African Livestock Production (Science focus - Agri/Animal Science)

Improving Water Management Practices for Coffee Production among Smallholder Farmers in Uganda's Rural Regions: An Agronomic Approach

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Abstract

Coffee production in Uganda's rural regions faces significant challenges related to water management, which is crucial for maintaining yields and economic viability among smallholder farmers. A mixed-method approach was employed, combining farmer surveys with field experiments to assess the impact of different irrigation strategies and soil amendments on coffee yields and resource use efficiency. Field trials demonstrated an average increase in coffee yield by 15% when farmers adopted a combination of mulching and drip irrigation compared to traditional flood irrigation methods. Soil moisture content was also found to be significantly higher, with at least 20% reduction in evapotranspiration under optimal management practices. The results suggest that integrating soil conservation techniques such as mulching can substantially improve water use efficiency in coffee farming systems, leading to enhanced productivity and sustainability. Farmers should be encouraged to adopt the recommended agronomic strategies, including regular application of organic mulches and precise scheduling of irrigation events, alongside local extension support for technology adoption and training. The empirical specification follows $Y = \vec{\beta_{0+\beta}} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Geographical Indicators, Smallholder Agriculture, Integrated Pest Management, Soil Conservation, Water Harvesting, Sustainable Irrigation Systems, Climate-Smart Agriculture*

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