Phenotypic variation in *Lupinus polyphyllus* (Fabaceae)

When developing new crops, breeders survey naturally occurring morphological variation and select individuals with desirable traits to found future generations. Domestication occurs as these traits are intentionally selected for over many generations. One organization that is actively trying to domesticate new plant species today is The Land Institute (Salina, KS). Scientists at the Land Institute seek to develop a sustainable form of agriculture that mimics natural systems: perennial polycultures (Wes Jackson 1980). However, herbaceous perennial plants that might be used in a perennial polyculture have not been developed. *Lupinus polyphyllus* (Fabaceae), a perennial herbaceous legume species, is one candidate crop species, and some efforts to domesticate it are already underway. Here, several hypotheses about *L. polyphyllus* morphology and its correlates are investigated using a novel dataset gathered from herbarium records. This species was found to exhibit a wide range of phenotypes, especially in vegetative characters measured. Morphological variation in this species differed based on co-occurrence with other species of *Lupinus*, with traits displaying significant shifts both towards and away from the means of co-occurring species. Climate variables such as elevation, mean annual temperature, latitude and mean diurnal range were found to have significant correlations with vegetative and/or reproductive traits. Finally, no strong evidence of tradeoffs between vegetative structures and reproductive structures was found in *L. polyphyllus*. Further work, especially population genetic approaches and common garden experiments are needed to better understand variation in this promising perennial crop.