African Nanotechnology Applications (Technology)

Designing Cost-Efficient Irrigation Solutions for Drought Afflicted Mali Fields

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Abstract

Drought conditions in Mali have significantly impacted agricultural productivity, necessitating innovative irrigation solutions to ensure food security and economic stability. A mixed-method approach combining field surveys, stakeholder consultations, and economic modelling was employed to identify the most suitable technologies and their affordability within local contexts. Field surveys revealed that a gravity-fed drip irrigation system could reduce water usage by up to 30% compared to traditional flood irrigation methods. Economic models estimated an initial investment of $50 per hectare, with payback periods under two years in most cases. The findings suggest that the proposed low-$ Y{it}=\beta0+\beta1X{it}+ui+\varepsilon{it}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African geography, drought-resistant engineering, sustainable agriculture, irrigation efficiency, low-cost technologies, rural development, water management systems*

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