

Plant Propagation Protocol for *Lupinus alpicola* (Mt. Adams Lupine)

ESRM 412 – Native Plant Production

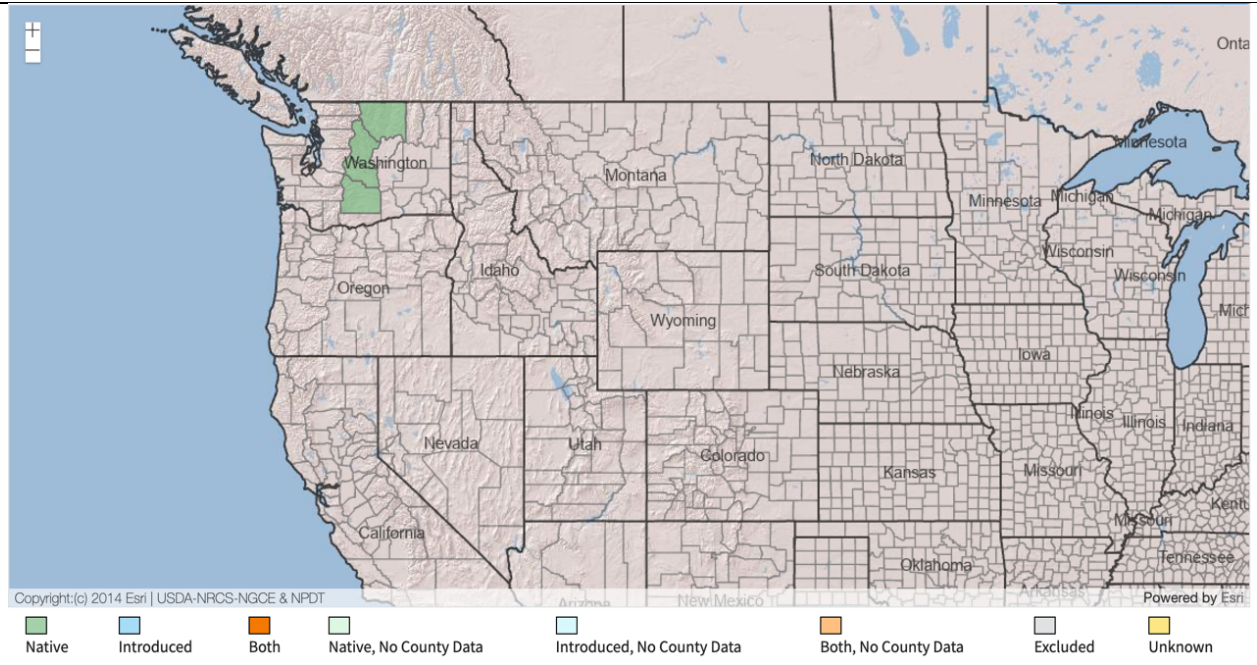
URL: <https://courses.washington.edu/esrm412/protocols/2026/LUAL6.pdf>

TAXONOMY

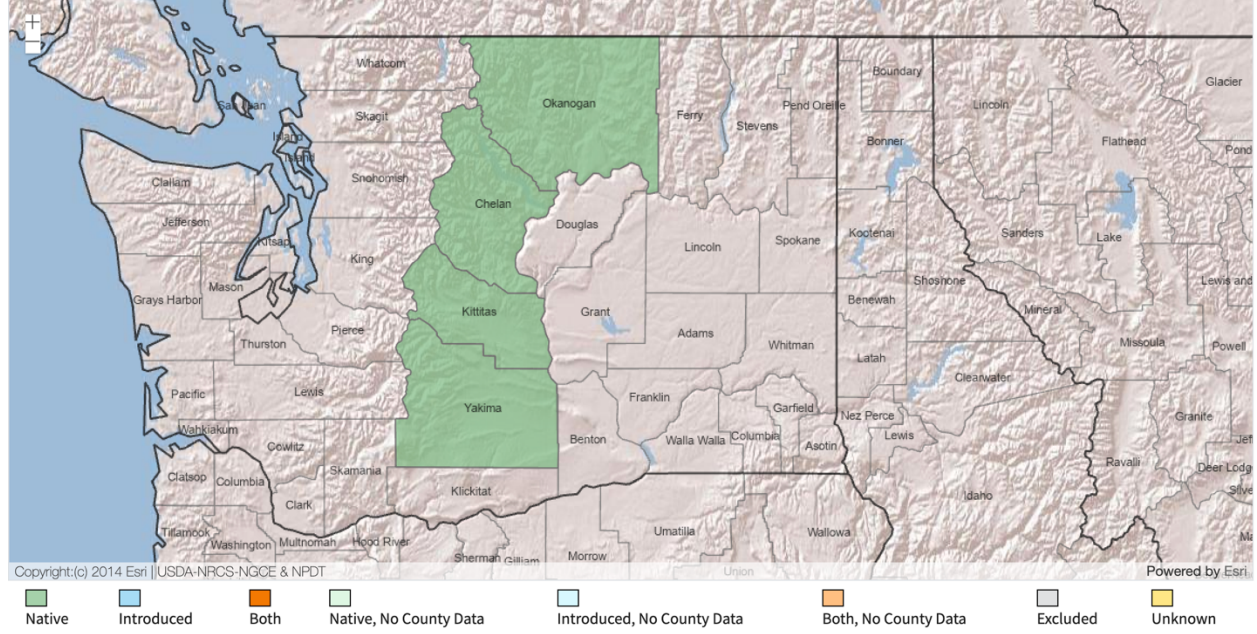
Plant Family	
Scientific Name	Fabaceae Lindl. ⁹
Common Name	Pea ⁹
Species Scientific Name	
Scientific Name	Genus: <i>Lupinus</i> Epithet: <i>alpicola</i> Authority: L.F. Hend. ex Piper <i>Lupinus alpicola</i> L.F. Hend. ex Piper ⁹
Varieties	N/A
Sub-species	<i>Lupinus alpicola</i> itself is a subspecies of <i>Lupinus sericeus</i> (silky lupine) ^{4, 6} *see FEIS, Slichter blog
Cultivar	N/A
Common Synonym(s)	*Note that there is much disagreement among experts about recognized subspecies, varieties, and other forms of silky lupine, given that species within the genus are highly variable and freely intergrade (merge gradually into one another), making morphological characteristics used to separate taxa very inconsistent as well as few and far between (FEIS Database). ⁴ <i>Lupinus sericeus</i> var. <i>sericeus</i> <i>Lupinus buckinghamii</i> <i>Lupinus fikeranus</i> <i>Lupinus flavicaulis</i> <i>Lupinus flexuosus</i> <i>Lupinus huilcoflorus</i> <i>Lupinus ramosus</i> <i>Lupinus sericeus</i> ssp. <i>sericeus</i> <i>Lupinus sericeus</i> var. <i>fikeranus</i> <i>Lupinus sericeus</i> var. <i>flexuosus</i> <i>Lupinus sericeus</i> var. <i>subflexuosus</i> <i>Lupinus spiraeaphilus</i> <i>Lupinus tuckerianus</i>
Common Name(s)	Mt. Adams lupine, silky lupine ⁶
Species Code (as per USDA Plants database)	LUAL6 ⁹

GENERAL INFORMATION

Geographical range



(USDA)



(USDA)

Ecological distribution

Mt. Adams lupine/silky lupine can be found on well drained, sandy, loamy, or sandy-loamy soils on canyon slopes, from the lowlands to high up in the mountains. It is typical to find in grasslands and meadows but can also be found in mature, established ponderosa pine ecosystems or open woodlands, especially near clumped (bunch)grasses ^{4, 6}

Mt. Adams Lupine is a subspecies of silky lupine that can only be found east of the Cascade Range in Washington, in Okanogan, Chelan, Klittitas, and Yakima counties.⁹

Climate and elevation range	Silky lupine species and subspecies can be found in elevations ranging from 820 feet (250 m) to 10,000 ft (3,030 m) in elevation. It is found in areas that receive at least 10-18 inches of annual precipitation, grows in neutral soils (pH 7-7.5), and prefers full sun (although it will tolerate partial) ⁴
Local habitat and abundance	<p>Common in its typical range across ponderosa pine savannas, shrub-steppe, and grassland communities east of the Cascade range. Often a significant component of these ecosystem's herbaceous layer. It is a cool-season species, typically growing in May and flowering between June and July⁴</p> <p>Common associations include sedges (<i>Carex</i> spp.), prairie junegrass (<i>Koeleria cristata</i>), Idaho fescue (<i>Festuca idahoensis</i>), Sandberg bluegrass (<i>Poa secunda</i>), and bluebunch wheatgrass (<i>Pseudoroegneria spicata</i>). It can also be found alongside Gambel oak (<i>Quercus gambelii</i>), ninebark (<i>Physocarpus malvaceus</i>), serviceberry (<i>Amelanchier</i> spp.), mountain mahogany (<i>Cercocarpus</i> spp.), arrowleaf balsamroot (<i>Balsamorhiza sagittata</i>), and western yarrow (<i>Achillea millefolium</i> var. <i>occidentalis</i>)⁴</p>
Plant strategy type / successional stage	Mt. Adams lupine is a nitrogen-fixing plant with a deep root system, which allows it to sprout easily following disturbances, even in poor quality soils. This means it is commonly found in the initial stages of postfire plant succession. Otherwise, often found in <i>climax</i> (mature, established) ponderosa pine forests ^{4,9}

Plant characteristics

Silky lupine is a perennial, cool-season legume with a deep taproot and woody caudex, which allows it to persist in dry environments. One to several erect, usually unbranched or lightly branched stems shoot from the base, typically around 20–50 cm (8–20 in) tall, though sometimes taller. Stems are thin (2–8 mm in diameter) and covered in fine white hairs, giving the plant a somewhat silvery or rusty appearance. Leaves are palmately compound, with 5–9 (most commonly 7–9) narrow leaflets that are pubescent on both sides.

The inflorescence is a terminal raceme (10–25 cm long) of numerous small, pea-like flowers that become more open as they mature. Flowers are typically blue to lavender with white or yellowish spots, though they may also be pale blue or whitish. The banner petal is white and hairy, which distinguishes this subspecies from other lupines found around the Cascade Range. Seed pods are somewhat flattened, silky, and about 2–3 cm long, containing between 2–7 seeds.

It is largely concentrated, as the name would suggest, around Mt. Adams in the Cascades. In its natural environment and range, growth begins in May and flowering occurs from June through August or September, with seed dissemination taking place in August or September. Plants are dried by the end of September. ^{4, 6, 9}



(Photos courtesy of Paul Slichter, 2005)

PROPAGATION DETAILS: FROM SEED

*Many details pulled from Skinner’s Protocol for *Lupinus sericeus* given plant similarities; see citation (5)

Ecotype	Pacific Northwest dry montane ecotype (e.g., eastern Washington / Cascade foothills; open ponderosa pine and bunchgrass habitats). ⁵
Propagation Goal	Plants

Propagation Method	Seed
Product Type	Container (plug)
Stock Type	10 cu. in. container
Time to Grow	Approximately 4 months
Target Specifications	Tight root plug in container. ~20–50 cm tall, well-developed foliage, hardened off, with an intact taproot. Species has sensitive, deeply developing taproot, care must be taken to avoid root disturbance ⁵
Propagule Collection Instructions	Seeds are collected by hand when seeds are tan to gray colored and begin to split at maturity, typically in July or August. Seeds dehisce forcefully at maturity, so pods are cut from field plants just as they begin to dry and placed into paper bags or envelopes for transport. Alternatively, the entire stalk can be cut ⁵
Propagule Processing/Propagule Characteristics	Reported seed weights for silky lupine/Mt. Adams lupine range from 12,873 seeds per pound ² to 24,550 seeds per pound ⁹ . However, there is wide variation in seed size, with other studies indicating up to 42,000 seeds/lb. ^{1,3}
Pre-Planting Propagule Treatments	<p>After collecting, pods should be spread out to dry and covered with a fine mesh cloth. Once seeds are dried they must be processed to remove the pods and other inert matter. Small amounts of seed pods can be crushed by hand to remove seed, but if working with large quantities, an air column separator is recommended. After cleaning, seed can be stored at 4.4°C (40°F) and 40 percent humidity as needed⁵</p> <p>Additionally, Lupinus plants have a hard seed coat that must be treated using scarification and stratification to break seed dormancy. Scarification is done by placing the seed in a 5 to 10 second hot water bath and immediately transferring to cold water to imbibe overnight. After cooling, seeds should be wrapped in moist paper towels and refrigerated at 3°C (36°F) to be stratified for 30 days.^{2,5}</p>
Growing Area Preparation / Annual Practices for Perennial Crops	<p>Seeds should be inoculated with species specific Rhizobium (typically Bradyrhizobium) to allow for Nitrogen fixation capabilities) and can be planted in containers in a soilless mix of peat, perlite, vermiculite and sand (such as Sunshine mix) with a controlled release fertilizer.²</p> <p>¼ to ½ inch of headspace should be kept in containers to allow deep watering. A thin layer of coarse grit should be applied on top of seeds to prevent them from floating during watering⁵.</p>
Establishment Phase Details	<p>Soilless medium should be kept moist until emergence, which begins in about 5 days and is often completed in 3 weeks. It is possible that some seeds may not germinate for 5 to 6 weeks.⁵</p> <p>Greenhouse temperatures should be maintained at 20-25°C (68-78°F) during the day and 16- 18°C (60-66°F) at night²</p>
Length of Establishment Phase	3 weeks
Active Growth Phase	Water containers deeply every other day, fertilize with a water-soluble fertilizer containing Micronutrients. ⁵
Length of Active Growth Phase	2 to 3 months
Hardening Phase	At this point, plants are able to be transported to a cold frame (cooler, semi-protected outdoor environment). If weather is cool and moist, water every other day. If weather is hot and dry,

	water every day. ⁵
Length of Hardening Phase	2 weeks
Harvesting, Storage and Shipping	<p>Mt. Adams lupine has a delicate root system and transports poorly. If choosing to grow in containers, seedlings should be transplanted in their first year after hardening and can be planted in either the spring or fall. Otherwise, lupine responds well to direct seeding as it would occur in the wild. Direct seeding strategies would still require pre-treatment of the seed, though the treated seeds could then be immediately sowed at the outplanting site.²</p> <p>Seed maintains high germination after storage of up to 15 years in an unheated warehouse.⁸</p> <p>Seeds can remain viable from 20 to 60 years in sealed containers at 3° to 5° C (37.4° - 41° F).²</p>
Guidelines for Outplanting / Performance on Typical Sites	Transplanting can be done in mid spring or fall. An electric drill can be used to drill 1.5 inch diameter holes at the planting site. Without competing vegetation, seed survival averages 90%; sites with existing vegetation will reduce plant survival and vigor. Flowering and seed production can be expected the same year as transplanting, if not within the next season. For example, if plants are planted in mid-May, one could expect them to flower between June and early August. ⁵
Other Comments	<p>The plant can pose dangers to domesticated farm animals, causing damage to their central nervous systems, and may be classified as a weed in heavily grazed areas for this reason. It is toxic to domestic livestock due to high concentrations of quinolizidine and piperidine alkaloids, which bind to nervous system receptors, causing neurological damage and birth defects (especially in cattle).] It is, however, edible for many wild animals, including deer, squirrels, and bighorn sheep, as they tend to eat a highly varied diet and have evolved alongside these plants, so they possess the digestive mechanisms to break down these alkaloids.⁴</p> <p>Mt. Adams lupine is a short-lived plant, but seeds vigorously throughout its life. Seeds dehisce from mature plant and can land 10 feet or more from the mother plant.⁵</p>

INFORMATION SOURCES

References	<ol style="list-style-type: none"> 1. Hassell, Wendell, W. Rocky Beavers, Steve Ouellette, and Thomas Mitchell. 1996. Seeding Rate Statistics for Native and Introduced Species. USDI National Park Service and USDA Natural Resources Conservation Service. 2. Hosokawa, J., Wick, D., Luna, T. 2004. Propagation protocol for production of container <i>Lupinus sericeus</i> Pursh. Plants (172 ml conetainers); USDI NPS – Glacier National Park, West Glacier, Montana. University of Idaho, College of Natural Resources, Forest Research Nursery. Native Plant Network. 3. Link, Ellen (ed.). 1993. Native Plant Propagation Techniques for National Parks Interim Guide. USDA SCS Rose Lake Plant Materials Center and USDI National Park Service. East Lansing, Michigan. 240 pp. 4. Matthews, Robin. 1993. <i>Lupinus sericeus</i>, silky lupine. Fire Effects Information System (FEIS).US Forest Service Research and Development. https://research.fs.usda.gov/feis/species-reviews/lupser.
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	<p>5. Skinner, David M. 2007. Propagation protocol for production of container <i>Lupinus sericeus</i> L. ex Lindl. plants (10 cu. in.); Natural Resources Conservation Service - Pullman Plant Materials Center, Pullman, Washington. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 1 July 2014). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.</p> <p>6. Slichter, Paul. 2007. Silky Lupine: <i>Lupinus sericeus</i> http://science.halleyhosting.com/nature/gorge/5petal/pea/lupinus/sericeus.htm.</p> <p>**Despite the above source being a .com “blog” style post, which might not typically be reputable, I have researched Paul Slichter and found the source to be highly reputable. Slichter was a high school biology teacher at Gresham High School in Oregon and began a massive field guide database, in part to teach his students. He is a member of the Native Plant Society of Oregon and has done surveys for UW’s Rare Care project. Slichter has since retired and taken up a second career as a field botanist continuing his work documenting native flora across the PNW. Read more about Paul Slichter and his research here: https://www.npsoregon.org/wp/paul-slichter/</p> <p>7. St. John, L. and D. Tilley. 2012. Plant Guide for silky lupine (<i>Lupinus sericeus</i>). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho 83210. https://www.nrcs.usda.gov/plantmaterials/idpmcpg11102.pdf</p> <p>8. Stevens, Richard, Kent R. Jorgensen, and James N. Davis. 1981. Viability of Seed From Thirty-two Shrub and Forb Species Through Fifteen Years of Warehouse Storage. <i>Great Basin Naturalist</i> 41:274-277.</p> <p>9. USDA Plants Database. https://plants.sc.egov.usda.gov/plant-profile/LUAL6.</p>
Other Sources Consulted	<p>10. WTU Herbarium, Burke Museum, University of Washington. <i>Lupinus sericeus</i> var. <i>sericeus</i> – Burke Herbarium Image Collection. Copyright (C) 2004-2026 WTU Herbarium, Burke Museum, University of Washington. https://burkeherbarium.org/imagecollection/taxon.php?Taxon=Lupinus%20sericeus%20var.%20sericeus</p>
Protocol Author	Emily Sanders
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