

**ORGANIC MANAGED CACAO AGROFORESTRY SYSTEMS INCREASE  
SOIL CARBON AND NITROGEN LEVELS AND MICROBIAL BIOMASS  
WITHIN SIX YEARS AFTER ESTABLISHMENT**

**KAKAO-AGROFORSTSYSTEME UNTER ÖKOLOGISCHER  
BEWIRTSCHAFTUNG ERHÖHEN DEN KOHLENSTOFF- UND  
STICKSTOFFGEHALT DES BODENS UND DIE MIKROBIELLE  
BIOMASSE INNERHALB VON SECHS JAHREN NACH  
IHRER EINRICHTUNG**

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**SUMMARY**

Agroforestry and organic (org) agriculture pursue largely the same goals and methods. Accumulation of biomass for improvement of soil structure and fertility as the basis for agricultural production and avoidance of agrochemicals to preserve biodiversity. Nevertheless, there are still many gaps of knowledge about agroforestry systems (AFS) and org agriculture, especially about the long-term effect. In this study, conventionally and organically managed cacao monocultures (MCS) and AFS are compared in terms of soil organic carbon (SOC) and total nitrogen (N), microbial biomass, and litter decomposition. SOC and N stocks in the topsoil were significantly higher in org management practices, while there are no differences between the MCS and agroforestry systems (AFS) with the same management practices. A change between the cultivation systems with increasing soil depth was not found. Microbial biomass strongly decreases from the organic surface layer to the subsoil in all systems. Differences in mic carbon concentrations became apparent between the four different production systems. In the organic surface layer, microbial nitrogen was four times higher in the organically managed systems than in conventional systems. The org managed AFS had the highest concentrations of microbial nitrogen. Decomposition rates of cacao and *Erythrina* spp. leaves showed no differences between the systems, but half-life of cacao leaves litter was almost twice of erythrina leaves.

Thus, organically managed cacao AFS lead to healthier soils and should therefore form the basis for production that is not only designed for short-term profit, but also preserves soil ecosystem services in the long-term.