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Impact of temperature on level and functionality of miraculin in Beninese sirsè berries (*Synsepalum dulcificum*)

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Abstract

This study aimed to valorise the miracle fruit (*Synsepalum dulcificum*) from Benin. This fruit has the ability to change the acidic taste of ingested food into a sweet taste after consumption, due its miraculin content, which is a glycoprotein present in its pulp. Miraculin is low in calories but has a sweetening power 400,000 times greater than that of saccharose, making it a natural compound that could be used to develop natural sweeteners for food use, in response to the nutritional problems associated with sugar overconsumption. The aim of this study was to assess the effect of temperature on this heat-sensitive glycoprotein, in order to define the optimum conditions for the stabilisation of the pulp, at lower cost while preserving its functional properties. Fruits, collected from markets in the locality of Sèhouè in the Republic of Benin, were frozen, depulped and then stored at -20°C before processing and analysis. Heat treatments ranging from 40 to 70°C were applied to the fresh pulp for 5 min. Sensory tests were carried out on the pulp samples generated to test miraculin functionality and determine the remanence time after treatment at different temperatures. Analytical measurements were carried out to determine miraculin concentrations and compare them with sensory results. Sensory analysis showed that the sweetening effect of native pulp lasted for more than 2 hours. A significant loss of functionality was observed after the pulp was exposed to temperatures above 50°C. The results of SDS-PAGE analysis also showed that from temperatures above 50°C, the miraculin concentration of the pulp decreased significantly, but was not equal to zero. These results suggest that pulp could be stabilised by drying at low temperatures between 30 and 50°C.

Keywords: Drying, heating, miraculin, stabilisation, sweetener