Emma Sumner,
PhD Candidate

Susanna Venn,
supervisor

Australian Alps

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- Alpine ecosystems considered at risk from climate change

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- ⬇ Snow + earlier snow melt
- ⬆ Temperature
- ⬆ Frequency and intensity of heatwaves
- ✥ Changes to timing and magnitude of precipitation

Thermal extremes

Earlier snowmelt exposes plants to more freezing events

Exposure to extreme high temperatures during summer heatwaves

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Tolerance range

>> Co-occurring drought <<

Temperature Extremes and Drought

Research focus

- Resistance of Australian alpine plants to:
  - High and low temperature extremes
  - Drought
- How drought affects heat and freezing resistance

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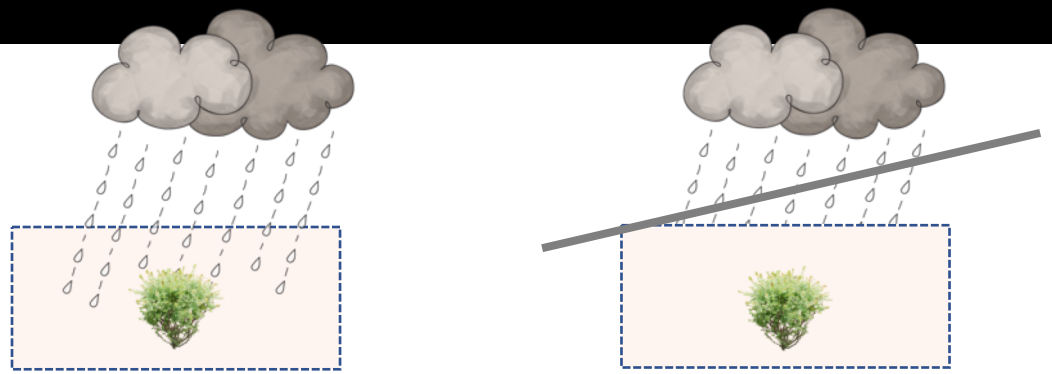

In-situ rain out shelters

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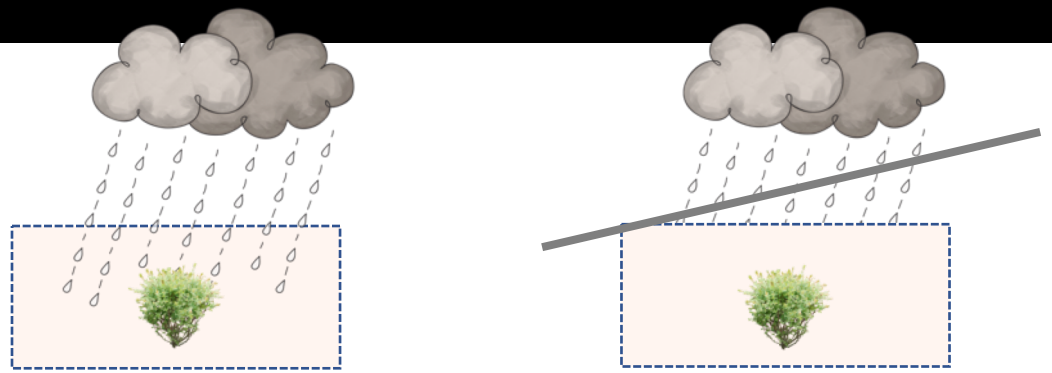

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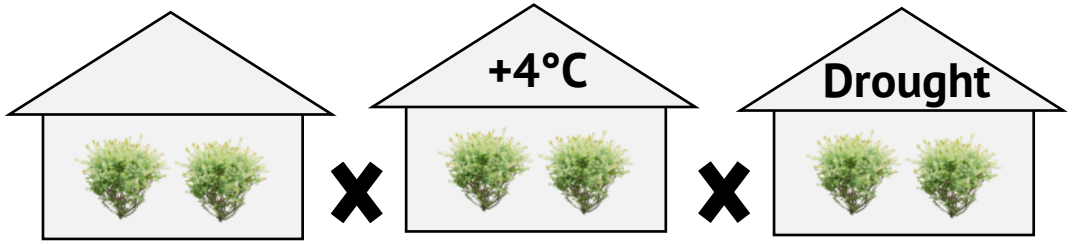

Glasshouse heat x drought combination

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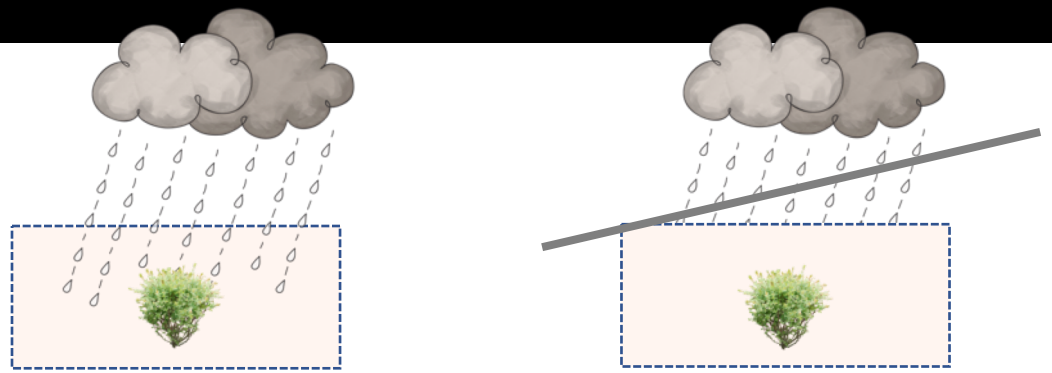
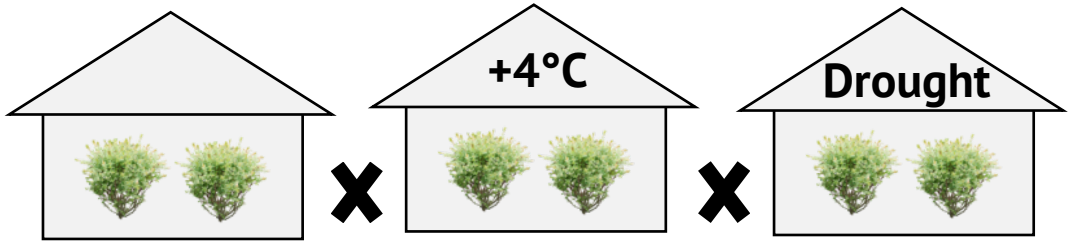


In-situ rain out shelters



Glasshouse heat x drought combination

Environmental gradients

Preliminary Results

(average LT_{50} during April 2019)

Life form	Species	Freezing resistance (°C)	Heat resistance (°C)
Graminoid	*Poa hiemata* Poaceae	-21.4	51.9
	Carex breviculmis Cyperaceae	-21.3	52.1
Shrub	*Acrothamnus montanus* Ericaceae	-15.2	50.5
	Grevillea australis Proteaceae	-18.5	52.4
	Pimelea axiflora ssp. *alpina* Thymeleaceae	-21.2	50

High freezing and heat resistance towards end of growing season

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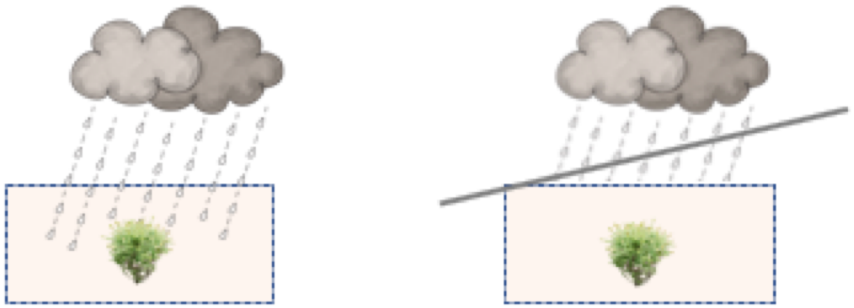
High freezing and heat resistance towards end of growing season

Environmental gradients

Freezing resistance did not change with elevation

Heating resistance increased with elevation

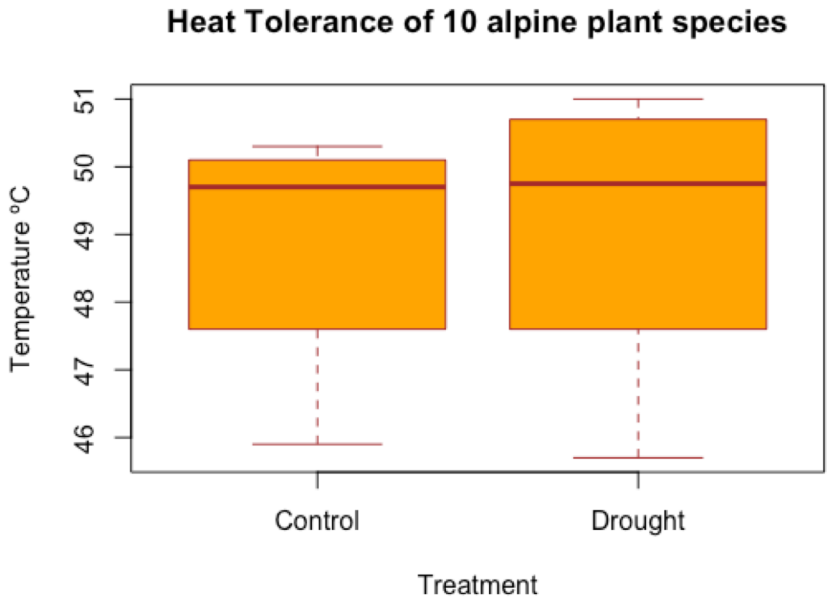
Preliminary Results

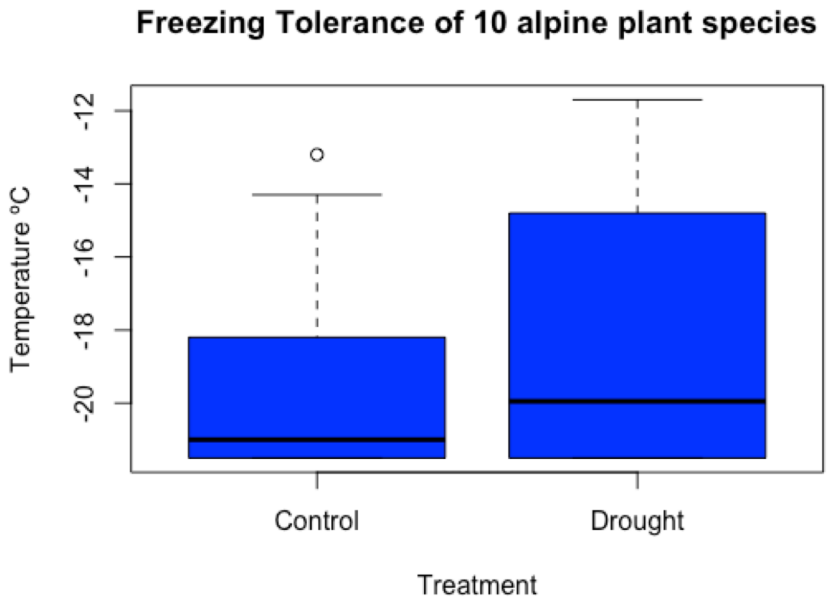


In situ rain out shelters
Reduced soil moisture by 20%

First season results

Freezing resistance more variable in plants with reduced soil moisture





Australian alpine plants show high resistance to temperature extremes and changes to soil moisture, at least in the short term - perhaps resistant to ongoing climate change

Emma Sumner, PhD Candidate

Susanna Venn, supervisor