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Experiments on the Culture of *Penaeus monodon* in the Salt Pan Area at Tuticorin

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ABSTRACT

The paper embodies the results of growth and production of *Penaeus monodon* cultured during 1988-89 in the salt pan area at Tuticorin. The overall growth rate of the hatchery produced seeds stocked in ponds varied from 25.1 mm/5.85 g to 35.2 mm/9.8g per month and the best growth was associated with low stocking density. The post-larvae attained marketable size of 32 g in about 140 days. Supplementary feed consisted of 7-9 ingredients with protein value of 38%. The conversion ratio varied from 1:5 to 1:1.91.

INTRODUCTION

Semi-intensive prawn culture is fast developing and has been demonstrated to be a viable project in Tuticorin area on the south-east coast of India adjacent to the Gulf of Mannar. Nair *et al.* (1974) highlighted the scope for development of shrimp culture in high saline sites in and around Tuticorin. In Japan and Philippines, producitve prawn farms are nothing but the converted salt pan sites. Marichamy and John Motha (1986) reported a maximum production of 1604 kg/ha/ 140 days of *P. indicus* reared in salt pans. Since *Penaeus monodon* is identified to be a fast growing euryhaline species, information on its growth, survival and production under high saline conditions prevailing in the salt pan area is of practical significance. Therefore, trial experiments were carried out employing *P. monodon* in the same environmental conditions where *P. indicus* had been successfully reared earlier. The experiments were conducted between March, 1988 and January, 1990.

MATERIAL AND METHODS

The environmental and soil conditions of the culture ponds, the details of pond preparation, farm management practices, etc. have been described by Marichamy and John Motha (1986). One fifth of the volume of pond water was changed daily. The seed of *P. monodon* used in the earlier experiments was procured from Hindustan Lever Hatchery, Madras, while seed produced by M/s. Motha Brothers, Veppalodai, was used for stocking in the later experiments. Post-larvae of the size 18 mm were acclimatised in the culture site and stocked at different densities ranging from 1 to 5/m^2 in 5 ponds.

Locally available pulverised feed ingredients such as squid waste, fishmeal, shrimp head powder, groundnut oil cake, rice bran, tapioca powder, mineral-vitamin mix and fish oil were mixed with water to prepare pelleted feed of 3 mm size. The diet contained 38% protein and 3500K cal/g energy. Higher feeding rate of 7-10% of body weight was employed initially. Sixty days post-stocking, the feeding rate was reduced to 5%; it was further reduced to 3% after 4 months. Feeding was done at intervals of 6 hours, giving increased quantum at night. The duration of the culture varied from 116 to 169 days. The growth and survival of the prawn was assessed by periodic sampling, operating a cast net. Hydrological observations of the ponds were also carried out simultaneously.

RESULTS AND DISCUSSION

The temperature of the surface water in the culture ponds varied from 24.2° to 29.3°C, while salinity varied form 28 to 40.65 ppt. Oxygen was in the range 3.85-5.13 ml/1, whereas pH varied between 7.94 and 8.08 (Table 1).

The results of the culture experiments are presented in Table 2. In the first experiment, the post-larvae attained a length of 171.2 mm/37.7g in 141 days, giving a production of 1048 kg/ha. This indicates that the existing environmental conditions could support stocking density of over 50,000/ha. Comparatively poor survival was noticed in experiments 3 and 4 and this may be attributed to the prevalence of higher temperature and salinity during the summer period. The final size of prawn, the monthly overall growth rate as well as production were more or less similar when the stocking density was maintained

Table 1. Hydrological factors of the culture site

Month	Water temperature (°C)	Salinity (‰)	Dissolved oxygen (ml/1)	pH
March 1988	29.3	40.00	4.82	7.98
April	28.0	38.50	4.63	8.01
May	27.0	39.25	3.87	8.03
June	27.0	40.60	3.89	8.08
July	26.7	39.25	4.56	7.95
August	25.2	40.65	5.13	7.94
September	25.8	36.75	4.01	7.97
October	27.1	38.25	3.85	8.05
November	25.6	37.38	4.11	8.01
December	24.5	28.10	4.30	8.00
January 1989	24.3	28.00	4.30	8.02

Table 2. Results of culture experiments on *Penaeus monodon*

Expt.	Pond size	No. of seed stocked	Duration (days)	Survival (%)	Size at harvest (mm/g)	Growth rate (mm/g/m)	Rate of production (kg/ha)	Conversion ratio	Income fetched (Rs)
1	0.02	1150	141	50.8	171.2/37.7	32.2/8.02	1048	1:5.0	2640
2	0.45	7250	169	56.2	169.0/37.3	26.4/6.62	338	1:6.5	16720
3	0.97	23500	164	38.0	157.0/32.0	25.1/5.85	295	1:9.1	36240
4	0.51	11000	153	45.1	155.6/29.0	26.6/5.69	282	1:7.3	17280
5	0.45	5000	116	90.0	156.0/30.0	35.2/9.8	304	1:6.0	16440

around 20,000/ha. The post-larvae of *P. monodon* attained marketable size of 156-169 mm/29-37 g in about 160 days. The crop raised during September '89-January '90 (monsoon period) registered higher growth of 35.2 mm/9.8 g/month. This stock reached harvesting size of 156 mm/30 g in 116 days. The low stocking density of 11,000/ha, and the favourable water quality appear to have promoted faster growth. The conversion ratio in this experiment was 1:5.9. The rearing trial carried out in 0.97 ha pond, gave an income of Rs. 36,240/- even with a low survival rate of 38% (Table 2). It may be reasonably assumed that increasing the stocking density as well as survival by improving the farm management practices, can yield a two to three fold increase in income.

Subrahmanyam (1973) reported a growth rate of 25 to 30 mm/ month in nature. Sebastian *et al.* (1980) found an average growth rate of 38.4 mm/ month at a stocking density of 7000/ha in the salinity range 5.3 to 20 ppt. The growth rate observed by Sundararajan *et al.* (1979) in the salinity range of 10.9 to 22.4 was 43 mm/month. Chakraborti *et al.* (1986) recorded an overall growth rate of 39.6 mm to 41 mm/month at a higher stocking density of 40,000/ha in the salinity range of 16.8-30 ppt. The yield varied between 250 and 329 kg/ha in 105 days with a survival of 25-33%. Felix and Sukumaran (1988) observed that *P. monodon* attained a body weight of 19 g in 105 days under monoculture. Paulraj and Sanjeevaraj (1982) observed maximum gain in *P. monodon* (48 mg/day) at a salinity of 25 ppt and comparatively poorer growth in the salinity range of 35-45 ppt. The influence of environmental conditions and rate of stocking on the growth and production of *P. monodon* have been well recognised by earlier workers (Subrahmanyam, 1973; Rajyalakshmi *et al.*, 1982; Chakraborti *et al.*, 1985).

Marichamy (1987) worked out the average income from the production of *P. indicus* as Rs. 22,000/ha/crop of 144 days. However, a higher income of Rs. 36,240/- could be realised in 164 days in one of the trials carried out in the present study. Bojan (1988) suggested a stocking density of 30,000-40,000/ha in pump-fed ponds. The environmental conditions that prevailed during the present study are suitable to raise two crops of longer duration for realising better profits.

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