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Long term leaf phenology and leaf exchange strategies of a cerrado savanna community

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Leaf development and senescence cycles are linked to a range of ecosystem processes, affecting seasonal patterns of atmosphere-ecosystem carbon and energy exchanges, resource availability and nutrient cycling. The degree of deciduousness of tropical trees and communities depend on ecosystems characteristics such as amount of biomass, species diversity and the strength and length of the dry season. Besides defining the growing season, deciduousness can also be an indicator of species response to climate changes in the tropics, mainly because severity of dry season can intensify leaf loss. Based on seven-years of phenological observations (2005 to 2011) we describe the long-term patterns of leafing phenology of a Brazilian cerrado savanna, aiming to (i) identify leaf exchange strategies of species, quantifying the degree of deciduousness, and verify whether these strategies vary among years depending on the length and strength of the dry seasons; (ii) define the growing seasons along the years and the main drivers of leaf flushing in the cerrado. We analyzed leafing patterns of 107 species and classified 69 species as deciduous (11 species), semi-deciduous (29) and evergreen (29). Leaf exchange was markedly seasonal, as expected for seasonal tropical savannas. Leaf fall predominated in the dry season, peaking in July, and leaf flushing in the transition between dry to wet seasons, peaking in September. Leafing patterns were similar among years with the growing season starting at the end of dry season, in September, for most species. However, leaf exchange strategies varied among years for most species (65%), except for evergreen strategy, mainly constant over years. Leafing patterns of cerrado species were strongly constrained by rainfall. The length of the dry season and rainfall intensity were likely affecting the individuals' leaf exchange strategies and suggesting a differential resilience of species to changes of rainfall regime, predicted on future global change scenarios.