HUMANS IN THE SAVANNAH AGE OF FIRE: HOW CAN FIRE MANAGEMENT ALTER POLLINATION ECOSYSTEM SERVICES?

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Fire occurrence is related to the expansion of human occupation, but several environments evolved with fire before the presence of humans.

The Brazilian savannah has an evolutionary history strongly associated with fire, which works as an ecological filter of species diversity, depending on its frequency and intensity. Natural fires in Brazilian savannahs are caused by lightning, but anthropogenic fires are much more common. Frequent or intense fires can cause deaths of organisms and drive the vegetation to higher homogenization by selecting fire-resistant species.

Anthropogenic fires can be accidental, criminal, or managed according to human needs. An interesting example of fire management can be observed in the highlands of the Brazilian state of Minas Gerais, at Espinhaço mountain ridge. In the rocky grasslands several endemic species of mainly Eriocaulaceae and Xyridaceae families provide dry flowers (named everlasting flowers, or *sempre-vivas*) that are collected by locals and sent for handcrafting. These resources are very important to local communities as they are a unique, natural resource that can be commercialized during some dry season periods in the region.

Traditional human communities manage fire to stimulate the s*empre-vivas* flowering. It is part of a traditional agricultural system, however, several testimonials from local people and some scientific publications point to *sempre-vivas* species decline. Besides overharvesting, inadequate burning regime (e.g. frequency and season) is another possible cause for the population's decline. If fire induces plant flowering and pollinators adapt as a function of floral resources and the way resources are offered, fire management by traditional human communities could promote changes for all plant species and their pollinators, and not only in the s*empre-vivas* species. So, in the massive flowering bursts induced by fire, where should we expect the pollinators to focus? What about animals' availability to pollinate this massive post-fire flowering?

A diverse set of burning regimes could alter the landscape forming it into a mosaic of environments with different burn frequencies, intensities, or periods. In this scenario, fire can differentially drive the plant reproduction of entire plant communities due to variation of flowering and pollinators abundance after fire. Recently, we evaluated how plants and pollinators interact in areas with different frequencies of fire events, expecting that more time without fire would enhance the diversity of species and their interactions. We found a positive relationship between flower abundance and time without fire, showing that more time without fire disturbance allowed plant communities to enhance floral resources. We also observed a negative effect of time without fire on floral visitors' specialization, showing that higher fire frequencies allowed pollinators to interact with more diverse plants.

Considering the possible effects of fire on plant resources available to pollinators under traditional fire management we are interested in verifying how fire events during different seasons may change the diversity of plant and pollinators interactions. It is possible to expect that, in addition to some species changing their flowering time, there are changes in the quantity of floral resources available to pollinators. We expect that the more abundant the resources, the higher pollinator diversity will be. However, we do not know if this will change when fire events occur during the dry and wet seasons.

FURTHER READING

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