Early-dry season prescribed burns used for fire management maintain woody vegetation structure in Cerrado open savannas

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ABSTRACT – Cerrado vegetation has evolved with fire for millions of years. This disturbance is one of the main factors determining vegetation structure in the biome, as it favors open physiognomies such as savannas and grasslands. Indiscriminate use of fire by humans in the past century led to the establishment of a no-fire policy by Brazilian authorities, which, in turn, prompted grassy fuel loading along vast areas of Cerrado. As an outcome, large wildfires became more common in the late-dry season. Fire management has been implemented in some Protected Areas (PA) in 2014 to tackle this issue. It comprises a series of practices, including prescribed burns in transitional months between the wet and dry seasons. As the effects of such fires on plant communities are poorly known, this study aimed to investigate how they affect woody vegetation structure in open savannas. It took place in two PA and a maroon community area in northern Cerrado where fire management was implemented. The study design was outlined along with PA managers to reflect their needs. We established a control (no fire) and two biennial fire treatments: management (early-dry season) fires (MF) and late-dry season fires (LF). We assigned 14 plots for each treatment and calculated basal area ($m^2.ha^{-1}$), stem density and percentage of different resprout types amongst the plants for each plot annually from 2015 to 2018. After two consecutive MF, basal area and stem density remained stable, but both of them declined following LF. MF yielded less resprouting with and without topkill than LF, even though mortality rates were similar between treatments. This may explain why vegetation structure remained stable after MF but opened up following LF. Fire exclusion led to woody encroachment: after four years, control plots had basal area and stem density 1.9 and 2.3 times greater than MF plots, respectively. MF were less severe than LF and tended to maintain a stable vegetation structure, as opposed to LF. Thus, early-dry season prescribed burns like those currently done in the study areas seem to be preferable for maintaining woody vegetation stability than leaving areas of Cerrado vulnerable to late-dry season wildfires.

Keywords: Fire season; resprouting; Jalapão; fire regime; protected areas

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