PHYTOPLANKTON CLEARANCE RATE BY THE OYSTER *CRASSOSTREA IREDALEI*

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ABSTRACT

Clearance rate was investigated with respect to time of the day and salinities of 20, 25, 30 and 35 ppt. Three times a day, oysters were exposed to a dense diatom culture of *Skeletonema costatum* for 8 hours. No significant difference was obtained with regard to clearance rate and the time of the day. Significant difference in clearance rate was only obtained at 20 ppt salinity, compared to 25, 30, and 35 ppt salinities.

INTRODUCTION

Species of *Crassostrea* are currently cultured in Indonesia because of the meat value. The shells can also be used, mainly for production of lime and handicraft. However, the populations of oyster in Jakarta Bay have decreased (Widiarsih,1988). It may be because of over-exploitation and pollution problems. But natural causes, such as severe salinity variations, may also be a reason for the decrease in Jakarta Bay. The present study was carried out to study if salinities down to 20 ppt had effect on the clearance rate of local oysters.

The food of oysters is plankton, detritus, fungi, flagellates, larvae of various invertebrates, and sponge particles (Imai,1971). Food intake of oysters can be measured by the decreasing particle concentration in water surrounding the oyster, and transformed to clearance rate which is the volume of water flowing through the gills per unit time (Bayne, 1976).

MATERIALS AND METHODS

Crassostrea iredalei (6-7 cm length) were collected from Jepara waters, Central Java, Indonesia. Before acclimatization, the oysters were cleaned, and fouling organisms brushed away. The specimens were acclimatized for 6 days at salinities of the consecutive experiments. Oysters were placed in beakers with continuous aeration and 27-28 ^{0}C sea water with 20,25,30, and 35 ppt salinity, respectively. *Skeletonema costatum* were counted with a haemacytometer and used at a start concentration of 500,000 cells per ml. The clearance rate was estimated during three periods at hourly intervals in a 24 hrs cycle (04-12 morning, 12-20 day, and 20-04 night). The medium was changed after each treatment. Clearance rate was calculated for each time interval using the formula:

$$CR = (V (\log C_1 - \log C_0)) / (W (T_1 - T_0))$$

where CR = clearance rate (ml/g/hr), V = volume of water (ml), C_0 = cell count at time T_0 (cells/ml), C_1 = Cell count at time T_1, W = total weight of animal (g), $T_1 - T_0$ = time interval.

RESULTS & DISCUSSION

Pairwise comparison of means by time showed that there were no significant differences among the means (variance analysis) . Hence, the clearance rates obtained during the morning, day and night measurements could be treated as 3 replicates of each salinity (20, 25, 30 and 35 ppt).

The calculated clearance rate per hour showed that the highest percentage clearance occurred in the last hour of each 8-hour cycle. This indicates that the initial concentration of 500,000 cells/ml was too high. These phytoplankton concentrations may have effected all the measurements, but under the given experimental conditions, an ANOVA test showed that the clearance rate was significantly higher at

20 ppt salinity. Based on existing information it is not possible to state why oysters had higher clearance rate at low salinity. It can only be concluded that the euryhaline oysters functioned better at low salinity, but it is unknown whether this was caused by well-being or the opposite. Some kind of stress may also have caused the high clearance rate at 20 ppt salinity.

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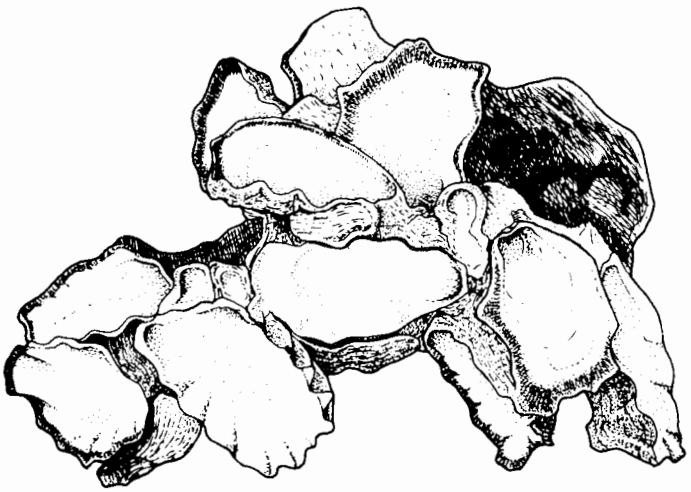

Saccostrea cucullata (Born, 1778). PMBC 8604.
Drawing by Patairat Singdam.