



Methodological Evaluation of South African Field Research Stations in Yield Improvement Forecasting Using Time-Series Models

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Abstract

Field research stations in South Africa play a crucial role in agriculture by providing data for yield improvement forecasting. A systematic literature review was conducted using databases such as PubMed, Scopus, and Web of Science to identify relevant studies published between and . Studies were selected based on methodological quality and relevance to South African agricultural contexts. The analysis revealed that while many stations used time-series models for yield forecasting, there was variability in model application and data collection methods, with some stations employing ARIMA models and others focusing on seasonal adjustment techniques. Despite methodological diversity, the reviewed studies highlighted a consistent trend of underestimating future yields due to limited historical data and variable environmental conditions. Strengthened collaboration between research stations is recommended for improving model accuracy. Future research should focus on integrating more advanced machine learning algorithms into yield forecasting models. The empirical specification follows $Y = \beta_{0+\beta}^{-} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, yield forecasting, time-series analysis, econometrics, agricultural systems, empirical methods, spatial statistics*

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