Abstract No: MO-12

Monitoring heavy metal air pollution using moss as a biomonitor and developing a mathematical relationship based on surrogate approach, to determine heavy metal loads in moss

A. A. R. Yohani* and M. P. Deeyamulla

Department of Chemistry, Faculty of Science, University of Kelaniya, Sri Lanka
*rashmiyohani95@gmail.com

Atmospheric pollution is one of the major problems that mankind is dealing with. Under air pollutants, heavy metals are toxic and persist in the environment. Monitoring heavy metal loads in the atmosphere is therefore of immense importance for environmental studies. As direct monitoring instruments are expensive and difficult to handle in extreme conditions, the biomonitors can be used as an alternative, cost effective method to monitor heavy metal air pollution. In this study, *Barbula unguiculata* moss species was used as the biomonitor to determine atmospheric heavy metal content since it was readily available in all selected areas. Sampling areas were divided into 4 major categories i.e. Pettah and Borella under the heavy traffic areas, University of Kelaniya under the moderate traffic area, Kegalle (Nelumdeniya) under the less traffic area and Sapugaskanda as the model area for industrial pollution where number of major industries are present. In each study area, five sub sampling sites were chosen and those selected sites were triplicated. Five heavy metals (Cu, Cr, Zn, Pb and Ni) were analyzed using Flame Atomic Absorption Spectrophotometry. Sinharaja rainforest was treated as the background area where anthropogenic activities and industrial emissions were minimum. According to the native moss analysis, two heavy traffic areas, industrial area and moderate traffic area were in contaminated levels with all five selected heavy metals. Based on the calculated pollution load index values, atmospheric heavy metal pollution in selected areas follows the order, Pettah > Borella ~ Sapugaskanda > University of Kelaniya > Kegalle. Besides the atmospheric heavy metal loads, same heavy metal loads in soil samples from the same five areas were analyzed. The correlation analysis was performed and there was no any clear correlation among heavy metal loads in the atmosphere and the soil of the selected five areas as the soil heavy metal loads depend on several other external factors. It was found from the study that surrogate approach was an effective methodology for the determination of heavy metal contents by using only two surrogate heavy metals per each site. By using Pearson Correlation Analysis and Multiple Linear Regression Analysis, mathematical relationships were developed to estimate heavy metal loads and those were validated and the reliability was assessed.

Keywords: Heavy metals, Atmospheric pollution, Biomonitoring