Bayesian Hierarchical Model Assessment for Yield Improvements in Smallholder Farms Systems of Rwanda,

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Abstract

Smallholder farms in Rwanda face challenges in achieving sustainable yield improvements due to varying environmental conditions and limited access to resources. A Bayesian hierarchical model was developed and applied to analyse yield data collected from multiple farms. The model accounts for spatial and temporal variability by incorporating regional and farm-specific covariates. The analysis revealed significant differences in yield improvement across different regions, with some areas showing a 15% increase over the study period. The Bayesian hierarchical model effectively captured the complexities of smallholder farming systems, providing insights into which regions require targeted interventions for further yield improvements. Investment should be directed towards implementing improved agricultural practices and access to resources in areas with lower yield improvement rates. The empirical specification follows $Y = \vec{\beta_{0+\beta}} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Geographic, African, Hierarchical, Bayesian, Model, Evaluation, Smallholder*

ABSTRACT-ONLY PUBLICATION

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