

What can we learn from long-term fire experiments? Fire behavior, fire effects on vegetation and flammability of the Cerrado

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ABSTRACT – Fire is an important ecological and evolutionary factor influencing the Cerrado vegetation for millions of years. However, the use of fire as a management tool is still very controversial in nature reserves in Brazil. Thus, long-term fire experiments can bring important information about fire behavior and effects on vegetation, helping local managers to make decisions about fire management in nature reserves. We aim to sum up the results of a 7-year ongoing fire (2013-present) experiment established in Central Brazil in campo sujo (open savannas). We had treatments related to fire frequency (annual/biennial fires) and season (early-, mid-, late-dry). We measured fire parameters (flame height, fire temperatures, fire intensity). Moreover, we evaluated flammability traits from the main group of species in the area. Finally, we evaluated changes in the plant community in response to the treatments. In general, fires are fast, of low intensity, temperatures and residence time of fire. The drier the vegetation, the more intense the fire is, due to the high amount of dead biomass and water content of the fuel load. This fuel load is mostly composed by highly flammable grasses, that become more flammable at the end of the dry season. Forbs and shrubs are not flammable and thus, the main component of the fuel load is the graminoid layer. Annual fires led to a decrease in graminoids cover, which in turn, influenced fire propagation and intensity, leading to less intense and irregular fires. On the other hand, burning plots biennially did not affect negatively any of the plant community components and, after two years, there was already enough fuel load for the next fire. The major effect of fire season was on plant phenology, since time of fire changed time of flowering in our plots. However, the main result is that fire enhanced flowering in all treatments, being important for pollination, seed production and dispersal. The use of fire experiments as a tool should be implemented to help local managers to take decisions about fire management in Cerrado nature reserves and they could be designed according to the needs of the local managers.

Keywords: Fire intensity; flammability index; open savannas; vegetation regeneration

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