African Food Chemistry (Food Science)

Sustainable Practices Metrics for Highland Ethiopian Coffee Farmers: An Income and Environmental Performance Assessment Methodology Study

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Abstract

Highland Ethiopian coffee farmers face challenges in achieving sustainable production practices that enhance both income growth and environmental performance. The study employs mixed-methods including surveys, interviews, and machine learning algorithms to analyse data from 100 randomly selected farms. A linear regression model is used to predict income growth based on eco-friendly farming techniques. Uncertainty in the regression coefficients is assessed using robust standard errors. The analysis reveals that incorporating organic fertilizers increases coffee yields by an average of 25% compared to conventional methods, leading to a significant rise in farmers' incomes. This study provides a comprehensive framework for assessing sustainable practices among Ethiopian coffee farmers, highlighting the positive impact on both economic and environmental sustainability. Policy makers should incentivize the adoption of organic farming techniques to support income growth and environmental conservation in highland regions. Sustainable Coffee Production, Highland Ethiopia, Income Metrics, Environmental Performance, Machine Learning The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Geographic, Africa, Highlands, Coffee, Biodiversity, Sustainability, Ecosystem, Metricology, Ethiopia, Farmers, Productivity, Agroecology, Climate, Indicators, Resilience, Communities, Soils, Water, Health, Forests, Livelihoods*

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