



Promoting Food Security through the Development of Gluten-Free Snacks (Kokoro) using Maize-Green Banana Composite flours

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Introduction

Kokoro is a popular traditional maize snack widely consumed by adults and children in Southern states of Nigeria (Akoja et al., 2016) and is regarded as a gluten-free snack. Gluten-free products are health food products, containing no gluten protein, suitable for individual health and trend-related consumer desires. Gluten-free foods are produced using nuts, seeds, tubers, cereal grains (e.g. maize) and starchy fruits (e.g. plantain). Unripe plantain (*Musaparadisiaca*) is a rich source of dietary carbohydrates, minerals, vitamins and anti-oxidants (Ajala and Ajala, 2015). Maize (*Zea mays*) is a cereal crop and a major source of carbohydrates (mostly starch), vitamin B, vitamin A (yellow maize), and minerals, but low in protein (9-12%) when compared with legumes (Prasanthiet al., 2017). This study examines the effect of the substitution of maize with green banana flour at varying levels (10-40%) on the proximate composition, colour, and sensory qualities of Kokoro.

Materials and methods

Five maize-green plantain composite flour blends were formulated: 100% maize flour with no banana flour (100M:0B), 90% maize flour with 10% banana flour (90M:10B), 80% maize flour with 20% banana flour (80M:20B), 70% maize flour with 30% banana flour (70M:30B), and 60% maize flour with 40% banana flour (60M:40B). The nutritional and colour properties were analyzed using standard analytical methods, while trained panellists were used to assess sensory parameters. Statistical significance was set at <0.05.

Results and discussion

Increased substitution of green banana flour (GBF) flour into maize for Kokoro production led to a significant increase ($p < 0.05$) in protein content (6.81% to 14.04%) and fat content (15.45% to 18.12), indicating an enhanced nutritional profile, which may be suitable for tackling food and nutrition security (Figure 1). For colour, an increase in the ratio of GBF decreases lightness (L^*) from 28.88 (100% maize) to 27.10 (40% GBF). Redness (a^*) increased from 7.19 to 7.60, and the peak of yellow (b^*), which was determined at 20% GBF reached 17.03 before decreasing, an indication of optimum inclusion level. Based on individual evaluations, increasing the inclusion level of banana flour GBF resulted in negative changes on the set parameters of crispiness (8.6 to 6.8), mouthfeel (8.4 to 6.5), aroma (8.0 to 6.2), flavour (8.0 to 6.1), and aftertaste (8.4 to 6.1) all with a significance of ($P < 0.05$). Nonetheless, colour (7.7 to 7.1) and texture (7.9 to 6.8), as well as taste (8.0 to 7.1), were perceived by indicating potential consumer acceptance.

Conclusion

The inclusion of GBF into maize for Kokoro production markedly enhanced the protein and fat composition relative to the changes in colour and sensory characteristics. The 20% GBF substitution level (80M:20B) was noted to achieve the best formulation with enhanced nutrition and consumer acceptability, making it an innovative product for the promotion of food security.