

SUBSTRATE TYPE AFFECTS THE DRYING SPEED AND DESICCATION

TOLERANCE OF FERN GAMETOPHYTES. Jordyn D. Regier^{1*}, Mayra J. Hernandez², Camille K. Sicangco³, Stephen D. Davis, Ph.D.¹, and Helen I. Holmlund, Ph.D.¹, ¹Natural Science Division, Pepperdine University, Malibu, CA 90263; ²Department of Biology, California State University, Dominguez Hills, Carson, CA 90747; ³Department of Biology, University of Florida, Gainesville, FL 32611.

Although most ferns require abundant water to thrive, some ferns can survive in habitats with limited water. Previous studies have examined the adaptations that allow xeric ferns to thrive in mediterranean-type ecosystems such as southern California. However, the large fern sporophyte only represents one stage of the fern life cycle; the independent gametophyte phase must also survive water stress, including the six-month summer drought periods of the Santa Monica Mountains. Some fern gametophytes have been reported to be desiccation tolerant (capable of recovery from near-complete drying), and this trait is believed to be dependent on the plant's drying speed. In order to test whether substrate type affects fern gametophyte dry out speed and level of recovery, we dried out gametophytes on five different substrates ranging from slow to fast drying speed: filter paper, agar, non-acclimated and acclimated soil plugs, and soil plates. Dark-adapted chlorophyll fluorescence (F_v/F_m) was measured to assess how long it took the gametophytes to desiccate completely and recover following rehydration. This study found that the substrate type affected both the gametophytes' drying speed and their ability to recover. Specifically, gametophytes that were acclimated to and tested on soil plates experienced the slowest drying and the greatest recovery in F_v/F_m . The adaptations of fern gametophytes remain elusive despite their critical position in the fern life cycle. With increasing global temperatures and longer drought periods, a better understanding of gametophyte ecology will illuminate fern species' susceptibility to climate change.