

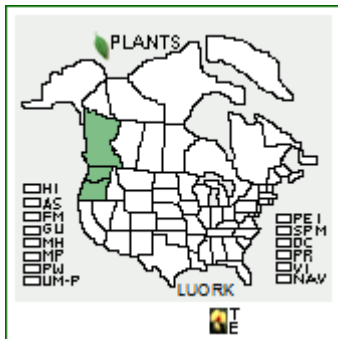
Plant Propagation Protocol for *Lupinus oreganus*
 ESRM 412 – Native Plant Production
 Protocol URL: <https://courses.washington.edu/esrm412/protocols/LUOR>



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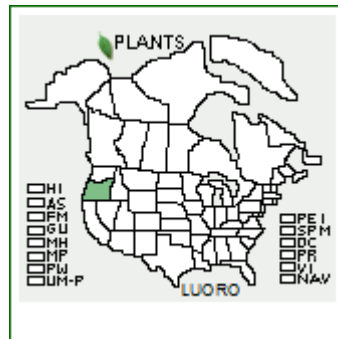


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(7)

Lupinus oreganus var. *kincaidii*



(7)

Lupinus oreganus var. *oreganus*

TAXONOMY	
Plant Family	
Scientific Name	Fabaceae
Common Name	Pea Family
Species Scientific Name	
Scientific Name	<i>Lupinus oreganus</i> A. Heller
Varieties	
Sub-species	<i>Lupinus oreganus</i> A. Heller var. <i>oreganus</i> <i>Lupinus oreganus</i> A. Heller var. <i>kincaidii</i> C.P. Sm. (7)
Cultivar	
Common Synonym(s)	<i>Lupinus amabilis</i> A. Heller <i>Lupinus biddlei</i> L.F. Hend. ex C.P. Sm. <i>Lupinus sulphureus</i> Douglas ex Hook. ssp. <i>kincaidii</i> (C.P. Sm.) L. Phillips

	<i>Lupinus sulphureus</i> Douglas ex Hook. var. <i>kincaidii</i> (C.P. Sm.) C.L. Hitchc. <i>Lupinus leucopsis</i> J. Agardh var. <i>hendersonianus</i> C.P. Sm. (6, 8, 13)
Common Name(s)	Oregon lupine, Kincaid's lupine, Sulphur lupine (2, 7, 9)
Species Code (as per USDA Plants database)	LUOR, LUORO, LUORK
GENERAL INFORMATION	
Geographical range	West of the Cascades in Washington, particularly Lewis County and south of Puget Sound; Willamette Valley in Oregon; Historically documented in British Columbia in Victoria and Vancouver Island but has not been seen there since the 1920's. (3, 4, 6, 7, 8, 11, 12)
Ecological distribution	Upland prairie, oak savanna habitats, and grassland habitats; can also be found at disturbed sites such as roadsides. These prairies were maintained in the past by frequent anthropogenic burning. (4, 6, 13)
Climate and elevation range	Below 2750 feet; temperate climate with moderate rainfall; fires also influence the ecosystem. (3, 4, 6, 13)
Local habitat and abundance	Note: <i>Lupinus oreganus</i> var. <i>kincaidii</i> is listed as Threatened by the Endangered Species Act in Oregon and by the Federal government as well as Endangered in Washington state. It is also listed as Extirpated by the Committee on the Status of Endangered Wildlife in Canada and the Species at Risk Act. It prefers rocky, well-drained soils but will grow in a variety of soils, including serpentine soils. Commonly associated species: <i>Icaricia icarioides fenderi</i> (Fender's Blue Butterfly, listed by ESA as Endangered) <i>Agoseris grandiflora</i> , <i>Arbutus menziesii</i> , <i>Bromus carinatus</i> , <i>Calochortus tolmiei</i> , <i>Camassia quamash</i> , <i>Cicendia quadrangulis</i> , <i>Cryptantha intermedia</i> , <i>Danthonia californica</i> , <i>Delphinium menziesii</i> , <i>Deschampsia cespitosa</i> , <i>Elymus glaucus</i> , <i>Eriophyllum lanatum</i> , <i>Festuca idahoensis</i> , <i>F. roemeri</i> , <i>Fragaria vesca</i> , <i>F. virginiana</i> , <i>Holodiscus discolor</i> , <i>Iris tenax</i> , <i>Lomatium triternatum</i> , <i>L. utriculatum</i> , <i>Luzula comosa</i> , <i>Madia gracilis</i> , <i>Potentilla gracilis</i> , <i>Pseudotsuga menziesii</i> , <i>Pteridium aquilinum</i> , <i>Sanicula crassicaulis</i> , <i>Silene hookeri</i> , <i>Symphoricarpos mollis</i> , <i>Toxicodendron diversilobum</i> , <i>Whipplea modesta</i> (3, 6, 7, 8, 11, 12)
Plant strategy type / successional stage	Early seral (6, 8)

Plant characteristics	Perennial herb, rhizomatous, deciduous perennial legume, long-lived, symbiotic relationships with nitrogen fixing bacteria and mycorrhizal fungi (4, 6, 7, 11, 12)
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PROPAGATION DETAILS

(By Amy Bartow, USDA NRCS, Corvallis Plant Materials Center, Corvallis, Oregon) (2)

Ecotype	
Propagation Goal	Plants
Propagation Method	Seeds
Product Type	Container (plug)
Stock Type	
Time to Grow	Multiple weeks
Target Specifications	Well-developed crowns, roots and rhizomes filling soil profile in container.
Propagule Collection Instructions	
Propagule Processing/Propagule Characteristics	
Pre-Planting Propagule Treatments	In our tests, this plant is best served by 8 weeks cool/moist stratification for top germination rates.
Growing Area Preparation / Annual Practices for Perennial Crops	
Establishment Phase Details	
Length of Establishment Phase	
Active Growth Phase	
Length of Active Growth Phase	
Hardening Phase	
Length of Hardening Phase	
Harvesting, Storage and Shipping	
Length of Storage	
Guidelines for Outplanting / Performance on Typical Sites	
Other Comments	

PROPAGATION DETAILS

(Based on information from Paul Severns papers and communication; all experiments were conducted in the field) (10, 11, 12)

Ecotype	Two experimental planting sites, Row Point and Green Oaks, both in the Willamette Valley upland prairie remnants in Lane County, Oregon, U.S.A. located on public lands maintained by the U.S. Army Corps of Engineers. Green Oaks and Row Point are well within the known distribution of Kincaid's lupine. (11)
Propagation Goal	Plants
Propagation Method	Seeds

Product Type	None (outside)
Stock Type	
Time to Grow	1 year
Target Specifications	Seedling
Propagule Collection Instructions	Collected lupine seeds from the five colonies in the summer of 1997 and stored them in glassine envelopes at room temperature until the seeds were planted 3 months later. Fruits were collected haphazardly throughout each population. Fully filled seeds were kept for planting, whereas deformed, desiccated, and aborted seeds were discarded. (11)
Propagule Processing/Propagule Characteristics	
Pre-Planting Propagule Treatments	<p>3 months storage at room temperature.</p> <p>Scarified lupine seeds by notching the seed coat with a triangular file. A total of 330 Green Oaks seeds were mechanically scarified (11 plots) and 210 Green Oaks seeds (7 plots) were left as control unscarified seed. All other Kincaid's lupine seed planted at Row Point and Green Oaks were mechanically scarified (excluding the 210 unscarified seeds at Green Oaks).</p> <p>Mechanical seed scarification had no significant effect on the survivorship of lupine plants per plot through 34 months. Of the 330 scarified Green Oaks seeds 142 germinated (43.03%), and 84 of 210 control seeds germinated (40.0%), indicating that the total germination rate was likely not affected by seed treatment. Seed scarification, however, resulted in significantly higher fall germination rates, approximately two times greater than unscarified seeds in October. Conversely, scarified seeds germinated at a significantly lower rate in April. (11)</p>
Growing Area Preparation / Annual Practices for Perennial Crops	
Establishment Phase Details	<p>The most vulnerable life stages are the early ones. The germinant life stage and the first growing year experienced high mortality at both study sites</p> <p>Germination rates in Kincaid's lupine can be enhanced by a combination of mechanical seed scarification and cold stratification in a greenhouse environment (Kaye & Kuykendall 2001). Fall sowing, however, provides natural cold stratification and results in less effort because lupine plants transplanted from the greenhouse to the field require intensive watering for the first 3 months if planted in spring (personal observation).</p>

	<p>Watering, weeding, and coddling of first-year seedlings may increase the establishment rate for Kincaid's lupine and increase the vigor of plants in future restoration projects. (11)</p> <p>Naturally germinated lupine seedlings were found primarily in habitats that were likely to have more exposure to sunlight and temperature fluctuations, such as moss beds, bare ground, and areas of short grass. (12)</p>
Length of Establishment Phase	2 to 7 months
Active Growth Phase	
Length of Active Growth Phase	34 months
Hardening Phase	
Length of Hardening Phase	
Harvesting, Storage and Shipping	
Length of Storage	
Guidelines for Outplanting / Performance on Typical Sites	<p>Symbiotic relationships between the lupine, <i>Rhizobium</i> sp., and mycorrhizal fungi may be necessary for plant establishment, because the absence of symbiotic species in other leguminous species results in plants with decreased vigor or individuals that are unable to survive. Kincaid's lupine symbionts remain unknown, but a rare or species-specific interaction with symbiotic species may partially explain the results from the two planting sites.</p> <p>Furthermore, past attempts to grow Kincaid's lupine in areas separated from existing lupine patches met with low establishment rates, less than 1% in one study (Schultz 2001) and under 3% at another site that was separated by more than 100 m from the nearest Kincaid's lupine plant (Leininger 2001). Multiple Kincaid's lupine restoration projects near Green Oaks planted in 1998 suggest that establishment (alive at the end of 2 growing years) in fields near naturally occurring Kincaid's lupine populations experience higher survivorship compared with distant sites. (11)</p> <p>I have planted out plugs that someone else grew... establishment depends on growing season supplemental watering (May through middle June). Without watering most of the plugs won't survive the Summer. I never did any formal experiments with plugs but I have advised others who planted plugs to water in May and June. Those who took my advice received decent establishment (> 75% via personal communications), those who did not reported low</p>

	establishment (< 5%). (10)
Other Comments	Kincaid's lupine may be capable of living for 100 years or more, and the plant's ability to send nonadventitious rhizomes up to 10 m makes demographic site descriptions difficult. (11) Because Kincaid's lupine appears to lack adventitious rhizomes, it relies solely on sexual reproduction for population growth. (12)
INFORMATION SOURCES	
References	See below
Other Sources Consulted	See below
Protocol Author	Kimberly Ertel
Date Protocol Created or Updated	5/24/17

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