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RESEARCH ARTICLE

Determination of selenium content in selected edible green leaves

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Abstract: The selenium (Se) contents in seven conventional Edible Green Leaves (EGL) that consumed by Sri Lankans were determined using Hydride Generation Atomic Absorption Spectrometric method (HGAAS). The EGLs that were grown in five districts under different climatic conditions in Sri Lanka were collected from Gampaha, Kandy, Kurunegala, Anuradhapura and Puttalam areas. The EGL that were subjected to current study are *Centella asiatica (Sin. Gotukola), Alternanthra sessilis (Sin. Mukunuwenna), Basella alba (Sin. Nivithi/ Spinach), Boerhavia diffusa (Sin. Sarana), Ipomoea aquatica (Sin. Kankun), Amaranthus spinosus (Sin. Thampala)* and *Hygrophila schulli (Sin. Neeramulliya)*. Soil samples corresponding to each EGL sample were also collected from Gampaha, Kandy and Anuradhapura districts in order identify a relationship between the Se content in plants and soils. Prior to the analysis EGL samples and corresponding soil samples were subjected to acid digestion with nitric acid. Se contents in the EGL were in the range of 31.2 – 103.2 µg kg^{-1}on dry weight basis. According to the results, *Centella asiatica* and *Hygrophila schulli* varieties showed relatively higher Se content, while *Hygrophila schulli* shown the highest value and the lowest was reported in *Boerhavia diffusa*. The Se content in corresponding soil samples were ranged from 96.4 to 133.9 µg kg^{-1}on dry weight basis. The Se content in soil was higher than that in plants, but there was no significant correlation between the Se content in soil and EGLs.

Keywords: Selenium, edible green leaves, soil, Sri Lanka.

INTRODUCTION

Selenium is an essential micro-nutrient for both human and animals that specially incorporated as amino acids. It is an important trace element in human for good thyroid function and promotes immunity system (Hatfield, 2012). Its anti-oxidant activity reduces the risk of cancer and coronary heart diseases (Patric, 2004; Briggs, 1999). Selenium is also involved in the regulation of variety of cellular functions in living organisms (Rayman, 2000). Tolerable intake level of Se is quite narrow and its deficiencies and toxicities may cause considerable impact on human and animals (Food and Nutrition Board, 2000) and that indicate the vital importance of determining Se content in human diet.

There are relatively many reports on Se content in food (Sunde *et al*., 2006), but limited studies carried out on the Se content in foods consumed by Sri Lankans; i.e.: studies done on rice (Mahagama, 2013, Prasanna 2014), vegetables and cereals (Bandara, 2012; Buwaneka, 2014; Prasanna, 2014). The Se content in meals consumed for lunch by Sri Lankans has also been reported (Kiridena, 2017).

Majority of South Asians including Sri Lankans are consumed plant-derived foods. Particularly, EGLs are dominant choice in their daily meals while the staple food is rice. The contribution of EGLs to dietary intakes of Se has not been reported in Sri Lanka. EGL that were grown on selenium enriched soil and their selenium content was determined by spectrophotometry elsewhere (Petro *et al.,* 2015)

The aim of the present study was to evaluate the Se content in selected edible green leaves consumed by Sri Lankans. The Analysis was done by extracting Se by acid digestion followed by determination using Hydride Generation Atomic Absorption Spectrometry (HGAAS) technique.

MATERIALS AND METHODS

Reagents

Nitric acid (AR, 69%, Sigma Aldrich), hydrochloric acid (AR, 37%, Fluka), hydrogen peroxide (60%, BHD), sodium borohydride (98%, Sd fine-CHEM), sodium hydroxide (99%, Sigma Aldrich), Selenium (AAS standard, Reagecon).

Instrument

Hydride generation atomic absorption spectrophotometer (Analytikjena - nov AA 400P)

Sampling

Seven varieties of edible green leaf samples were selected for the analysis from five districts including Gampaha, Kandy, Kurunegala, Anuradhapura and Chilaw. The EGL samples that were selected for the current study are *Centella asiatica (Sin. Gotukola), Alternanthra sessilis (Sin. Mukunuwenna), Basella alba (Sin. Nivithi/ Spinach), Boerhavia diffusa (Sin. Sarana), Ipomoea aquatica (Sin. Kankun), Amaranthus spinosus (Sin. Thampala)* and *Hygrophila schulli (Sin. Neeramulliya)*. Corresponding soil samples were also collected from three districts including

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