

SUMMARY

A study on ecophysiology of selected molluscan species inhabiting estuaries in the Western coast was carried out using commercially and ecologically important gastropod and bivalve molluscs collected from the Puttalam and Negombo estuaries. The gastropod, *Cerithidea cingulata* and the bivalves *Marcia hiantina*, *Marcia opima*, *Gaffrarium tumidum* and *Brachiodontes* were selected and their salinity tolerances, temperature tolerances, respirometry at different physico-chemical conditions and growth responses to environmental variables were carried out to gain an understanding of their ecophysiology.

The study has been able to show the ecophysiological basis of the distribution patterns and interactions of the selected molluscan species within the estuarine habitats. From among the molluscs studied, *Cerithidea cingulata* was able to tolerate and to retain activity in the widest salinity range. It respired actively in salinities from 6 ppt to 35 ppt and did not show active respiration only in fresh water. This euryhaline gastropod has tidal growth bands in their shells which can be used for monitoring growth on a daily basis. The increased sensitivity of this growth measure, combined with its demonstrated euryhalinity, would make it possible to use these shell growth bands to monitor *in situ* pollution, including prawn pond effluent effects which is now an issue of importance affecting our estuarine productivity.

Gill oxygen uptake in *Marcia opima* was similar in both male and female animals (1.015 and 1.108 $\mu\text{l/hr/mg}$, respectively) with immature animals showing much higher rates of activity (2.232 $\mu\text{l/hr/mg}$). Whole animal respiration rates were related to body size

and ranged from 0.3115 to 0.8825 $\mu\text{l/hr/mg}$ in mature females and from 0.3581 to 0.9899 $\mu\text{l/hr/mg}$ in mature males whereas juveniles showed a mean rate of 0.6498 $\mu\text{l/hr/mg}$. Males displayed increased respiration rates up to 31 degrees C whereas females showed a similar relationship up to 33 degrees C.

Gaffrarium tumidum tolerated temperatures up to 40 degrees C, with smaller animals being more tolerant of higher temperatures. *M. opima* had lower temperature tolerances (up to 30 degrees C) whereas *M. hiantina* was still less tolerant of increased temperatures and was unable to survive for more than 3 days at 30 degrees C. In all species, smaller size groups were more tolerant of increased temperatures. With temperature increases, all species increased their ventilation rates which involved higher energy expenditure.

The results on the growth experiments with the oyster, *Saccostrea cuculata*, shows that it is well adapted as an estuarine species, growing best at brackish water salinities and favouring higher salinities within the brackish range of salinities. Therefore, it would be less attractive to grow this oyster commercially in the upper reaches of estuaries and under full sea water conditions. It is in high demand by tourist hotels and since spatfall periods are also known (based on work that I have carried out on a previous NARESA grant), further work including field trials would be very appropriate at this stage for its field culture.

The results on *Cerithidia cingulata* feeding experiments indicate that the filamentous algae and sea grasses have a greater contribution for faster growth of this ubiquitous gastropod. Since *C. cingulata* is the dominant macro-detritivore of the

estuarine ecosystem, some field studies of decay/detritus cycles should provide illuminating results on the trophic functioning and recycling characteristics of this productive estuarine ecosystem. Such results would be necessary for developing effective conservation-management strategies for our highly impacted estuarine ecosystems. Shell micro-growth studies should be undertaken of this species so that growth responses over a range of estuarine conditions could be monitored and perhaps tested for use as an early-warning bioassay system for undesirable pollutants.