IMPACT OF NATURAL GRASSLAND SUBSTITUTION BY FORESTRY ON VEGETATION AND SOIL MACROFAUNA IN TACUAREMBÓ RIVER BASIN

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Soil ecosystem services are emergent properties resulting from the wide range of processes operating at much smaller scales, in which soil biota are involved. Soil macrofauna, invertebrates larger than 2 mm, play a key role in the preservation of soil structure and fertility as a consequence of their physical and metabolic activities. Besides, soil macrofauna have an essential role to promote soil microorganisms activities and thus in improving soil health and reducing the incidence of pests and soil-borne pathogens. Community composition depends on climatic, edaphic, topographic, vegetation conditions and land use. The aim of this study was to evaluate the changes on soil macrofauna communities as a consequence of substitution of natural vegetation by pinetrees.

MATERIALS AND METHODS

During fall 2008, sampling were made in two small adjacent watersheds at Tacuarembó river basin: one natural catlle-grazed pasture, (M1), and a non-grazed natural vegetation that had been as replaced by Pinus taeda in 50% of the area (M2). Samples from each watershed were taken from three topographic positions, high and mid-slope, and low zone. Natural vegetation was mantained at the M2 low zone (LWF).

Sampling method

We used the standard Tropical Soil Biology and Fertility (TSBF) method that consists of hand-sorting earthworms from soil monoliths 25 x 25 cm and 30 cm depth. In each site 10 samples were taken every 5 m on two parallel transects of four points separated by 20 m. Vegetation of each sample unit were taken to identified de plant species present.

The macroinvetebrates were classifying into the large taxonomic units:

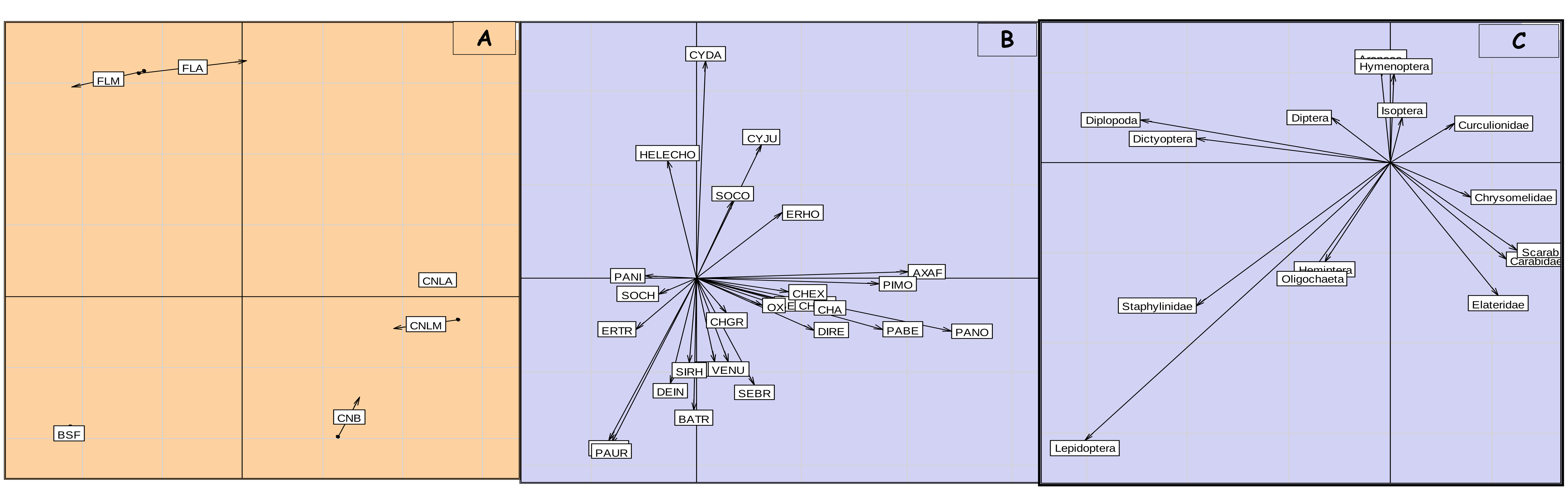
- Aranchnida
- Carabidae
- Chilopoda
- Chrysomelidae
- Curculionidae
- Diplopoda
- Diptera
- Dictyoptera
- Elateridae
- Hemiptera
- Lepidoptera
- Oligochaeta
- Ortopthera
- Scarabaeidae
- Staphylinidae

Andropogon	*lateralis*	ANLA	*Oxalis*	*sp*	OX
Erianthus	*trinii*	ERTR	*Pterophylium*	*sp*	HELECHO
Cynodon	*dactylon*	CYDA	*Solanum*	*commersonii*	SOCO
Paspalum	*nicorae*	PANI	*Eryngium*	*horridum*	ERHO
Paspalum	*pumilum*	PAPU	*Solidago*	*chilensis*	SOCH
Paspalum	*urvillei*	PAUR	*Dichondra*	*repens*	DIRE
Paspalum	*notatum*	PANO	*Chevreulia*	*sarmentosa*	CHSA
Cyperus	*Juncus*	CYJU	*Plantago*	*myosurus*	PLMY
Axonopus	*affinis*	AXAF	*Chaptalia*	*exscapa*	CHEX
Piptochaetium	*montevidensis*	PIMO	*Chevreulia*	*sarmentosa*	CHA
Bromus	*auleticus*	BRAU	*Desmodium*	*incanum*	DEIN
Setaria	*geniculata*	SEGE	*Vernonia*	*nudiflora*	VENU
Panicum	*bergii*	PABE	*Baccharis*	*trimera*	BATR
Chloris	*grandiflora*	CHGR	*Senecio*	*brasiliensis*	SEBR
			Sida	*rhombifolia*	SIRH

Data analysis

A principal components analysis (PCA) was performed on vegetation and soil macrofauna data sets. In order to explore the relationships between the soil macrofauna and the habitat, defined by the plant assemblages, we used CO-inertia Analysis (COA). COA is a symmetric ordination technique well adjusted to analyze data sets with many explaining variables and a relatively low number of sites (Dolédec and Chessel, 1994).

RESULTS



Results of the co-inertia analysys performed. (a) Ordination plot (2 first axes); (b) position of vegetation in the A1xA2 co-inertia plane, (c) position of soil macrofauna on the A1xA2 co-inertia plane. FLM-Forest medium slope, FLA-Forest high slope; CNLA- natural catlle-grazed pasture high slope; CNLM- natural catlle-grazed pasture medium slope; CNB- natural catlle-grazed pasture low slope; BSF- Natural vegetation M2 low zone

There was a strong association between vegetation communities and soil macrofauna communities. The co-inertia test was highly significant ($p < 0.029$), this indicate that the structure described separately for soil macrofauna and plat species data are relatively well captures by the first co-inertia plane, indicating that the structure of co-variation between soil macrofauna and plant species succeeds in explaining the main pattern of soil macrofauna assemblages. The main two axes of COA explain 66% and 23% of the common structure shared by the soil macrofauna and the plant species. The highest and lowest values of density and richness by sampling unit were registered in LWF and M2 (high and mid-slope), respectively. Curculionidae and Chrysomelidae were the main taxa associated with M1 both in high and mid-slope. Elateridade, Scarabaeidae and Carabidae were the taxa found in low zone. Diplopoda and Dictyoptera were more abundant in high and mid-slope on M2 than M1, whereas Staphylinidae, Lepidoptera and Oligochaeta density were highest in LWF. M1 and M2 (high and mid-slope) shared 16% of the species. These results indicate that the replacement of natural vegetation by *Pinus taeda* cause important changes both on quantity and quality of soil macrofauna communities.

BIBLIOGRAFÍA
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