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Soil Moisture Adjacent the Roots of Post-fire Ceanothus megacarpus and Malosma laurina

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Abstract

Hydraulic lift is a passive process in which a plant will bring water from subsoil to topsoil levels through its roots. In this experiment, we compared the soil moisture levels in the area surrounding two different chaparral species *C. megacarpus, a* shallow rooted nonsprouter, and *M. laurina,* a deep-rooted obligate sprouter, in order to determine the hydraulic lift patterns of chaparral as they re-grow after fire. Furthermore, the *C. Megacarpus had died due to the Malibu fire, while the M. Laurina* was resprouting. Therefore, using a Hydrosense Soil Water Measurement System, we measured soil moisture percentages, and the results showed there was no significant difference in soil moisture levels between *C. megacarpus* and *M. laurina* despite obtaining a p-value of .0721. Furthermore, there was no significant difference between the two plants and their controls implying that hydraulic lift was not taking place. Therefore we concluded that there is no hydraulic lift in either the *C. megacarpus* and *M. laurina*.

Introduction

Chaparral is the common vegetation found in the Santa Monica Mountains, and it consists of evergreen drought and fire-hardy shrubs and is known for its dry, hot summers and unpredictable weather patterns (Keeley 2006).

In addition, hydraulic lift is an internal process used by some chaparral plants to provide water from subsoil levels to the topsoil (Querejeta 2007). In this experiment, soil moisture near the roots was measured between two different chaparral species, *Ceanothus megacarpus* and *Malosma laurina,* in order to relate soil moisture to hydraulic lift. *C. megacarpus* is a non-sprouter with no root crown and shallow roots with narrow vessels (Lagnan 1997). On the other hand, *M. laurina* has a large root crown and re-sprouts after fire with almost 100% success. It is known to have large vessels and deep roots which may play a role in its success (Langan 1997). Therefore we predict that *M. laurina* will have higher soil moisture content than *C. Megacarpus* due to its deep roots and its obligate sprouting traits.

Study Site

Fig. 1 *Ceanothus megacarpus* (left) and *Malosma laurina* (right)

Materials and Methods

Fig. 2 A Hydrosense Soil Water Measurement System was used to measure the percent volumetric water content at predawn and dusk for six specimens of both *Ceanothus megacarpus* and *Malosma laurina.* Four readings were taken for each plant with corresponding controls.

Data

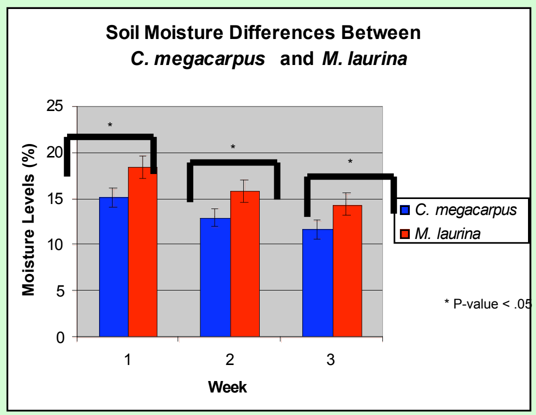

Fig. 3 There was no significant difference between *C. megacarpus* and *M. laurina* since the p-value obtained was .0721. There was a significant difference between the different weeks which had a p < .05.

Conclusions

We conclude, that in our study of relative moisture adjacent the roots of *C. megacarpus* and *M. laurina*, there was no significant difference between the moisture levels near their roots and their respective controls. Furthermore, our study shows that there is not a significant difference between pre-dawn and dusk soil moisture levels. In addition, we found that there was no significant difference in the moisture levels between the chaparral species *C. megacarpus* and *M. laurina* despite obtaining a p-value of .0721. Therefore, our hypothesis that *M. laurina* would have a greater soil moisture level around its roots than *C. megacarpus* was proven wrong. While we were collecting our data, we noticed that smaller *M. laurina* plants had higher soil moisture values than larger *M. laurina.* We believe that if we had taken measurements of smaller *M. laurina* plants we would have obtained a p-value < .05. However, we did find a significant difference between the soil moisture measurements of our plants week to week showing that the soil was becoming drier as the weeks progressed.

Literature Cited

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