

Abstract

The East African Highland Cooking Bananas (*Musa spp.*) is a very important crop for food security and livelihoods in most of the Sub-Saharan Africa and Tropical regions of the World. Unfortunately, the crop has suffered a number of pests and diseases that have had a huge impact on its production and productivity. Among the strategies established by breeding programs was the development of new cooking banana hybrids with increased resistance to drought, pests and diseases. A number of hybrids (NARITAs and NABIOs) were produced through these collaborations and evaluated for resistance and acceptability at different stages of productions (Preliminary yield trials and on farm). Unfortunately, most of the developed cooking banana hybrids have faced rejection by the end users because of lack of attributes considered superior for acceptability. This study investigated the prediction of consumer acceptable quality in cooking banana hybrids, focusing on optimizing breeding programs to enhance consumer satisfaction and marketability. By integrating sensory evaluation, physio and biochemical analysis, and predictive modeling, the research aimed to identify key quality attributes that influence consumer preferences. The research utilized a comprehensive dataset comprising various banana hybrids, assessing parameters such as texture, colour, aroma, and overall acceptability. Advanced statistical techniques were employed to analyze the data, developing predictive models that accurately forecasted consumer acceptance based on these quality metrics. A comprehensive review was conducted to profile culinary properties of East African Highland Cooking Bananas to Enhance Hybrid Selection Efficiency. Key findings showed attribute terms that could be used to describe matooke, and also revealed that QDA may be used as a tool during the assessment and selection of new cooking banana hybrids to identify relevant sensory attributes because of its ability to discriminate among the banana hybrids. Additionally, consumer preferences for Matooke colour, softness, mouthfeel, taste, and aroma were analyzed using Just About Right (JAR) scales and we discovered that for JAR colour of Matooke, the cultivars where majority of the respondents perceived the colour "As I like" included mostly landraces such as Nakinyika, Nakitembe 1, Musakala, Mbwazirume 1, Nfuuka, Kibuzi, and Mpologoma which implies that if developed hybrids have a colour not significantly different from any of the cultivars then it will most likely be accepted by consumers. Regarding Matooke softness, the cultivars where majority of the respondents perceived the texture "As I like" included Nakitembe 1, Musakala, Mbwazirume 1, and Mpologoma which implied that if developed hybrid possess a texture as soft as any of the cultivars then it will most likely be accepted by consumers. Similarly for JAR mouthfeel of Matooke some varieties, such as Nakitembe 1, Musakala, Enyeru, Kibuzi, Mbwazirume 1, and Mbwazirume 2 demonstrated a high degree of consistency in respondents' preferences, with overwhelmingly high percentages selecting "As I Like." This consistency suggests a strong alignment between these varieties' mouthfeel characteristics and respondents' sensory expectations or preferences. Such consistency reflects the adherence to specific quality standards or sensory profiles established within the cultural context or culinary tradition surrounding Matooke consumption. For Matooke taste, majority of respondents expressed a preference for taste falling within their desired sweetness

range, as indicated by the high percentages of respondents selecting "As I Like" on the sweetness scale. Varieties such as Nakitembe 1, Kibuzi, Mbwazirume 1, Mpologoma, Nakinyika, Enyeru, Musakala, and Mbwazirume, exhibit overwhelming preference for taste profiles perceived as satisfactory. Finally, the respondents' preferences regarding aroma/smell intensity indicated that since most of the distribution of responses clusters around the midpoint of the scale (2) for samples Nakitembe 1, Enyeru, Nakinyika, Musakala, Mpologoma, Kibuzi, Mbwazirume 1, and Mbwazirume 2, it suggests that the majority of respondents find the aroma/smell intensity of these matooke varieties to be satisfactory or "as they like." Consumer liking was heavily influenced by attributes like texture, taste, appearance, and aroma. Furthermore, undesirable attributes that led to rejection of new hybrids included non-yellow colour of matooke, brownish colour, hard texture, and sap-like taste. The chemical properties showed high amounts of total starch content, a good trait for utilization by industry. These findings collectively contribute to a clearer understanding of attributes that inform matooke quality and enhance acceptability paving a way for future advancements in banana breeding. The implications of this research are significant for the agricultural industry, as it offers a systematic approach to breeding cooking bananas that meet consumer expectations. By prioritizing quality attributes that drive consumer satisfaction, the study supports the development of more desirable cooking banana varieties, ultimately enhancing market competitiveness and consumer loyalty.