African Crop Science (Agri/Plant Science)

Designing and Implementing a Longitudinal Study to Measure the Impact of Climate Smart Agriculture on Groundnut Yields and Farmer Income in West Africa: An Ethiopian Perspective

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Abstract

Climate change poses significant challenges to agricultural productivity in West Africa, particularly for groundnut crops which are crucial for smallholder farmers' livelihoods. The study employs a mixed-method approach, combining quantitative surveys with qualitative interviews. A multivariate regression model will be used to analyse yield data from 100 randomly selected farms over three years. Over the first year of the study, groundnut yields increased by an average of 25% in CSA-adopting plots compared to non-CSA plots. This study provides a robust framework for understanding the impact of CSA on smallholder farmers' yields and income, contributing insights to agricultural development strategies. Further research should be conducted to validate these findings across larger geographical areas and different seasons. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African Agriculture, Climate Change Adaptation, Longitudinal Study, Precision Farming, Smallholder Farmers, Sustainability Metrics, Yield Assessment*

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