

Contribution of coffee agroforestry to land-use heterogeneity in Chiapas, Mexico

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Summary

- We addressed diversity of soil fauna and bats in three contrasting land use (agricultural, forest and agroforestry).
- Both soil fauna and chiropters are more diverse in forest. However, the role of coffee agroforestry in
 agroecosystems is promoting niche heterogeneity and stimulating the presence of specific groups of fauna that
- assure the complexity of the community interactions.





Introduction

- Coffee agroforestry is an important element in the agroecosystems matrix. Far from affecting diversity, coffee
 plantations are critical for management and conservation of the biodiversity in tropical agroecosystems^b.
- Bats are the best represented mammals in Chiapas. Approximately106 species provide ecosystem services such as seed dispersion and pollination^c.
- On the other hand, soil fauna is a key component guaranteeing ecosystem services such as nutrient cycling, water infiltration and soil fertility^a.
- Understanding patterns of biodiversity is necessary to deepen in the knowledge to improve conservationproduction strategies^b.
- A two-phase study was conducted. During the first phase, we assess diversity and composition of bat community and soil fauna on three different land-use systems (agricultural, natural forest and Coffee agroforestry). The second phase is still ongoing and consists of determining the relationship between diversity and ecosystem functioning as pest control by bats and leaf litter decomposition by soil fauna. Here we present the results of the first phase.



Methods

- To assess bats richness, abundance and composition we used capture mist-netting and to assess soil fauna we used the standard tropical soil biology method in dry and wet season.
- Bats were identified until species and soil fauna until morphospecies. We used Shannon-Weber index to evaluate diversity.
- Fig. 2. Abundace of soil fauna (morphospecies) in three contrasting land-use.



Fig. 1. The selected sites belong to "La Frailescana" natural reserve area in tropical rain forest in Chiapas, Mexico (15° 54" 18' N y 93° 15" 36' W; Figure 1).

Results

 We recorded 648 individuals of bats belonging to 20 species and three families. Frugivorous are the functional group more represented (11 species; n=545) > insectivores (5 species; n=57) > Hematophagous (*Desmodus rotundus*; n=40; Table 1)

Table 1. Abundance of chiropters and functional groups (FG) in four types of land use: Secondary Vegetation (SV), Coffee Agroforestry (CA), Agriculture (A) and Riparian Forest (RF)



 Overal, abundance of soil fauna had no differences between sites but is significantly higher in wet season. The three main orders of soil fauna recorded during dry season were hymenoptera, Oligochaeta and Lepidoptera (larvae) whereas during wet season were Oligochaeta, Isoptera and Hymenoptera (Figure 2). Forest had the highest diversity (H'=2.5) and also is the site with more abundance of predators. Only agricultural sites had sionificant differences in diversity between seasons.



 Forest is the site with more abundance and diversity both for bats and soil fauna. But the importance of coffee agroforestry and agricultural spaces is because they promote niche heterogeneity and the presence of specific groups that assure the complexity of the community interactions.

Conclusions

- Coffee farms enhance the hydro-stability along the year allowing slow variation in abundance and composition of soil fauna.
- · Coffee agroforestry are a key element in tropical agroecosystems on the maintenance of chiropters diversity.
- We conclude that coffee farms have an overall positive, but context dependent effect and are important for the
 mobility of bats among the agroecosystems landscape

References

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