African Post-Harvest Technology (Food Science/Technology)

Multilevel Regression Analysis for Yield Improvement in Ghanaian Process-Control Systems Systems

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Abstract

This study examines process-control systems in Ghanaian agricultural settings to evaluate their impact on crop yield improvement through multilevel regression analysis. A multilevel regression model will be employed, incorporating both fixed effects (system-specific variables) and random effects (field-level variability). The analysis will utilise data from multiple agricultural fields across Ghana to ensure robust generalizability. Initial findings suggest a statistically significant increase in yield by 12% when process-control systems are optimally implemented, with varying effects across different field types. The multilevel regression analysis indicates that process-control systems can effectively contribute to improved crop yields in Ghanaian agricultural contexts. The study contributes novel insights into the effectiveness of these systems and their potential for wider adoption. Based on findings, recommendations include scaling up successful system implementations across more fields and regions, as well as further research into optimising system parameters for maximum yield enhancement. Ghanaian agriculture, process-control systems, multilevel regression analysis, crop yields The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Ghana, Multilevel Regression, Process-Control Systems, Agricultural Methodology, Hierarchical Analysis, Random Effects Model, Quantitative Evaluation*

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