

Quality Evaluation of Pregelatinized Palmyrah Tuber Flour-Based Bread Using Response Surface Methodology

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Palmyrah tuber flour (PTF) is a locally available cheap raw material with many nutritional and medicinal properties. However, the PTF does not contain gluten which is essential to improve the texture of the bread. Hence, the pre-gelatinization technique is used in the development of PTF bread to improve the texture of the bread. This research was conducted with the intention of developing a composite flour bread with the combination of pre-gelatinized PTF and wheat flour. Response surface methodology (Box-Behnken design) was used to analyze the responses of specific volume, crumb pH, moisture content, and hardness for the variables of PTF content (10, 25, 40 %), pregelatinized PTF content (2.5, 3.75, 5.0 %), and water content (25, 30, 35 %). The best formulation of 10 % PTF, 5 % pregelatinized PTF, and 35% water content was identified as the optimized parameters for bread manufacturing. The results showed that the optimized PTF bread had significantly ($p < 0.05$) high crude fiber (4.60 ± 0.01 g/100g), sodium (423.77 ± 3.72 mg/100g), calcium (61.33 ± 6.11 mg/100g), potassium (243.9 ± 22.00 mg/100g) and total polyphenol (1.307 ± 0.11 mg GAE/g) compared to the control treatment according to AOAC, 2019 method. The physico-chemical properties of PTF bread, such as water activity, ash content, acid-insoluble ash, and the crust and crumb colour, differed significantly from the control. However, there is no significant difference in pH, moisture content, and sensory properties between the two treatments. Hence, the pre-gelatinized PTF can be used as a major ingredient to reduce the quantity of wheat flour in the manufacturing of bread.

Keywords: Box-Behnken design, Palmyrah tuber flour bread, Pre-gelatinization, Specific volume, Wheat flour