CHEMICAL COMPOSITION AND SENSORY PROPERTIES OF BISCUIT FROM MALTED SORGHUM FLOUR AND SOY PROTEIN ISOLATE BLEND

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ABSTRACT

The challenges associated with climate change, increasing population, and rapid urbanization have drawn attention to climate-smart cereals such as sorghum as a sustainable source of food. Soybean proteins have been accepted in many applications because they provide desirable functionalities in developed foods at lower cost. This study evaluated the chemical composition and sensory quality of biscuit produced from malted sorghum flour (MSG) and soy protein isolate (SPI) composite flour. Simplex lattice mixture design for two component mixtures was used to formulate the flour combination (70-90% MSG: 10-30% SPI). MSG-SPI biscuits were analysed for chemical composition, physical properties and consumer acceptability. Data were analysed using ANOVA, regression model, and numerical optimisation to obtain the optimized Sample. The optimised MSG-SPI biscuits were analysed for proximate composition, minerals, anti-nutrients, amino acid profile, protein digestibility, texture profile and sensory-descriptive profile. Texture profile and consumer acceptability of optimised MSG-SPI biscuit and commercial reference biscuits (Coaster® biscuit and Digestive fibre® active biscuit) were compared using the texture analyser and 9-point hedonic scale. MSG-SPI biscuits differed significantly ($p<0.05$) in moisture content (4.91-11.7%), protein (10.94-19.73%), fat (13.47-17.25%), ash (6.55-8.12%), fibre (10.44-12.32%), and carbohydrate (33.21-51.12%) contents. The biscuits also differed significantly ($p<0.05$) in diameter (44.91-45.32 mm), thickness (8.83-9.23 mm), spread ratio (4.87-5.13), weight (5.85-6.24 g), browning index (20.64-23.73) and overall consumer acceptability (6.56-7.02). Optimised MSG-SPI biscuit was produced from 80% MSG and 20% SPI. The nutritional quality of optimised MSG-SPI biscuit were moisture (8.5%), protein (14.81%), fat (15.63%), ash (7.22%), fibre (11.33%), carbohydrate (42.51%),

potassium (3.01 mg/100 g), phosphorus (38.19 mg/100 g), iron (0.102 mg/g), zinc (0.213 mg/g), magnesium (0.98 mg/g) and copper (0.25 mg/100 g). Anti-nutritional factors of the optimised biscuit were phytate (113.9 mg/100g), and tannins (5.0 mg/100g). Essential amino acids of the optimised biscuit were leucine (6.26 mg/100g protein), lysine (3.54 mg/100 g protein), isoleucine (3.66 mg/100 g protein), phenylalanine (4.67 mg/100 g protein), tryptophan (0.76 mg/100 g protein), valine (3.46 mg/100 g protein), methionine (1.22 mg/100 g protein), histidine (2.22 mg/100 g protein), glutamic acid (10.84 mg/100 g protein) and threonine (2.72 mg/100 g protein) and a protein digestibility value of 74.68%. Texture profile of optimised MSG- SPI biscuit was gumminess (5753 N), adhesiveness (3.32 J), chewiness (3250.5 N) and cohesiveness (0.70) as compared to reference biscuits. Eight terms (smooth appearance, brown colour, hard texture, gritty texture, crunchy texture, sweet taste, malty aroma, and caramel flavour) were generated to describe the sensory attributes of the biscuit. The consumer acceptability of the biscuit was relatively high (6.96). In conclusion, addition of MSG to SPI increased the protein content of MSG-SPI biscuits effectively by about 70% and the ash content by about 24%. Consumption of optimised MSG- SPI biscuit could contribute to a healthy snacking due to its high protein content, very high protein digestibility, high profile of essential amino acids, especially leucine and glutamic acid and low anti-nutrient content especially tannin. All the ratios of MSG-SPI biscuits produced had high scores for consumer acceptability.