world congress on integrated crop-livestock-forest systems
3rd International Symposium on Integrated Crop-Livestock Systems
towards sustainable intensification • brasilia • brazil • 2015

SOIL MACROFAUNA IN LAND USE SYSTEMS IN PONTA GROSSA-PARANA STATE, BRAZIL

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Introduction

The soil macrofauna is represented by invertebrates between 2 to 20 mm body width that live permanently in soil or on its surface. Chemical and physical soil properties, management and seasonality can alter the soil macrofauna community. Thus the aim of this study was to assess macrofauna diversity and abundance under different land use systems in order to identify changes in the soil invertebrate community due land management and soil properties.

Material and Methods

Five land use systems were chosen: crop-livestock integration (CLI), crop-livestock-forestry integration (CLFI), grazed native pasture (NP), no tillage (NT) and *Eucalyptus dunnii* plantation (EU) in Ponta Grossa-PR, Brazil. For each system we selected three 50 x 100 m plots and five soil monoliths (25 x 25 cm in 0-10 and 10-20 cm deep) were taken along a central transect in spring (2012). From each layer of the monolith soil samples were removed for chemical and physical analyses. The monoliths were handsorted and the invertebrates were preserved in alcohol 70% and identified in order level. Diversity (order richness, Simpson index and dominance) and abundance were calculated. Duncan tests (5% of significance) and multivariate analysis were performed to assess macrofauna relationships with land use, chemical and physical soil properties.

Results and Conclusions

Table 1. Macrofauna abundance (individuals m^{-2}) and diversity in the 0-20 cm layer in CLI, CLFI, NP EU and NT in Ponta Grossa, Paraná, Brazil, in spring 2012.

Ecological Characteristics	CLI	CLFI	NP	EU	NT
Macrofauna Abundance	566b*	490b	3558a	287b	115c
Order Richness	13	13	13	8	6
Mean Richness (System)	9,00a	8,33a	9,67a	6,00b	4,33c
Dominance (System)	0,30a	0,49a	0,52a	0,40a	0,45a
Simpson (System)	0,70a	0,51a	0,48a	0,60a	0,55a

*Means followed by different letters in line differ by the Duncan's test ($p<0,05$).

Higher macrofauna abundance was found in NP (3558 individuals m^{-2}), and lower abundance in NT (115 individuals m^{-2}) (Table 1). The lower abundance in NT can be attributed to soil compaction in this system, which causes reduction in pore space and habitat losses for soil macrofauna. Simpson diversity tended to be lower in grazed native pasture, where Isoptera was dominant (Table 1). In degraded systems, the low soil fertility added to the low quantity and quality of litter, the high C / N ratio of plants and the low plant diversity favors some groups, such as Isoptera, which can become pests in degraded pastures. Order richness was higher in grazed systems than the other systems probably due the cattle feces because these represent inputs of organic matter to the soil, which stimulate the soil macrofauna diversity (Table 1). Soil properties, as, P, K, pH, Mg, C, C/N ratio, moist, sand and silt and land use systems influenced soil macrofauna abundance and diversity.