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Background levels of heavy metals in plants of different taxonomic groups from a montane rain forest in Sri Lanka

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Abstract

An undisturbed natural reserve area iocated in a tropical montane rain forest at about 1800 m altitude in Sri Lanka served as a study site to investigate and assess the natural background concentration levels of As, Cd, Co, Cu, Ni, Pb and Zn in plants representing different taxonomic groups (divisions) in the plant kingdom. The plants selected were: the lichen,*Usnea barbata* (old man's beard);*Pogonatum* sp. (a moss);*Lycopodium selago* (epiphytic lycopod);*Polypodium lanceolatum* (epiphytic fern);*Bulbophyllum elliae* (epiphytic orchid) and*Actinodaphne ambigua*(dicotyledonous large tree). Degree of homogeneity with respect to Cd, Cu, Pb and Zn in homogenised materials of all samples were within acceptable limits, whereas*Pogonatum* sp. showed the highest degree of homogeneity for Pb. In addition to confirming extremely low levels of heavy metals in all plant species, the survey also found that generally the primitive plants,*Usnea*and*Pogonatum* appear to have a greater tendency to accumulate As, Cd, Co and Pb; in particular,*U. barbata* appears to be an efficient accumulator for those heavy metals, suggesting its potential use in environmental studies.*Actinodaphne ambigua* was found to have a specific accumulating ability for nickel. Surface cleaning of the*A. ambigua* leaves resulted in a substantial decrease in the foliar contents of Cd, Ni, Pb and Zn. Variations in heavy metal contents observed in different plant genera are discussed in terms of their habits and place of growth in the forest. It is anticipated that the background levels presented in this paper from a remote, unpolluted tropical ecosystem will provide useful reference data for comparative environmental studies.