Precision Fertilizer Application Enhances Maize Yield in Northern Zambia: An Intervention Study

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Abstract

Maize is a crucial staple crop in Northern Zambia, where nutrient deficiencies can significantly impact yields. A randomized controlled trial was conducted with two groups: control (no additional fertilizers) and intervention (precision-fertilized plots). Soil samples were analysed using spectroscopy to determine nutrient levels, and a linear regression model was used to predict yield based on fertilizer application data. Precision applications of nitrogen, phosphorus, and potassium increased maize yields by an average of 20% with minimal soil nutrient imbalances (mean ± SD: N=15.2±3.8 kg/ha, P=16.4±2.9 kg/ha, K=17.3±3.5 kg/ha). The study demonstrated the feasibility and efficacy of precision fertilizer application in enhancing maize yields in Northern Zambia. Farmers should adopt these techniques to improve their crop productivity sustainably.

Keywords: *African Agriculture, Nutrient Management, Precision Agriculture, Crop Yield Analysis, Soil Fertility, Experimental Design, Field Trials*

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