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CORRELATION AND REGRESSION ANALYSIS OF PROXIMATE NUTRITIONAL PARAMETERS IN MICROWAVE-BAKED ORANGE-FLESHED SWEET POTATO (*IPOMOEA BATATAS L.)*

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Abstract: The aim of the present study was to evaluate the proximate nutritional composition and parameter interdependencies of orange-fleshed sweet potato pulp baked in the microwave. Various cooking techniques—such as frying, boiling, dehydration, conventional baking, steaming, and microwave processing—can be utilized for preparing orange-fleshed sweet potatoes. Although thermal treatment improves sensory attributes, it also influences the nutritional composition, digestibility, and nutrient bioavailability in the final product. Microwave baking offers a rapid dielectric heating method that preserves water-soluble nutrients while maintaining structural food matrix relationships.

• Introduction

The sweet potato (Ipomoea batatas L.) is a food crop widely cultivated across the world. Orange-fleshed sweet potato contains significant amounts of essential nutrients, including carbohydrates, dietary fibre, vitamins, and minerals (such as potassium, phosphorus, calcium, magnesium, iron, manganese, and copper), which explains the considerable scientific interest it has attracted in recent years.In terms of biologically active compounds, orange-fleshed sweet potatoes are rich in carotenoids and phenolic compounds—responsible for the characteristic skin and flesh color—as well as important amounts of vitamin C. Microwave baking represents a fast and efficient thermal processing method that minimizes nutrient leaching.

• Material and method



Figure 1. Orange-fleshed sweet potato (Ipomoea batatas L.) samples: raw storage roots in cross-section (left) and microwave-baked pulp (right)

Orange-fleshed sweet potato (Ipomoea batatas L.) samples were collected from three local retailers. Proximate nutritional parameters (moisture, ash, protein, fat, crude fibre, and total carbohydrates) were determined for all microwave-baked pulp samples, and the data were statistically evaluated in R using Pearson's linear correlation and simple linear regression.

• Results and discussions

The correlation matrix (heatmap) revealed distinct compositional patterns and trade-offs within the microwave-baked orange-fleshed sweet potato pulp: Ash & Crude Fibre - very strong positive correlation ($r = .99$, $t(1) = 35.50$, $p = 0.018$), indicating that mineral retention is tightly bound to the structural cell-wall polysaccharide matrix; Moisture & Fat - very strong positive correlation ($r = .99$, $t(1) = 22.05$, $p = 0.029$), reflecting coupled water-holding and lipid retention during rapid dielectric heating.

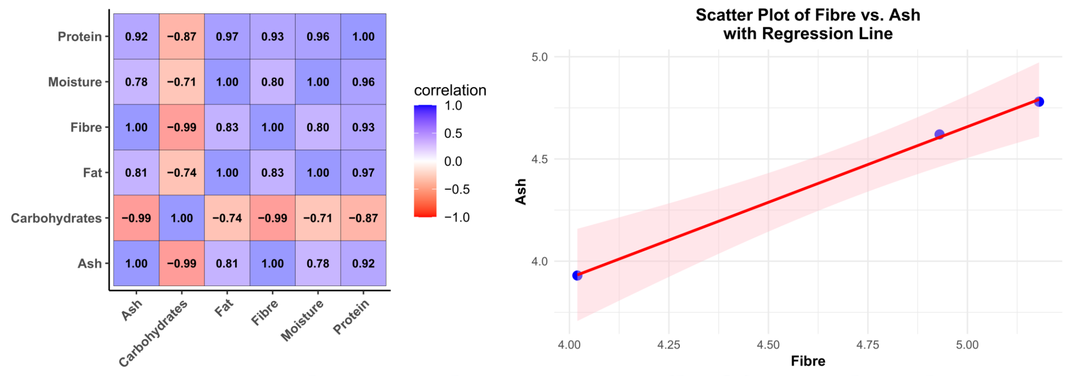


Figure 2. Correlation heatmap (left) and Fibre vs. Ash linear regression (right).

Conclusions

- The correlation analysis showed strong positive associations among moisture, protein, fat, ash, and crude fibre, while total carbohydrates displayed a clear inverse relationship with the other nutritional components, particularly ash and fibre.
- In addition, the linear regression models developed in this study showed high predictive accuracy, confirming that basic gravimetric parameters can reliably estimate variations in more complex nutritional fractions within microwave-baked sweet potato pulp.