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MARINE PRAWN FARMING ALONG THE COAST OF THE GULF OF KUTCH - ITS PROSPECTS AND PROBLEMS

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ABSTRACT

Along the 250 kilometer coastline of the Gulf of Kutch, there are no prawn farming activities. Millions of juveniles of prawns ascending the creeks in the little rann of Kutch are trapped by staked bag nets and marketed for meagre revenue. The fishermen remain in perpetual poverty due to drought prone conditions of the coast during remaining period of the year. A tidal range of 2.6 metres and high salinity conditions of the Gulf of Kutch necessitate capital investment for supply, retention and exchange of seawater in farming operations. The avaiable seed are not of quick growing variety of prawns. An experimental project was initiated in 1979 firstly to explore the feasibility of utilisation of low saline reservoirs of solar saltworks in Okhamandal for extensive prawn farming using the indigenous seed and there after to assess the culturability, economic viability and management problems associated with small scale intensive farming. During September 1986 to March 1987, seed of *Penaeus merguiensis* and *Metapenaeus kutchensis* @ 36332 nos/hectare were stocked in three ponds of 1.92 hectare each. A growth rate of 0.437 mm/day length and 0.056 gm/day weight in respect of the former and 0.33 mm/day length and 0.037 gm/day weight in respect of the latter species in 187 days of rearing was achieved. The harvested prawns were acceptable to freezing industry and fetched Rs. 14000-23000 (Headon) per tonne. The advantages of employment generation, economic upliftment and utilisation of the monsoon seed resources for farming are discussed.

INTRODUCTION

The coast of the Gulf of Kutch is a a. drought prone area receiving scanty annual rainfall. During the southwest monsoon, the rivers Banas and Machhu, empty into the Little Rann of Kutch. Millions of prawn juveniles ascend from the Gulf of Kutch into

the Kandla-Hansthal creeks and remain in the rann area from july to September. The fishermen of the area, trap these juveniles in staked bag nets and sell for a meagre price. Lakumb (1960) and Ramamurthy (1965) have described several aspects of this monsoon fishery. The juveniles occur in other creeks and mangrove channels of the Gulf of Kutch in good numbers during this period (Gopalakrishnan, *et al*, 1987). The tidal wastelands along the coast are sparsely populated by mangroves of the species *Avicennia* sp. The fishermen are economically most backward and except during the monsoon fishery, remain in perpetual poverty. With a view to exploring the possibility of developing prawn farming along the coast, the suitability of the juveniles in short term farming was studied by stocking them in ponds adjoining a saltworks in the Okhamandal area near Port Okha (Lat. 22° 28' N Long. 69° 05'E). The present study was in continuation of an earlier experiment using indigenous prawn seed in large scale farming integrated with primary reservoirs of saltworks.

MATERIAL AND METHODS

Three identical ponds constructed by impounding the rann area near the salt works were used in the present study. Each pond had 1.92 hectare area and was provided with screened sluices individually connected to a feeder channel. The feeder channel received seawater from adjoining source through pumping The suction and delivery areas of the pump were screened with 25 mm mesh monofilament and 20x20x40 mesh 'garfil' webbing respectively to prevent entry of trash and predators. Each pond had an overflow pipe of 30 cm diameter fixed at 0.75 metre from the botom and a drain pipe of 60 cm diameter fixed along the pond bottom for draining.

Details of pond preparation are given in Table 1. Twigs of mangroves were made into bundles and distributed along the bottom.

The prawn juveniles of *Penaeus merguensis* and *Metapenaeus kutchensis*, collected from nearby mangrove channel were conditioned

Table 1.

Details of preparation of ponds and manuring schedule during the prawn culture.

Item (kg)	Pond 1		Pond 2		Pond 3		Remarks
	Initial	Bimonthly	Initial	Bimonthly	Initial	Bimonthly	
Lime ($CaCo_3$)	200	-	-	-	-	-	1. Rearing period in pond-1.187 days pond-2.157 days pond-3.127 days
Mahwa oil cake	-	-	-	-	1000	-	2. In pond 1 lime was applied as the pond could not be totally dried prior to manuring.
Raw cowdung	1000	-	1000	-	-	-	3. In pond 2 neither lime nor mahwa oil cake was applied as a test case.
Superphosphate	-	96	-	96	-	96	4. In pond 3, the raw cowdung was not applied as mahwa oil cake was used.
Ammonium sulphate	-	96	-	96	-	96	

for 24 hours after which the healthy surviving seed were stocked in the ponds. Feeding at the rate of 5% of the body weight was done using groundnut oil cake, between 6 to 7 pm daily.

The hydrological data of the ponds was monitored at regular intervals.

The rearing of juveniles was for 187 days in pond 1, 157 days in pond 2 and 127 days in pond 3, using different size groups and manuring practices, between September 1986 to April 1987.

Harvesting was done by total draining gradually over 4 to 5 nights. During day time water was pumped into the ponds. Handpicking and treatment with Mahwa oil cake at the rate of 250 kg/hectare were tried to remove any residual prawn stock.

GROWTH AND PRODUCTION

The hydrological data showed salinity range of 35 — 55 ppt in pond 1, 38-49 ppt in pond 2 and 39 — 55 ppt in pond 3. The temperature ranged from 17°C — 31.2°C. The dissolved oxygen content ranged from 7.2 to 8.2 ppm. The pH was from 7.2 to 7.5. The water depth in the ponds was maintained between 0.5 to 1.0 metre.

Prawn juveniles stocked at an overall average rate of 36332/hectre showed an overall 14.3% survival. In pond 1, both *Penaeus merguensis* and *Metapenaeus kutchensis* were stocked, which yielded 6.44% and 19.36% survival respectively. The total survival rate for pond 1 was thus 25.8%. In this, the juveniles of *P.merguensis* had a mean size of 29.36 mm growing to 99.45 mm with a mean weight of 10.47 gms. The average growth rate/day for the species in the 187 days culture was 0.44 mm and 0.056 gms. Similarly, *M. kutchensis* of 37.27 mm recorded 99.52 mm with a mean growth rate of 0.33 mm and 0.037 gm/day. In ponds 2 and 3 only *M. kutchensis* were stocked. The advanced juveniles, 78 — 79.6 mm grew to 101.17 — 101.95 mm in 157 and 127 days respectively recording a growth rate of 0.13 mm and 0.029 gm/day and 0.18 mm and 0.041 gm/day and survival of 16.58% and 8.81% respectively (Table 2).

Table 2. *Details of growth experiments*

Species/Pond	Stocked	Rate of stocking/ hectare	Mean length	Mean weight	Duration of experiment	Survival	Mean harvested length	Mean harvested weight	Mean length gain per day	Mean weight gain per day
	(nos)	(nos)	(mm)	(gm)	(Days)	(%)	(mm)	(gm)	(mm)	(gm)
Pond. 1										
P. merguiensis	11962	6230	29.36	0.19	187	6.44	99.45	10.47	0.44	0.056
M. kutchensis	60513	31517	37.27	0.69	187	19.36	99.52	7.43	0.33	0.037
Total	72675	37747	—	—	—	25.80	—	—	—	—
Pond. 2										
M. kutchensis	69464	36179	79.60	3.30	157	16.58	101.17	7.93	0.13	0.029
Pond. 3										
M. kutchensis	67216	35008	78.00	3.20	127	8.81	101.95	8.46	0.18	0.041

The experiments showed a total unsuitability of *P. merguensis* in the local conditions. Despite around 54% of the prawn seed resources of this area being represented by this species, *P. merguensis* does not figure in the prawn catches of Okhamandal or the Gulf of Kutch (Gopalakrishnan *et al* 1987; Ramamurthy, 1965). Ramamurthy (1965) estimated a growth rate of 0.16 to 0.23 mm/day in a lower salinity range of 29.9 to 41.88 ppt in respect of the size group of 56-60 mm of the species in the Kutch fishery. The experiments thus indicated the advantage of farming utilising the *M. kutchensis* juveniles in raising short term crops.

The harvested prawns were healthy and had no symptoms of any disease, infection or the 'soft shell' problem An average value of Rs. 17000 per tonne, contributed by 30% of the prawns being medium fetching Rs. 23000 per tonne and 70% being small, fetching Rs. 14000 per tonne could be realised. The quality of the prawns was superior to trawl catches and prices were also improved by 30 to 40%.

POTENTIAL AND PROBLEMS

Ramamurthy (1965) had estimated the landings of the monsoon fishery at 814 tonnes comprising almost entirely of *M. kutchensis*. The modal size of 56-60 mm weighing 1.6 gm represented juveniles. Thus an estimated potential 500 million prawns seed will be available in the region when the catchment areas of the river Banas received good rainfall, enabling adequate discharge from the Dantiwada dam on the river flowing into the little rann of Kutch diluting the salinity in the creeks there (Table 3). Based on the present study, a 20% survival in the six month period of growth of the seed in prawn farming would be substantial for providing employment to 3000 fishermen and increased revenue.

Neverthless, the task of prawn culture in the highly saline backwater areas of the Gulf of Kutch is formidable and not as easy as reported from elsewhere along the brackish-water and estuarine areas of the country. The high tidal range necessitate strong dykes for water retention. Pumping seawater into the farm would be necessary, during day and night As a result of these the capital cost of farming would be high. Besides, inadequate and unsure seed supply of even the slow growing prawn species is also a deterrant. However, by judicious use of local seed and selective introduction of suitable quick growing species of the Indian white jumbo prawn *Penaeus indicus*, reported to be well suited for salt pan areas (Marichamy and Motha, 1986) and a similar good performer *Penaeus monodon* (Marichamy and Rajapackiam, 1982), the seed problem could be solved. The Marine Products Export Development Authority, through their hatcheries under construction now in different parts of the

Table 3. *Production during monsoon prawn fishery in the Gulf of Kutch* (Data provided by the Supdt. of Fisheries, Kutch)

Year	Quantity (tonnes)	Price offered by merchants (Rs) per tonne Fresh	Dry	Remarks
1982-83	89	3000-7000	10000-15000	The low production directly
1983-84	1484	,,	,,	related to poor water discharge
1984-85	1443	,,	,,	from Dantiwada dam on river
1985-86	85	,,	,,	Banas during the years monsoon
1986-87	7	,,	,,	failed.

country's coastline, should be able to meet the seed demands. Through long term lease of the land on nominal rental, to fishermen groups or societies, as in the case of salt-works and by liberal soft loans and adequate subsidy to cover capital cost, monitored through agencies like the Fish Farmers Development Agency, the Government can in a big way promote prawn farming in this region tormented by droughts and economic backwardness. In order to help the poor fisherfolk, the construction of the prawn farms could be taken up as a scarcity relief work through the engineering agencies similar to construction of checkdams, roads etc. during scarcity period every year. Besides the marketing of the prawns through a non-profit oriented organisation would help to achieve better price for the produce and more attractive returns to the fishermen.

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