

**Physicochemical Characterization and Food Application Potential of Pumpkin  
(*Cucurbita Sp.*) Fruit and Seed Kernel Flours**

**Monicah Salano Fedha**

**A thesis submitted in partial fulfilment for the Degree of  
Master of Science in Food Science and Postharvest Technology  
in the Jomo Kenyatta University of Agriculture and Technology**

**2008**

## ABSTRACT

The purpose of this work was to study the effect of drying on physicochemical properties and nutritional quality of fruits, seeds and seed kernels of two species of pumpkin; isolate and quantify their fruit starch; characterize the functional properties of the seed oils and proteins; carry out elemental mineral analysis and lastly formulate a food product based on pumpkin fruit flour-wheat flour blend.

The investigation was done on samples of *Cucurbita maxima* and *Cucurbita moschata*. The treatment structure involved fruits with rind and those without rind (fruit pulp), whole seeds and seed kernels, and raw and dry samples (flours). Proximate composition of raw *C. moschata* fruit with rind was 87.9 % moisture (fresh weight), 1.6 g/100g crude ether extract, 4.9 g/100g crude protein, 10.9 g/100g crude fibre, 6.7 g/100g crude ash, and 76.0 g/100g nitrogen free extract (by difference) on dry weight basis. The corresponding values for *C. maxima* were 87.0 g/100g, 2.0 g/100g, and 3.9 g/100g, 9.6 g/100g, 6.9 g/100g, and 77.6 g/100g respectively. *C. moschata* fruit with rind contained significantly ( $p < 0.05$ ) higher crude protein and crude fibre than *C. maxima*. Proximate analysis of the seeds showed that *C. maxima* whole seeds had significantly ( $p < 0.05$ ) higher moisture, crude fat and crude protein content than *C. moschata* seeds. The results indicated that the pumpkin seeds are rich in lipids and proteins. Physicochemical analysis of oil extracted from *C. maxima* and *C. moschata* seeds showed that they are highly unsaturated. The lipid profile of the pumpkin seed oil indicated that the major unsaturated fatty acids were oleic and linoleic. Fruits and seeds contained varying amounts of potassium (K), phosphorus (P), magnesium (Mg), zinc (Zn), manganese (Mn), Iron (Fe), calcium (Ca), copper (Cu) and sodium (Na). The fresh fruits with rind of *C. maxima* had significantly ( $p < 0.05$ ) higher amounts of starch (9.5 % f. w) and  $\beta$ -carotene ( $582.7 \pm 3.9 \mu\text{g/g d.w}$ ) than *C. moschata* fruit with rind that had

corresponding values of 3.8 mg/100g and  $534.5 \pm 10.2$   $\mu\text{g/g}$  on dry weight basis respectively. Emulsifying activity of pumpkin seed proteins ranged between 42-46 %, while foaming activity ranged between 26-43 %. The cake flavour at 5% pumpkin flour replacement level was the most acceptable. The results show that pumpkin seeds and fruits could be processed and potentially added to various food systems to improve nutrient content and as functional ingredients, hence their increased production, processing and utilization should be encouraged.