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The Small Palm (*Allagoptera campestris*) in Misiones, Argentina

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ABSTRACT

In this study the population structure of *Allagoptera campestris* in Teyú Cuaré, Misiones, Argentina, is described. This population was affected by fire the previous year and by the development of a *Pinus* plantation. For this study three sites were considered: a forested area and a grassland, both affected by fire, and another grassland with no evidence of fire. Ten plots of 100 m at each site were monitored, registering the height and the presence of reproductive organs for each palm. The highest density was found in the pine plantation site, and some hypotheses to explain this are provided. Average height and number of palms with infructescenses were significantly higher in the site unaffected by fire. Recurrent fire may be altering population structure, reproductive success and long-term conservation of this species. The reduction in the distribution area of *A. campestris* caused by livestock grazing and forestry, even within the protected area, may be threatening the survival of this species.

Allagoptera campestris is a small palm (0.3–1 m) apparently stemless, but with a creeping and rhizomatous stem to 20 cm below the soil surface (Fig. 1). The species is well described by Moraes (1996).

In Argentina *A. campestris* is found in open areas called "campos" (fields) in the south of Misiones province (Moraes 1996). In the 1960's Martinez Crovetto (1963) cited five palm populations in this province, and asserted that they were already being altered by fires at that time. At present they have been affected by livestock grazing, agricultural activities, and forestry. Only one of the populations is protected in the Teyú Cuaré Natural Monument, where we conducted this study.

Fire is one of the main factors affecting seasonal savanna and grassland landscapes such as campos in Misiones. Studies conducted at the Brazilian cerrado show the influence of fire in the survival of plants, their aerial parts, germination, mortality, and vegetative and sexual reproduction (Almeida 1996). However, the effect of fire as a modeling factor depends on the frequency and intensity of occurrence (Klink and Solbridge 1996). In palm construction the absence of secondary thickening from a peripheral vascular cambium promotes fire-resistance and accounts for their frequent abundance in fire-climaxes. However, the association between palms and fire has never been fully scrutinized (Tomlinson 1990). Barbosa Rodríguez (1899) suggests that fire is one of the factors determining the variability in the length of the reproductive organs of *Allagoptera*.

The object of this research is to describe the structure of a population of *A. campestris* partially affected by fire that occurred a year before the study and where there is an area with a *Pinus* plantation.

Study Area

This population of *Allagoptera campestris* is within the Teyú Cuaré Natural Monument, an area of 78 ha. The Natural Monument is located in the Departamento de San Ignacio, Misiones, Argentina, on the Paraná River. The palm population covers 80 ha. This population is included in the campos district, Paranaense phytogeographic province (Cabrera and Willink 1980).

The climate is subtropical with thermic but not rainfall seasonality. Mean annual temperature is 20 C, with probable freezing over two months. Mean annual precipitation is 1782 mm (Cabrera 1976). According to Martínez Crovetto (1963) vegetation communities of the campos district are of primarily the result of edaphic factors and they must be linked with the existence of a layer of rock, 1.5 and 3 m below soil level which acts as a barrier between the upper horizon and the phreatic layers.

The soil is acid. The analysis of two samples from depths of 0–10 cm, collected during the study, showed an acid pH (4.6–4.9), with low or-

1. *Allagoptera campestris* in Teyú Cuaré "campo".

ganic matter content (2.3–1.06%), and nitrogen (0.1–0.056%). Available phosphorus was low (8–6.4 ppm) and available potasium was deficient (0.19–0.1 K. me/100 gr) (Bustos et al. unpubl. data).

Historically these "campos" have been largely used, first by Amerindians (Guaraníes), then by the Jesuits who took advantage of these areas without forests to build their missions. Nowadays they are used for livestock grazing, agriculture, and forestry as well as for human settlements. People of the region indicated that every year, in August and September, they burn the grasslands to improve the quality of pasture for livestock. This is a traditional activity deeply rooted in the practices of the people of the region; unfortunately the effect on the ecosystems and the actual effect of fire on pastures have not yet been studied.

Methods

The study was conducted in February 1996. Three different sites were chosen based on the human activities developed in them—a *Pinus* plantation and a grassland both affected by a fire in August 1995 and another grassland with no evidence of fire. In each site we sampled 10 plots of 100 square m each, placed in two transects randomly located, that made a total of 0.1 ha per habitat. The height of all palms to the distal portion of the longest leaf were measured and the presence of reproductive organs were also registered (Figs. 2 and 3).

2. Measuring the height of *A. campestris*.

To assess the statistical significance of differences in height and density the Kruskal-Wallis test was applied.

Two specimens were collected and identified by M. Moraes of the Herbario Nacional de Bolivia.

Results

The highest density of palms was observed at the forested site, although there were no significant differences with the density in the other two habitats. Mean height and the number of palms showing infructescences were higher in the grassland not affected by fire (Table 1).

Significant differences were found in the height of palms between the habitats affected and not affected by fire (P0.005, Kw: 10.5.).

3. Infrutescence of *A. campestris*

Discussion

Palms in the burned sites (grassland and plantation), though resprouted, still showed burned woody bracts and leaves. This might be an explanation for their lower height and lack of infructescences. Though *A. campestris* tolerates fires, recurrent fires may be altering the structure of this population and its long-term reproductive success as their seeds are destroyed every year.

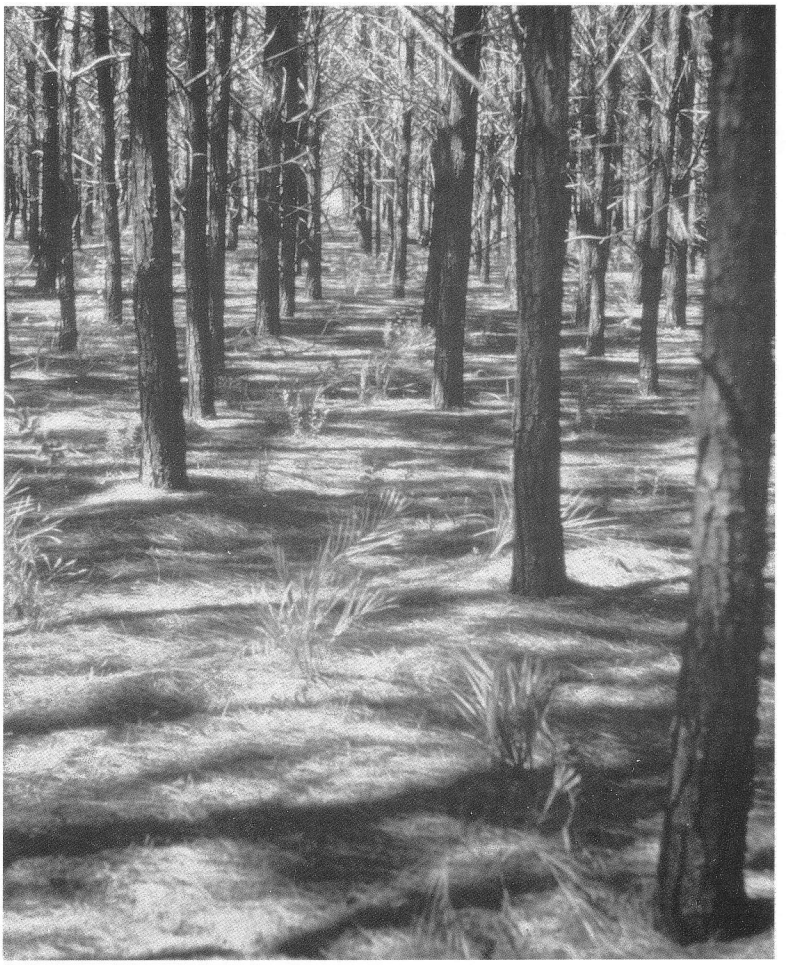
A. campestris shows the highest density in the Pine plantation site. This might be the result of the breaking up of the soil before the planting of the pines; this activity may have fragmented the palm rhizomes, each segment then resprouting. On the other hand the Pines increase litter cover at ground level with pine needles, the canopy reduces light intensity, and together with pine root biomass may all inhibit grassland species and favor either directly or indirectly the presence of *A. campestris*. Further studies on these subjects will undoubtedly contribute to our knowledge of the ecology of this beautiful palm and help develop strategies for its conservation.

The presence of *A. campestris* populations south in the Paranaense Forest isolated from the cerrado populations to the north, may indicate a wider distribution of the cerrado in the past when possibly drier and seasonal climatic conditions may have been predominant.

In Argentina *A. campestris* is not effectively conserved by the system of protected areas. The majority of the "campos" have been transformed. For example, in January 1997 we visited the "campo" in Loreto in the South of Misiones province, of special interest as there, besides *A. campestris*, also *Butia yatay* var. *paraguariensis*

Table 1. Density of palms. Numbers of individuals with infructescences and mean height of the palms in the three studied sites.

Habitat	Density (ind./0.1 ha)	Infructscences (ind/0.1ha)	Mean height (cm)
Burnt grassland	185	2	59
Unburnt grassland	190	36	69
Forested-burnt site	310	1	55



4. Burnt forestation with *A. campestris* as a dominant element of the understory.

is found. Those palm populations are also being replaced by a *Pinus* plantation.

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