

Characterisation of Bario Rice Flour Varieties: Nutritional Compositions and Physicochemical Properties

ABSTRACT

Gluten-free grains have been intensively studied as alternatives to wheat flour. Bario rice, an indigenous crop from Sarawak, Malaysia, is noted for its excellent aroma and taste. This research examined the nutritional and physicochemical properties of Bario rice flour variations. Four Bario varieties—Bario *Adan Halus* (white), Bario *Tuan* (brown), Bario *Celum* (black), and Bario *Merah Sederhana* (red)—were analysed against the reference sample. The results revealed Bario samples containing moisture contents from 8.35% to 8.69%, ash contents from 0.27% to 1.25%, crude protein contents from 6.89% to 9.43%, crude fat contents from 0.16% to 2.45%, crude fibre contents from 0.21% to 0.87%, and carbohydrate contents from 79.17% to 82.13%. All Bario rice flour contains high amylose contents (26.67% to 36.52%), which positively impact loaf volume. The water absorption capacity (1.20 g/g to 1.26 g/g) of all samples shows no significant difference ($p > 0.05$). The swelling capacity was significantly ($p < 0.05$) high in non-pigmented rice flour. In contrast, pigmented Bario rice flour presented a greater water solubility index than non-pigmented Bario rice flour. The Bario rice flour gelatinisation onset (71.43 °C to 76.49 °C) and peak (77.03 °C to 79.56 °C) temperature were lower than those of the control sample. Higher gelatinisation enthalpy was presented by Bario rice flour (1.23 J/g to 2.59 J/g) than by the control (0.79 J/g). Retrogradation onset (42.65 °C to 50.79 °C), peak (53.64 °C to 56.15 °C) temperatures, and enthalpy (0.19 J/g to 0.87 J/g) were greater in Bario rice flour compared with those in the control. The research suggests that Bario rice flour has potential for use in gluten-free bread mainly due to the relevant carbohydrates, crude proteins, amylose, and swelling capacity.