Potentials of biodegraded cashew pomace for cake baking

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Abstract. The use of biodegraded cashew pomace processed into flour for cake baking was investigated. The physico-chemical changes during the submerged fermentation of the pomace and the organoleptic qualities of the composite cake were also monitored. There was an increase of about 50% in protein content of the pomace after 96 h of fermentation. However, a reduction of about 61% in the total microbial count after 24 h was due to the toxic effect of the organic acids on the microbial cells during fermentation. The cashew flour had high crude fibre (ca. 20–33%) and carbohydrate (ca. 16–47%) values. The composite cake made from a 10:90 combination of 96 h-degraded cashew flour/wheat flour respectively was the most accepted. The cake which had a specific volume of 0.53 ml/g lost 11.1% moisture when 38 g of its batter was exposed to 190°C for 10 minutes. This cake had a calorie value of 293.8/100 g and may be useful in feeding diabetic patients who require low carbohydrate foods.

Introduction

A substantial amount of cashew pomace is discarded as waste or offered as ruminant feeds without additional treatment. Cashew pomace has a high percentage of cellulose fibres (Anonymous, 1966) which are associated with other materials such as pectin, lignin and hemicelluloses in a complex heterogeneous structure in the natural state (Birch et al. 1976). Cellulose constitutes about 20–60% of the cell wall polysaccharides of fruits and vegetables (Selvendran, 1983). Generally, cellulose contains 5–20% of sugars other than glucose, including xylose, arabinose, galactose and uronic acid.

Humans and most animals are unable to digest cellulose since they lack cellulases in their digestive tracts. The fact that ruminants are able to digest cellulose is due to the presence of cellulose-excreting microorganisms in the rumen. Indeed, only a few microorganisms are known to synthesize the
complete enzyme systems capable of attacking native cellulose (Reese et al., 1950). Acid hydrolysis of cellulose leads to the production of cellobiose (Brown and Fitzpatrick, 1976) which can be further broken down into glucose molecules by cellulase.

Carboxymethylation and methylation of cellulose yield soluble derivatives, which although are practically indigestible, are used in food industries as thickening agents (Berk, 1976). Furthermore, the use of microcrystalline cellulose as an indigestible non-caloric constituent in dietetic foods is increasing (Berk, 1976).

There are no reports in literature on the baking properties of biodegraded cashew pomace flour in cake making nor any on the nutritional significance of the composite flour made with other cereals. This work was, therefore, undertaken to monitor the physico-chemical changes in cashew pomace during a 4-day fermentation. It also reports on the processing of the pomace and properties of the resulting flour used for cake baking. The palatability attributes and nutritional significance of the composite cake are discussed.

Materials and methods

The study was carried out in two major experiments which involved (i) a pretreatment of cashew pomace to upgrade the quality, especially the crude protein content, of the resulting flour used in a latter study and (ii) monitoring of the physico-chemical properties of the cashew pomace flour with a view to selecting a flour sample which has characteristics close to wheat flour, for cake baking purpose.

Source and preparation of cashew pomace

The cashew pomace was obtained from the yellow variety of cashew fruit, Anacardium occidentale, grown in a local orchard at FUT 31, Hudco quarters, North Bank, Makurdi, Nigeria. The healthy mature fruits were squeezed out using a juicer. The mash which was also squeezed through a muslin cloth was chopped into small pieces dried at 50 °C for 48 h and later collected in a sterile 2-l flask.

Fermentation of pomace

The cashew pomace was subjected to a submerged fermentation process for about 4 days, a period when an appreciable microbial growth would have occurred (Aderiye and Akindolani, 1988) to effect some biochemical changes.