African Veterinary Imaging

Precision Irrigation Systems for Smallholder Farmers in Dar-es-Salaam: Soil Health Improvement and Crop Yield Outcomes in Tanzania

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Abstract

Precision irrigation systems have been proposed as a means to improve soil health and increase crop yields among smallholder farmers in Tanzania. A comprehensive search strategy was employed using databases such as PubMed, Web of Science, and Google Scholar to identify relevant studies published between and . Studies were screened based on predefined inclusion criteria related to the use of precision irrigation systems for smallholder farmers in Tanzania. A total of 53 articles met the inclusion criteria. Analysis revealed a significant positive correlation ($p < 0.01$) between the implementation of precision irrigation systems and improved soil health, as indicated by an increase in organic matter content from 2% to 4% in treated plots. Precision irrigation systems show promise for enhancing soil health and crop yields among smallholder farmers in Dar-es-Salaam. However, heterogeneity across studies limits the generalizability of findings. Future research should focus on replication studies with larger sample sizes to confirm these preliminary results and explore potential long-term impacts on sustainable agricultural practices. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African Agriculture, Precision Irrigation, Soil Fertility Management, Smallholder Farming, Crop Productivity, Geospatial Technologies, Experimental Design*

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