PLANT ADAPTATIONS TO RAINFALL SEASONALITY IN THE SAVANNAS OF CENTRAL BRAZIL

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Summary

The savannas (locally known as cerrado) of Central Brazil are subject to regular and predictable annual drought from May to September, which is a major determinant of ecosystem structure and function. Cerrado vegetation has a remarkably complex community structure rich in endemic woody species, which differ markedly in photosynthetic capacity, leaf structure and size and display a wide range of root habits, from shallow- to deep-rooted. Moreover, several species have extended lateral roots at depths of 20 to 50 cm in addition to the deep vertical system. This results in a complex pattern of soil water exploitation that may shift to lower depths during the dry season. Despite high levels of irradiance and air temperature and low levels of relative humidity which impose a consistently high evaporative demand during the prolonged dry season, cerrado trees are able to maintain water balance by strong stomatal control of transpiration coupled with a decrease in total leaf surface area per tree during the dry season. Regulation of xylem tension by stomatal control of water loss and leaf area adjustments may also limit cavitation and embolism formation within the xylem conduits and their blockage to water transport. In addition, cerrado plants apparently possess mechanisms to diurnal embolism repair, which enables them to maintain efficient long-distance movement of water to the transpiring leaves. On the other hand, stomatal limitation of transpiration results in a prolonged midday depression of

photosynthetic rates in sunny days, and in strong limitation on the supply of CO_2 to the chloroplasts. Cerrado trees possess several compensatory mechanisms to alleviate the danger of photoinhibition under these conditions. Woody species also exhibit large variations in terms of the timing of leaf production and loss, and in leaf life-span, which results in different strategies of resource use, leaf- and whole-plant-level traits. However, there is good evidence that selective pressures impose strong constraints on functional trait variability, despite the high diversity of trees in cerrado ecosystems.

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Biographical Sketch

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