

RESEARCH ABSTRACT

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Study Title: The evolutionary ecology of *Lupinus lepidus*

Key Words: terrestrial plant upland subalpine herbs
seedlings survival dispersal pyroclastic flow archives lupine

Abstract: A four year study of the evolutionary consequences of colonization was begun in 1990. The objectives of this study are to document the pattern of genetic variation in a colonizing plant species, *Lupinus lepidus*, and investigate the ecological processes which are expected to affect that pattern.

Preliminary genetic data indicate that colonies of *L. lepidus* on the pumice plain of Mount St. Helens are genetically different from each other, probably due to the differing genetic composition of founders. Whether or not differentiation due to founder effects will persist depends on a) the rate of population growth, b) the level of migration between populations, c) the rate of self-fertilization, and d) spatial variability in natural selection. Efforts are underway to assess the importance of each of these processes.

Population growth rate and factors affecting it, such as herbivory, are being studied by measuring survivorship, fecundity, seed bank properties, and other demographic parameters for a large number of natural and experimental populations. Genetic studies of these populations are underway which will allow a comparison of genetic drift with population growth.

Preliminary data shows that *L. lepidus* is self-compatible and that colonizing populations may exhibit a high level of self-fertilization due to the absence of pollinators. This will tend to increase differentiation between populations.

The relationship between fruit set and flowering time was studied in seven populations for two years. This data indicates strong natural selection which varies among populations. However, the observation that selection also varies within populations among years is expected to counteract the population effects. Much of the variation among populations and years is due to variation in herbivore loads and possibly to pollinator visitation. Reciprocal transplants between populations, started in 1991, will reveal population differentiation and the genetic basis for character differences.

Type of Measurement(s):

- 1) Demographic - size, density, fecundity, survivorship, seed germination and survival for individuals in 20 colonizing populations (begun 1991) and 50 small experimental populations (beginning 1992).
- 2) Phenological - weekly flower and fruit production, pollinator visitation, herbivore damage.
- 3) Genetic - allozyme variation at eight loci, used for estimating population genotype frequencies and mating systems.

Frequency of Measurement(s):

- 1) Demographic annually beginning in 1991.
- 2) Phenological weekly in 1990 and 1991.
- 3) Genetic annually beginning in 1990.
- 4) Mating system semi annually.

Data Storage: Data are stored permanently on field data sheets, and on Macintosh and Unix OS computers in various formats.

Long term plans: Data available for collaborative efforts: Long term monitoring of demography and genetic variation in a number of permanent plots is planned. Proposals of collaborative efforts are welcome.