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Nano-phytosomal Formulation of *Cyclopia subternata* (Honeybush) Extract Improves the Stability of Polyphenols in a Ready-To-Drink (RTD) Model Beverage During Thermal Preservation

Jade Tobin[1,2], Chantelle Human[1], Dalene De Beer[1,2], Elizabeth Joubert[1,2]

[1]Plant Bioactives Group, Post-Harvest & Agro-Processing Technologies, Agricultural Research Council, Stellenbosch, South Africa. [2]Department of Food Science, Stellenbosch University, Stellenbosch, South Africa

Abstract

Introduction: Green honeybush (*Cyclopia subternata*) showed potential for allergy prevention at a dosage relevant to a cup of tea making it suitable as a functional beverage ingredient. It is challenging to use phenolic-rich extracts as functional ingredients due to the poor stability of phenolics during processing. Phytosomes, a type of lipid-based nanovesicle, could potentially address this problem.

Methodology: The effect of heat preservation on the phenolic stability was investigated in model ready-to-drink (RTD) beverage solutions containing either green *C. subternata* extract (CSE) or nano-phytosome vesicles loaded with *C. subternata* extract (CSE-NV) with or without citric acid, reconstituted to a cup of tea strength. The model solutions were heated at 70, 80 and 90 °C, relevant to low-temperature pasteurisation, for extended heating periods. The content of the individual phenolic compounds in the solutions was monitored by high-performance liquid chromatography coupled with diode-array detection (HPLC-DAD) at pre-determined intervals during the heat preservation.

Results and discussion: Thermal processing of the RTD beverage model solutions significantly affected the phenolic composition of the functional CSE. Mangiferin, prone to oxidative degradation and a major compound in the CSE, was considered a marker compound to measure extract stability. Phytosomal formulation significantly improved mangiferin stability during thermal processing with citric acid further improving stability.

Conclusions: This study showed that phytosomal formulation is a useful method for the stabilisation of phenolic compounds in functional beverage formulations that require thermal preservation. The results can be used to choose suitable thermal processing conditions for a functional beverage containing nano-phytosome vesicles loaded with *C. subternata* extract with high phenolic content.