



# Methodological Evaluation of Smallholder Farms Systems in Ghana: Randomized Field Trial for Efficiency Gains

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## Abstract

Smallholder farming systems in Ghana face challenges in achieving optimal productivity due to varying environmental conditions and resource availability. A stratified random sampling method was employed to select fields for the intervention. Data on crop yield, soil health indicators, water usage, and farmer practices were collected using standardised protocols over two growing seasons. In a subset of randomly selected fields, an average increase in maize yields of 20% was observed compared to control plots, while maintaining equivalent levels of resource use efficiency. The randomized field trial demonstrated the feasibility and effectiveness of implementing best management practices for smallholder farmers in Ghana. Policy recommendations include promoting access to improved seeds and fertilizers, coupled with training on sustainable farming techniques. The empirical specification follows  $Y = \beta_{0+\beta} X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *African geography, randomized trials, efficiency measurement, resource management, smallholder farming, sustainable agriculture, yield optimization*

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