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Highlighted Articles for July 2024

Unprecedented salt tolerance in a neotropical orchid species

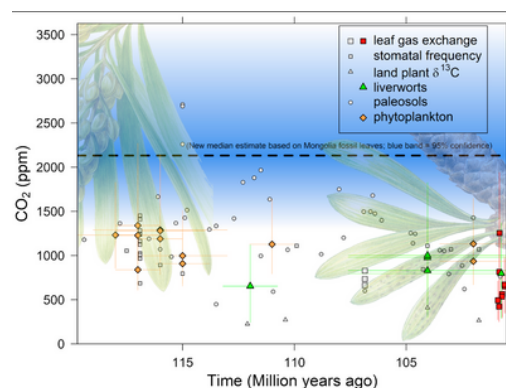


Thales M. de Lima, et al. 2024. Salt tolerance in a neotropical orchid in the absence of local adaptation to salt spray. *American Journal of Botany* <https://doi.org/10.1002/ajb2.16373>

Orchids are not usually thought of as salt-tolerant plants. In one of the few studies to investigate salt tolerance in the Orchidaceae family—and in the neotropics—de Lima et al. challenge this idea by demonstrating high salt tolerance in a long-lived neotropical orchid (*Epidendrum fulgens*). In their experiment, the authors collected plants from coastal and inland areas and exposed them regularly to salt spray for two months. Control and treated plants had similar growth and photosynthesis parameters. Moreover, the high saturated water content (a succulence index) measured for the leaves, and the lack of correlation between leaf Na concentration and chlorophyll index, point to leaf succulence as a key mechanism that may allow the plants to store high amounts of Na in their leaves without negative consequences. Finally, the results also show that there is no local adaptation to salt spray because both coastal and inland populations are tolerant to salt. **These results suggest that *E. fulgens* and its allied species could be a model group to explore the evolution of traits related to salt stress.**

Fossil leaves used to estimate higher atmospheric CO₂ during the mid-Cretaceous

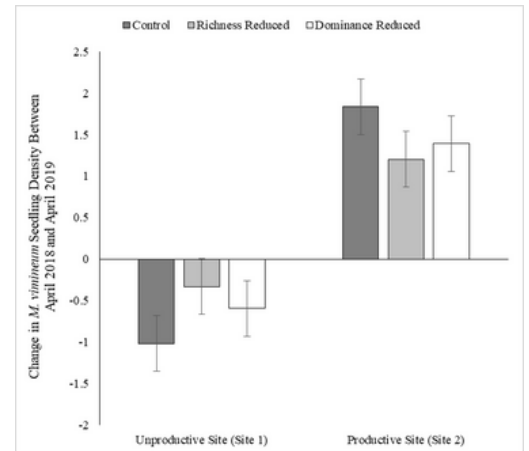
The Aptian–Albian, spanning from 121.4 to 100.5 million years ago, is widely recognized as a significant greenhouse event during which global temperatures soared an estimated 10–15°C. Given this substantial increase, researchers have questioned the reliability of CO₂ estimates from this time, which typically fall below 1400 ppm (colored symbols in figure). Zhang et al. used a well-vetted paleo-CO₂ proxy based on leaf gas-exchange principles (Franks model) to provide new estimates based on the analysis of 155 fossilized leaves of taxa related to ginkgo trees from Mongolia. The results reveal a median CO₂ concentration of 2132 ppm (represented by the dashed horizontal line in the figure). **These findings surpass nearly all previously reported CO₂ estimates for the same period (illustrated by all symbols in the figure) but align much more closely with the current understanding of climate sensitivity.**



Xiaoping Zhang et al. 2024. Estimates of late Early Cretaceous atmospheric CO₂ from Mongolia based on stomatal and isotopic analysis of *Pseudotorellia*. *American Journal of Botany* <https://doi.org/10.1002/ajb2.16376>

Levels of plant diversity in natural communities do not affect invasion by the highly competitive grass, *Microstegium vimineum*

Previous studies have shown that manipulated communities with high species diversity are resistant to invasion, but does this hold true for highly competitive invaders in natural communities? Few studies have measured both invasion resistance and invader impact in the same study. Williams and Brewer used a two-year field experiment at two sites to test both resistance to invasion of a competitive, invasive grass, *Microstegium vimineum*, and the influence of *M. vimineum* on resident plant diversity. The authors examined the responses of *M. vimineum* to two native plant density-reduction treatments that either increased species diversity or reduced the density of dominant resident species—and neither treatment significantly increased *M. vimineum* density. *M. vimineum* invasion was undeterred by resident plant diversity at both sites. Management that prevents species losses is desirable for a variety of reasons but reducing invasion by *M. vimineum* does not appear to be one of them.



Griffin Lee Williams and J. Stephen Brewer. 2024. Naturally diverse plant communities do not resist invasion by the strong competitor, *Microstegium vimineum*. *American Journal of Botany* <https://doi.org/10.1002/ajb2.16362>

Mycorrhizal fungi have diverse and varied effects on plant growth



Katherine N. Stahlhut et al. 2024. Measuring leaf and root functional traits uncovers multidimensionality of plant responses to arbuscular mycorrhizal fungi. *American Journal of Botany* <https://doi.org/10.1002/ajb2.16369>

Mycorrhizal fungi are important for the growth of many plant species, but the impact of this mutualism varies across the plant kingdom. Scientists typically assess this responsiveness by measuring the change in aboveground biomass, but this only captures a fraction of the potential benefits mycorrhizal fungi can provide that improve plant fitness. Stahlhut et al. used 26 plant species from the Midwestern prairie ecosystem with and without mycorrhizal fungi to fully capture variation in whole-plant trait responses. While change in aboveground biomass did account for a large proportion of this variation, the changes in traits associated with root structure were also important, and their results suggest changes in root system foraging strategies were not always associated with aboveground biomass growth. The authors also found that aboveground growth responses were variable over time, with some responding with faster growth, while others had longer, sustained growth. The results of this study highlight that mycorrhizal symbioses provide more than just growth benefits but are also a key component of plant growth strategies involving multiple adaptive responses.