

PRELIMINARY STUDY ON THE REARING OF CHILKA PRAWN ('KANTALA') *PENAEUS INDICUS* H. MILNE — EDWARDS IN THE BRACKISH WATER PONDS AT KESHPUR (ORISSA)

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Results of the experimental rearing of *Penaeus indicus* without supplemental feeding in the unfertilized brackishwater ponds in the fore-shore of the Chilka lake are presented in this paper. Higher rate of survival was recorded in the experiment where advanced juveniles were stocked and lower rate of survival was recorded where early juveniles were stocked. The average growth rate recorded from the rearing experiments was higher than the average growth rate of *Penaeus indicus* recorded from the adjoining Chilka lake which indicates the promising future of prawn farming in and around the Chilka lake. Analysis of gut contents revealed that *Penaeus indicus* could efficiently utilise the algal and higher plant matter present in the ponds. No noticeable differences in daily growth rates were noticed between early and advanced juveniles in the rearing experiments.

INTRODUCTION

The prawn fishery of the Chilka lake which contributes over 30% of the total catch is mainly supported by the juveniles of *Penaeus indicus*. The post-larvae of *Penaeus indicus* and *Penaeus monodon* are available in large number in the lower regions of the outer channel and enter the Chilka lake almost throughout the year the seasons of abundance being October to July (Subrahmanyam, 1966; Subrahmanyam and Rao, 1968; Gopalkrishnan, 1972). This can be considered as a potential source for obtaining cultivable prawn seeds. Jhin-

gran and Natarajan (1966; 1969) suggested that culture fisheries of penaeid prawns should be developed in the Chilka lake, a beginning for which may be made in Keshpur brackishwater fish farm. Farming and culturing of this species, in the strict sense of those terms, is not reported from any part of the world (Mohamed, 1969). Subrahmanyam and Rao (*op. cit.*) recorded growth rate of *Penaeus indicus* from a small brackish water pond where the salinity and water temperature were high. Efficiency of shrimp pond fertilization was studied in Thailand and higher yield was obtained from the fertilized ponds (Cook, 1972). The present work is

a preliminary step in culturing penaeid prawns in brackishwater ponds in and around the Chilka lake. Preliminary observations on the growth rate, survival and food and feeding habits of *Penaeus indicus* reared in brackishwater ponds are presented in this paper.

MATERIALS AND METHODS

Rearing of juveniles of *Penaeus indicus* collected from the lower region of the outer channel of the Chilka lake was carried out at the brackishwater fish farm, Keshpur in the fore - shore of the Chilka lake from April, 1971 to January, 1972 (280 days) in the first experiment. Eight hundred sixteen juvenile prawns, 45-83 mm. in total length (average length 67.62 mm.) were stocked in a 0.04 hectare brackishwater pond. The salinity, dissolved oxygen and surface temperature of the pond water varied from 5.3 - 8.8‰, 3.4 - 4.9 ppm. and 27 - 32°C respectively.

In the second experiment, 200 juveniles of *Penaeus indicus* (average length 115.6 mm.) collected from the trap catches near Keshpur in the Chilka lake were stocked in another identical pond at Keshpur and reared from September, 1971 to April, 1972 (216 days).

Both the experiments were carried out without supplemental feeding and fertilization of the ponds. Growth observations were made through sample netting every month and the physico - chemical conditions of the pond water were regularly recorded. Final harvesting was done by netting and poisoning with taffdrin-20.

The stomach contents of prawns were preserved in 7% formalin solution on every sampling date and numerical methods of

analysis improved by points method was used in determining the quantity of food taken.

RESULTS

(i) RATE OF SURVIVAL

In the first experiment, 219 specimens were obtained in the final harvest after a rearing period of 280 days resulting in a survival of 26.85%. In the second experiment, comparatively larger juveniles were stocked at a lesser density and a survival of 63.0% was obtained.

(ii) RATE OF GROWTH

Growth rate in *Penaeus indicus* was estimated from increment in body weight by using the following equation (Deshimaru and Shigeno, 1972).

$$\text{Daily rate of growth (\%)} = \left(\sqrt[t]{\frac{W}{W_0}} - 1 \right) \times 100$$

Where W_0 = initial bodyweight in average in g.

W = final body weight in average in g.

t = duration of rearing in days.

Very little difference in daily growth rates was recorded in these two experiments (table 1). Daily growth rates in the first and second experiments were in the range 0.59-1.51% and 0.46-1.13% respectively. Higher growth rates were observed up to a rearing period of 126 days in the first experiment and 61 days in the second experiment and decreased gradually thereafter. The juvenile prawns attained an average size of 144.47 mm. in 9 months in the first case and 159.79 mm. in 7 months in the second case and the age of the prawn is about 11 months and 13 months respectively assuming that the juveniles stocked in the ponds in April,

TABLE 1
GROWTH OF *Penaeus indicus* IN THE BRACKISHWATER PONDS
AT KESHPUR (CHILKA LAKE)

Expt. No.	Rearing period (days)	Modal length (mm.)	Average body weight g.		Rate of daily growth	Growth rate per 30 days
			Initial	Final		
I	0	69.0	3.82	—	—	—
	31	85.0	„	6.00	1.51	15.66
	66	98.56	„	7.02	0.92	13.71
	91	112.00	„	12.79	1.33	14.28
	126	120.20	„	14.69	1.07	12.21
	160	134.02	„	16.13	0.90	12.09
	190	140.54	„	17.43	0.80	11.01
	219	142.01	„	18.73	0.72	9.75
	247	144.56	„	18.82	0.64	9.09
	280	145.80	„	20.01	0.59	8.22
II	0	117.03	13.90	—	—	—
	30	134.50	„	19.48	1.13	14.44
	61	152.56	„	27.65	1.13	17.61
	91	158.52	„	28.00	0.77	13.71
	126	160.60	„	32.50	0.67	10.41
	161	160.85	„	34.00	0.55	8.22
	—	—	„	—	—	—
	216	160.92	„	37.62	0.46	6.12

1971 and September, 1971 were about 2 months and 6 months old respectively. Higher increase in length was observed in the first experiment (fig 2) and length-weight relationship has been shown in fig 1.

Sex ratio of surviving specimens in the brackishwater ponds was observed to be 1 male : 2 females in the first experiment and 1 male : 1.25 female in the second experiment.

(iii) FOOD COMPOSITION

Analysis of gut contents of the pond reared prawns (*Penaeus indicus*) revealed the presence of organic detritus, microcrustaceans, algae, weedcuttings, molluscan shells and sand particles. The percentage composition of the food items in the juvenile and adult specimens are presented in table II.

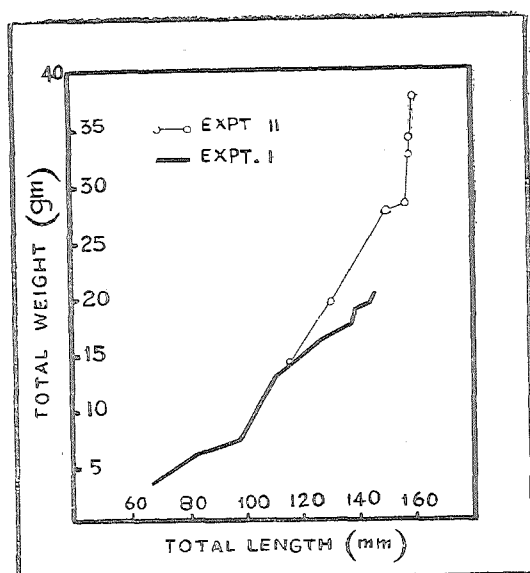


FIG. 1
LENGTH WEIGHT RELATIONSHIP OF
P. indicus REARED IN BRACKISHWATER PONDS
AT KESHPUR (CHILKA LAKE)

The organic detritus constituted the largest percentage (45.54%) of the adults while algae (47.46%), of the juveniles.

DISCUSSION

Jhingran and Natarajan (1969) estimated the growth rate of (*Penaeus indicus*) in different sectors for different juvenile waves in the Chilka lake and the average monthly growthrate (average of 3 waves) was estimated from their observations at 7.71 mm. in Northern sector, 8.86 mm. in the Central sector and 9.42 mm. in the Southern sector. They estimated the highest monthly growth rate 11.66 mm. among three juvenile waves in the Southern sector of the lake when the prawns (*Penaeus indicus*) attained an average length of 109mm. The Keshpur brackishwater fish farm is located in the fore - shore of the Chilka lake in the Southern sector and the growth rate of *Penaeus indicus* in ponds is, thus, comparable. The average monthly growth rate in *Penaeus indicus* in ponds at Keshpur was 14.28mm.

when they attained modal length of 112.00 mm. (table II) and, thus, indicated faster growth. Subrahmanyam and Rao (*op. cit.*) recorded still faster monthly growth rate (19.35 mm.) in the juveniles of *Penaeus indicus* in a small brackishwater pond near the Pulicat lake mouth during 3 months rearing when compared with the maximum monthly growth rate (15.66mm.) in the ponds at Keshpur. The difference could be the result of high salinity and temperature of the pond at the Pulicat lake mouth and might be due to ecological differences of

TABLE II

Food items	% Composition	
	Juveniles (60-120 mm.)	Sub adults & adults (125-157 mm.)
Organic detritus	33.14	45.54
Microcrustaceans	18.60	8.12
Algae	47.46	13.57
Molluscan shells	—	1.93
Weed cuttings	0.80	23.60
Sand	—	7.24
Total Animal matter	18.60	10.05
Total vegetable matter	48.26	37.17

the two environments (Subrahmanyam and Rao, *op cit* ; Crosnier, 1965). Ghosh, *et al.* (1972) reported that the most favourable salinity range for growth of penaeid prawns appears to be around 27 p.p.t to 25 p.p.t. The monthly growth rate (10.8mm.) in *Penaeus merguensis*, an allied species of *Penaeus indicus* in the brackishwater ponds in Indonesia (Poernomo, 1968) was slightly less

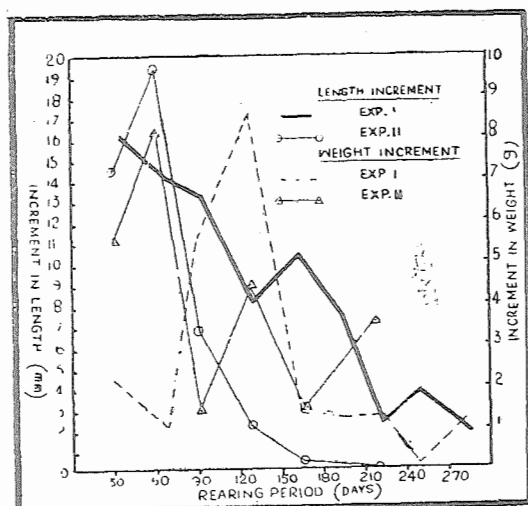


FIG II
INCREMENT IN LENGTH AND WEIGHT
IN *P. indicus* REARED IN BRACKISHWATER PONDS AT
KESHPUR (CHILKA LAKE)

than the observations made in the present study. Very much higher growth rate in *Penaeus indicus* (36mm. / month) from the time it assumes benthic existence to size at detection in the Chilka lake was indirectly estimated by Jhingran and Natarajan (*loc. cit.* 1969). Higher rate of daily growth with respect to body weight was not observed in any of these two rearing experiments and thus, differs from the general opinion that the rate of growth is relatively high in juveniles when they are in the estuaries and backwaters (Mohamed, *op.cit.*).

Cook (*loc. cit.* 1972) estimated mortality rate at 76% and 32% in penaeid prawns from the unfertilized and fertilized ponds in Thailand. The growth of *Penaeus indicus* in the brackishwater ponds at Keshpur could have been better by fertilizing the ponds and providing supplemental diet of vegetable and animal matter. The ponds utilised in the present experiments contained only benthic blue-green algae and other higher plants viz. *Potamogeton* sp.

and *Chara* sp. The bulk of food found in the stomach contents of the specimens obtained from ponds was vegetable matter which might be due to the available food factor which confirms the general opinion that they seem to consume large quantities of algal matter when available (Mohamed, *loc. cit.* 1969).

The overall survival (44.92%) of *Penaeus indicus* in the course of culture to marketable size in the Keshpur ponds was much higher than the survival rate (24%) from the unfertilized ponds in Thailand (Cook, *loc. cit.* 1972) and much less than the survival rate (70%) in *Penaeus orientalis* under artificial culture in Korea (Kuwon Doo, 1966). This difference is probably due to the poor plankton production in the unfertilized ponds as the minute plants and animals of the fish ponds form the main food of the fry of penaeid prawns (Borja and Rasalan, 1968).

CONCLUSIONS

Culture of penaeid prawns in the fertilized ponds may result in better survival and growth as more planktonic food will be made available to the juveniles. The prevailing physico-chemical conditions and natural growth of algal mass in the ponds at Keshpur provide conducive ecological environment for raising better prawn crops. Since the present study is of preliminary nature, further studies on culture in fertilized ponds at various stocking rates and use of various supplementary feeds are required. Polyculture of mullets and penaeid prawns in the brackishwater ponds at Keshpur is suggestible. However, the present study makes a head-way in the prawn culture in brackishwater ponds in and around the vast Chilka lake when there is roaring demand for larger grade prawns in the export industry.

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* Not consulted in original.