J. mar. biol. Ass. India, 1987, **29** (1 & 2) : 108-114

CULTURE OF *PENAEUS INDICUS* (MILNE-EDWARDS) WITH DIFFERENT STOCKING DENSITIES

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ABSTRACT

Culture of white prawn *Penaeus indicus* with different stocking densities *i.e.* 15,000 nos/ha to 75,000 nos/ha was tried by giving prawn head waste as artificial feed in the Estuarine Fish Farm at Portonovo. Hydrographical parameters of pond waters like salinity, dissolved oxygen, pH, Temperature and depth have been studied and growth rate of prawn head waste in all the experiments has been explained. Stocking density ranging from 30,000 nos/ha to 45,000 nos/ha seems to be ideal based on the production rate.

INTRODUCTION

THERE is in satiating demand for prawn and prawn products. India as the leading prawn producing country in the world has to keep pace with the demand. The production of prawns from the wild has been more or less stabilised and there are two ways by which production could be maximised *i.e.* by finding out new fishing grounds and by culturing them in ponds.

The concept of modern prawn farming depends upon the following factors : (1) increasing the survival rate, (2) development of natural food material and cheap artifical feeds (3) optimum stocking rate and manipulation of profitable species combinations. On this basis, preliminary investigations reveal that to our estuarine conditions one or two species of prawns namely *Penaeus indicus* and *P. monodon* having satisfactory growth rates are suitable. Tamil Nadu has a number of brackish-water lakes and lagoons which are rich with the juveniles of penaeid prawns (Muthu, 1972).

The prawn culture techniques currently practiced in India are based on the traditional and empirical methods (Gopalakrishnan, 1972). The techniques have to be evaluated and standardized in the light of the constraints faced by Prawn farmers. The present study experiments, the influence of different stocking densities on the growth and production rates of prawns in the estuarine fish farm at Portonovo.

The authors are thankful to the Director of Fisheries, Tamil Nadu for his kind permission to publish this account.

MATERIAL AND METHODS

Description of the study area : The State Fisheries Estuarine Research prawn farm is located on the northern bank of Vellar Estuary close to the Centre of Advanced Study in Marine Biology, Portonovo. It has a total area of 0.2 ha comprising 4 rearing ponds (30 m X 15 m each) and 2 nursery ponds (15 m × 10 m each). These ponds are almost nondrainable and supply of water to the ponds is by the tidal flow through a main channel running by the side of the farm. The main

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channel which is 250 metres long and 1 metre wide is provided with cement pipes at the entrance of the channel which are covered with 16 p mesh size velon screen to filter the unwanted fish, prawn juveniles and debris. Each pond has again been provided with a shutter inside and another outside for further filtering of incoming waters.

Preparation of ponds : Prior to the stocking of juveniles in the ponds, all the ponds were dewatered to the maximum extent possible. Complete drying could not be done due to bottom percolation. The lowest level was maintained for the sunlight penetration and also to remove the predatory and other unwanted fishes by netting. Botton soil was ploughed manually to eliminate the lethal gases like CO_2 and H_2S. Mahua oil cake (*Madhukka indica*) was also applied in all the ponds at the rate of 500 kg/ha when water was at the lowest level. This Mahua oil cake acts not only as a killing agent but also as manure. Application of organic and inorganic fertilizers was deferred in the ponds as conditions were better. Even without the application of fertilizers, there has been production of lab-lab in these ponds. Hence after the application of M.O.C. fresh tidal water was let in. Drag nets and cast nets were also operated to eliminate the unwanted fishes or prawn juveniles.

Healthy uniform sized juveniles were collected from the Vellar Estuary by making use of the push net. The collected juveniles were conditioned for sometime by keeping them in happas in the estuary. The juveniles of *P. indicus* were sorted out and stocked in the cooler hours of the day in the ponds with different stocking densities.

Depth of ponds were read directly by a depth gauze provided in the ponds. Surface temperature of pond waters was determined by a thermometer.

Salinity of pond waters was estimated by titration methods, pH by making use of BDH pH papers and Dissolved oxygen by the Winkler's method.

The hydrographical conditions of the pond waters were studied especially during full and new moon days when there was mixing of pond waters with estuarine water.

Prawn head waste procured from the landing centre was used as the supplementary feed. The feed was prepared by boiling and chopping. The boiling of the prawn head waste was to reduce the bacterial load and thereby to save the quality of the pond waters. The feed was given in the evening hours between 5 PM and 6 PM. The rate of feeding was 15% of body weight of the stocking density. The growth rate was assessed by collecting monthly random samples of 50 to 100 numbers of prawns from all the ponds and the feed rate was altered.

14 types of experiments with the stocking density ranging from 15,000 nos/ha to 75,000 nos/ha with the supplementary feed and a control were carried in these ponds.

Results

The variations in the hydrographical conditions during the period of experiments have been shown in the Fig. 1 and 2. Fig. 3 gives an account of the fluctuation of water level in ponds and Fig. 4 and 5 indicate the length and weight of prawns noted during the experiments. The stocking density, different size range and weight at the time of stocking and duration of experiments, final growth rate, production rate and conversion efficiency are given in the Table 1. In most of the experiments conducted it was possible to take 100% recovery. In the control experiments stocked with 30,000/ha and without supplementary feed the final unit weight was 3.5 gms, whereas in other experiments the final weight ranged from 5.2 gms (75,000 nos/ha) to 17.0 gms (15,000 nos/ha and 20,000 nos/ha). The length of the harvested prawns ranged from 78.9 mm

(control experiment) to 126.9 mm (15,000 nos/ha). Production rate of prawns was from 236.67 kg/ha/crop (15,000 nos/ha) to 478.89 kg/ha/crop (45,000 nos/ha). In experiments conducted, the production rates over 400 kg/ha/crop were observed with the stocking densities 30,000 nos/ha to 45,000 nos/ha. Conversion ratio ranged from 1 : 7.13 (65,000 nos/ha) to 1 : 15.49 (60,000 nos/ha).

Discussion

From the results of experiments it is inferred that stocking densities of prawns in the ponds are ideal with 30,000 nos/ha to 45,000 nos/ha.

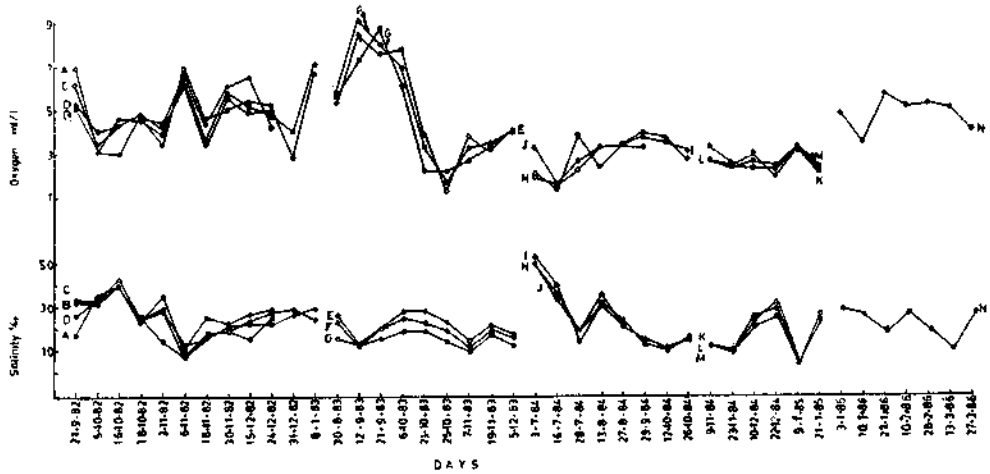

Fig. 1. Salinity and oxygen variations in different experiments.

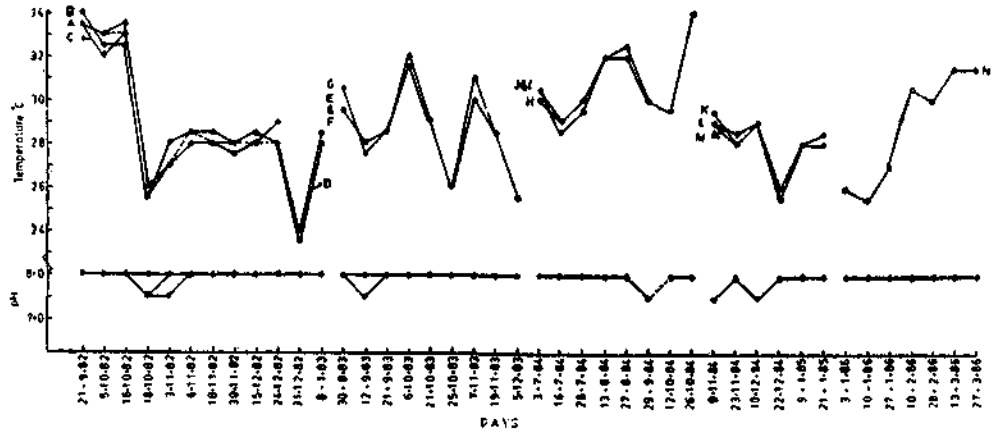

Fig. 2. Temperature and pH variations in different experiments.

In some of the experiments, the recovery was not at its maximum because of the entry of some of the predators like *Scylla serrata* and *Lates calcarifer*. The crab scylla serrata

claims the bunds and enter the ponds and compete for the feed and the *Lates calcarifer* feed on prawns stocked.

production. The density of population and availability of space for individual may have direct impact on the growth of prawns (Kunju,

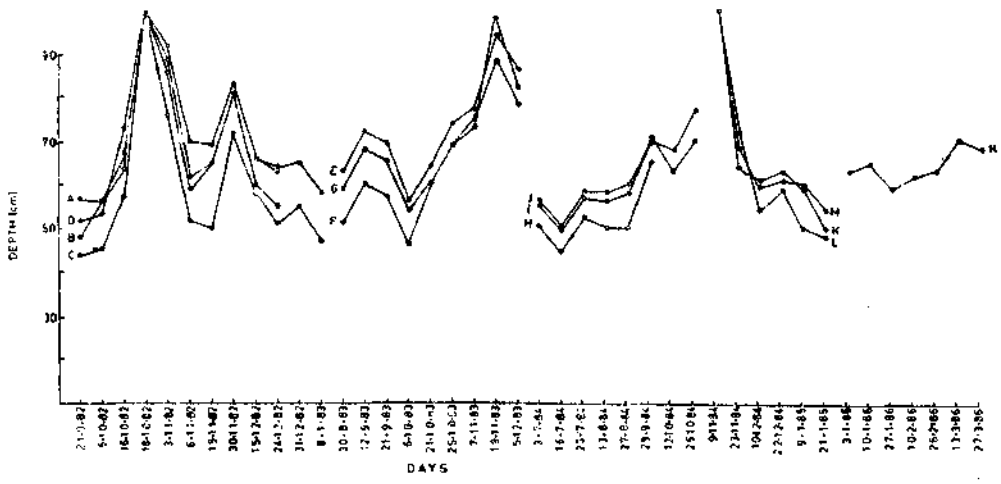

FIG. 3. Variations in water depth in different experiments.

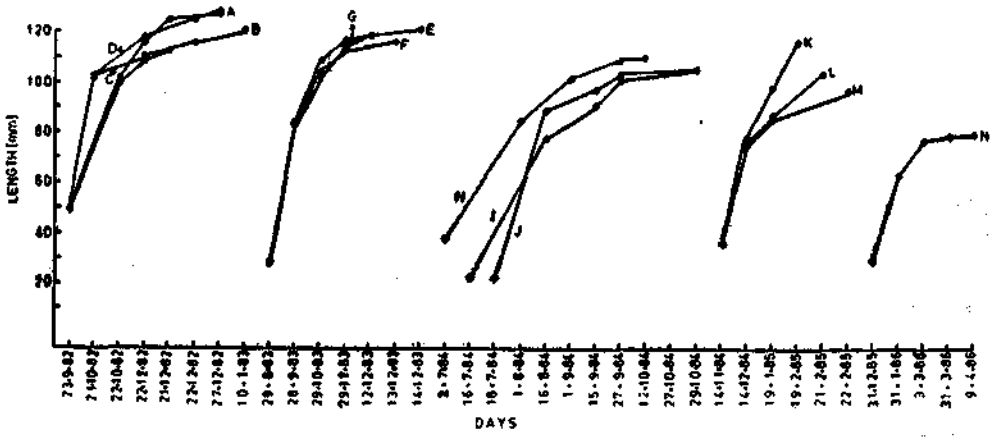

FIG. 4. Growth variation (length) in different experiments.

India has a vast brackishwater area of 2.2 million hactares suitable for aquaculture (George, 1980). In the traditional method of prawn culture in Kerala, production rate vary from 500 to 1200 kg/ha. But by systematic culture, it is quite possible to raise higher

1978). Likewise *P. indicus* stocked at 30,000 nos/ha to 45,000 nos/ha seemed to be ideal in terms of unit weight as well as rate of production.

The growth rate of prawns are affected by

TABLE 1. *Details of different experiments*

Particulars	Experiments					
	A	B	C	D	E	F
Pond area (ha) ..	0.045	0.045	0.045	0.045	0.045	0.045
Species cultured ..	*P. indicus*	*P. indicus*	*P. indicus*	*P. indicus*	*P. indicus*	*P. indicus*
Date of Stocking ..	23.9.82	23.9.82	23.9.82	23.9.82	29.8.83	29.8.83
Nos. Stocked per pond ..	750	1000	1250	1500	1575	1800
Rate of Stocking per ha ..	15000	20000	25000	30000	35000	40000
Initial average length (mm)	48.8	48.8	48.8	48.8	27.8	27.8
Initial average weight (gms)	0.7560	0.7560	0.7560	0.7560	0.200	0.200
Supplementary feed ..	Prawn head waste	Prawn head waste	Prawn head waste	Prawn head waste	Prawn head waste	Prawn head waste
Rate of feeding (% body weight) ..	15%	15%	15%	15%	15%	15%
Final average length (mm) ..	126.9	125.7	119.6	120.1	119.9	115.3
Increase in length (mm) ..	78.0	76.9	70.7	71.2	92.0	87.5
Final average weight (gms)	17.0	17.0	12.8	14.5	13.6	12.4
Increase in weight (gms) ..	16.3	16.3	12.0	13.8	13.4	12.2
Date of harvest ..	27.12.82	27.12.82	10.1.83	10.1.83	14.12.83	13.12.83
Duration of experiment in days ..	95	95	109	109	107	106
Total nos. of prawns harvested ..	703	1000	1250	1476	1575	1800
Percentage of recovery ..	93.73%	100%	100%	98.4%	100%	100%
Total weigh of prawns harvested (kg) ..	10.650	12.650	12.100	19.100	18.000	19.000
Rate of production ha/crop ..	236.67	281.11	268.89	424.44	400.00	422.22
Total feed given (kg) ..	90.595	115.655	150.987	185.033	175.544	192.294
Conversion ratio (wet wt basis) ..	1 : 8.98	1 : 9.72	1 : 13.54	1 : 10.30	1 : 9.93	1 : 10.32

Experiments							
G	H	I	J	K	L	M	N (control)
0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.015
P. Indicus	*P. indicus*	*P. indicus*	*P. indicus*	*P. indicus*	*P. indicus*	*P. indicus*	*P. indicus*
29.8.83	2.7.84	16.7.84	18.7.84	14.11.84	14.11.84	14.11.84	31.12.85
2025	2250	2475	2700	2925	3150	3375	300
45000	50000	55000	60000	65000	70000	75000	30000
27.8	36.75	22.45	22.45	36.00	36	36	28.850
0.200	0.360	0.100	0.100	0.640	0.640	0.640	0.150
Prawn head waste	Prawn head waste	Prawn head waste	Prawn head waste	Prawn head waste	Prawn head waste	Prawn head waste	No feed
15%	15%	15%	15%	15%	15%	15%	..
118.1	109.2	104.0	103.0	115.1	103.3	95.9	78.9
90.3	72.5	81.5	81.1	79.1	67.3	59.9	50.1
13.2	12.2	9.9	10.4	8.0	5.5	5.2	3.5
13.0	11.8	9.8	10.3	7.3	4.8	4.5	3.3
12.12.83	12.10.84	27.10.84	29.10.84	19.2.85	21.2.85	22.2.85	9.4.86
105	102	103	103	97	99	100	99
2025	1303	1740	1700	2630	2650	3375	300
100%	57.91%	70.30%	62.96%	89.91%	84.13	100	100
21.550	12.000	15.000	14.500	18.100	14.200	16.000	1.200
478.89	266.67	333.33	322.22	402.22	315.56	355.56	120.00
216.331	159.034	162.835	220.444	115.698	93.895]	104.895	..
1 : 10.23	1 : 14.21	1 : 11.03	1 : 15.49	1 : 7.13	1 : 7.71	1': 7.5	..

over crowding and lack of sufficient food (Muthu, 1978 ; George, 1978). Such conditions were not encountered in the present observation.

In all the experiments it has been observed that the growth rate was higher during the early part *i.e.* first month growth, than in the second and third months. This is in accordance with the Medawar's 5th law of growth that ' Specific growth rate declines gradually as the organism increases in age ' (Brown, 1957).

Normally the prawns are to be harvested after around 90 to 100 days from the date of stocking, to get a higher rate of production and prevent subsequent mortality. Heavy mortality is likely to take place, if the harvest is done beyond 120 days.

High salinity, production of HS, lack of optimum depth, silt formation, entry of predators are some of the important problems encountered in prawn culture. In the present study all the above problems were tackled.

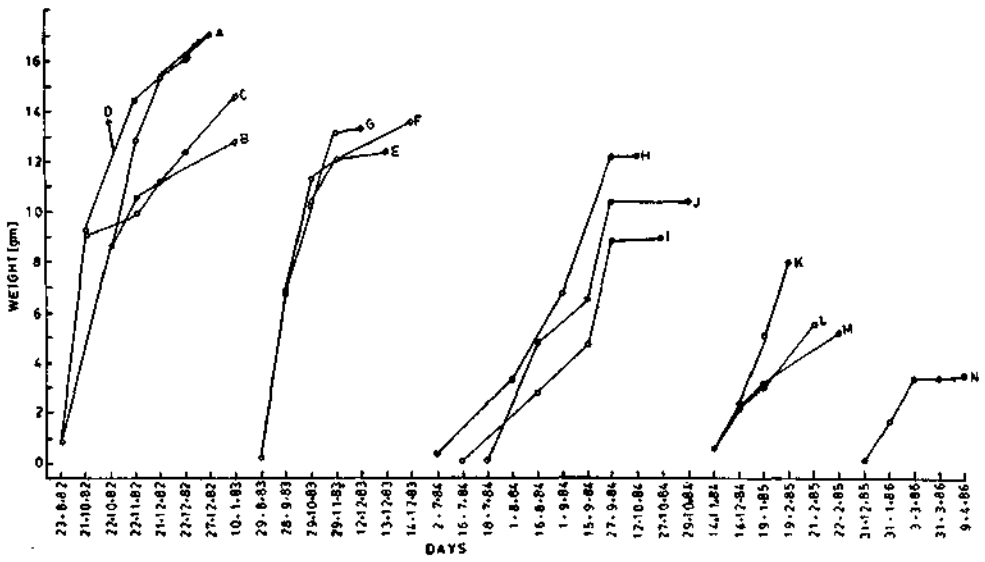

FIG. 5. Growth variations (weight) in different experiments.

The importance of supplementary feed in the prawn culture experiments is felt very much and found to show higher growth rate when compared to ponds without feed (Subramanian, 1981).

The prawn head feed seems to have good conversion efficiency and therefore can be recommended as one of the ingredients for pellet feed.

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