METAMORPHOSIS, GROWTH, AND SURVIVAL OF TOP SHELL LARVAE (*TROCHUS NILOTICUS*) IN CULTURES WITH FOUR SPECIES OF MICROALGAE.

Gunarto Latama

Faculty of Marine Sciences and Fisheries, (Fakultas Kelautan dan Perikanan). Hasanuddin University. Jl. Perintis Kemerdekaan Km. 10. Tamalanrea, Ujung Pandang, 90245, South Sulawesi. Indonesia

ABSTRACT

The gastropod *Trochus niloticus* was studied during 42 days in cultures added 4 species of microalgae: *Tetraselmis* sp., *Chaetoceros gracilis*, *Isocrycis galbana*, *Nannochlorosis* sp. Unfiltered sea water served as a control. Metamorphosis was fastest when *Tetraselmis* sp. was present in the culture dish and slowest in unfiltered sea water. The highest growth and survival were observed among the larvae feeding on *Isochrysis galbana* for 42 days (1816,7 + 43,7 µm and 47,3 + 8,3% respectively). Very poor survival was found in treatment with *Tetraselmis* sp., *Chaetoceros gracilis* and *Nannochlorosis* sp.

INTRODUCTION

The mother of pearl and the edible meat have made top shell *Trochus niloticus* Linne, 1767 one of the intensively utilized species in the Indo-Pacific region including Indonesia (Hahn 1988; Heslinga et al. 1984; Latama 1995). Because of over-harvesting it has been listed as a protected species in a declaration issued by the minister of forestry (No. 12/KPTS-II/1987). Top shell has been studied with respect to distribution patterns and food preference. Filamentous algae and diatoms are important food items (McGowan, 1958).

Larvae settlement has been related to light intensity (Latama, 1997), the presence of gamma-aminobutyric acid (GABA), and the red coralline algae (*Porolithon*), which stimulated metamorphosis of the larvae (Heslinga & Hillman 1981; Hahn 1981). The purpose of this study was to obtain a better understanding the effect of types of algal food in relation to settlement, metamorphosis, growth and survival.

MATERIALS AND METHODS

Larvae produced in the Marine Station of Hasanuddin University were placed in Petri dishes (200 ml) filled with 175 ml 0.5 µm filtered sea water (except the control). A total of 50 larvae, one day old, were placed in each dish. Food had been added 3 days before the larvae as either *Tetraselmis* sp., *Chaetoceros gracilis*, *Isochrysis galbana*, *Nannochlorosis* sp., or unfiltered sea water as control. The algae created an algal film on the surface of the water in the dish. Salinity was maintained at 31-34 ‰ by addition of fresh sea water. Time until metamorphosis, absolute growth, and mortality were measured. The cultures were terminated after 42 days.

Table 1. Percentage of larvae metamorphosed over 12 days (d) after addition of 4 kinds of algae and unfiltered sea water (control).

Treatment	Days			
	3	6	9	12
A. *Tetracelmis* sp.	20	100	100	100
B. *Chaetoceros grasilis*	0	26.7	80	100
C. *Isochrycis galbana*	0	20.0	66.7	100
D. *Nannochlorosis* sp.	6.7	73.3	100	100
E. Unfiltered sea water	0	0	0	100

Table 2. Growth of the larvae in dishes added 4 species of microalgae. Unfiltered sea water was the control. Growth was measured for 42 days (d) and is shown in terms of increments of shell lengths (µm ± sd). A hyphen signifies total mortality.

Treatment	Days			
	20	27	35	42
A. *Tetracelmis* sp.	390.0 ± 32.8	-	-	-
B. *Chaetoceros gracilis*	378.3 ± 37.5	396.0 ± 5.8	-	-
C. *Isochrycis galbana*	556.7 ± 46.5	911.7 ± 70.1	1305.0 ± 50.7	1816.7 ± 43.7
D. *Tetracelmis* sp.	360.0 ± 17.3	-	-	-
Unfiltered sea water	608.3 ± 14.4	861.7 ± 48.6	1150.0 ± 86.6	1538.3 ± 32.1

RESULTS

Development of the larvae

The time from hatching until metamorphosis of the lecithotrophic larvae of *T. niloticus* was influenced by the species of algae added to the cultures (Table 1). However, all larvae had metamorphosed within 12 days.

The fastest metamorphosis was found when the larvae were exposed to *Tetraselmis* sp. followed by *Nannochlorosis* sp., *Chaetoceros gracilis*, and *Isochrysis galbana*. After metamorphosis the larvae started to feed on the surface of the substrate.

Growth and survival

The highest growth and survival was found in cultures with *Isochrysis galbana* and unfiltered sea water. Slow growth and high mortality occurred in dishes with *Tetraselmis* sp., *Isochrysis galbana*, and *Nannochlorosis* sp. (Table 2). Survival after 42 days was calculated at 47.3 ± 8.3 % and 28.0 ± 6 % in cultures with *Isochrysis galbana* and unfiltered sea water respectively.

DISCUSSION

An important factor in the nutritional value of food for crustacean, molluscan and fish larvae are the levels of polyunsaturated fatty acids (Kanzawa, 1983; Webb and Chu, 1983; Pillsbury, 1985 in Helm and Laing, 1987). The fatty acid composition is different from one species to another species of algae but it is a complex situation where the fatty acids interplay with other nutritional factors. However, nutritional deficiencies in a diet can be remedied by the use of mixed algae diets (Volman et al, 1988). Natural sea water contains a diverse mixture of food organisms. This may explain why unfiltered sea water resulted in good growth and survival. The present study suggest that pure cultures of *I. galbana* constitute a satisfactory food source for juvenile *T. niloticus*.

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