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Physico-chemical, sensory and microbial qualities of yacon (*Smallanthus sonchifolius*)-based oatmeal energy bar

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Abstract

Yacon is a sweet tasting Andean tuber considered a functional food due to its bioactive compounds. It has been used to formulate various baked products but there's limited research on its use in energy bars. The aim of this study was to evaluate the physico-chemical, sensory and microbial qualities of yacon based oatmeal energy bar. Energy bars were made using four oats to yacon powder mixtures in the following proportions: 100:00 (control), 95:5, 85:15, 75:25 and 60:40. A completely randomised design with three replicates was used and analysed using one way analysis of variance and significant differences determined by Fisher's Least Significant Difference. There was no significant difference in ash and fiber ranging 1.93 %⁻².95 % and 0.70 %⁻¹.14 % respectively, with substitution of yacon powder. The carbohydrate content significantly increased 74.79 %-82.72 % while there was a significant decrease in moisture, protein and fat 7.90 %-4.70 %, 11.90 %-7.57 %, 2.79 %-0.91 % respectively with substitution of yacon powder. There was 40 % significant decrease in total energy (1555.88kJ-1545.40 kJ) with addition of 40 % yacon powder. Yacon powder also led to a significant increase in polyphenol content from 254.40mg/100g-338.50mg/100 g which increased antioxidant activity. Calcium (24.70mg/100g-39.21mg/100 g) and potassium (444.97mg/100g-537.50mg/100 g) also increased significantly with addition of yacon. There was a significant decrease in flavonoid content (656.40mg/100g-522.20mg/100 g) due to processing conditions. Texture (6.52N⁻².44 N) and pH (5.85-5.72) significantly decreased while water activity (0.62-0.68) and bulk density (1.26 g/cm³-1.41 g/cm³) increased, low pH guarantees long shelf-life. Consumer acceptability tests showed significant differences highlighting the treatment with 60:40 oats: yacon powder with the highest scores and intent to buy. Yeast and molds were detected after 30-day storage at room temperature; the count remained within safe limits (yeasts/molds <100 CFU/g). Making the energy bars with oats and yacon powder can increase the utilisation of this exotic tuber that offers nutritional benefits as well as microbial safety and satisfactory sensory characteristics.

Keywords: Energybar, fructooligosaccharides, oats, yacon