

Tailoring the deployment of market-driven coffee varieties in Rwanda from the international multilocal varietal testing

Simon Martin Mvuyekure^{1,2} (msmartin202@gmail.com), Jorge Berny², Julianne Kayonga³ Celestin Gatarayih⁴

¹Rwanda Agriculture and Animal Resources Development Board (RAB) Kigali Rwanda; ²World Coffee Research (WCR) Portland OR 97225;

³Starbucks's Farmer Support Center Kigali Rwanda; ⁴Inter-African Coffee Organization, Abidjan Cote d'Ivoire



Introduction

The Rwandan economy relies heavily on agricultural exports, and coffee accounts for 11.8% of agricultural export earnings [1]. To address current and future challenges in the supply chain, there is a need to transform farming from subsistence to more market-led, high-productivity systems [2]. The deployment of new coffee varieties needs to consider farmers' and market preferences to maximize the return on investment from multi-actor stakeholders.

Materials/Methods

WCR located and gathered 31 top-performing coffee varieties from 11 suppliers around the world. 28 of them are being evaluated in Rwanda for yield, quality, and stress tolerance in 3 locations, which are characterized by mid-level altitude and low rainfalls (Huye), low altitudes and raw rainfalls (Ngoma), and mid-level altitude and high rainfalls (Nyamasheke). The field performance of the varieties was evaluated through GGE biplot analysis to assess adaptability and stability. Multivariate biplots were performed to identify correlations between variables.

Conclusion/Perspectives: These findings are breakthroughs in varietal evaluation, introduction, and adoption programs with regard to minimization of the cost of production and maximization of production in efforts to ensure the future of the supply chain with regard to market demand.

References:

1. NAEF (2022). Annual 2021-2022 Agriculture Exports Performance. National Agricultural Export Development Board. Kigali Rwanda, Page 2.
2. Kimani P.M. 2017. Principles of Demand-led Plant Variety Design in G.J. Persley and V.M. Anthony (eds). The Business of Plant Breeding. © CAB International 2017, Page 7.
3. Megos Meressa, A., & Navrud, S. (2020). Not my cup of coffee: Farmers' preferences for coffee variety traits – Lessons for crop breeding in the age of climate change. *Bio-Based and Applied Economics*, 9(3), Pages 263–282. <https://doi.org/10.13128/bae-7758>

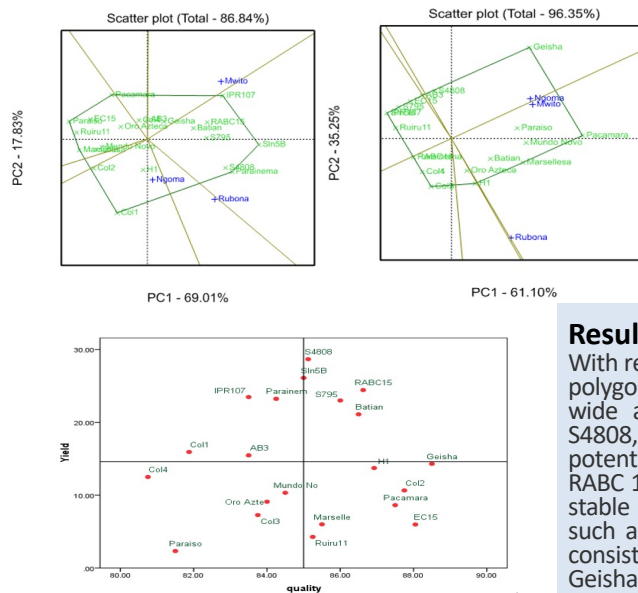
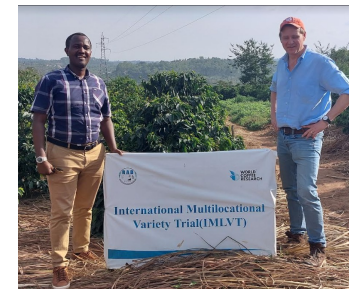


Figure 3: Yield and quality perspectives of varieties

Figure 1&2: Genotype by Environment interaction for yield parameters (left) and rust susceptibility (right)



Results/Discussion

With regard to farmers' and consumers' preferences [3], the polygon view by GGE biplots revealed varieties that have wide adaptability. The vertex varieties IPR107, SLN 5B, S4808, Paraneima, and Pacamara showed a top-yielding potential site-specific adaptability. Other varieties, such as RABC 15 (local variety), Batian, S795, Geisha, and AB3 were stable across the trial sites (broad adaptability). Varieties such as Col 4, EC 15, RABC 15, Col 2, and Ruiru 11 were consistently less susceptible to CBD across the sites whereas Geisha, Pacamara, H1, and Marsellesa were highly susceptible to rust. The multivariate biplot revealed good varieties for yield and quality attributes (S4808, SLN5B, RABC15, S795, Batian, and Geisha). Other varieties such as Col 2, Pacamara, EC15, Marsellesa, and Ruiru 11, showed relatively low yielding potential and high quality attributes.