

Effects of Light Availability, Prey Capture, and Their Interaction on Pitcher Plant Morphology

Michael Segala

MS Biology

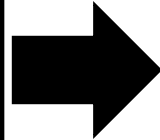
Advisor: Dr. John D. Horner

Texas Christian University

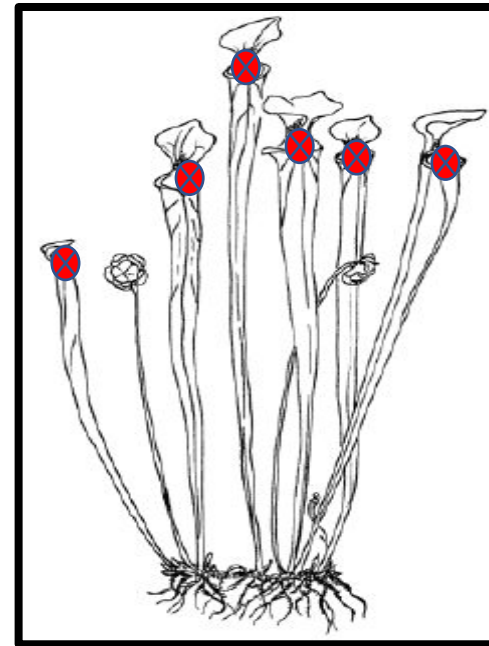
Hypothesis: Resource (light and prey) availability affect pitcher morphology

Eighty plants randomly assigned (20 each)

		Prey	
		+	-
Light	+	Control (full sun, fed)	Unfed (full sun, unfed)
	-	Shaded (shaded, fed)	Interaction (shaded, unfed)



Shade, Fed
Photosynthetic morph
(Diameters)

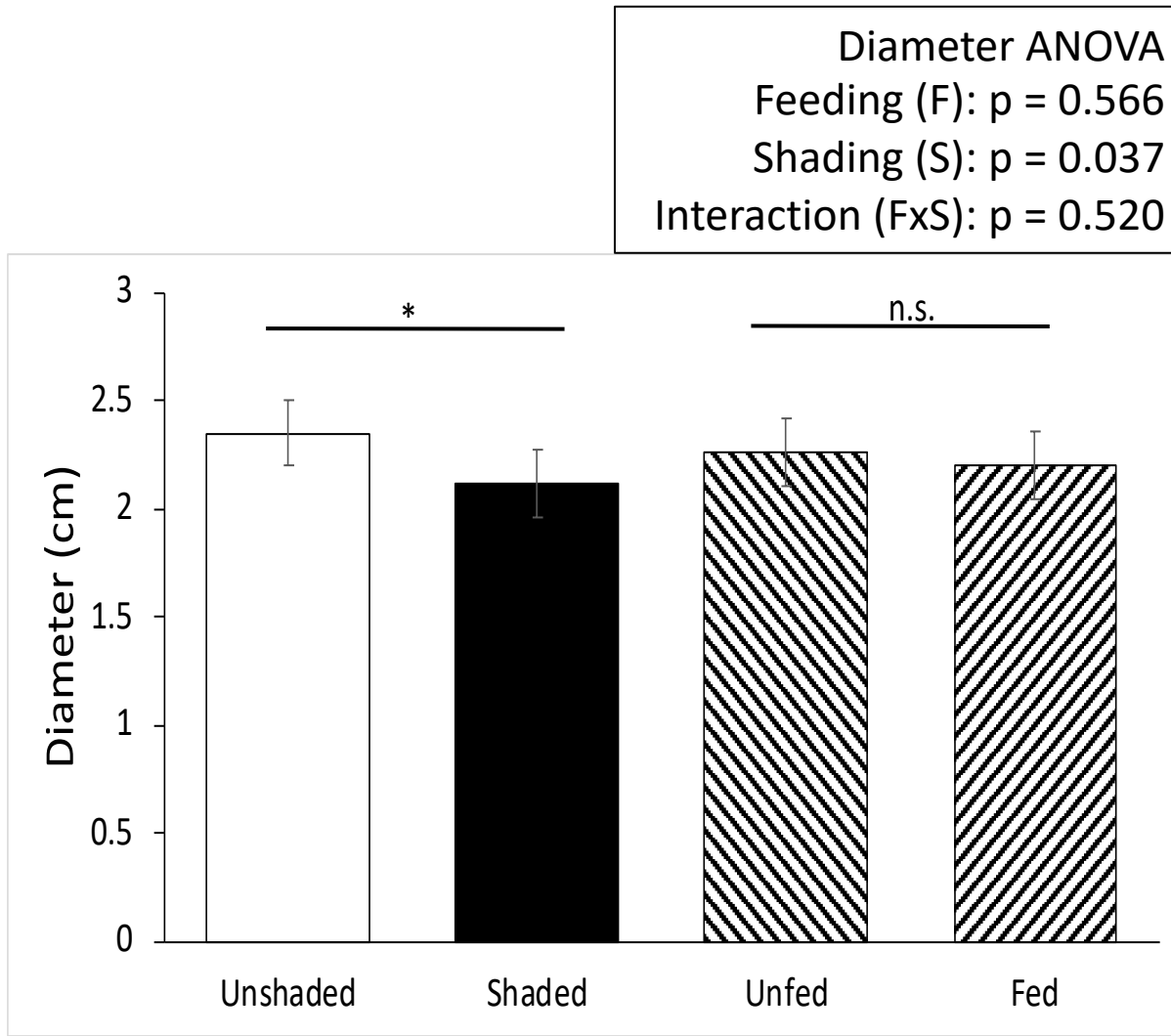


Full sun, Unfed
Overall reduced growth
(# of pitchers, sum of heights)

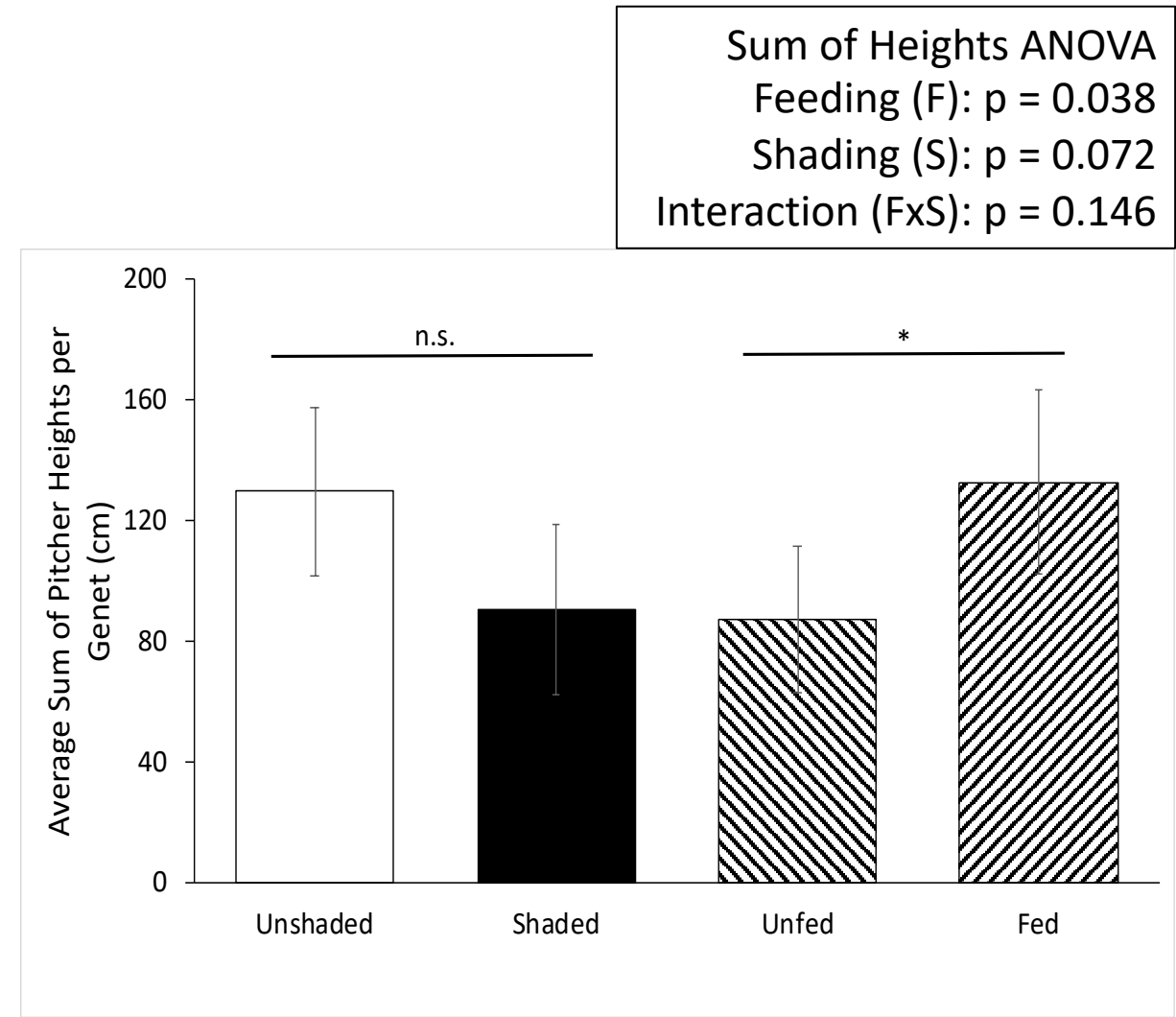


Shade, Unfed
Photosyn morph +
reduced growth

Results



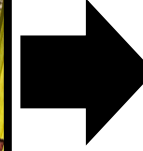
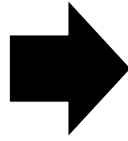
Shaded plants produced pitchers with smaller diameters
(photosynthetic morphology)



Unfed plants had lower sum of pitcher heights
(reduced growth)

Givnish et al. (1984) Cost-Benefit Model: Carnivorous traits are beneficial only under conditions of high light and water availability

Light Limited
↓
Abandon Carnivory
↓
Photosynthetic morphology



Summary

Experiment supported hypothesis:
Light limited -> smaller diameters (photosynthetic morph)
Prey excluded -> lower sum of pitcher heights (reduced growth)
Supported Givnish Cost-Benefit Model
Supports need for frequent burns and proper conservation

Acknowledgements

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To my committee
Dr. John Horner
Dr. Amanda Hale
Dr. Dean Williams

Questions?



Carnivorous plants inhabit nutrient-poor environments and supplement nutrient acquisition by capturing and digesting insect prey. Carnivorous adaptations have been hypothesized to be beneficial only in environments with high water and light availability. We hypothesized that plant morphology would change in response to resource availability, exhibiting traits that increase carnivory when light is abundant and exhibiting traits that increase photosynthesis when light is limited. When light availability was reduced, plants produced pitchers that had smaller diameters, which is reflective of a photosynthetic morphology. Unfed plants exhibited reduced growth (produced fewer pitchers and had lower sum of pitcher heights). This experiment provides support for a theoretical model that suggests that carnivorous traits are only beneficial under conditions of high light availability. It also emphasizes the importance of periodic burns of carnivorous plant bogs to remove vegetation, thereby reducing light competition.