Great Basin Forb Restoration: Lupine Response to Altered Precipitation Predicted by Climate Change

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Abundance of native forb species is declining, leading to degraded ecosystems within the Great Basin. Forbs provide many ecosystem functions, including wildlife habitat for species such as Sage Grouse, increased biodiversity, resistance to erosion, and protection from invasive plant species.

Climate change is predicted to affect timing, frequency, and intensity of precipitation within the Great Basin. During the fall season, precipitation is expected to increase by 30%.

Changes in precipitation will likely affect fall emergence of forbs, which is essential for overwintering and establishment. Learning how precipitation affects forb emergence could lead to new methods that increase fall emergence and therefore overall restoration success.

### Methods

Water treatments alter both the total amount and frequency. Baseline treatments use average precipitation. Increase treatments use baseline with a 30% increase as predicted with climate change. Baseline and increase treatments were tested at once/week and twice/week watering frequency.

Two lupine species (*Lupinus argenteus* and *Lupinus sercius*) and three soil textures (Loam, Silty Loam and Sand) were used to test the effects of soil moisture availability on establishment and growth.

### Results

Figure 1 indicates *L. argenteus* emergence is greater than *L. sercius* emergence in all soil textures. *L. argenteus* has greatest emergence in loam while *L. sercius* has greatest emergence in sand. Both show decreased emergence in silty loam.

Figure 2 shows *L. argenteus* emergence is greater than *L. sercius* under all water treatments. *L. sercius* only shows emergence in the Increase treatments. Altering the amount or frequency of water increased *L. argenteus* emergence compared to baseline.

### Conclusions

Managers will be able to use these results to inform more successful forb restoration in the Great Basin.

- *L. argenteus* may be preferable for use in restoration projects in Utah.
- Restoration projects in loamy or sandy soils will likely be most successful.
- Fall precipitation significantly affects germination of *L. Argenteus*.