



Changes in Functional Compounds and Antioxidant Activities of Freeze-Dried Natal Plum (*Carissa macrocarpa*) Fruit Powder During *In Vitro* Gastrointestinal Digestion

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Abstract

The global functional food market value is on the rise due to increased consumer acceptance of functional foods. Natal plum (*Carissa macrocarpa*) fruits are a natural source of functional ingredients. Natal plum is bright red or crimson red in colour and a rich source of Cyanidin-3-O- β -sambubioside and cyanidin-3-O-glucoside. Cyanidin derivatives are bioactive compounds with high functional properties such as antioxidant activity; however, the successful application as a functional food ingredient depends on the bioaccessibility of the phytochemicals. This study focused on characterising and quantifying the different components of anthocyanins and the antioxidant capacity of freeze-dried Natal plum powder during simulated *in vitro* gastrointestinal digestion. UPLC/QTOF/MS helped to identify and quantify the anthocyanin components. Antioxidant activity was determined using DPPH, ABTS, and FRAP assays. DPPH and ABTS scavenging activity decreased in the gastric fraction, while at the intestinal phase is increased significantly. The FRAP activity was similar in the gastric fraction and the undigested sample but decreased in the intestinal fraction possibly due to pH changes between the gastric and intestinal phase. A strong positive correlation was established between the different phenolic components and DPPH, ABTS and FRAP activity (R^2 values between 0.79 and 0.99). The pH (7) in the intestinal phase affected the stability of cyanidins and resulted in increased concentrations of gallic acid (8.8 mg kg^{-1}), protocatechuic acid (88.6 mg kg^{-1}), coumaric acid (85.7 mg kg^{-1}) and ferulic acid (73.5 mg kg^{-1}) and increased the bioaccessibility of these phenolic acids. Cyanidin 3-O- β -sambubioside showed 32.2% bioaccessibility compared to cyanidin-3-O-glucoside (16.3%); therefore, consumption of fruits, such as Natal plum, with a higher concentration of cyanidin 3-O- β -sambubioside must be encouraged for health benefits.

Biography: Faith Seke

Faith Seke is a PHD student at the Tswane University of Technology, South Africa. She holds an honours degree in Food Science and Nutrition from Midlands State University Zimbabwe. She also holds a master's degree in Food Science and Technology from Durban University of Technology. The project she worked on was based on the production of gluten free bread using some of the underutilised crops in South Africa. The project sought to evaluate the influence of hydrocolloids and enzymes on bread quality. The project she is currently working on is focused on investigating the phytonutritional properties, antioxidant, and biological activities of indigenous fruits, and to evaluate their potential in the development of functional foods. This project was motivated by the fact that the global functional food market value is rising due to

increased consumer acceptance of functional foods and indigenous fruits are a natural source of functional ingredients.