

The influence of environmental factors on growth and survival of oyster, (*Crassostrea madrasensis*) cultivated in Negombo Estuary

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Growth of marine bivalves is affected by the interactions of several environmental variables, particularly water salinity, temperature and food supply. Possible influences of environmental parameters on growth and survival of oysters (*Crassostrea madrasensis*) placed in three plastic cages of 30x25 cm² at five locations, Thaladuwa, Munnakkaraya, Pitipana, Wedikanda and Dungalpitiya in Negombo Estuary, Sri Lanka were investigated over a period of seven months. Daily Weight Gain (DWG), Specific Growth Rate (SGR) and survival rate of oysters were determined. Environmental factors that are known to affect growth and heavy metal contents in the tissues of oysters were also determined. One-way ANOVA indicated significantly higher ($p<0.05$) daily weight gains (0.22 ± 0.01 and 0.16 ± 0.01 g/day) in Pitipana and Munnakkaraya sites. Oysters at Pitipana, which was the site that recorded the highest salinity (mean= 20.9 ± 0.34 ppt) and the highest chlorophyll-a (5.41 ± 1.49 µg/L), had a significantly higher growth rate (0.22 ± 0.01 g/day) compared to the growth rate (0.04 ± 0.02 g/day) of oysters in Thaladuwa, where significantly lowest salinity (13.29 ± 1.13 ppt), highest turbidity (19.26 ± 0.99 NTU) and ammoniacal nitrogen (0.368 ± 0.078 mg/L) were recorded. DWG showed a significant second order polynomial relationships with chlorophyll-a ($R^2 = 0.44$, $P<0.05$) and salinity ($R^2 = 0.28$, $p<0.05$). Negative exponential relationships of DWG were evident with higher level of ammoniacal nitrogen ($R^2 = 0.24$, $p<0.05$) and phosphate ($R^2 = 0.25$, $p<0.05$). The high concentrations of Lead (1.883 mg/kg) recorded here exceeded the EU permissible limit of 0.5 mg/kg (wet weight) in the tissues of oysters placed in the site, where urban waste water is released to the lagoon. These preliminary results indicated that phytoplankton biomass and salinity positively influenced growth of *C. madrasensis* in the Negombo Estuary, whereas there would be health concerns due to heavy metal accumulation in oyster tissues in polluted areas of the estuary. The findings of the present study are therefore useful for understanding the potential impacts of environmental and anthropogenic changes on oyster resources and for long-term sustainability of oyster fisheries and aquaculture.

Keywords: chlorophyll-a, environmental effect, oyster resource management, heavy metals

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