



Climate Smart Agriculture Programmes' Impact on Soil Fertility and Crop Diversity in Eastern African Highlands: A Senegalese Longitudinal Study

Usman Touré^{1,2}, Mariama Diop^{3,4}

¹ Department of Advanced Studies, Institut Sénégalais de Recherches Agricoles (ISRA)

² Department of Advanced Studies, Université Alioune Diop de Bambey (UADB)

³ Institut Sénégalais de Recherches Agricoles (ISRA)

⁴ Université Alioune Diop de Bambey (UADB)

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Correspondence: utour@outlook.com

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Author notes

Usman Touré is affiliated with Department of Advanced Studies, Institut Sénégalais de Recherches Agricoles (ISRA) and focuses on Environmental Science research in Africa.

Mariama Diop is affiliated with Institut Sénégalais de Recherches Agricoles (ISRA) and focuses on Environmental Science research in Africa.

Abstract

Climate change impacts on agriculture in Eastern Africa are significant, necessitating innovative solutions to maintain soil fertility and crop diversity. The study employed a longitudinal design, collecting data through farmer surveys and soil analysis at six sites across the region. Statistical models were used to analyse trends in soil quality and crop composition. There was a notable increase (20%) in maize production alongside a reduction of 15% in nitrogen-poor crops like cassava over five years, indicating improvements in CSA programme efficacy. The CSA programmes have significantly enhanced soil fertility and diversified the crop portfolio in Senegal's eastern highlands, with particular emphasis on maize productivity and reduced reliance on nitrogen-deficient crops. Further research should focus on scaling up these successful CSA models across other regions of Senegal to maximise benefits for farmers and environmental sustainability. Climate Smart Agriculture, Soil Fertility, Crop Diversity, Eastern Africa Highlands, Senegal The empirical specification follows $Y = \beta_{0+\beta}^{-} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African savannah, soil health, crop diversity, agroecology, longitudinal analysis, sustainability, climate resilience*

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