Multivariate analysis of heavy metal concentrations in the different tissues of four intertidal clams from Peninsular Malaysia

Abstract

Four species of clams (Macoma sp., Siliqua sp., Pharus sp. and Mactra sp.) were collected from the intertidal area of Peninsular Malaysia, Their different soft tissues (siphon, muscle, foot, mantle, gill and remaining soft tissues), and shells were analyzed for the concentrations of Cd, Cu, Fe, Ni, Pb and Zn. The relationships of heavy metals in the different tissues of clams were detennined using multivariate analyses including correlation analysis, cluster analysis and multiple linear stepwise regression analysis (MLSRA). Metal distribution in the clams were explained using correlation analysis, which indicated that the shell was not signihcantly (P> 0.05) correlated with other tissues and the shell is also clustered differently from the rest of soft tissues as indicated by the cluster analysis. Among the soft tissues, it was found that the gills and mantle of all clams were identified as the most influential tissues in the accumulation of heavy metals in the total soft tissues for the clams by MLSRA, The present study found that the distributions of heavy metals in the different tissues of clams were related to their differences in biological and ecological aspects. Since the multivariate analyses used in this study can reduce the cost and time involved in identifying an effective tissue to monitor the heavy metal(s) bioavailability and contamination (Yap et al. 2010), this preliminary finding provided an altemative for future environmental management in the intertidal area of Peninsular Malaysia.

Keyword: Tropical intertidal clams; Metal distributions; Correlation; Cluster; Multiple linear stepwise regression analyses