African Food Chemistry (Food Science)

Theoretical Framework for Evaluating Integrated Pest Management Practices Among Smallholder Farmers in Eastern Uganda: Implications and Long-term Efficacy on Crop Protection Systems

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Published: 20 April 2005 | **Received:** 20 January 2005 | **Accepted:** 20 March 2005

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DOI: 10.5281/zenodo.18812264

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Abstract

This study focuses on evaluating Integrated Pest Management (IPM) practices among smallholder farmers in Eastern Uganda, a region where IPM is increasingly recognised as an effective strategy for sustainable crop protection. The methodology employed will involve literature review and expert consultations to establish a robust theoretical model underpinning IPM implementation in Ugandan agricultural contexts. This model will incorporate statistical tools such as logistic regression for predictive analysis of IPM adoption rates and sensitivity analyses to assess the impact of variables on pest control effectiveness. This theoretical framework provides essential insights into the effectiveness and sustainability of IPM among smallholder farmers. It serves as a foundation for future research, policy development, and practical applications aimed at enhancing agricultural productivity while reducing environmental impact. Recommendations include strengthening farmer education programmes to promote IPM knowledge and skills, providing targeted financial assistance to offset initial costs, and establishing community-based support networks to facilitate collective action in adopting sustainable pest management strategies. The empirical specification follows $Y = \vec{\beta_{0+\beta}}\, p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African agroecology, biophysical thresholds, crop diversity, ecosystem services, iterative cycles, participatory rural appraisal, risk assessment*

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