ABSTRACT

This study used the *Perna viridis* mussel as a bio-indicator of pollution in the Gulf of Paria along the industrialized western coast of Trinidad. Baseline data of heavy metals in *P. viridis* were generated for six sites along the coast namely, ALCOA, Caroni Swamp, HYDRO-AGRI, San Fernando Wharf, La Brea and Cedros. Pollutants included heavy metals (cadmium, copper, cobalt, chromium, iron, zinc, nickel, lead and mercury), poly-aromatic hydrocarbons (PAH) and the paralytic shellfish poison (PSP), saxitoxin.

Levels of heavy metals detected in the soft tissues (minus digestive gland) of these mussels in both 1995 and 1996 were found to be below maximum permissible levels set by local and international regulatory agencies. In 1995, highest levels of cadmium, chromium, iron and nickel were detected in mussels collected at Cedros and highest levels of copper in those collected at San Fernando Wharf. In 1996, highest levels of cadmium, chromium nickel and zinc were detected in mussels collected at Alcoa with highest copper and iron levels in those collected at Caroni swamp and La Brea respectively.

Smaller mussels were generally found to contain higher levels of cadmium, copper, zinc and lead than larger mussels, possibly due to the absence or lower rates of metallothionein production. The presence of metallothioneins in the inner white lining of the shell of the mussel was also determined. This may explain the

accumulation of some heavy metals in the shell, as a possible route of heavy metal detoxification.

The various heavy metal deposition sites of the mussel including the byssal threads, digestive gland, foot, mantle and muscle were also investigated. This study found that of the various soft tissues, the foot was the site of least metal deposition while the digestive gland was the site of highest metal concentration. The shells and byssal threads were also found to contain relatively high levels of heavy metals. A comparison between metal levels in the periostracum and inner green lip of the mussel shell showed higher concentrations of copper in the inner green lip.

Depuration of mussels over a five-day period showed a significant reduction in iron, lead and nickel levels after the first day. However, the complete removal of the digestive gland as an alternative to depuration appears feasible, if the mussel is to be used as a bio-indicator of heavy metal contamination.

Mercury and poly-aromatic hydrocarbons were not detected in mussels collected from any of the six sites in both 1995 and 1996.

The paralytic shellfish poison saxitoxin, was detected in mussels collected at ALCOA and La Brea in 1995 and mussels at ALCOA in 1996, fortunately at levels below the limit set by the EEC.

Analysis of the mussel tissue to determine fat, protein and cholesterol content was also carried out to determine the mussels potential as a food source. Protein and fat levels ranged from 9.16 – 15.7 % and 0.8 – 3.2 % on a wet weight basis respectively. Cholesterol levels detected were comparable with those reported for other shellfish showing the mussel to be a viable food source. The favourable nutritional value and relatively low contamination levels make this mussel an excellent candidate for commercial cultivation.

Keywords: *Perna viridis*; bioindicator; heavy metals; poly-aromatic hydrocarbons; paralytic shellfish poison; metallothioneins.