



EVALUATING SEED INCREASE POTENTIAL OF BROADLEAF LUPINE

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With the current emphasis on using native species for conservation and revegetation plantings, the need for seeds and plants often exceeds the supply available from direct wild seed collection. Public and private land managers are interested in developing reliable seed sources for some key species such as broadleaf lupine (*Lupinus latifolius*) to replace non-native species traditionally relied upon for erosion control and site stabilization. The PMC is evaluating the potential for seed increase using plots established in cooperation with the USDA National Forest Service Mt. Hood and Gifford Pinchot National Forests (GPFS) for the purpose of studying adaptive genetic variation in broadleaf lupine and implications for seed transfer guidelines (Doede et al, 1998). Lupine seeds collected by the Forest Service throughout Mt Hood National Forest have been established in common gardens at the PMC and at GPFS for this 3-year cooperative study.

The PMC had previously grown small seed increase plots of broadleaf lupine from seed originating from 3 different collection zones at Mt. Rainier National Park and a fourth collection from Crater Lake National Park, with widely varying yields as low as 19 lbs/ac and up to 162 lbs/ac from small (less than .3 acre) intensively managed plots. It should be noted that in collecting the wild seed to establish these increase plots, care was taken to sample from all sizes of the species and not to select only the most vigorous or productive plants, in order to maintain the diversity of the original population. More information on the genetic structure of lupine populations from the present common garden study is needed before we can determine how to efficiently manage seed increase without compromising the ability of the resulting population to adapt and persist in outplanting areas.

Various alternative means for increasing seed availability for this widespread forb species are outlined and will be considered in light of the genetic information obtained from this common garden study.

Uniformity is a key feature of most cultivated crops that allows for mechanization of plant culture. Others are early seedling vigor, uniform germination and emergence, uniform growth rates and determinate seed ripening, and non-shattering. In contrast, wild stands of broadleaf lupines have none of these features. Thus many adjustments,

often labor-intensive, have to be made in production methods in order to maintain the germplasm in a “wild” state. These could include:

- using large quantities of seed at a heavy seeding rate for adequate initial stand density or
- raise seedlings in pot culture and transplant to field,
- plant into ground mulch fabric for weed control and to collect shattered seeds off the ground and/or
- multiple hand-harvests

In small areas where reestablishment of native species is vital, direct reseeding of native-collected seed is also an option. If seed is extremely limited it may even be preferable to start seedlings in pot-culture in a controlled environment such as a greenhouse and then transplant out to the site. Direct reseeding offers several advantages to land managers interested in retaining locally adapted germplasm. Seed may be harvested directly from replanted areas such as old logging roads or landings. If only small or moderate quantities of seed are needed in any one year, this method offers a way to circumvent the need for high agronomic inputs such as weed control to prevent competition with aggressive exotic weeds, while at the same time ensuring the likelihood of plants reaching maturity and producing seed in their native environment. If the decision is made to attempt larger-scale agronomic seed production, land managers will need to be aware of growers concerns / agronomic limitations to ensure a

successful seed increase project. These include:

- “economy of scale” needs - equipment set-up and clean-up time are the same for small and large plots
- weed control may be expensive because of lack of available herbicides, and the prevalence of exotic weeds in most production areas
- lack of available yield histories make it difficult for producers to decide on crop pricing

A further complication is the need for field isolation from other lupine fields if maintaining separate “ecotypes” is needed. In sum, the information gained from the Adaptive Genetic Variation study will help guide land managers in choosing from among the different options presented here to succeed in reaching revegetation and restoration goals.

Literature Cited

Doede, David L., C. Cray, J. Trindle and D. Darris. 1998 Adaptive genetic variation of broadleaf lupine (*Lupinus latifolius*) and implications for seed transfer. In Proceedings: Native Plants Propagation and Planting Dec. 1998, Corvallis, OR