No consensus confirmed (WTU Herbarium).
Cultivars:	'Hederma' (Oregon)

GENERAL INFORMATION

Geographical range:

Native to Washington, western Oregon, and northern California (Darris, 2005).

Ecological distribution:

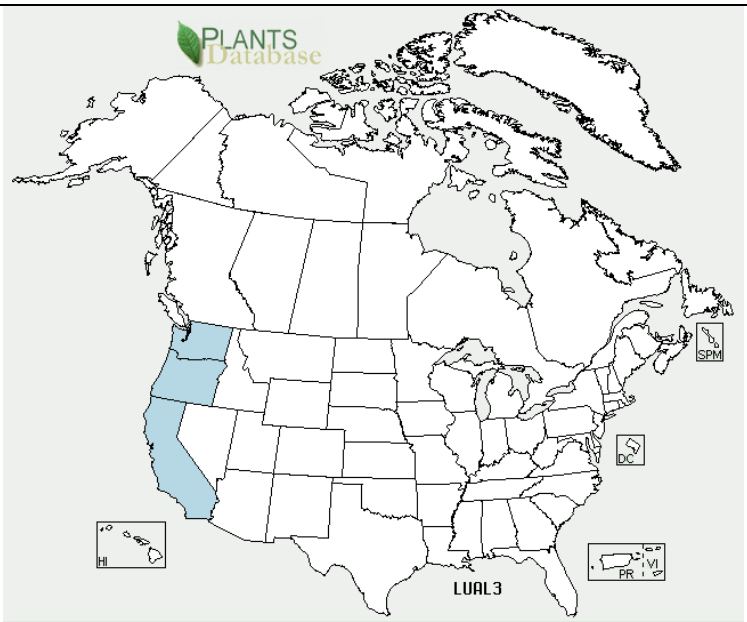
Prefers sun exposed disturbed sites such as dry slopes, and clearings.

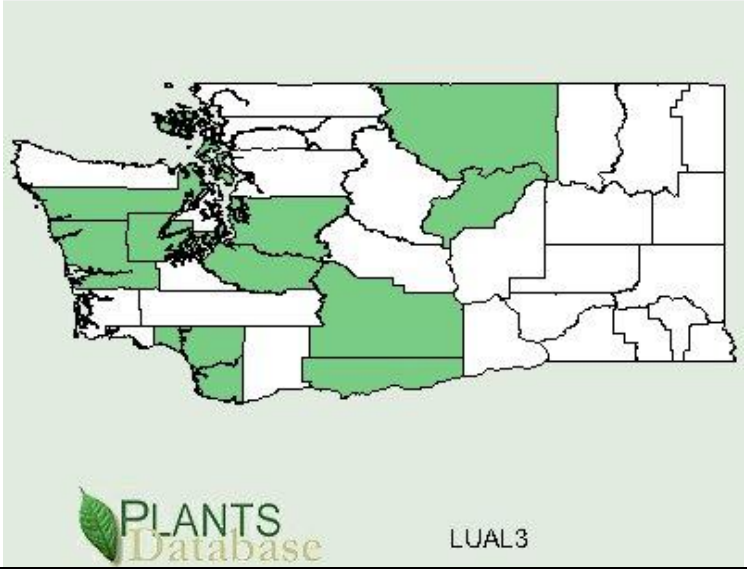
Climate and elevation range:

Found from sea level up to 8,000ft elevation in locations with annual precipitation between 25 and 80 inches according to Darris (2005) although the USDA Characteristics sheet lists the precipitation range at 35-60 inches.

Local habitat and abundance:

In Washington, Lupinus albicaulis is locally abundant in mountain meadows (WTU Herbarium) and is found in Puget Sound lowlands within remnant grassland and Oak woodland sites (<25) where it is found with the *Quercus garryana/Carex inops*-(*Camassia quamash*) plant association and the *Festuca roemeri-Sericocarpus rigidus* association (Chappell, 2006).





Plant strategy type/successional stage:
This pioneer species thrives on disturbed, droughty, and infertile soils (Darris, 2005) but still persists in seral oak woodland and prairie communities where soil conditions restrict conifer encroachment (Chappell, 2006).

Plant characteristics:
Multi-stemmed erect forb with alternate leaves composed of 1-1.5 inch leaflets, hairy (Hopkins and Rawlings 1985) and palmately compound in clusters of 5-9 according to Darris (2005) or 6-10 according to Hopkins and Rawlings (1985). The plant is deeply tap-rooted and has a maximum height of 5 feet (Darris, 2005), although more commonly reported to reach a maximum height around 3 feet (Hopkins and Rawlings 1985, USDA Conservation Characteristics). Flowers bloom for 3 weeks-5 weeks between the end of May and the end of July (Dunn, 1998, Hopkins and Rawlings 1985, Darris, 2005) with upright blue, purple, or white flower clusters 4-6 inches long. Distinguished from closely related species by the exposed, glabrous keel(Hitchcock et al, 1961). Fruit is a hairy pod 3-4cm long (Hitchcock et al, 1961,Hopkins and Rawlings, 1985). *Lupinus albicaulis* varies from a perennial to an annual within its range (Darris, 2005) and is listed as an annual in Washington State by the Burke herbarium.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Propagation Details

Summary from Germination Experiment (Drake et al, 1998)

Ecotype /seed source: Fort Lewis Army Base, South Puget Sound, Washington

Propagation Goal: Improve germination success and seedling health

Propagation Method: Seed

Stock type: Seedlings

Target Specification: Germinant performance at four weeks.

Propagule Collection: Seeds collected between June and October 1995, stored in paper bags at room temperature 3-6 months, then refrigerated until trial began in 1996.

Pre-Planting Propagule Treatments:
Two treatments had the highest germination success:

31.7 % germination was observed following 6-week stratification in moist, sterile, inorganic soil mix at 2-6° C followed by placement in a temperature regulated greenhouse (65-70° F night, 70-85° F day) for 4 weeks.

29.3% germination was observed following the same 6 week stratification followed by placement in a plastic-covered frame outdoors (48-65° F).

Growing Area Preparation: Packed sterile inorganic soil mix, 3cm deep standard flats, seeds covered with 0.5cm soil.

Establishment phase (seeding to germination): Flats placed in outdoor frame and greenhouse were checked daily and watered as needed.

Length of Establishment Phase: 2 days following stratification

****Not documented by the study:*

Processing (seed density, longevity)
Time to grow (seedling to outplanting)
Active Growth Phase (from germination until active growth ceases)
Length of Active Growth Phase
Hardening Phase (end of active phase to end of growing season/cold hardiness prep)
Length of Hardening Phase
Harvesting, Storage and Shipping (of seedlings)
Length of Storage (of seedlings between nursery and outplanting)
Guidelines for Outplanting/Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering)
Other Comments (restrictions on collection)

Direct Sowing Details:

Propagule Collection: First 3 weeks in July (Dunn, 1998), stems with pods should be collected onto tarps to dry, after mowing (if collecting from crop) or cutting, to prevent seed loss from pod rupture.

Processing: According to Darris (2005), density is between 11,000-29,000 seeds per pound and lupine seeds have been reported viable after 30 years when dried sufficiently (Riemenschneider et al, 2008).

Pre-Planting Propagule Treatments (cleaning, dormancy): Lupinus species can be scarified using sandpaper, nicking, or hot water (Riemenschneider, 2008).

Growing Area Preparation: Sow seeds at a depth of 0.5-.75 inches in well drained soils in early fall or spring. Planting densities range from 4-20 pounds per acre (Darris, 2005).

Uses: Pine lupine competes aggressively with short stature weeds and can reduce weed suppression maintenance required at the planting site. It can also be used to manage erosion on droughty slopes (Darris, 2005).

Additional Comments:
Seed collection may be prohibited at many sites, always check regulations or seek permission prior to collecting from the wild. Seeds are commercially available.

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*Note: The protocol template used was modified by J.D. Bakker from that available at: http://www.nativeplantnetwork.org/network/SampleBlankForm.asp