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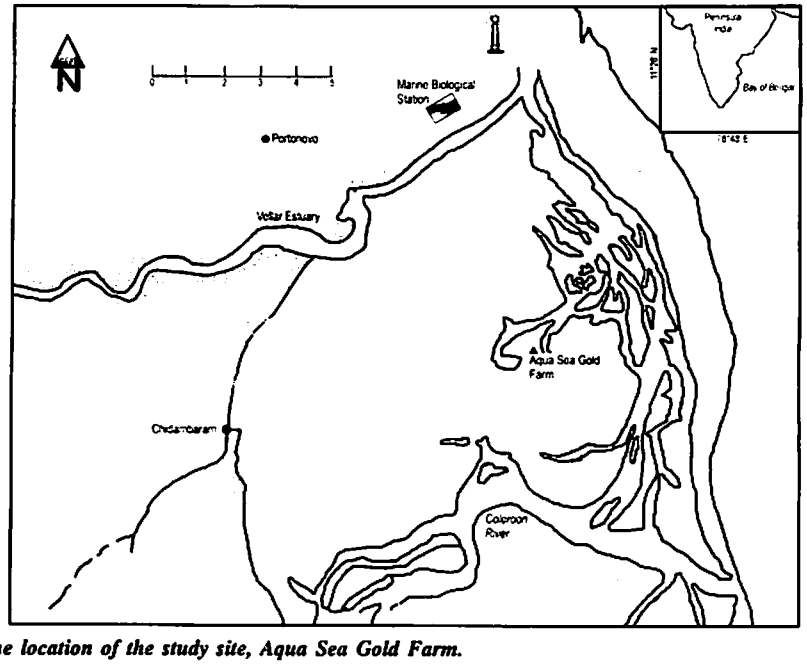
Culture of Prawn in Rotation with Shrimp

M. Srinivasan, S. Ajmal Khan and S. Rajagopal

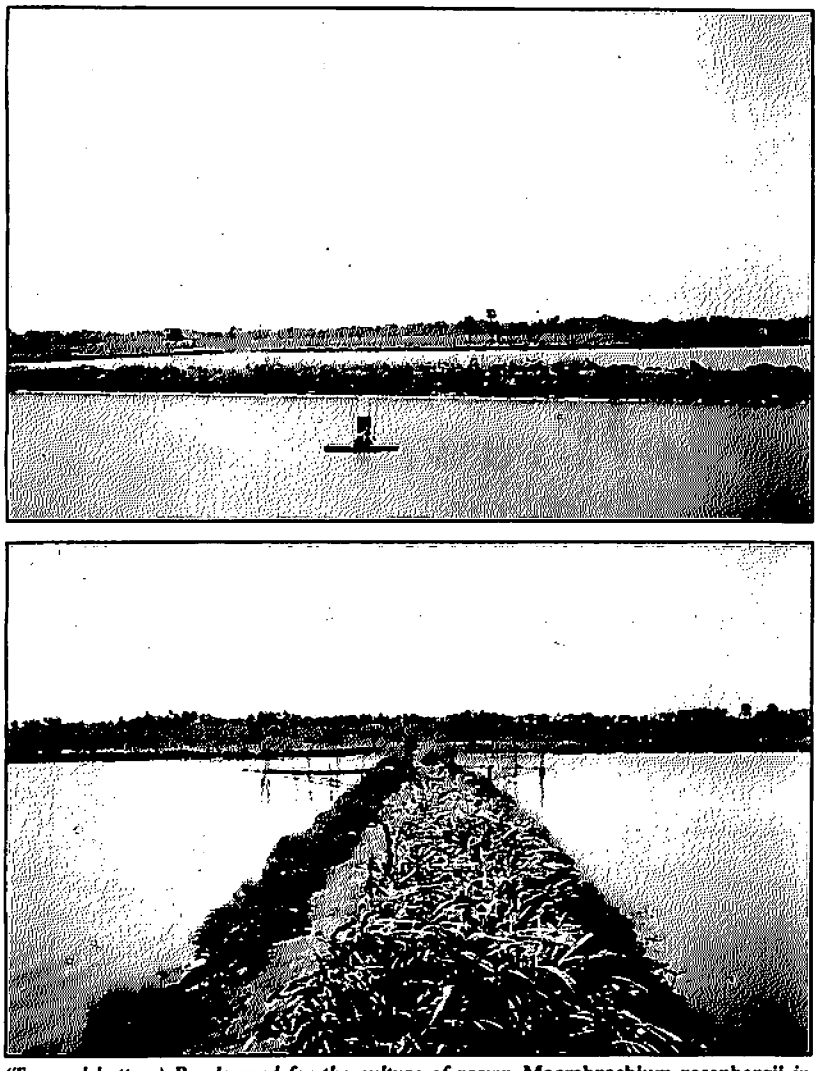
Aquaculture is playing an increasingly important role in world food production. The scope for this industry in India with its strategic location, climate, and rainfall is vast. Brackishwater shrimp (*Penaeus monodon*) and freshwater prawn (*Macrobrachium rosenbergii*) culture is receiving much attention in India, as in many other Asian countries, because of the export potential. While traditional and extensive methods of culture are being practised in states like Kerala, Karnataka, Goa, Maharashtra, Orissa, and West Bengal, semi-intensive culture is being practised in Andhra Pradesh and Tamil Nadu states. High yield and returns encouraged many farmers and entrepreneurs to set up shrimp farms. Farms were set up hastily resulting in chaotic development, and social tension arose in many places as paddy fields were converted to shrimp/prawn farms. No one had anticipated any problems for the industry until the outbreak of white spot disease which caused severe losses to shrimp farmers. Crop rotation was suggested as one option for overcoming the problem of disease in *P. monodon* culture. A progressive farmer in Tamil Nadu state experimented with crop rotation and successfully cultured *P. monodon* during the dry season and *M. rosenbergii* during the wet season. The details of *M. rosenbergii* culture are discussed here.



The location of the study site, Aqua Sea Gold Farm.

The Farm

Studies were carried out at the Aqua Sea Gold Farm, situated on the bank of Uppanar Creek, surrounded by agricultural fields and rice paddies. The farm has eight ponds with an area of 0.8 ha each and one pond with an area of 1.4 ha. A vertical axial flow pump pumps water from the creek into a concrete tank measuring 3.6 x 2.4 x 1.5 m. The delivery pipe is covered with a screen of no. 40 mesh net. The concrete tank supplies water to the culture ponds through a feeder canal which is 400 m long, 1.5 m wide and 0.5 m deep. The ponds have monk type outlets, which discharge water into the drainage canal and from there to the creek. The water depth in the pond is 0.9 m at the inlet and 1.2 m near the



(Top and bottom) Ponds used for the culture of prawn **Macrobrachium rosenbergii** *in rotation with shrimp* **Penaeus monodon**. *Shrimp is cultivated during the dry season and prawn during the wet. Crop rotation has been successfully carried out on one farm in Tamil Nadu and this experiment has tentatively been seen as one way of overcoming the problems of disease resulting from exclusive shrimp culture.*

outlet. Paddle wheel aerators were used during the culture of *P. monodon*, but not during the culture of *M. rosenbergii*. Each pond was provided with four feeding trays.

The farm had initially been used exclusively for the semi-intensive culture of *P. monodon*. There were two success crops with a yield of 1.5 t/ha each, before the third crop was affected by the white spot disease resulting in the loss of the entire crop.

Culture Details

The ponds were prepared by drying the pond bottom after ploughing. Hydrated lime ($Ca(OH)_2$) was applied to the pond bottom before and after ploughing at the rate of 400 kg/ha to stabilize soil pH to seven. The ponds were filled with water to a depth of 75 cm, and then fertilized with urea and superphosphate at the rate of 25 and 2.5 kg/ha, respectively, and cattle manure at the rate of 112.5 kg/ha. The water level was then raised to 1 m. Periodically, small doses of fertilizers were added to maintain the planktonic bloom. Postlarvae (PL) of *M. rosenbergii* were stocked in two ponds (0.8 ha each) at the rate of 18 500 PL/ha in one pond and 17 500 PL/ha in the other. During the culture period, the salinity in the ponds varied from 0 to 4 ppt and the temperature ranged from 23 to 32°C. Transparency of water varied from 24 to 50 cm and the pH from 7.5 to 9.6. Sampling was done with a cast net every 15 days to assess the growth, survival, and health of the prawns. No hide-outs had been provided in the ponds and during sampling, prawns with broken legs were observed. Pond water was exchanged only once a month at the rate of 10-25% of total volume. Commercial feeds were used to feed the prawns at the rate of 8, 6, 4, 3, 3 and 2% of prawn biomass with feed quantity decreasing from the first to sixth month of culture, respectively. Harvesting was done by cast netting followed by draining and hand picking after 6 months of rearing. The weight of harvested prawn varied from 20 to 120 g each, with an average of 66.5 g. The percentage recovery was 80% and the total harvest was 964.25 kg/ha. The food conversion ratio (FCR) was 1:1.17.

Predatory fishes such as *Oreochromis mossambicus, Clarias* sp. and water snakes found their way into the ponds and did cause some problems but they were periodically removed with the help of the cast net. Frogs and insects were also quite common in the ponds.

Conclusion

The losses incurred in the exclusive culture of *P. monodon* due to the outbreak of white spot disease prompted the farmer to adopt rotation of crop with cautious optimism, which dissuaded him from vigorously pursuing the culture of *M. rosenbergii*. Nevertheless, it did pay him dividends. The farmer could have increased production and returns through higher stocking density, operation of paddle wheel aerators, and more frequent water exchange. Rotation with *M. rosenbergii* culture did help the farmer overcome the disease problem since farmers who exclusively cultured *P. monodon* in the nearby areas during the same season

Operational cost (per ha)		Rs.*
a.	Lime	375.00
b.	Fertilizers	63.00
c.	Seed	6 000.00
d.	Feed @ Rs. 20 per kg	22 563.00
e.	Fuel for pump	1 875.00
f.	Chemicals for water analyses	250.00
g.	Nets and feed trays	500.00
h.	Labor	
	1. Technician	6 000.00
	2. Laborer and watchman - one each @ Rs 750/mo. for 6 months	9 000.00
		46 626.00
Income		
Total production of prawns - head on		964.25 kg
Total production of prawns - headless		231.42 kg
Gross income @ Rs. 330 kg for headless		Rs. 76 368.60
Net income		Rs. 29 742.60

*US$1 = Rs 35

suffered losses due to white spot disease.

Acknowledgements

The authors sincerely thank Mr. Durai and Mr. S. Ravisankar of the Aqua Sea Gold Farm for their help and cooperation in this study; and Dr. M. Kalyani, Professor and Director of the Center of Advanced Study in Marine Biology, Annamalai University, for his encouragement. S. Ajmal Khan and S. Rajagopal thank the Tamil Nadu State Council for Science and Technology for the financial support.

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Tilapia Breeding in Ricefields in Vietnam

Nguyen Cong Dan, Tran Mai Thien and Dinh Van Trung

Fish culture in ricefields has been in practice for over a thousand years (Khoo and Tan 1980) and is most developed in Southeast Asia. Various types of rice-fish farming systems such as rearing of fry and fingerlings, and production of marketable size fish, are practised (Chapman 1992; Li and Pan 1992; Yunus et al. 1992). Costa-Pierce (1992) indicated that raising fingerlings in ricefields in Indonesia was more profitable than growout, and that shallow ricefields might be better suited to nursery systems. In Vietnam, the common carp (*Cyprinus carpio*) is known to breed and grow naturally in ricefields, but the use of ricefields as hatcheries and nurseries for tilapia is not known. Results of studies undertaken for breeding and nursing Nile tilapia (*Oreochromis niloticus*) in ricefields in Thai Binh province in Vietnam during the years 1995-96 are briefly presented in this paper.

Study Area

The study was undertaken at Duyen Hai commune, Hung Ha district, Thai Binh province, 120 km southeast of Hanoi. The commune has an area of 479 ha, of which 350 ha are ricefields and 15 ha are ponds. The land is very fertile with a controlled irrigation system which makes it suitable for integrated rice-fish farming. In addition, the commune has an underground source of warm water with temperatures between 52 and 72°C depending on the depth of the aquifer. The aquifers are generally located at a depth of 70-170 m and come up naturally at ground level. This is a very convenient source of warm water for overwintering and conditioning tilapia broodfish