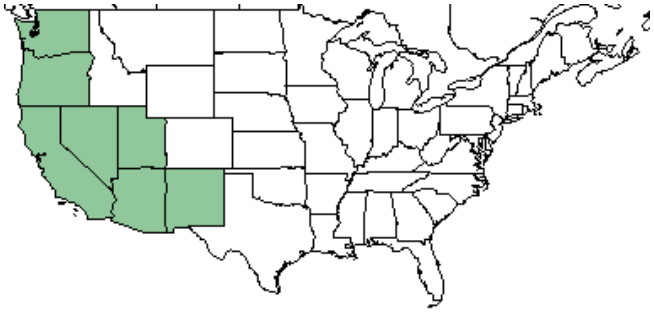
Plant Propagation Protocol for *[Insert Species]*
ESRM 412 – Native Plant Production
Protocol URL: http://courses.washington.edu/esrm412/protocols/LULALpdf)

Lupinus latifolius Leaves

Lupinus latifolius Flower

North American Distribution



Source: USDA PLANTS Database

TAXONOMY	
Plant Family	
Family Scientific Name	Fabaceae
Family Common Name	Pea family
Species Scientific Name	
Scientific Name	*Lupinus latifolius* Lindl. ex J. Agardh
Varieties	
Sub-species	*Lupinus arcticus* S. Watson ssp. *subalpinus* (Piper & B.L. Rob.) D. Dunn – subalpine lupine [2]
Cultivar	
Common Synonym(s)	*Lupinus latifolius* spp. *dudleyi* (Rydb.) Kenney & D.

	Dunn [1] *Lupinus latifolius* spp. *Latifolius* [1] *Lupinus latifolius* spp. *leucanthus* (Rydb.) Kenney & D. Dunn [49] [1] *Lupinus latifolius* spp. *longipes* (Greene) Kenney & D. Dunn [49,50] [1] *Lupinus latifolius* spp. *parishii* (C.P. Sm.) Kenney & D. Dunn [1] *Lupinus latifolius* spp. *viridifolius* (Heller) Kenney & D. Dunn [49] [1]
Common Name(s)	Broadleaf Lupine, broad-leaved lupine [1]
Species Code (as per USDA Plants database)	LULA4
GENERAL INFORMATION	
Geographical range	Washington south to California and east to Utah, Nevada, and New Mexico. In Canada, it is only found in British Columbia.[1]
Ecological distribution	Chiefly in forest openings at mid-elevation to subalpine meadows[10]
Climate and elevation range	California: Moist areas in shady to open woods below 11,000 feet (3,500 m) Nevada: Moist soils on stream banks, mountain ridges, and meadows, 5,000 to 9,000 feet (1,500-2,700 m) Utah, Zion National Park: Oakbrush (Quercus spp.) and stream side communities at 4,000 feet (1,200 m) Olympic National Forest, Washington: High elevation, drier environmental zones and moist subalpine meadows[1]
Local habitat and abundance	Commonly found in subalpine meadows and forest of the Pacific Northwest, often locally abundant within the ecotonal margins of coniferous tree island and late-melt subalpine basins[5] Common broad-leaf lupine is generally found on open lowland prairies as well as wooded to open mountain slopes.[7]
Plant strategy type / successional stage	First colonizers of early successional habitats [8] Mid-sucessional[9]
Plant characteristics	Broad-leaf lupine is an attractive perennial with erect stems up to 1 meter in height, varying with variety from sparsely haired to heavily haired. The stems typically have 6-8 leaves with the lower leaves having petioles 2-3 times longer than the blade. The lower

	leaves tend to persist through flowering time. The petioles of the upper leaves range from 1-2 times longer than the blades. The 7-9 leaflets are elliptic to obovate in shape and each ranges from 3-6 cm long and 10-20 mm wide. The upper leaf surface tends to be less haired than the lower surface. [7] The inflorescence consists of several showy racemes from 10-20 cm long. the thin flower pedicels range from 4-9 mm long. The flowers range from light blue to bluish or lavender, or may be marked with bright violet. The flowers range from 12-15 mm long. The back of the banner lacks hairs and is distinctly well reflexed backwards from the wings and keel (Index = 15-30.) The wings lack hairs and completely cover the curved keel.The calyx is silky to shaggy-haired and lacks a spur or sac. The upper calyx lip is shallowly double-toothed. The seed pods range from 2-3 cm long and average 8 mm wide.[7] Seeds are green turning to brown with long pods with brown hairs, 1-1/4 inch. Per pod there are around 6 to 10 seeds that are about 1/8 inch in length.[6]
USDA Propagation Method	
Ecotype	Crater Lake National Park at 6,000 to 6,700 ft elevation.; Mt Rainier National Park- 3 collections along highways on the east side of Park at elevations of 2,000 to 5,400 ft.[4]
Propagation Goal	Plants[4]
Propagation Method	Seeds[4]
Product Type	Container (plug)[4]
Stock Type	7 or 10” cones[4]
Time to Grow	5 Months[4]
Target Specifications	Healthy crowns and root development with some branching[4]
Propagule Collection Instructions	As the seed pods began to turn brown they were hand stripped and placed into cloth seed sacks and held in a cool, shaded location until they can be spread out on benches in the poly house to dry. You want to collect ripened seeds that have a whitish appearance where unripened seed that are green colored tends to shrivel on drying. Pods contain high levels of moisture initially and these collections need to be handled carefully to keep from overheating during transit. Seed pods were plentiful in most years except for 2 seasons that were exceptionally warm in early spring.[4]
Propagule Processing/Propagule Characteristics	Pods should be spread in a thin layer on paper or cloth so that the seeds are collected when shattered from the

	drying pods. They should be kept to dry in an area with good air flow and turned frequently. Small lots can be threshed with a geared-down hammermill; larger lots in a stationary thresher. Threshed lots air-screened with #10 round screen, medium-high air flow. Clean seed averaged 38,000 / lb. Germination rates have been quite variable between years as well as lots; ranging from 18% germination plus 3% hard seed to 27% germination with 42% hard seed[4].
Pre-Planting Propagule Treatments	Scarification can be used with a hot water by pouring hot tap water over seeds a few times and then allow seed to steep in water while it cools) or mechanical scarification in a seed tumbler seems to aid in germination. Even with such treatment, there will be varying levels of hard seed that remains impermeable.[4]
Growing Area Preparation / Annual Practices for Perennial Crops	Seeds sown singly into cone-tainers filled with Sunshine #1 soil-less potting mix amended with Micromax trace elements, covered with 1/8" soil and placed into greenhouse at moderate temperatures (75 F days / 55 to 60 F nights). Seed can be inoculated with Rhizobium lupini inoculant at sowing time. Four inch deep peat pots have also been used for producing spring transplants if established seedlings can be out planted within 3 or 4 months.[4]
Establishment Phase Details	Germination will be scattered; some seedlings emerging up to 45 days after sowing. During this time, medium is kept moist but good air flow is also important to prevent mildew.[4]
Length of Establishment Phase	6 weeks Active Growth Phase: Seedlings[4]
Active Growth Phase	Seedlings fertilized once or twice with Peters' 9-45- 15 NPK starter fertilizer at half rate; seedlings need to be watched closely for powdery mildew. Mildew is mostly a problem if leaves are allowed to remain wet over night. Plants moved to an outdoor shade house (cloth providing 50% shade) in May on elevated benches to allow good drainage. By mid summer, cones may need to be spread out to every other cell in the racks to allow room for leaf and crown growth.[4]
Length of Active Growth Phase	April to July[4]
Hardening Phase	No fertilizer after July 1; irrigation intervals lengthened in August and shade cloth removed late August / September for full sun acclimation.[4]
Length of Hardening Phase	6 weeks[4]
Harvesting, Storage and Shipping	Plants shipped via refrigerated van or in protected, cool boxes in their cones in August to early September to parks for further acclimation prior to out planting.[4]

Length of Storage	Not recommended to overwinter in pots[4]
Guidelines for Out planting / Performance on Typical Sites	Seedlings have initially transplanted well at Corvallis and at a test site at Mt Hood National Forest as 2-to 3-month-old seedlings in the 4" peat pots which provide for minimal root disturbance during transplanting. Irrigation was provided to the spring-transplants which produced excellent first-season survival. Cones have not proved to be an ideal container because the taproots do not adapt well to the cones and rootlets do not tend to fill out the cone and hold the soil plug together. Many of the cones were cut open with a sharp knife rather than pulling the root plugs from cones.[4]
Other Comments	Direct-reseeding at test plots at Crater Lake and Mt Rainier National Parks have shown that seedlings can establish well by fall-sowing into amended plots. These plots had organic matter and straw erosion control blankets. Cones do not store well over winter outdoors at Corvallis; but if needed should be held in a walk - in cooler or other controlled, cold location where they will be sheltered from heavy winter rains. Seed can be stored for several years; some germination will be retained due to presence of "hard seed" as is common for other legumes[4]
INFORMATION SOURCES	
References	See Below
Other Sources Consulted	See Below
Protocol Author	Emma Woods
Date Protocol Created or Updated	04/22/15

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