



Research article

FORMULATION AND EVALUATION OF NUTRITIOUS BISCUITS: A COMPARATIVE STUDY OF COMPOSITE FLOUR BLENDS WITH JACKFRUIT SEEDS (*Artocarpus heterophyllus*), KITHUL PALM FLOUR (*Caryota urens*), AND PUMPKIN SEEDS (*Cucurbita maxima*) AGAINST WHEAT FLOUR

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ABSTRACT

Nutritional deficiencies remain a major global health concern particularly in developing countries where monotonous diets fail to provide adequate nutrients. In Sri Lanka, biscuits manufacturing heavy reliance on imported wheat flour (WF) limits dietary diversity and reduces nutritional quality. This study aimed to formulate and evaluate nutritious biscuits using composite flour (CF) consisting of jackfruit seed (*Artocarpus heterophyllus*), kithul palm (*Caryota urens*), and pumpkin seed (*Cucurbita maxima*) flours in a 1:1:1 ratio. Four flour blends were prepared: T1 (100% WF, control), T2 (85% WF + 15% CF), T3 (70% WF + 30% CF), and T4 (55% WF + 45% CF). Techno functional properties of flours, sensory attributes of the biscuits using 48 untrained panelists (9-point hedonic scale), total phenolic content (TPC) and total antioxidant capacity (TAC) of the biscuits were evaluated for all formulations. Proximate composition, shelf-life analyses and physical properties were conducted only for the selected T2 formulation. The T2 flour blend exhibited the highest water absorption, bulk density, emulsion activity and stability, and the lowest gelatinization temperature and gelation concentration. T2 biscuits achieved the highest scores for taste, aroma, and overall acceptability. Proximate analysis of T2 biscuits (per 100 g) showed 3.11 g moisture, 1.56 g ash, 20 g fat, 0.61 g fibre, 7.85 g protein, 66.87 g carbohydrate, and 478.88 kcal energy. The total bacterial count after one week without preservatives (1.9×10^2 CFU/g) remained within safe limits (1×10^4 CFU/g). All composite biscuits showed significantly higher ($p < 0.05$) TPC and TAC compared to wheat flour biscuit. These findings highlight that substituting 15% of wheat

flour by developed composite flour produced nutritionally rich and consumer acceptable biscuits, supporting food security and economic sustainability through local resource utilization.



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