Do plants from coastal habitat have smaller thermal niches?

Preliminary data suggest coastal populations of *E. guttata* have smaller thermal niches, but this project is ongoing.

METHODS

1. Expose plants to a range of temperature treatments (10 - 60 °C) for two weeks in controlled environment chambers.
2. Measure growth rate by quantifying change in leaf area using EasyLeafArea.^2
3. Build performance curves to estimate niche breadth using a Bayesian framework.^3

**Empirical Measurements**

**Thermal Performance Curve**

**Bayesian Framework**

**Growth Rate (cm²/day)**

**Population**

- Inland CA
- Coastal CA

**Temperature (°C)**

- 0
- 10
- 20
- 30
- 40
- 50
- 60

**Month**

- Jan
- Feb
- Mar
- Apr
- May
- Jun
- Jul
- Aug
- Sep
- Oct
- Nov
- Dec

**BACKGROUND**

**Climate Variability Hypothesis (CVH):** organisms that live in more variable climates have adapted to handle a wider range of climatic conditions (i.e. they have a wider climatic niche).

Due to marine influence, coastal areas have little variability in temperature relative to inland. Shaded ribbons represent standard deviation. Figures summarize hourly microclimate temperature data from 1980-2019. Coastal sites experience far less variation in temperature on a daily and annual scale.

**RESEARCH QUESTIONS**

Do plants from coastal habitat have smaller thermal niches?

If so, are coastal populations more sensitive to climate change?

Figure 1. Mean maximum (red) and minimum (blue) temperature of two study sites, one coastal and one inland. Shaded ribbons represent standard deviation. Figures summarize hourly microclimate temperature data from 1980-2019. Coastal sites experience far less variation in temperature on a daily and annual scale.

Figure 2. Schematic of building thermal performance curve from collected growth data.

Figure 3. Preliminary thermal performance curves for two populations, one coastal (Pt. Reyes National Seashore) and one inland (Mono Lake). Shading represents 95% credible interval. This includes data from only 3 temperature treatments: 5, 20, 35 °C. Because sample size is small, there is much overlap in credible intervals. Still, the inland population performed better at higher temperatures. As predicted by the CVH, the inland population, which experiences more variation in temperature, appears to have a wider thermal niche.

REFERENCES


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