

POND CULTURE OF PENAEID SHRIMPS IN THE INDUS DELTA AREA

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Preliminary investigations were conducted in an experimental pond having an area of 50 m x 50 m x 2.5 m. 5000 juveniles of *Metapenaeus affinis*, 2000 of *Penaeus indicus* and 40 juveniles of *P. semisulcatus* were stocked at 2.5 to 5 cm size. After feeding for 80 days the shrimps were harvested on 25 November, 1987. The catch was 70 kg shrimps. 1.06 mm/day growth and 0.15 g/day increase in weight for *p. indicus* and 1.0 mm/day growth and 0.14 g/day increase in weight for *M. affinis* were observed. A very high 1.86 mm/day growth rate and 0.81 g/day increase in weight was recorded for *Penaeus semisulcatus*.

Key words: Wood cutting, Stocking, Maturation, Growth rate.

INTRODUCTION

Due to prolonged dry season in the Indus Delta area, salinity in the creek system gradually increases from 5 to 50 ‰ during the October-June period. Temperature gradually decreases from October to January (30-15 °) but later increases upto 32 ° during February-June period [5,6].

An earlier experiment on pond culture [5] was under taken during pre-monsoon period (March-June) which was associated with the high temperature and salinity range. Therefore there was a need to evaluate the possibilities of pond culture of penaeids during the second half of the year (July-November) when lower salinities (4.3-23.0 ‰) and moderate temperatures (19-29.8 °) prevail due to flooding of Indus River. December-February is the coldest period of the year [4] and apparently would not be suitable for aquaculture efforts.

MATERIAL AND METHODS

Details of the experimental pond, area, location and treatment were given earlier, in addition to the net used for catching juveniles from the adjacent Ambara Creek for stocking the pond [5]. After treatment and drying for 15 days [5] the pond was filled by creek water upto 1.5 m depth through pumping.

Wood cutting. Branches of mangrove (*Avicinia spp.*) one metre long were cut from the nearby forest and planted straight on the inner walls of the pond facing wind direction. The branches protect the walls from currents generated by the wind. The mangrove leaves degenerate slowly in the saline water and therefore add organic food (detritus) to the pond as well as providing cool shelter to the growing shrimps.

Stocking. Stocking was started on 7 August and completed on 7 September, 1986. 5000 juveniles of *Metapenaeus affinis* (H. Milne Edwards), 2000 of *Penaeus indicus* H. Milne Edwards, including few *P. penicillatus* Alcock, were stocked in the pond (50 m x 50 m x 2.5 m) in addition to 40 juveniles of *Penaeus semisulcatus* De Haan ('patapati jaira'). The juveniles 2.5 - 5 cm T.L. were caught from the adjacent Ambara Creek near Gharo village with a net having 5 mm mesh size.

Feeding. According to the food formula (Table 1), 5 kg food was given every day starting from 8 September, between 1700 to 1900 hours. After every 10 to 15 days the juveniles were sampled from the pond and measured.

Hydrographic conditions. Temperature in the Ambara Creek (Table 2) ranged between 29.8 and 19.0 °. Pond

Table 1. The formula for food maintained more or less throughout experiment.

Ingredients	Composition (%)	Quantity (g)
Fish meal	11.54	600
Shrimp head meal	11.54	600
Rice bran	24.04	1250
Wheat bran	24.04	1250
Wheat powder (used as binder)	14.42	750
Blood	9.61	500
Khali (oil extracted cake)	3.85	200
Vitamin-mineral mixture	0.96	50
Total	100	5200

salinity during this period ranged from 5.0 to 22.4 ‰ and in the creek it was between 4.3 and 23.0 ‰.

Table 2. Distribution of temperature in experimental pond and Ambara creek.

Date	Temperature (°C) in experimental pond	Temperature (°C) in Ambara creek
7.8.86	28.1	29.8
15.8.86	27.9	29.1
25.8.86	27.0	26.1
2.8.86	26.8	27.0
5.9.86	27.5	28.3
15.9.86	26.3	27.2
28.9.86	26.5	26.5
10.10.86	25.0	27.1
23.10.86	24.0	26.8
5.11.86	24.1	26.5
15.11.86	23.0	25.0
25.11.86	18.0	19.0

RESULTS

After feeding for about three months the shrimps were harvested on 25 November, 1986. With a negligible mortality of 2.5 ‰, the catch was 70 kg of shrimps, ranging in total length (T.L.) from 11.0 to 13.5 cm.

Growth. Growth of *P. penicillatus*, *P. indicus*, *P. semisulcatus* and *M. affinis* is shown in Fig. 1 as increases in the total length. In *P. penicillatus* and *P. indicus* 1.06 mm per day growth was observed. From an average 45 mm stocking size an average growth to 130 mm was observed in 80 days (85 mm in 80 days) when the stocking period (7 August to 7 September) was not included. A little lower growth was observed in *M. affinis*. With a mean 40 mm stocking size an average growth to 120 mm (80 mm in 80 days) or 1 mm/day was observed.

A much greater increase was observed in *P. semisulcatus*. During the same period of 80 days a growth to 200 mm (range 190-210 mm) was observed; 150 mm in 80 days, about 1.86 mm/day.

Weight. The average increase in weight was also observed in the four species. In *P. penicillatus* and *P. indicus* the increase was of the order of 12 g in 80 days (0.15 g/day) and in *M. affinis* 11 g during the same period (0.14 g/day). A 65 g increase in weight was observed in *P. semisulcatus*, about 0.81 g per day. Caubere *et al* [3] reported growth of 60 mm (35 g) from March to September in *P. japonicus*

Bate. During trials in ponds ranging from 0.7-1.4 ha in Indonesia, 50 g average increase in weight in *P. monodon fabricius* was recorded during 136 days (0.37 g/day) [2]. In the Philippines an increase of 23 g in 3½ month [1] was recorded at 2.5 m²/juvenile stocking density, or about 0.22 g/day for *P. monodon*.

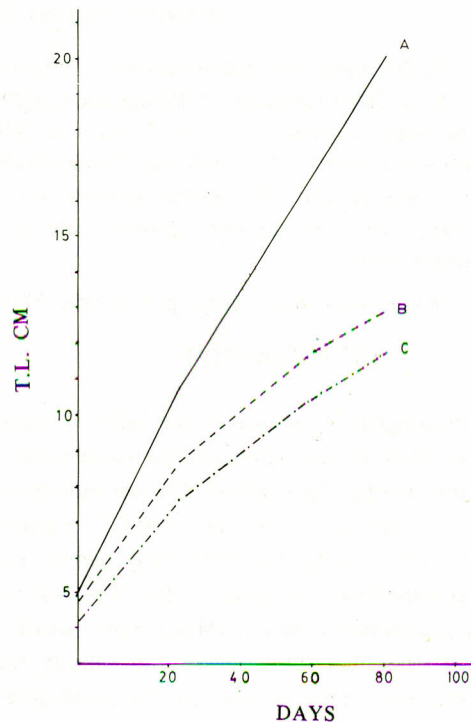


Fig. 1. Growth rate in total length (T.L.) in *P. semisulcatus* (A); *P. indicus* (B) and *M. affinis* (C), cultured in pond.

DISCUSSION

It is apparent from the results that *P. semisulcatus* is the best species for culture as a second crop during the July-November period when salinities are lowered in the Indus Delta area. *P. monodon* had not proved to be a suitable species for culture during this period, with an increase of only 12-14 g in three months [6]. The main problem is the availability of seed stock, as we have a very limited stock of *P. semisulcatus* in our waters. Seed (juveniles) of this species are produced in hatcheries in Taiwan and Kuwait. We might raise our own brood stock by importing postlarvae from the above countries, and then after maturing allow them to spawn in captivity [3,7]. For a short term until our hatcheries start producing enough seed, we could import the fry from the above countries or any other country which could help us in this venture.

P. indicus is a second promising species on the southwest coast of Pakistan. The juveniles are most abundant in

Table 3. Distribution of salinity in experimental pond and Ambara creek, during August – November, 1986.

Date	Salinity (‰) experimental pond	Salinity (‰) Ambara creek
7.8.86	14.7	14.0
15.8.86	12.3	11.5
25.8.86	5.0	4.3
5.9.86	14.0	12.0
15.9.86	16.8	16.0
28.9.86	18.6	18.0
10.10.86	18.1	16.0
23.10.86	19.0	20.3
5.11.86	19.0	19.5
15.11.86	22.4	23.0
25.11.86	21.0	22.0

the creek system and could sustain a limited stocking demand. Moreover, an abundant brood stock of this species is available in the northern Arabian Sea and could potentially be used in producing billions of fry each year in future hatcheries. *M. affinis* a third abundant species in the creek system also has a good growing potential, as mentioned above and in the earlier study [5].

Maturation. The females of *P. indicus* were found maturing in the pond, but at the time of harvesting the maturity passed the second stage only, possibly due to prevailing low salinity and temperature in the pond. In the previous experiment [5], well developed ovaries were observed in *P. merguensis* De Man females. The maturity was from fourth to fifth stage when spawning generally occurs at sixth stage.

Fish growth. Few fish fry were incidently introduced into the pond during water change. They grew well and attained a 25 cm T.L. and 230 g weight in 80 days. The fishes were indentified as *Lates* sp. During earlier experiment [5], the fry of the same species entered into the pond and grew to 15-22 cm in total length and 120 g in weight at the maximum. The lower growth during that period was apparently due to prevailing high salinity (42 ‰).

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