

spectrophotometry. Fuming nitric acid showed the lowest matrix effects for cadmium and copper (1.2 – 4.8 and 2.4 – 7.1, respectively).

Keywords

Biochar, activated carbon, low cost adsorbents, digestion, matrix effect, turbidity

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Determination of the oxalate ion concentration in green leafy vegetables

J V Liyanage, U K Jayasundara*

College of Chemical Sciences, Institute of Chemistry Ceylon, Rajagiriya, Sri Lanka

Email: udayaj@ichemc.edu.lk

Kidney and gall stone diseases occurring in the urinary tract can be life threatening and are promoted by the existence of oxalic acid (oxalate ion) in green leafy vegetables. Plants that accumulate large quantities of oxalic acid generally contain high concentrations of oxalate ions and salts. Consumption of green leafy vegetables containing large amount of oxalate could be fatal to humans because of the formation of oxalate deposits in vital tissues or organs in the body. The patients diagnosed with kidney and gall stones are advised to control and limit green leafy vegetable intake 40 – 50 mg/day according to American Diabetes Association. Thus, the objective of the present study was to determine the oxalate ion content of seven green leafy vegetables, namely spinach (*Spinacia oleracea*), mukunuwanna (*Alternanthera sessilis*), gotukola (*Centella asiatica*), hathawariya (*Asparagus zeylanicus*), thebu (*Costus speciosus*), cabbage (*Brassica oleracea*), leeks (*Allium ampeloprasum*) commonly consumed in Sri Lanka.

The raw materials for this study were purchased from local markets in the Central Province. The edible portion of plant material was dried, refluxed, extracted with diethyl ether, precipitated with a saturated calcium solution, and pH controlled solution was titrated with standard potassium permanganate solution in triplicate. The volume of potassium permanganate was used to calculate the amount of oxalate ion present in 20 g of each green leafy vegetable.

According to the results, all green leafy vegetables contain about 88% or more of moisture content. The results also show measureable amounts of soluble oxalates present in spinach, gotukola, mukunuwanna, hathawariya, and in thebu while cabbage and leeks have less or undetectable amount of oxalate ions. According to the oxalate content, the plants can be classified into four groups as green leafy vegetables with high oxalate content such as spinach (456.88 ± 20.59 mg/20.00 g) and hathawariya (556.04 ± 3.69 mg/20.00 g); leafy vegetables with intermediate level of oxalate content such as mukunuwanna (184.67 ± 8.05 mg/20 g) and thebu

(139.83 ± 3.20 mg/20.00 g); leafy vegetables with low level of oxalate content as in gotukola (48.04 ± 0.00 mg/20.00 g), and leafy vegetables with undetectable content of oxalate such as cabbage and leeks.

The green leafy vegetables which are commonly consumed by Sri Lankans have detectable and measurable amount of oxalate ions which exceeds the minimum permissible level for kidney and gall stone patients according to American Diabetes Association f. Except gotukola, all other green leafy vegetables with detectable oxalate ions, have several folds of recommended oxalate ions which is harmful for the human health.

Keywords

oxalate ion content, green leafy vegetables, kidney and gall stones, permissible level