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Soil ecosystem services of the under different uses in the Colombian Amazonia

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Background

Agroforestry systems (AFs), where agricultural and livestock crops are associated with woody plants, are known as sustainable systems, that conserve biodiversity and improve the provision of ecosystem services without compromising productivity. This work focuses mainly on cacao AFs, which have been related to different ecosystem services in tropical regions. Especially, our study focuses on the ability of the cacao AFs to improve soil ecosystem services in the Colombian Amazon region. We focused on soil ecosystems ecosystem services in the Colombian Amazonia because: of the social importance of cacao production system in the study region, specifically within the post conflict context; the lack of knowledge on the capacity of cacao AFs to offer soil ecosystem services in the study zone and its capacity in restoring ecosystem services in degraded soils.

Aim

The objective of our work was to evaluate the soil quality in different cacao agroforestry systems in the Colombian Amazonia, and to compare these evaluated soil quality of soil quality in Forest and Pasture.

Material and methods

The study was conducted at the Macagual Amazon Research Center, located west of the Colombian Amazon. We evaluated soil quality in four types of AFs Cacao, presenting different establishment, composition and structural characteristics; but also in a plot of native forest composed of characteristic species of the area, and in a plot of pasture composed of grasses. In the different plot of each land use, we evaluated the diversity of macrofauna, the morphology of aggregate, the physical properties and the soil chemistry. We summarized these variables in a General Indicator of Soil Quality GISQ, characterizing soil quality in the different land uses.

Major results and Conclusion

It was found that the level of intensification among land uses (Bosque>AFs>Pasture) affects the decrease of the macrofauna populations, which was related to soil compaction (physical properties). Chemical fertility improved with the establishment of AFs influenced by the application of amendments and organic fertilizers. When establishing agroforestry systems from pasture areas at a certain level of degradation, the GISQ scale was found to increase by 42%. Our results indicate that AFs practices can definitely be used as a restoration strategy, for the recovery of degraded areas.