Methodological Evaluation of Smallholder Farm Systems in Senegal: A Randomized Field Trial for Measuring Adoption Rates

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Abstract

Smallholder farming systems in Senegal face challenges in adopting new agricultural technologies. A randomized field trial was conducted to assess the adoption of improved maize varieties, with data collected on farmer practices and outcomes over two growing seasons. The study employed mixed-effects logistic regression models to analyse adoption rates, accounting for variability in farm characteristics and environmental factors. In a sample of 150 smallholder farms, farmers adopted new maize varieties at an average rate of 62%, with significant variation observed across different farming practices and soil types. The study validated the effectiveness of randomized field trials for measuring adoption rates in Senegalese agricultural contexts. Further research should explore factors influencing adoption decisions to enhance technology uptake among smallholders. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African agroecology, randomized controlled trial, smallholder farming, yield assessment, experimental design, sustainable agriculture, participatory research*

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