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Identification and quantification of glucosinolates in local Brassica species/varieties and study of the effect of cooking methods on *in vitro* accessibility of glucosinolates products

by

PWNM Colombagama

M.Phil 2009

Identification and quantification of glucosinolates in local Brassica species/varieties and study of the effect of cooking methods on *in vitro* accessibility of glucosinolates products

Results released after the board meeting held on 23/08/2011.
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PWNM Colombagama

Thesis submitted to the University of Sri Jayewardenepura for the award of the degree of Master of Philosophy in Food science and Technology on 2009.

DECLARATION

The work described in this thesis was carried out by me under the supervision of Prof. KKDS Ranaweera and Prof. UG Chandrika and a report on this has not been submitted in whole or in part to any University or any other institution for another Degree.

PWNM Colombagama

N. Colombagama ..... 21.06.2011 .....

Signature Date

We certify that the above statement made by the candidate is true and all corrections, additions and amendments have been done in accordance with the comments and suggestions of the examiners.

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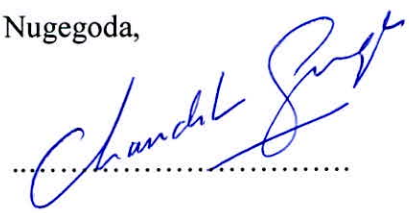

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DEDICATED TO MY LOVING PARENTS

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ABSTRACT

Glucosinolates are a large group of plant secondary metabolites. They are common in all economically important species of Brassicca vegetables. Reduced risk of certain cancers is found to associate with consumption of *Brassicaceae* family vegetables which contain glucosinolates. In the present study, four major glucosinolates (sinigrin, glucoraphanin, glucotropaeolin and gluconasturtiin) were identified in the tested samples and quantified using High Performance Liquid Chromatography (HPLC) combined with photodiode-array detection (PDA). Accordingly, five most locally popular Brassica species namely, broccoli (*Brassica oleracea* var. italica), white cabbage (*Brassica oleracea* var. capitata), red cabbage (*Brassica oleracea* var. capitata), radish (*Raphanus sativus*) and cauliflower (*Brassica oleracea* var. botrytis) were analysed for their glucosinolates profile in raw, cooked and *in vitro* digested samples. The stability of glucosinolates was evaluated in selected vegetables under different cooking methods and *in vitro* gastrointestinal digestion methods. It was observed that frying is the best method to preserve glucosinoltes in vegetables, compared with soups or vegetables cooked with coconut milk. It was found that the *in vitro* gastric digestion of vegetable varieties causes high losses in individual glucosinoltes (~70%). After the pancreatin-bile salts mediated digestion, an additional decrease in individual glucosinoltes was observed (~20%). When the Brassicca vegetables were subjected to complete *in vitro* gastro intestinal digestion, the amount of glucosinolates retained were approximately 10%. This high percentage of loss during the digestion process could be due to the degradation of glucosinolates either to nitriles or to secondary reaction products depending on the gastro intestinal pH conditions.