**A controlled microclimate contrast of three native and one highly invasive plant species in Southern California**

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**Question:** How does increasing temperature influence the germination, succession, and biomass of 3 native and 1 exotic desert annual plant species in arid ecosystems.

**Location:** The experiment was located in a greenhouse with controlled conditions representative of the Carrizo Plain National Monument, California, USA (35.1180, -119.6088) ecosystem.

**Methods:** The effects of temperature were tested on the native plant species *Salvia columbariae, Layia platyglossa,* and *Phacelia tanacetifolia*, and the highly invasive plant species *Bromus rubens*. Species were tested independently over a 6-week growing period in a temperature-controlled greenhouse in 2021. A total of 210 individual pot replicates per species were tested on a temperature gradient simulating the arid ecosystems of Southern California. Hourly temperature was recorded through a logger sensor array in the greenhouse. The germination and biomass of established plants were then recorded at the conclusion of each 6-week trial.

**Results:** Increasing temperatures decreased the germination rate of the native species *L. platyglossa* and the invasive species *B. rubens*. Temperature decreased the establishment of the native species *L. plataglossa*. Increasing temperature also decreased the biomass of the natives *L. platyglossa* and *S. columbaria* and the invasive *B. rubens.*

**Conclusion:**

Increases in regional temperatures in drylands will likely have negative impacts on both native and exotic plant establishment, succession, and biomass. Invasive species such as *B. rubens* suffering along with native plants is important as these species co-occur with one another within Southern California and have strong negative indirect effects on species richness. Analyzing the succession and establishment of these annual species is essential to understanding local plant community composition and diversity. In addition, determining the responses both native and exotic annuals have to increasing temperatures within arid and semi-arid ecosystems can prove crucial in the restoration and conservation of these ecosystems.

**Key Words:** *Bromus rubens*, Climate, Desert, Grassland, Growth trials, Invasion, Temperature