

## ACCUMULATION OF HEAVY METALS BY FLAT TREE-OYSTER *ISOGNOMON ALATUS*, IN SEPANG RIVERS, MALAYSIA

A. Ismail, K. Saed, M. Kusnan and H. Omar

Faculty of Sciences and Environmental Studies  
Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor,  
Malaysia

**Keywords:** bioindicator, heavy metals, oysters, pollution.

### Introduction

The Sepang River estuary is an economically important area, which supports commercial fish and prawn, and is regarded as being an important breeding ground and nursery for a number of estuarine and marine species of flora and fauna. Pig farm discharges are increasingly affecting the Sepang River estuary. Discharges from pig farms have been the second largest contribution to water pollution, since 1989-1993 (DOE, 1997). Effluent discharged from pig farm usually contains toxic trace metals, which affects environmental quality (Arzul and Maguer, 1990). Previous studies (Ismail and Ramli, 1997) showed that there are elevated levels of heavy metals in some gastropods and sediments of this river near pig farms compared to river mouth. But there has been no study done on heavy metal in oysters from this river. Therefore this study was conducted to use *Isognomon alatus* as a tool to measure heavy metals concentrations in the Sepang River.

### Materials and Methods

Sepang River is located in the Southwest of Peninsular Malaysia, and it flows into the Strait of Malacca. *Isognomon alatus* is well distributed, throughout the river and is found on mangrove trees attached by byssus to the roots of the red mangrove tree. Oysters were collected from 6 stations along the river, placed in labelled plastic bags and stored in icebox and taken to the laboratory for further processing. Oysters were defrosted, shucked, drained, removed from their shells, and washed with double distilled water to remove external contamination and pressed to extract excess water. Approximately 0.5-1.0g of the soft tissue was digested in concentrated nitric acid. The digests were then made up to volume with double distilled water and then analysed by Atomic Absorption Spectrometer model Perkin-Elmer 4100. In order to assess the accuracy of the method, standard additional experiments were carried out and blanks were used. All statistical analyses were performed using Statistica (Version 5.0, 1995) programme.

### Results and Discussion

Mean metal concentrations from all stations were recorded as  $312.34 \pm 12.71 \mu\text{g g}^{-1}$  for Zn,  $3.63 \pm 0.11 \mu\text{g g}^{-1}$  for Cd and

$30.74 \pm 0.78 \mu\text{g g}^{-1}$  for Cu. The pattern of metal occurrence, in order of decreasing concentrations in all stations was  $\text{Zn} > \text{Cu} > \text{Cd}$ . Copper and zinc present in oysters are greater than cadmium. This pattern of metal accumulation in oysters was found throughout the world (Michel and Zengel, 1998). Mean metal concentrations were found to be higher in oysters which were closer to pig farm discharge, whereas minimum concentrations of similar metals were recorded for station which were further from the effluent. It is obvious that there are large-scale differences in levels of metals in oysters. About 3-5 folds higher metal concentrations were found in oysters from stations close to pig farms than to those collected from the river mouth. Results from statistical analysis also showed a significant ( $P < 0.01$ ) increase in metals concentrations from the station at the river mouth to the station near the pig farm discharge. Similar pattern of heavy metals accumulation was shown in the previous study (Ismail and Ramli, 1997). There is no published data on heavy metals in *I. alatus*, to compare with this result. However, there are a few studies on heavy metals in oysters *Isognomon*, but in different species and places. If the results were compared with the maximum permissible limit suggested by the Malaysian Food Regulation (1985) in fish and fish products, Zn, Cd and Cu levels exceeded the maximum recommended permissible level.

### Conclusions

*Isognomon alatus* flat tree-oyster is a good accumulator of Zn, Cd and Cu and it shows a clear pattern of accumulation of heavy metals studied as what have shown in other molluscs in the same area. The high levels of heavy metals in *Isognomon alatus* showed that it can be a suitable indicator for environmental quality. Since the Sepang River is an economically important area, which supports commercial fish and prawn, and is regarded as being a nursery ground for marine life, consideration should be taken in terms of metal pollution. This study may represent the base data for the proper management of heavy metals pollution in this area.

### References

- Arzul, G. and Maguer, J.F. 1990. Influence of pig farming on the copper content of estuarine sediments in Brittany, France. *Marine Pollution Bulletin*. 22: 431-434.
- DOE. 1997. Environmental Quality Report 1997. Department of Environment, Ministry of Science, Technology and The Environment Malaysia, Kuala Lumpur. p. 79.
- Ismail, A. and Ramli, R. 1997. Trace metals in sediments and molluscs from an estuary receiving pig farms effluent. *Environmental Technology*. 18: 509-515.
- Malaysian Food Regulation. 1985. *Malaysian Law on Food and Drugs*. Malaysian Law Publisher. p. 289.
- Michel, J. and Zengel, S. 1998. Monitoring of oysters and sediments in Acajutla, El Salvador. *Marine Pollution Bulletin*. 36: 256-266.