



Tropentag, September 10-12, 2025, hybrid conference

“Reconcile land system changes
with planetary health”

Soil quality and productivity of organic cocoa under agroforestry in the Alto Beni region, Bolivia

OSCAR COLQUE FUENTES¹, ILICH FIGUEROA², HEBER JORA PERCA², STÉPHANE SAJ³

¹*Major University of San Simon, Fac. of Agricultural, Livestock and Forestry Sciences, Bolivia*

²*Foundation PIAF - El Ceibo, Bolivia*

³*Research Inst. of Organic Agriculture (FiBL), International Cooperation, Switzerland*

Abstract

Alto Beni is Bolivia's top cacao-producing region. It is also the oldest cacao pioneer front opened in the Bolivian Amazon forest. More than 1,500 farms here are certified organic and grow cocoa in agroforestry systems (OCAFS). According to a recent survey, 74 % of local OCAFS have dry bean yields below 690 kg ha⁻¹, which is considered insufficient to provide a livelihood. Furthermore, a robust characterisation of the tree community and soil quality of these OCAFS is still lacking, hampering adequate extension support to farmers.

This study was designed to assess the relationship between soil quality, tree community characteristics (biomass, density and diversity of cocoa and other trees, age) and productivity in OCAFS of the Alto Beni region. Based on a preliminary survey, we identified and selected 31 plots of 1,000 m², representative of six production areas and with varying cocoa yields. In each plot, we characterised the cacao population, associated tree communities, leaf litter volume, and soil physical, chemical and biological indicators.

All soil samples showed a loamy or loamy-silty texture, with an average bulk density of 1.51 g cm⁻³. Preliminary results show significant relationships between several variables and yield. Higher in soil pH, cation exchange capacity, phosphorus, and potassium were associated with higher yields. Other variables, such as the number of live cacao trees and the characteristics of associated trees within the plots, appeared unexpectedly uncorrelated with yields, despite being classical indicators used to characterise the cocoa and companion tree communities.

These results highlight both (i) the high variability among the sampled plots and/or (ii) the presumed prominence of soil nutrient limitation on cocoa yields in the Alto Beni region. Although sampling needs to be completed and data further analysed, these preliminary findings already raise the question of soil nutrient depletion in this old pioneer frontier, opened up some 50 years ago, even under organic or other eco-friendly certifications.

Keywords: Agroforestry, old pioneer front, organic cocoa productivity, soil quality