

Below-Ground BioDiversity in Tropical Landscapes: Mexican case study

Simoneta Negrete, Isabelle Barois, José A. García, Martín de los Santos, Javier Álvarez-Sánchez, Gonzalo Castillo, Silke Cram, Carlos Frago, Francisco Franco, Tajín Fuentes, Esperanza Martínez, Miguel A. Morón, Pilar Rodríguez, Patricia Rojas, Vinicio Sosa, Dora Trejo, y Lucía Varela.
 INECOL, UNAM, COLPOS, UV, RED, HONGOS Y DERIVADOS.



1. Introduction

Part of the international project. Participant countries: Kenya, Uganda, Ivory Coast, Brazil, Mexico, India and Indonesia.
 Belowground organisms perform essential roles for fertility maintenance but little is known about how land use intensification in tropical regions is affecting the diversity of these organisms and the functions that they perform.
 This project utilizes a unified methodology and gathers experts in different taxonomic groups (**Macrofauna**: Earthworms, Ants, Termites and Coleoptera; **Mesofauna**: Nematodes, Collembola and Acari; **Microrganisms**: Nitrogen Fixing Bacteria, Mycorrhizal and Phytopathogenic Fungi) to gain a global understanding of the relationship between land use intensification and Below Ground Biodiversity (BGDB).

2. Objective

To determine what is the effect of land use intensification on BGDB and fertility indicators.

3. Methods

Land Landscape
 3 Sites



4 Land Uses



Replicates	LM	SF	VC
Forest	9	6	5
Agroforestry	4	4	5
Milpa	7	6	6
Pasture	8	7	8

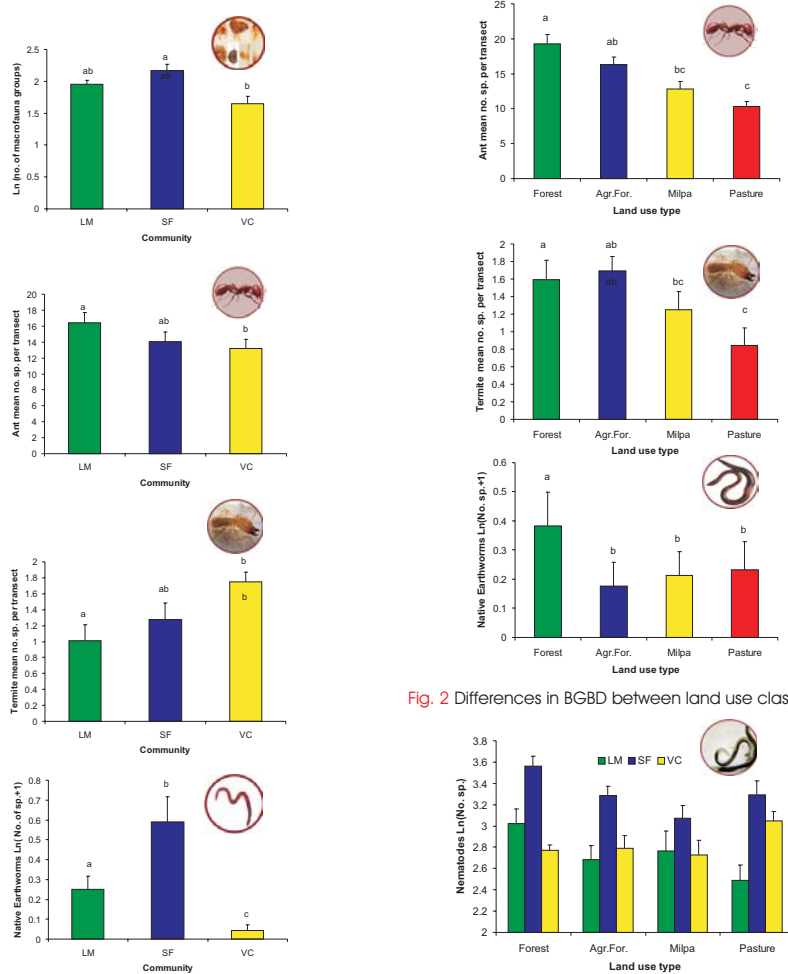
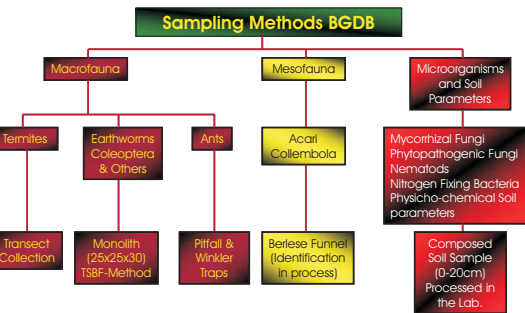


Fig. 1 Differences in BGDB at the landscape scale.

Fig. 2 Differences in BGDB between land use classes.

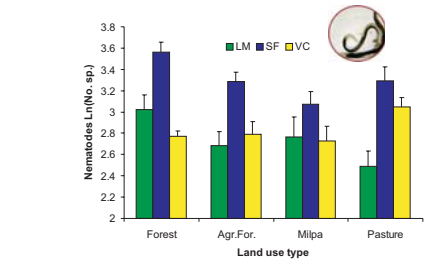


Fig. 3 Interaction between the landscape and land use.

4. Results

Total Number of species from the groups found in the whole sampling

Taxonomic Group	No. Species
Native Earthworms	6
Invasive Earthworms	7
Ants	138
Termites	10
Coleoptera	164
Nematodes	170
Nitrogen Fixing Bacteria	26
Mycorrhizal Fungi	64
Phytopathogenic Fungi	20

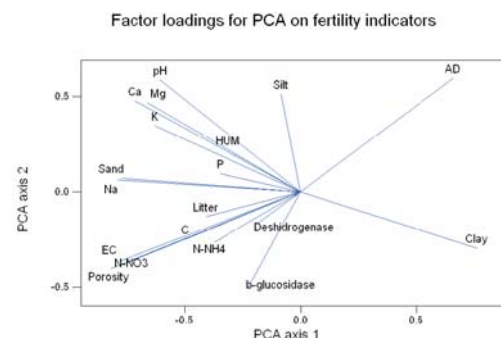


Fig. 4 Fertility variables that explain differences at the landscape scale and between land use intensity. PCA axis 1 and 2 explain 48% of total variance.

5. Discussion/Conclusions

- The strongest differences in species richness and diversity occur at the landscape scale (between sites).
- The land use intensity classes chosen reflect a land use intensity gradient that is associated with a decrease in sp. richness for ants, termites and native earthworms, but with different degrees of sensitivity.
- Differences between communities can be explained in terms of a fertility gradient LM>SF>VC. This gradient is mainly associated with soil structure (porosity, conductivity, sand/clay) and nutrient availability.
- Land use intensity can be defined in terms of a fertility gradient associated with soil structure (apparent density-porosity), nitrogen availability (N-NO₃) and microbial activity (α-glucosidase).
- Land use intensity and fertility define a gradient (Forest> agroforestry= pasture > milpa).
- Decrease in terms of species richness in BGDB taxa do not always follow the exact fertility gradient. There must be other landscape and land use variables at play (distance to the forest, land use history, differences within land use classes) that influence BGDB.

6. Acknowledgements

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