African Applied Botany (Agri/Plant Science)

Methodological Evaluation of Smallholder Farm Systems in South Africa Using Quasi-Experimental Design to Measure System Reliability

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Published: 21 October 2007 | **Received:** 20 August 2007 | **Accepted:** 30 September 2007

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DOI: 10.5281/zenodo.18846469

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Abstract

Smallholder farming systems in South Africa face challenges related to productivity and sustainability. Understanding these systems is crucial for developing targeted interventions. A quasi-experimental design will be employed, including pre- and post-intervention data collection to measure changes in system performance. Statistical models will account for potential confounders. The preliminary analysis suggests a significant improvement ($p < 0.05$) in crop yields following the intervention period, indicating enhanced reliability of the farming systems. This study aims to provide robust evidence on the effectiveness of interventions aimed at improving smallholder farm system reliability. Policy recommendations will be developed based on findings from this research protocol, focusing on scaling up successful practices and addressing identified challenges. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African agriculture, smallholder farming, farm management systems, quasi-experimental design, econometric analysis, resource efficiency, agricultural productivity*

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