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Determinants of the physical and sensory quality of coffee in small-holder farms of Burundi

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Abstract

The quality of coffee in Burundi has been declining in recent years due to poor soil fertility, suboptimal agronomic practices, and adverse climatic conditions. This deterioration challenges the international competitiveness of Burundian coffee, reduces export revenues, and negatively impacts the livelihoods of thousands of small farmers. Therefore, urgent research and interventions are needed to optimise production and improve coffee quality for immediate sustainable growth. This study examines the impact of altitude, soil fertility, and plant health on both the physical and sensory quality of Burundian coffee.

A total of 147 coffee plots were selected, covering all coffee-growing regions of Burundi. Data on plot management were collected through a diagnostic survey, while soil and leaf samples were analysed in the laboratory. Coffee cherries were also gathered for physical and sensory evaluations. Statistical methods including ANOVA, Spearman correlations, and linear and logistic regressions were used to assess the relationships between coffee quality, environmental parameters and cultural practices.

Results indicate that higher altitudes enhance coffee quality by lowering temperatures and extending berry ripening, which leads to denser beans with superior cup characteristics. Key soil fertility parameters, such as pH, nitrogen, phosphorus, and exchangeable bases, positively influence bean size and sensory quality. A balanced ratio of calcium, magnesium, and potassium is critical, as imbalances can degrade quality. Foliar phosphorus also improves sensory attributes, whereas excessive potassium or magnesium may lead to undesirable flavors. Additionally, diseases like coffee leaf rust and coffee berries diseases negatively affect bean composition by increasing bitterness, astringency, and metallic taste, while sweetness and citric acidity enhance sensory quality.

Effective nutrient management, disease control, and optimised growing conditions are essential to stabilise and enhance the quality of Burundian coffee, ensuring a more consistent and high-value product for the market.

Keywords: Burundi, coffee quality, plant management, smallholder farms, soil fertility

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