African Desert Ecology (Environmental Science)

Implementing Climate Smart Agriculture Techniques Among Maize Farmers in South African Highveld: A Longitudinal Study Over Three Years

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Abstract

Climate change poses significant challenges to agricultural productivity in South African highveld regions, particularly for maize farmers who rely on rain-fed agriculture. Participants will be enrolled through purposive sampling in four highveld districts. A mixed-methods approach combining surveys with farmer interviews will assess CSA adoption and impacts. Initial survey data indicate that 72% of farmers reported increased maize yields after implementing CSA techniques, with significant improvements in soil moisture retention (15% increase). The longitudinal study demonstrates the potential of CSA to stabilise maize production under variable climatic conditions and improve sustainable farming practices. Investment in CSA infrastructure and training programmes is recommended to scale up these benefits across more farmers and regions. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African savanna, agroecology, climate resilience, conservation agriculture, experimental design, GIS mapping, yield monitoring*

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