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Comparison of Post-fire Growth Rates between Elymus condensatus and Yucca Whipplei in Coastal Chaparral

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Comparison of Post-fire Growth Rates between *Elymus condensatus* and *Yucca whipplei* in Coastal Chaparral

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Abstract

The two monocot species, *Yucca whippelei* and *Elymus condensata* chosen for this study are two co-occurring species on the Pepperdine campus. We chose 6 samples of each species and looked at parameters that would allow us to compare their post fire growth rates. These parameters included leaf area index, internal CO2 levels, transpiration rate, and photosynthetic rate. We used the Students T-test on the means of each parameter and found significant differences in leaf area index, internal CO2 levels, and transpiration rate. All of these were greater in the Yucca except for the leaf area index. We concluded that, because Yucca was a re-sprout and already had established roots vs Elymus being a seedling and having no established roots,Yucca had a larger water supply and could out compete Elymus in post fire growth.

Introduction

California has a typical Mediterranean climate that consists of hot, dry summers and wet winters. Due to the long summer drought, even well adapted plants are prone to desiccation. This vulnerability provides a large fuel load for possible wildfires, which are becoming more frequent. This is why many scientific studies are centered around fire. There are two types of plants that make up the California chaparral; monocots and diocts. Prior post-fire studies have been focused mainly on dicot species, such as *Ceanothus megacarpus* and *Malosma laurina*, while monocot species have been neglected. The recent 2007 Malibu wild fire near Pepperdine campus provided us with a unique opportunity to study fire ecology, specifically, post-fire growth rates of two monocot species, *Yucca whipplei* and *Elymus condensatus*. In our experiment we measured photosynthetic rate and other parameters such as internal CO_2 concentration, average growth over time, and the leaf area index to compare the two species.

Methods

In our experiment, we used a Li-6200 Gas Exchange System, Sunfleck Ceptometer, and meter sticks to measure stomatal conductance, photosynthesis, internal CO_2, light level, leaf area index, and height. We chose specimens in areas with the least amount of human interference. This allowed us to measure each of the plants in their natural habitats. Six individuals of Yucca and Elymus were chosen and tagged as specimens. To measure the growth of each species, the lengths of three leaves on each Yucca and the overall height of each Elymus was measured. Measurements were taken roughly around the same time of day with similar conditions.

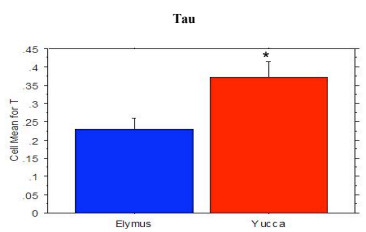

Figure 1: A student's unpaired t-test of Tau, which is the ratio of light available at the top of the plant to the bottom. An asterisks indicates a significant difference

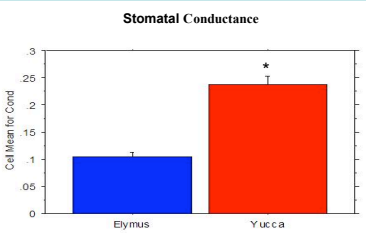

Figure 2: A student's unpaired t-test between the stomatal conductances. An asterisks indicates a significant difference.

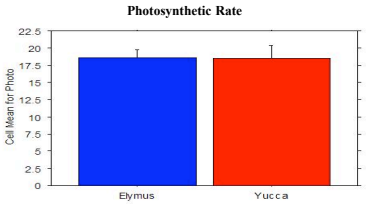

Figure 3: A student's unpaired t-test for the photosynthetic rate. No statistical difference was found.

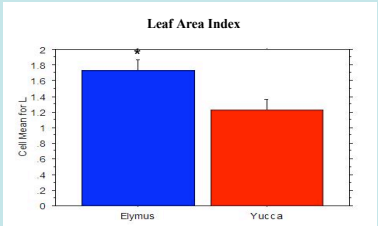

Figure 4: A student's unpaired t-test for the Leaf Area Index, which measures the ratio of the leaf area to ground area. An asterisks indicates a significant difference

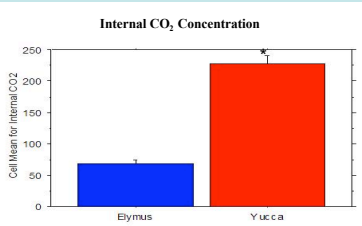

Figure 5: A student's unpaired t-test for the internal CO_2 concentration. An asterisks indicates a significant difference.

Conclusions

1) **The tau value was greater in Yucca than Elymus.**
2) **The stomatal conductance was higher in Yucca than Elymus.**
3) **There was no significant difference between the photosynthetic rates of Elymus and Yucca.**
4) **The leaf area index was greater in Elymus than Yucca.**
5) **The internal CO_2 was greater in Yuccan than in Elymus.**

Literature Cited

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