



# Climate-Smart Agriculture Adoption and Its Impact on Smallholder Agricultural Productivity in Kenya: A Review of Trends

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## Abstract

Climate-smart agriculture (CSA) has been promoted as a strategy to enhance agricultural productivity in response to climate change challenges. The analysis is based on secondary data from the Kenyan Agricultural Information System (KAINS) for the period -, focusing on a sample of 500 randomly selected farms. A linear regression model was used to estimate the impact of CSA adoption on smallholder productivity, with an  $R^2$  value of 0.73 indicating strong explanatory power. The findings suggest that CSA adoption significantly increased maize yields by 15% ( $p < 0.05$ ), highlighting its potential as a robust strategy for enhancing agricultural resilience in Kenya. Smallholder farmers should be encouraged to adopt CSA practices, and extension services need to be strengthened to facilitate technology dissemination. The empirical specification follows  $Y = \beta_0 + \beta_1 X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Climate Change, Geographical Information Systems, Precision Agriculture, Sustainable Intensification, Agroforestry, Remote Sensing, Yield Forecasting*

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