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Track Name: ISGTA2025

Paper ID: 146

Paper Title: Artificial Intelligence for Sustainable Agriculture: SARIMAX Models in Optimization of High-Andean Potato Production

Abstract:
High-Andean agriculture faces challenges of low productivity and limited technological adoption in climate change contexts. This study applied SARIMAX models to evaluate the impact of sustainability indicators on the predictive capacity of potato production in Puno, Peru (2015-2024, n=17,679 producers). A technification index based on yield was constructed as a proxy for adoption of sustainable practices, classifying producers into three technological levels. Results show that 18.9% operate with high technology, with perfect correlation (r=1.0, p<0.05) between technological level and yield. The SARIMAX model incorporating sustainability variables presented an annual seasonal component ARIMA(0,0,1)(0,0,1)12, improving interpretability compared to the economic baseline model. Scenario simulation projects a 3.4% increase in production with greater technological adoption (+30%), demonstrating resource optimization potential. These findings show that artificial intelligence applied through SARIMAX models facilitates decision-making for precision agriculture in high-Andean zones, contributing to food security and green economy through efficient use of land and productive resources.

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Authors:
   - livilca@est.unap.edu.pe (Primary)

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