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Relationship between Dehydration Tolerance of California Ferns and the Mechanical Strength of their Stipes

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Hypothesis: There will be no significant difference in the mechanical strength of fern stems between water-stress resistant species and water-stress sensitive species of ferns.

Materials and Methods

In seed-bearing plants, the mechanical support for the vascular system lies in the supporting fibers that surround vessel and tracheid conduits. This research was funded by the National Science Foundation. Research Experience for Undergraduates (NSF REU Site Grant, #DBI-1062721), and the National Science Institute of Pacific (NSIOP) M/C Grant (SARU-WF #033121). We are grateful to Jarmila Pi3ermann, Adam fantastic lab partners arise in the dry, southern chaparral shrubs in a dry, southern chaparral shrubs. Finally, we assessed the possibility that some ferns might adapt to water stress by means of stomatal adjustment. This hypothesis was tested by taking the osmotic potential at the turgor loss point (%x) at different points in the season. We also compared ferns in the Santa Monica Mountains to ferns in the Santa Cruz Mountains.

Discussion

Our results are consistent with our original hypothesis that water-stress resistance in ferns does not relate to stomatal mechanics. All of the parameters we measured did not relate to stomatal mechanics. Furthermore, the data obtained from our vulnerability curves (Ψt) were consistent with measured Ψp and native embolism, giving us confidence that our data were biologically consistent. Finally, we assessed the possibility that species might adapt stomatically to cope with high water stress. This hypothesis was supported for two species that showed significant change in osmotic potential at the turgor loss point (Ψt), from June (moderate stress) to July (high stress).

Conclusions

The semiotic potential at the turgor loss point does not correlate with the minimum seasonal water potential does not correlate with MCE.

The water potential at 50% loss conductivity does not correlate with MCE.

The minimum seasonal water potential, native embolism, and midday water potential are consistent with the vulnerability curves generated using the centrifuge method.

Thus, there is no correlation between water-stress resistance and mechanical strength in ferns as was previously observed for seed-bearing plants.