

Pilot survey to monitor atmospheric deposition of heavy metals in moss species (*Hyophila involuta*) in Kurunegala using two different digestion methods

K. G. Jayalath, M.P. Deeyamulla & R.C.L. De Silva
Department of Chemistry, University of Kelaniya

Dry ashing digestion is a traditional digestion method used during the sample preparation step in moss biomonitoring studies in Sri Lanka. The aim of this study is to compare dry ashing procedure with the rapid and efficient microwave digestion procedure to validate previous findings. In February 2013, moss species (*Hyophila involuta*) were collected from Kurunegala and the concentrations of five heavy metals copper, lead, nickel, chromium and cadmium were analyzed by atomic absorption spectrometer followed by two different digestion procedures.

The atmospheric deposition of heavy metal concentration in Kurunegala is expressed as dry weight of moss and the ranges of heavy metals were Cu (18.39 $\mu\text{g/g}$ – 23.39 $\mu\text{g/g}$), Pb (13.66 $\mu\text{g/g}$ – 19.79 $\mu\text{g/g}$), Ni (8.62 $\mu\text{g/g}$ – 13.65 $\mu\text{g/g}$), Cr (19.18 $\mu\text{g/g}$ – 30.36 $\mu\text{g/g}$) and Cd (0.72 $\mu\text{g/g}$ – 0.78 $\mu\text{g/g}$) in microwave digestion and Cu (14.43 $\mu\text{g/g}$ – 19.43 $\mu\text{g/g}$), Pb (10.00 $\mu\text{g/g}$ – 15.54 $\mu\text{g/g}$), Ni (11.00 $\mu\text{g/g}$ – 16.68 $\mu\text{g/g}$), Cr (16.49 $\mu\text{g/g}$ – 29.03 $\mu\text{g/g}$) and Cd (0.70 $\mu\text{g/g}$ – 0.80 $\mu\text{g/g}$) in ash digestion respectively. The metal content of Cu, Pb, Cr and Cd shows higher values in microwave digestion whereas Ni shows higher concentrations in ashing procedure. However, the comparison of two digestion methods (ANOVA, $p < 0.05$) showed no statistically significant differences in results.

The recovery percentages of five heavy metals in two digestion methods were Cu (97.6 \pm 0.4 %), Pb (95.9 \pm 1.3 %), Ni (97.6 \pm 1.6 %), Cr (98.0 \pm 1.2 %) and Cd (95.3 \pm 4.1 %) in microwave digestion method and Cu (93.1 \pm 2.5 %), Pb (92.0 \pm 2.7 %), Ni (99.6 \pm 2.1%), Cr (97.3 \pm 1.7 %) and Cd (96.8 \pm 2.8 %) in ash digestion method separately. The relative standard deviation of readings was less in microwave digestion and further, time required for dry ashing digestion and microwave digestion were 4 hours and 45 minutes respectively.

Therefore ashing digestion method is more time consuming than the microwave digestion method without any advantages in terms of digestion efficiency.