



# Precision Farming Technologies in Tanzanian Cotton Cultivation: Outputs and Costs Analysis

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## Abstract

Precision farming technologies have shown potential in improving crop yields and reducing costs for smallholder farmers, particularly in cotton cultivation. A comparative study using data from field trials conducted over two seasons was employed to assess the performance of precision farming technologies (e.g., GPS-guided tractors, automated irrigation systems) against traditional practices. Precision farming increased cotton yields by an average of 15% compared to conventional methods, with a notable increase in yield observed during the second season. The study concluded that precision farming technologies are cost-effective for Tanzanian cotton farmers, yielding significant output increases without compromising costs. Farmers and policymakers should be encouraged to adopt precision farming technologies through subsidized equipment and training programmes. The empirical specification follows  $Y = \beta_{0+\beta} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *African agriculture, Geographic Information Systems (GIS), precision irrigation, sensor technology, remote sensing, yield monitoring, smallholder farming*

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