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Cocoa Agroforestry as Climate Change Adaptation Strategy in Ivory Coast: Scientist's versus Farmer's Perceptions

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Abstract

Cocoa production in Ivory Coast is important for sustaining global supply, national economy and income of smallholder farmers but climate change poses a serious threat. Therefore, sustainable and resilient cocoa production systems are of crucial importance. Agroforestry is seen as an option to adapt the cocoa farming systems to projected changes of increase drought frequency and severity. However, there is ongoing scientific debate about the actual protective (microclimate moderation) and complementary resources (soil water and nutrients) use between shade trees and cocoa plants especially under drought conditions.

Objective of the study was to evaluate shade tree use intensity along precipitation gradient against the basic hypothesis that cocoa agroforestry practice increases with more challenging climate. Research was conducted on-farm in three climatically different regions classified by their annual precipitation as dry (1,000 mm), medium (1,500 mm), and wet (1,800 mm). Farms were characterised regarding shade tree species composition, shade cover, and plantation size. Farmers were interviewed about their recorded yield, farming practices and perception on shade and drought interaction.

Contrary to the expectations, the cocoa plantations showed no significant differences in yield, shade cover, cocoa tree density, and cocoa biomass across the climatic gradient. Yield median varied from 0.7 (wet) to 0.8 t ha^{-1} (medium), shade cover median ranged from 10 (dry) to 17 % (medium), cocoa tree density median was between 1,100 (medium) to 1,400 trees ha^{-1} (wet), and cocoa aboveground biomass median from 32 (wet) to 45 t ha^{-1} (medium). The farmer interviews revealed a large difference in farmer's perceptions across the regions regarding drought mitigating effects of shade trees. While in the dry region shade trees were seen rather to have negative effects by 50 % of the farmers, in the medium and wet regions the shade trees were largely seen positive and a suitable adaptation measures against drought.

Farmers did not increase their shade tree use to adapt their cocoa farming systems in climatically less suitable region. In conclusion, the currently recommended agroforestry systems are not equally suitable along the climatic gradient of cocoa production in Ivory Coast.

Keywords: Agroforestry, climate adaptation, *Theobroma cacao*, West Africa

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