



# Cattle decrease plant species diversity in protected humid temperate savanna

William B. Batista\*, Lucía S. Mochi & Fernando Biganzoli

## Abstract

**Question:** Is domestic cattle an appropriate surrogate for fire in a protected humid temperate savanna? **Study area:** *El Palmar Grande de Colón* (31°52' S, 58°17' W), Argentina. **Methods:** We surveyed dense *Butia yatay* palm savannas in two neighboring protected areas, El Palmar National Park (EPNP), under cattle exclusion since 1970 with sporadic burning; and La Aurora Wildlife Refuge (LAWR), under moderate cattle density, and not burnt since 1997. In each area, we randomly selected ten dense savanna stands, established 500 m<sup>2</sup> plots and undertook floristic survey in spring and summer to produce exhaustive plant-species lists. We statistically compared the two samples in terms of: local and global diversities; compositional heterogeneity among stands; mean similarity to a historical record from the area; overall species composition; and abundance and numbers of species with different growth habits and origins. **Results:** Differences between our samples are clear-cut. Savannas at EPNP have significantly increased local and global species richness and exhibit decreased similarities with the historical record. They have a novel understory, with significantly increased abundances and species numbers of fire-resistant grassland shrubs and fire-sensitive trees, and a groundcover with significantly increased richness of subshrub and perennial graminoid species. Savannas at LAWR have virtually no woody understory, and exhibit a groundcover dominated by an impoverished suite of perennial grasses, with significantly increased abundances and numbers of annual and of exotic species. **Conclusions:** Our results suggest that large-scale, long-term cattle exclusion and sporadic fires have resulted in changes in the structure and composition of the savanna vegetation leading to increased plant species diversity. Apparently, conservation of these humid savannas in protected areas requires periodic fire, while domestic cattle are a poor alternative for maintaining their plant species diversity.

**Keywords:** Campos region; cattle; fire; grazing; National Park; humid savanna; protected area; species diversity.

**Abbreviations:** EPNP = El Palmar National Park; LAWR = La Aurora Wildlife Refuge

**Taxonomic reference:** Anton & Zuloaga (2012)

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## Introduction

In humid areas, persistence of grassland and savanna physiognomies depends on the suppression of trees by fire or by large herbivores (Bond & Keeley 2005; Sankaran et al. 2008). This is the case in the *Campos*, the humid, subtropical to temperate region extending over southern Brazil, Uruguay, and north-eastern Argentina (Fig. 1) (Soriano et al. 1991; Royo Pallarés et al. 2005; Overbeck

et al. 2007). In this region, natural grasslands and savannas remain from the Pleistocene, as trees have been controlled by fire for most of the Holocene and in addition by exotic cattle since the 17<sup>th</sup> century (Pillar & Quadros 1997; Behling et al. 2005, 2007; Overbeck et al. 2007). Nowadays, grasslands and savannas adjacent to mountain-slope and valley-bottom forests undergo woody encroachment if fires are suppressed and cattle are excluded (Oliveira & Pillar 2004; Overbeck et al. 2007; Rolhauser

\*Corresponding author's address: Departamento de Métodos Cuantitativos y Sistemas de Información, Facultad de Agronomía, Universidad de Buenos Aires. Av. San Martín 4453, 1417 Buenos Aires, Argentina; batista@agro.uba.ar. Complete addresses of all authors can be found at the bottom of the paper.