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Experimental Culture of the Black Clam, *Villorita Cyprinoides* (Grey) in Vembanad Lake, Kerala

V. KRIPA, T.S. VELAYUDHAN and P.S. ALLOYCIOUS

Central Marine Fisheries Research Institute, Cochin 682 014

Abstract

On-bottom culture of *Villorita cyprinoides* at four stocking densities, *viz.* 500, 1000, 2000 and 3000 per sq.m was carried out in the Vembanad Lake. Seed clams of length of 11 to 15mm weighing 0.4 to 1 gm were collected from the natural bed and grown for a period of one year. Variations in the growth and survival rates of clams in different stocking densities showed that these parameters are dependent on the initial stocking density. Based on the results, the optimum stocking density for maximum yield is given. The present practice of relaying (semiculture) of seed clams by fishermen to suitable grow-out areas for augmenting production is described. Prospects for developing black clam culture on scientific in lines in Vembanad Lake is discussed.

Introduction

Villorita cyprinoides (Grey) popularly known as the black clam is a dominant bivalve inhabiting the Vembanad lake in Kerala. The clam is exploited for its meat and shell. The meat is used as food while the shell serves as a raw material in lime based industries. The biology and fishery of *V. cyprinoides* has been studied (Raslam and Sebastian, 1976; Sivankutty Nair, 1975; Achary, 1988; Kripa and Mathew, 1993). Apart from its conventional use, in the recent years this clam is used in the semi intensive shrimp farms as shrimp feed (Kripa and Gopakumar, 1995). Considering the intense exploitation of *V. cyprinoides*, it was felt that aquaculture of this spices must be experimented to gain adequate information for the enhancement of this resource which will be essential in the coming years. On bottom culture of *V. cyprinoides* in different stocking densities were carried out in two series of experiments during 1993-94 at Kumbalangi and Nettoor in Vembanad Lake. The results of these are presented here.

Materials and Methods

Villorita cyprinoides spat ranging in length from 11 to 15 mm were collected from the natural clam beds of Vembanad Lake. These were transported to the farm site for experiment I located at Kumbalanghi about 8 km away from Cochin. The clam spat were kept for acclimatization for one week in the farm area, after which the dead shells were removed, the spat counted and stocked in densities of 500, 1000, 3000 and 4000/ m^2. Before stocking, the area was cleared of unwanted material and a small pen enclosure was made of split bamboo and 2mm velon screen mesh of 0.5m width. The experiments were carried out at the same location in duplicate from July 1993 to December 1993. In the second experiment low stocking densities, 300, 450 and 650 numbers per sq.m. were tried at Nettoor about 13 km from Kochi. The experimental procedure was the same as that for the first experiment. Growth in length and total weight were noted at monthly intervals. Two samples from 25 x 25 cm area were taken from each stocking density every month. All the clams in this area were measured and counted for studying the growth and survival. The dead shells were removed and the clams were restocked after taking the measurements.

Results and Discussion

Survival: In the first experiment, highest survival (98.4%) was observed in stocking density SD-500 and lowest (22.43%) in SD-3000. Mortality was observed in the first month itself in stocking densities 1000 to 3000. However mortality was severe in these stocking densities in the 4th month. In the second experiment survival rates were high. The final survival recorded was 98.67, 96.67 and 95.83% in stocking densities 300, 450 and 600 number per sq.m. respectively. There was no mortality from the second month onwards in SD-300 while in SD-450 mortality was not observed in the 4th, 5th and 7th months. In SD-600 mortality was nil in the 3rd, 5th and 7th months.

Growth in length: The average length of the clams in the first experiment was 13.5mm while in the second experiment the average length of the clam seed was 14.6mm. The clams attained an average length of 26.8, 16.4m 15.3 and 15.2 mm in stocking densities 500, 1000, 2000 and 3000 after a period of 6 months. The growth increment was high, 13.3 mm in 5 months in stocking density 500 while in all other SDs the growth increment was negligible ranging from 1.5 to 2.9 mm in 5 months. In the second series of experiment the clams reached 29.8, 30.1 and 26.1 mm after a period of 7 months in stocking densities 300, 450 and 600 numbers/sq.m. The growth increment was comparatively high, 15.2 and 11.5 m respectively.

The increase in total weight was very low in high stocking densities. From an average weight of 0.75 g, the clams grew to 10.3, 4.3, 4.8 and 4.5 g in 6 months. In the second experiment the total weight of clams in SDs 300, 450 and 600 was 9.8, 10.2 and 8.3 g respectively after 7 months. The highest growth increment of 9.55 g in 6 months was recorded in stocking density 500. The average meat weight per clam at the initiation of the experiment was 0.1 g which grew to 2.6, 1.1, 1.3 and 0.9 g in stocking densities 500, 1000, 2000 and 3000 respectively. However in lower stocking densities the average meat weight

Table 1. Growth details of the clam, *V. cyprinoides* in different stocking densities after a culture period of 7 months

Experiment	SD	Average length (APM) mm	Average meat wt (g)	Average Total weight (g)	Average no. that survived
Experiment I	500	26.8	2.6	10.3	492
	1000	16.4	1.1	4.3	423
	2000	15.1	1.3	4.8	463
	3000	15.2	0.9	4.5	492
Experiment II	300	29.8	2.1	9.8	296
	450	30.1	2.7	10.2	435
	600	26.1	2.1	7.3	580

of the clam were 2.1, 2.7 and 2.1 in SD 300, 450 and 600 respectively. Growth details of clams in different stocking densities at the termination of the experiment after 7 months is given in Table 1.

The growth of the clam in high stocking densities was very low with high and mortality. Such clams with stunted growth were seen in some areas of the Vembanad Lake. The clams in the low stocking densities had good growth rate, which is comparable to the growth observed in the clams beds of Cochin area (Sivankutty Nair, 1975). In the present study it was observed that growth and mortality are affected by stocking densities. Parson and Dadswell (1992) have observed that stocking density in a culture system can effect the survival, growth and production per unit area in scallop culture. High density cultures are practiced in the intermediary stage or nursery culture for scallops, oysters and clams where seed from the hatchery is grown for a short period in the natural environment before initiating the actual growout culture. In experiment I where high stocking densities were tried the survival rates were low. Similar observations where survival is inversely related to stocking density has been made by Imai, (1977). Contrary to these observation Parson and Dadswell (1992) have observed that survival is independent of density in the giant scallop *Placopecten magellanicus.*

Concurrent to these experiments, the clam population in the natural bed were also observed to study their growth and natural mortality. In the natural bed mortality of the clams during July to December 1993 and January to July 1994 was negligible. In the first experiment, the salinity of the clam bed ranged from 7 ppt to 23 ppt while in the second experiment the salinity ranged from almost fresh water condition to 24 ppt.

Production of clams per unit area: In the two experiments conducted maximum meat production of 1279 g with a shell on weight of 5067 g was obtained in stocking density 500 numbers/sq.m. The production is SD 450 and 600 were 1174 and 1218 g meat weight and 4437 g and 4234 g total weight. Hence it is concluded that the optimum stocking density for culture of *V. cyprinoides* will be 500 numbers per sq.m. The average production in different densities is given in Table 2. In the recent years the clam fishermen of Vembanad Lake have adopted a system of relaying of clams. In this method the spat collected from the natural bed are stocked in the water bodies adjacent to the fishermen residence where they are grown to marketable size. By this method the fishermen protect the clam from depletion. Considering the high spatfall in certain areas in Vembanad Lake it is suggested that some initiative is taken to relay the clam spat from the high density areas to suitable locations in densities 450 to 600 for further growth of the clams.

Table 2. Average production rates of *V.cyprinoides* in different stocking densities after a culture period of 7 months at Vembanad Lake during 1993-94.

Stocking density no./sq.m	Number survived at the end of 7 months	Meat production (g)	Total shell on production
500	492	1279	5068
1000	423	469	1818
2000	463	602	1620
3000	673	605	3028
300	296	621	2900
450	435	1174	4437
600	580	1218	4243

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