Global Change Effects on Mojave Desert Perennials:
Summer Monsoons, Nitrogen Deposition, and Soil Disturbance

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Background

Global Change in the Mojave Desert

	Historical	Predicted
Water	winter	winter + summer
Nitrogen	N-limited	N-deposition
Disturbance	limited	increased

Research Questions

- How do monsoons, nitrogen and disturbance affect perennial plant growth?
- Does this vary among plant functional types?

Species and Site

- Located on the Nevada Test Site, ~ 100 km north of Las Vegas, NV, in the northern Mojave Desert.
- Site dominated by *Larrea tridentata*, *Lycium pallidum* and *Pleuraphis rigida*..
- Mean annual precipitation 138 ± 62 mm.

Mojave Global Change Facility (MGCF)

Methods

Treatments:

**applied annually 2001-present*

Monsoons: 25 mm in June, July, and August (75 mm/yr)

Nitrogen: 10 or 40 kg N/ha/yr as $CaNO_3$ in October

Soil disturbance: human trampling in October

Sampling:

- 3-4 branches or tillers marked per plant
- One plant per plot/species; 5 plots per treatment (n=5)

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Larrea tridentata
C_3 evergreen

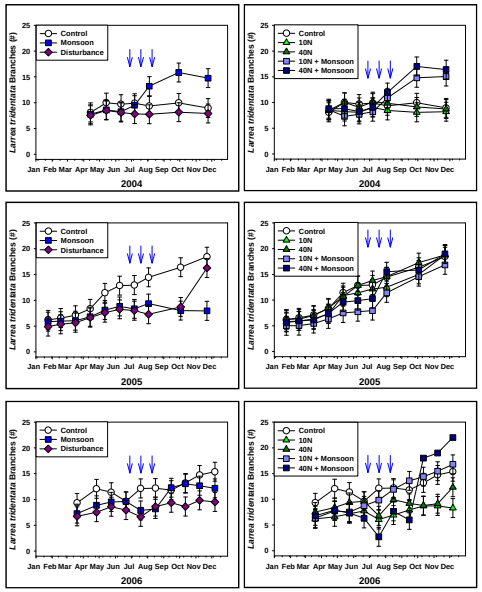
	'04	'05	'06
Disturbance		-	
Monsoon	+	-	
Nitrogen		+	-
Monsoon x Nitrogen	+		

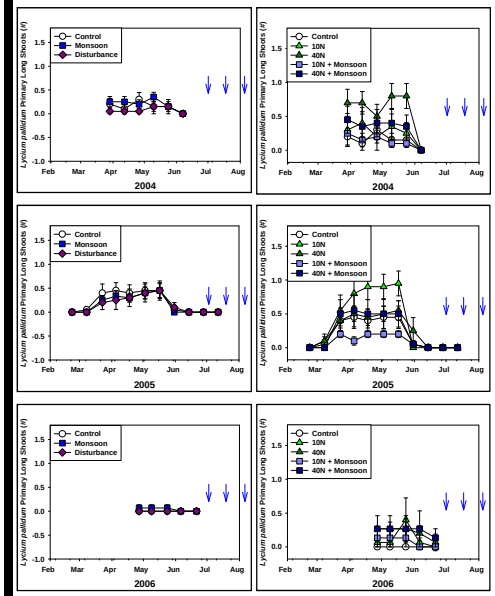
Lycium pallidum
C_3 drought deciduous

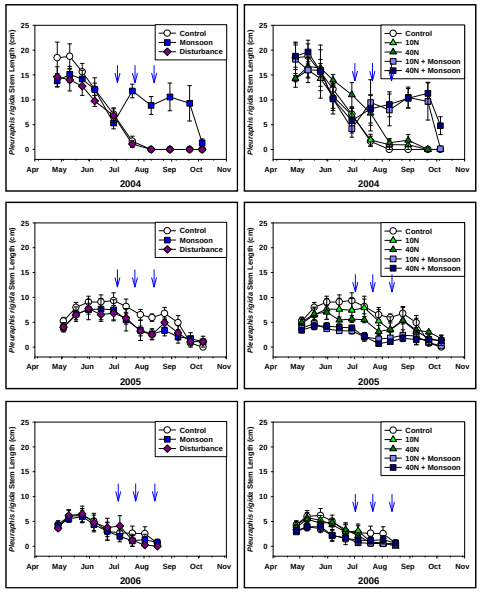
	'04	'05	'06
Disturbance			
Monsoon			
Nitrogen	+	+	+
Monsoon x Nitrogen		-	+

Pleuraphis rigida
C_4 grass

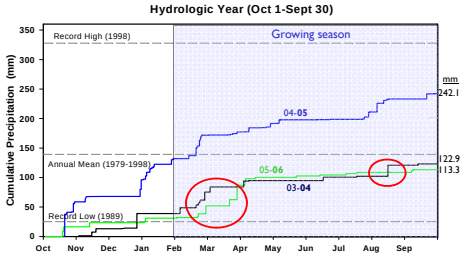
	'04	'05	'06
Disturbance		-	
Monsoon	+	-	
Nitrogen		-	
Monsoon x Nitrogen	+	-	-







Natural Precipitation



Conclusions

- **Soil disturbance** had negative effects on *Larrea* and *Pleuraphis* in the wet year.
- **Summer monsoons** increased *Larrea* and *Pleuraphis* in one of the average years but had negative effects in the wet year.
- **Nitrogen deposition** had positive effects on *Lycium* all three years, but no clear patterns emerged for *Larrea* or *Pleuraphis*.
- **Monsoons and nitrogen** had variable effects on all species with no clear patterns emerging.

Global change will differentially affect species, which may result in altered competitive interactions and changes in plant communities.