



4th World Congress on Agroforestry

20-22 May 2019
Montpellier, France

Book of Abstracts



Trade-offs among ecosystem services and productivity in coffee-based agroforestry systems in Nicaragua

Cerdán C. R.¹ (ccerdan@uv.mx), Bucardo E. M.², Cartier M.³, Soto G.⁴, Fallot A.⁵, Rapidel B.⁶

¹Faculty of Agricultural Sciences, Universidad Veracruzana, Xalapa, Veracruz, Mexico; ²Biodiversity International, Jinotega, Nicaragua; ³ISTOM, Cergy, France; ⁴Committee on Sustainability Assessment, San José, Costa Rica; ⁵UPR GREEN, CIRAD, Montpellier, France; ⁶Persyst Department, CIRAD, Montpellier, France

Many studies have measured biodiversity loss across the coffee intensification gradient; some studies have shown, with contradictory results, the trade-offs between biodiversity loss and coffee production increments. Plot assessments of tree diversity, soil conservation, carbon sequestration and coffee production are lacking. We characterized the structure, productivity, diversity, soil conservation and carbon sequestration of 40 coffee agroforestry systems in two different areas in Northern Nicaragua. Coffee management, environmental conditions and soils properties were also characterized to better understand the trade-offs among services within the plots and their dependence on the local environment. These agroforestry systems were chosen to maximize contrasts in terms of biophysical context, botanical composition and management practices. Results (preliminary) showed significant differences in the vegetation structure that enabled us to identify main clusters: CAFS with dense and diverse overstorey canopy, CAFS with high *Musa* density and CAFS with low density of overstorey canopy. Changes in vegetation structure reflected differences in farmers' strategies but did not affect the overall coffee yield or the conservation of soils. Coffee yields had strong variations among the plots, and this was mainly related to the amount of fertilizer applied. Neither carbon sequestered, soil conserved nor tree diversity have a significant negative relationship with coffee productivity. However, coffee yields were low comparing with other coffee areas in the region. These results open new perspectives to improve coffee agroforestry systems' structural complexity and their relative ecosystem services without affecting their overall productivity. Further investigations and a more stratified sampling to get a good grasp of the whole range of variability (in highly productive areas with less shade canopy) are needed to fully understand the mechanisms involved in trade-offs.

Keywords: Performance, Management, Multivariate analysis, Ecological intensification.