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A RAIN-FED COASTAL POND IN SUNDERBANS

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ABSTRACT

Polyculture of *Penaeus monodon*, along with freshwater carps, mullets and milk fish, was undertaken in a rain-fed pond to study the growth and survival in freshwater conditions in coastal areas. In two consecutive experiments during 1978 and 1979 the prawns showed relatively faster growth, attaining 60-65 g in 4 months and 70-80 g in 7-8 months of culture. However, survival of the prawns was poor, maximum being 34.6%.

Studies on the culture of *Penaeus monodon*, the fastest growing penaeid prawn available in Indian waters, in low-saline and fresh waters were initiated by the Central Inland Fisheries Research Institute, Barrackpore, in a 0.25 ha rain-fed pond at its Bakkhali fish farm located in Henry's Island in lower Sunderbans. This confined pond, excavated in 1968, had initial salinity of 20.12 ppt

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(Jhingran et al 1972), but by natural desalination it has later reached a stabilised phase in the range from traces to 3 ppt. Two polyculture experiments were conducted in succession in this pond in 1977-1978 and 1978-1979 with freshwater carps (*Catla catla*, *Labeo rohita*, *Cirrhinus mrigala*, *Hypophthalmichthys molitrix*), brackishwater fishes (*Mugil cephalus*, *Liza tade*, *Liza parsia*, *Chanos chanos*) and prawn (*Penaeus monodon*).

The pond was prepared first by the application of mohua oil cake @ 200 ppm to eradicate unwanted fishes and organisms. After 20 days, when the pond water cleared and a rich concentration of plankton developed, stocking of fishes was done, which was followed by prawn. The pond was manured once in a month with raw cowdung @ 5000 kg/ha and fertilized with urea and superphosphate @ 480-500 kg/ha alternately at fortnightly intervals.

The postlarvae of *P. monodon* were collected locally by operating Midnapore type spawn collection nets from the adjacent Bakkhali creek and also from nearby intertidal pits during spring tides. The salinity of the creek was 28-30 ppt. The postlarvae were then gradually acclimated to low saline conditions (3 ppt) over a period of 20-30 days.

In the first experiment, the prawns were stocked in March 1978 at the rate of 1060/ha. The combined stocking density of prawns and fishes was 5300/ha. The prawns were harvested in October 1978 after 235 days of culture. The second experiment was initiated in May 1979 and the stocking rate of prawns was 1600/ha. The overall density of prawns and fishes was 8000/ha. The prawns were cultured for 214 days, and were harvested in November 1979. In both the experiments the fishes and prawns were stocked in the ratio 4:1.

The fishes and prawns were fed @ 3% of body weight with mustard oil-cake, rice bran and wheat powder in the ratio 1:1:1. Bundles of date palm leaves were placed on the sides of the pond at regular intervals as substratum for periphyton growth and to provide shelter to the young and newly moulted prawns. Monthly sampling was done to assess the growth of the prawns. Hydrological parameters of the pond water were studied at fortnightly intervals using standard methods (A.P.H.A., 1965). The water depth and temperature were recorded daily. Turbidity of the pond water was measured by Secchi-disc method. Primary productivity was studied in 1979 only, by dark and light bottle method. Plankton analysis was carried out at fortnightly intervals.

The details of the two culture experiments are furnished in Table 1. In the first experiment, advanced juvenile prawns in the average size of 77.9 mm|4.3 g were stocked. They attained the final average size of 208.9 mm|71.1 g in 235 days, giving a growth increment of 131.0 mm|66.8 g. The daily weight increment was 0.284 g. The average monthly growth was 16.8 mm|8.52 g. In the second culture, the average stocking size of the prawns was 28.4 mm|0.3 g,

and they were in early juvenile stage. Within 214 days of culture they grew to an average size of 225.0 mm|80.0 g, giving an increment of 196.6 mm|79.7 g. The daily weight increment was 0.372 g and the average monthly growth was 27.0 mm|11.16 g. From earlier experiments conducted in the same rain-fed pond, *P. monodon* had been reported to reach the final average size of 237.2 mm|85.0 g in 9-10 months (Jhingran et al 1972) and 200.9 mm|95.0 g in 7-8 months (Rao et al 1979).

TABLE 1. Pond details and details of stocking and growth of *P. monodon* in the rain-fed polyculture pond.

Particulars	1978	1979
Area of the pond (ha)	0.25	0.25
Stocking density of fishes and prawns (no/ha)	5300	8000
Stocking ratio of fishes and prawns	4:1	4:1
Stocking density of <i>P. monodon</i> (no/ha)	1060	1600
Average initial size (mm g)	77.9 4.3	28.4 0.3
Average final size (mm g)	208.9 71.1	225.0 80.0
Culture duration (days)	235	214
Average monthly growth (mm g)	16.8 8.52	27.0 11.16
Weight increment per day (g)	0.284	0.372
Average size in first 4 months (mm g)	196.0 60.0	194.5 65.0
Weight increment per day in first 4 months (g)	0.464	0.539
Survival (%)	34.6	0.8

It was thus observed from the two experiments that the prawns had a higher growth to begin with. Within 4 months of culture, the prawns attained an average size of 196.0 mm|60.0 g and 194.5 mm|65.0 g in 1978 and 1979, respectively. The respective daily weight increments were 0.464 g and 0.539 g. This initial faster rate of growth indicates the prawn's ability to adapt well to low saline conditions and to grow to marketable size in 4 months. When the cultures were continued for a little more than 7 months, the growth rate had, however, slowed down, the weight gain being only 11.1 g and 15.0 g, respectively for experiments 1 and 2.

Nevertheless, the survival rate was low and unsteady, whereas it was 34.6% in the first experiment, it was only 0.8% in the second. Rao et al (1979)

obtained a survival of 37.4% for *P. monodon* from this pond in an earlier study with multistocking and repeated harvesting programme.

TABLE 2. *Hydrological factors of the low-saline pond.*

Hydrological parameters	1978	1979
Depth (cm)	110-133	56-110
Turbidity (Secchi disc) (mm)	110-210	80-200
Temperature (°C)	23.0-34.0	25.2-35.1
DO (ppm)	6.0-9.6	6.2-10.6
pH	8.0-9.0	8.4-9.1
Alkalinity (ppm)	164.0-206.0	122.0-220.0
Phosphate (ppm)	0.125-0.216	0.009-0.076
Salinity (ppt)	0.72-2.55	0.75-1.70

The salinity of the pond was almost zero during monsoon and postmonsoon months and slowly increased to 2.55 ppt in summer months. During this time the pond water level had gone down to 56 cm. The fluctuations in hydrological parameters of the pond water are shown in Table 2. Primary productivity was minimum in October and maximum in May (248-620 mg C|M³|h). The reduced water column, higher temperature and the turbid conditions of the pond water in summer months along with the already-stocked fishes (including bottom feeders) may have led to interspecific and intraspecific competition among the stocked species, which may possibly have resulted the poor survival of the prawns. The stocking of prawns was done after 4-5 months of stocking of fishes. The water level in the pond increased considerably following monsoon and this had greatly hampered complete harvesting of the prawns. The overall survival of fishes and prawns from the second experiment was only 33.2%.

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