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Optimization of oven drying conditions of banana (*musa spp.*, *aaa group*, cv ‘*luvhele*’ and ‘*mabonde*’) using response surface methodology

Adewale Olusegun Omolola¹, Afam Israel Obiefuna Jideani¹, Patrick Francis Kapila² and Victoria Adaora Jideani³

¹University of Venda, South Africa

²University of Venda, South Africa

³Cape Peninsula University of Technology, South Africa

Statement of the Problem: *Luvhele* and *Mabonde* banana varieties are bananas grown in Limpopo province of South Africa. They are rich in nutriment and antioxidants. Color is a main quality characteristic of food products that are affected by the drying conditions while texture changes in solid foods during processing by drying are an important cause of quality deterioration. Methodology & Theoretical Orientation: Optimization of oven drying conditions of *Luvhele* and *Mabonde* banana varieties were studied using response surface methodology. The drying was performed according to a central composite rotatable design to explore two sets of variables: oven temperatures (40, 50 and, 60°C) and drying time (1260, 1080, and 900 min) for *Luvhele*; (40, 50 and, 60°C) and (1260, 900, and 600 min) for *Mabonde*. The color and texture (hardness) data were analyzed using ANOVA and regression analysis. Findings: Results indicated that L*, a*, b*, hue angle and hardness varied with drying conditions for the two banana varieties. Values to the hue angle ranged between 63.38 – 74.70 and 60.14 - 72.80 to dried slices of the banana varieties *Luvhele* and *Mabonde*.

The hardness of dried slices of the banana varieties, *Luvhele* and *Mabonde* ranged between 1.15 - 14.62 N and 1.28 - 14.29 N, respectively. Oven temperature and drying time had significant ($p < 0.05$) effects on the overall color (hue) and hardness of *Luvhele* and *Mabonde* banana varieties. Models obtained for the prediction of overall color (hue) and hardness of dried slices of both banana varieties as a function of the process variables drying temperature and time had no significant ($p > 0.05$) lack of fit test, adequate and acceptable regression values: adjusted R² between 0.78 and 0.80 coefficient of variance (CV) < 10%; hence the models obtained for the responses were adequate and acceptable. The drying conditions of 47.56°C drying temperature and 944.87 min of drying time were found optimum to obtain a quality at desirability of 0.97 to the *Luvhele* variety; whereas 40°C drying temperature and 646.17 min of drying duration with a desirability of 0.83 was predicted as optimum drying for *Mabonde*. Conclusion: The result of this study could be used as a standard for oven drying of *Luvhele* and *Mabonde* banana varieties.

Biography

Adewale Olusegun Omolola is a postdoctoral research fellow in the Department of Agricultural and Rural Engineering, University of Venda. He specializes in modeling and optimization of food processing operations

omololadewale@gmail.com

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