African Poultry Science (Agri/Animal Science)

Effectiveness of Soil Moisture Monitoring Systems on Irrigated Maize Crops in Ethiopia,

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Abstract

Soil moisture monitoring systems have been used to optimise irrigation practices in various agricultural settings, but their effectiveness on maize crops under specific Ethiopian conditions has not been thoroughly evaluated. A randomized controlled trial was conducted across three different farms representing diverse agricultural conditions. Soil moisture sensors were installed to monitor soil moisture levels at various depths, and farmers were instructed on adjusting irrigation timings based on sensor readings. Yield data and water consumption records were collected over a year to assess the system's effectiveness. Findings suggest that by reducing unnecessary irrigation cycles by approximately 15%, maize yields increased by an average of 20% compared to traditional manual monitoring methods, with significant reductions in water usage without compromising crop productivity. The sensor readings showed a strong correlation (R^2 = 0.89) with actual yield variations. The soil moisture monitoring systems demonstrated enhanced precision and efficiency in irrigation management, leading to improved maize yields and reduced water consumption. Farmers should be trained on the use of these systems for optimal performance and integrated into routine agricultural practices. Government support is recommended to facilitate adoption at a larger scale. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African, Geospatial, Precision Agriculture, Soil Sensors, Irrigation Management, Monitoring Systems, Crop Yield Analysis*

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