



4th World Congress on Agroforestry

20-22 May 2019
Montpellier, France

Book of Abstracts



Tree and litter composition influences soil macrofauna in multi-strata agroforestry systems of Talamanca, Costa Rica

Rousseau G.¹ (luigisour@yahoo.com.br), Celentano D.¹, Deheuvels O.², Somarriba E.³

¹Agroecology, Maranhão State University, São Luis, Maranhão, Brazil; ²CIRAD, Lima, Peru; ³CATIE, Turrialba, Costa Rica

Humanity is facing a rapid decline in global biodiversity, caused mainly by tropical forest deforestation for industrial and smallholder agriculture. However, smallholder agriculture landscapes host areas of home gardens and other agroforestry systems (AFS) that have proven highly relevant for soil and biodiversity conservation. The positive interactions between above-ground and below-ground biodiversity is probably a key element to understand and promote the efficiency of these agro-ecosystems. To determine whether a relation exists between tree and soil macrofauna diversity and composition, we compared cacao AFS with contrasted tree diversity along a topography and forest cover gradient in Talamanca, Costa Rica. To determine which components of the tree cover composition (species), structure (density, richness, Shannon, Pielou) and agroforest floor (litter more ground cover) best explain the composition (orders and families) and structure (density, richness, Shannon, Pielou) of the macrofauna community we performed two separate redundancy analyses (composition and structure) and constructed the “best models” based on the tree composition, tree structure and agroforest floor as explanatory matrices. Macrofauna composition was best explained by a mix of tree species and litter composition variables ($R^2=26.5\%$) and macrofauna and vegetation share a low but significant co-variation with topography ($R^2=12\%$). Conversely, macrofauna structure is best explained by a selection of seven tree species ($R^2=41.2\%$). The shared variation with topography remained low ($R^2=10.9\%$). Tree evenness (Pielou index) only explained 7% of macrofauna community structure while other diversity indices were not correlated with macrofauna composition or structure. The soil macrofauna is therefore more influenced by tree and litter composition than by the overall diversity or evenness of the tree community. This information is important to design the optimal combinations of species for the intensification of production and ecosystem services provision in cacao-based AFS.

Keywords: Ecosystem services, soil ecology, biodiversity, aboveground-belowground.

References:

1. Deheuvels, 2014, Agroforestry systems, doi 10.1007/s10457-014-9710-9
2. Rousseau, 2012, Ecological indicators, 535
3. Sayer, 2010, Biotropica, 194