



# Replication of Field Trial Methods for Yield Improvement in Smallholder Farms Systems in Senegal

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### Abstract

This study addresses a current research gap in Computer Science concerning Methodological evaluation of smallholder farms systems in Senegal: randomized field trial for measuring yield improvement in Senegal. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Methodological evaluation of smallholder farms systems in Senegal: randomized field trial for measuring yield improvement, Senegal, Africa, Computer Science, replication study This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. Model estimation used  $\hat{\theta} = \operatorname{argmin} \{ \theta \} \operatorname{sumiell} ( y_i, f\theta ( \xi ) ) + \lambda \operatorname{Vert}\theta \operatorname{Vert}^2$ , with performance evaluated using out-of-sample error.

**Keywords:** African, randomized, trials, evaluation, methodology, yield, analysis

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