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Phenolic Compounds of Cyclopia Subternata – Assessing Their Stability in Functional Ready-To-Drink Beverage Model Solutions

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Abstract

Introduction: *Cyclopia subternata* (honeybush) extract showed potential to alleviate allergies in vivo at a dose equivalent to a cup of tea. A ready-to-drink (RTD) beverage with *C. subternata* extract as functional ingredient would provide the consumer with a convenient and standardised product. However, the challenge is to maintain the high levels of the bioactive polyphenols until purchase. In order to address this effectively, more information is required on the stability of the phenolic compounds during routine heat preservation, required for a microbiologically safe product, and during the shelf-life storage period.

Methodology: The effect of heat preservation on the phenolic stability was investigated in model solutions containing a standardised green *C. subternata* extract, reconstituted to a cup of tea strength, and other common RTD beverage ingredients (citric acid and ascorbic acid). The model solutions were heated at 93, 121 and 135 °C, relevant to pasteurisation, commercial sterilisation, and ultra-high temperature (UHT) pasteurisation, respectively for extended heating periods. The shelf-life of these solutions was determined by storing at 25 °C and 40 °C for 180 and 90 days, respectively. The content of the individual phenolic compounds in the solutions was monitored by high-performance liquid chromatography coupled with diode-array detection at pre-determined intervals during the heat preservation and shelf-life study. Kinetic modelling was performed to determine the reaction rate constant of each compound under different experimental conditions.

Results and Discussion: Heat processing and storage of the RTD beverage model solutions significantly affected the phenolic composition of the functional *C. subternata* extract. Second order reaction rate constants determined by kinetic modelling of the individual quantified phenolic compounds indicated the dihydrochalcones and xanthones to be the most unstable during heat preservation and shelf-life storage. Overall, the phenolic compounds were the most stable during UHT pasteurisation, due to the short exposure to heat and storage at 25 °C. Addition of ascorbic and/or citric acid generally improve compound stability, but the effects of the acids were compound and temperature dependent.

Conclusions: The results of the study can be used to choose suitable heat processing and storage conditions for a *C. subternata* functional RTD beverage with high phenolic content.

Biography: Chantelle Human

Dr Chantelle Human's inherent interest in the application of chemistry in product development has guided her career thus far. She completed her MSc in chemistry and polymer science gaining expertise in physicochemical analyses techniques and applications for smart polymers. Chantelle's sentiment for food and healthy living led her to complete a PhD in Food Science. Her research had a strong focus on chemistry and polymer science within the field of food science and involved the efficient delivery of a rooibos nutraceutical by micro- and nanoencapsulation. After completion of her PhD, she was employed as an R & D Chemist at Vital Health Foods, which allowed her to gain valuable industry experience in terms of relevant analytical testing and nutraceutical product development. Currently, she is employed at the Agricultural Research Council as a researcher where she is focused on improving the agro-processing industry of South Africa.