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Soil Salinity and Stomatal Conductance on Chaparral Plants

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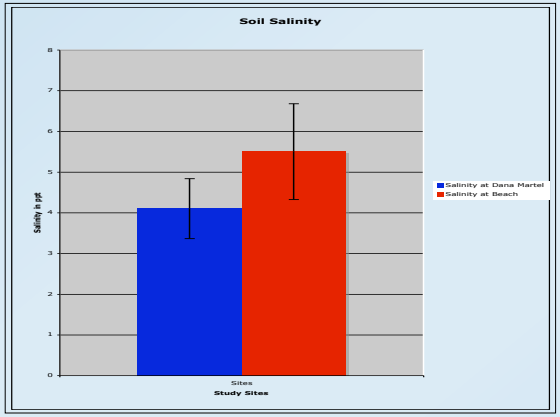
ABSTRACT

In our experiment we evaluated the soil salinity and corresponding stomatal conductance rates of *Malosma laurina* and *Rhus integrifolia* located near the coast and farther inland . Our prediction was that stomatal conductance would vary with the change in location of each species. Stomatal conductance was measured using a simple diffusion porometer and soil salinity was measured using a refractometer. We concluded that soil salinity caused a decline in stomatal conductance in both chaparral species. *M. laurina* was also found to be more sensitive to an increase in soil salinity, as its stomatal conductance rates declined more than that of *R. integrifolia*.

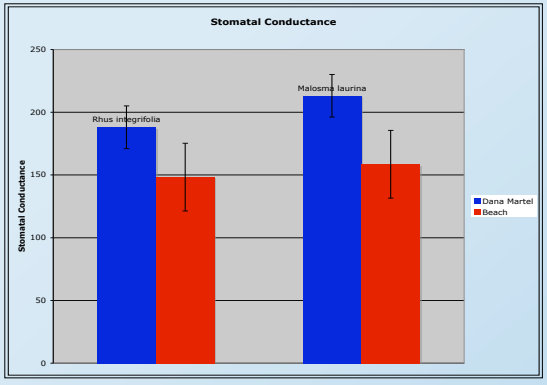
INTRODUCTION

In Southern California there are two plant species that coexist in the lower elevation areas of the Santa Monica Mountains. These two chaparral species, *Rhus integrifolia* and *Malosma laurina,* appear to share similar physiological qualities and react in similar ways to changing environmental effects (Poole 1975). Specifically, it has been shown that *R. integrifolia* and *M. laurina* have similarities in transpiration rates and reactions to physiological stresses including water stress. (Shapiro 1932). Due to the similarities between these two species our research project aimed to evaluate the relationship between salinity levels and the corresponding stomatal conductance rates. Research has shown that soil salinity negatively impacts stomatal conductance rates and high rates can severely affect a plant's ability to perform photosynthesis (Brungoli 1991). With this in mind it would be interesting to see how the change in salinity levels amongst these species would affect stomatal conductance. It is also important to note that as the environment changes from coastal to inland, water stress decreases with chaparral due to higher soil moisture content (Poole 1975). Taking into account that both species are adapted to maximize water availability, a change in water stress should yield some physiological changes with the plant and thus affect stomatal conductance.

DATA



Soil Salinity levels at the Dana Martel Trail and the Near Beach Site on Malibu Road



Stomatal Conductance in *R. integrifolia* and *M. laurina* at both sites

METHODS

Five *Malosma laurina* and five *Rhus integrifolia* were located on the Dana Martel trail and at the beach site on Malibu Road. The Dana Martel was chosen to act as the inland environment while the Malibu Road site represented the coastal environment. The stomatal conductance of three mature, green, sun leaves of each plant was taken using the Porometer. To ensure that no exceptions to the norm skewed the results, we averaged the three individual leaf values for each plant. We then averaged the values of the five plants to obtain four stomatal conductance values reflecting the two plant species on the Dana Martel and the two plant species at the beach site. To determine soil salinity, a soil sample was extracted near the base of each plant. In the lab, 5mL of soil was measured in a plastic syringe. 1.5mL of deionized water was measured in a graduated cylinder and poured into the plastic syringe. The deionized water was passed through the soil and filtered onto a hand held refractometer from which soil salinity was measured.

CONCLUSION

- Soil salinity was higher at the Malibu Road site with a mean value of 5.3 ppt while the Dana Martel had a mean value of 4.1 ppt.
- Both species of plants showed a higher stomatal conductance at the Dana Martel trail than those at the Malibu Road Site.
- *Malosma laurina* showed a higher sensitivity to soil salinity based upon the greater difference in stomatal conductivity between each site compared to that of *Rhus integrifolia*.

LITERATURE CITED

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