

Determination of trace metals in lichens under different ecological conditions in Malaysia urban proximity and pristine environment

ABSTRACT

This study is carried out to report the concentrations of trace elements (As, Cd, Cr, Cu, Mn, Pb, V and Zn) in several species sample of lichens which were collected from Maliau Basin, Sabah and Universiti Kebangsaan Malaysia (UKM) Bangi campus in Selangor. Comparison with the natural concentration of trace elements from different species of lichens collected in Maliau Basin with the samples collected in UKM Campus provides unambiguous evidence of pollutions from both study locations. Eight species of lichens were sampled from Maliau Basin, Sabah, and two more species from UKM campus, Bangi. The eight species collected from Maliau Basin were *Coccocarpia dissecta*, *Cladonia* cf. *floerkeana*, *Cladonia adspersa*, *Pseudocyphellaria* cf. *gilva*, *Parmotrema acrotrychum*, *Parmotrema cristiferum*, *Parmotrema* cf. *pseudonilgherrense*, and *Sticita weigeli*, while the species collected from UKM campus were *Parmotrema praesorediosum* and *Dirinaria picta*. Generally, the results of this study showed that concentrations of trace elements in the lichens from UKM campus were relatively higher than those from Maliau Basin. Besides that, the distribution of each trace metal is uneven in each lichen species from Maliau Basin. The ranges of concentrations ($\mu\text{g/g}$) of each trace element in the lichens from UKM campus were V (0.38-0.67), Cr (1.02-3.78), Mn (3.48-7.94), Cu (9.97-44.39), Zn (68.38-98.36), As (0.76-1.73), Cd (0.05-0.09) and Pb (12.36-31.99), whereas that of each trace element in the lichens from Maliau Basin were V (0.01-0.14), Cr (0.46-0.93), Mn (3.28-234.35), Cu (3.05-13.74), Zn (1.61-16.01), As (<2.00), Cd (0.0004-0.09) and Pb (1.49-7.73). The fast pace of modernization together with air pollution may probably be the reason for the difference in level of metals accumulated compared from both study locations. The present study will be a reference record for conducting future biomonitoring studies in this fast-growing country.

Keyword: Trace metals; Lichens; Ecological condition; Malaysia; Urban proximity; Pristine environment