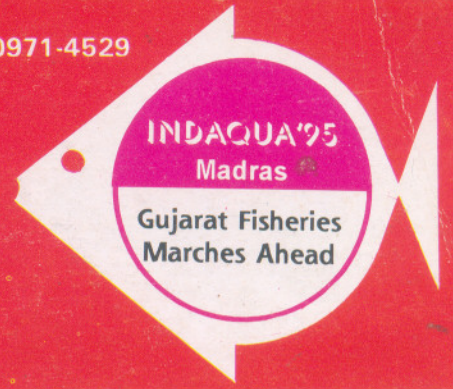




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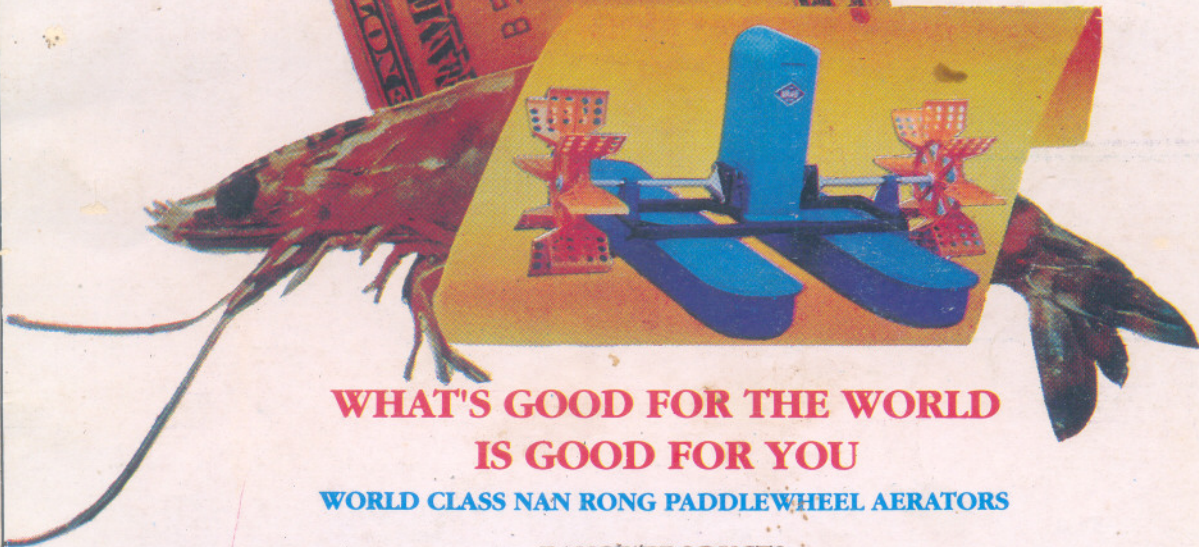
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# PENAEUS SEMISULCATUS: A POTENTIAL SPECIES FOR COMMERCIAL CULTURE ALONG TAMILNADU COAST.

G. Maheswarudu, E.V. Radhakrishnan, N. Neelakanta Pillai M.R. Arputharaj, A. Ramakrishnan, S. Mohan, A. Vairamani  
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Major portion of the marine export products by value wise, is being contributed by shrimps. Three fourth of exported shrimps is from sea and the rest from culture. Since the exploitation of shrimps has already reached optimum level in Indian coastal waters, one alternative is to increase shrimp entering shrimp culture for quick and high returns. Farming technology for *P. monodon* and *P. indicus* has been considerably developed than that for the other species of Indian coast. Prime species that are cultured successfully at present in India are *P. monodon* and *P. indicus* in the order of trade preference. But in Japanese market *P. semisulcatus*, a striped shrimp is fetching higher price than *P. indicus*. Information on grow-out practices of *P. semisulcatus* is scanty. Experimental-scale culture has been attempted in Kuwait, Israel, Bahrain, Taiwan, and Malaysia.

*P. Semisulcatus*, having limited and patchy distribution in Indian coast, is a major exploited species in the southeast coast of India. Of late, a declining catch trend for this species has

been observed along Tamilnadu coast. In view of this, a research project on sea ranching of *P. semisulcatus* is being carried out and as a part of this a small shrimp hatchery of one million capacity/year has been established at the Regional Centre of CMFRI, Mandapam Camp. Besides postlarval production and ranching in Palk Bay/Gulf of Mannar during the last 7 years period, various experiments have been conducted to complete its life cycle in captivity and it now stands domesticated. Extensive culture experiments in two earthen coastal ponds for a period of 136 days at Fish Farm, Regional Centre of CMFRI, Mandapam have revealed the potential of *P. semisulcatus* for commercial culture along Tamilnadu coast which has negative agro-climate and semi-arid climate in general.

**Pond. Pond preparation and water management (Table-1):** Two identical rectangular ponds of 800m<sup>2</sup> waterspread area each (40 m x 20 m) were used. Pond bottom is peaty allowing heavy seepage; with admix-

ture of clay, sand, corals and fragments of molluscan shells. Out of two ponds, pond II was with one m width of sea grass (*Halodule uninervis*) bed in the peripheral region. Ponds are excavated ones, one m from ground level and has no gravity drain. Pond water was fertilized with urea and ammonium phosphate at the rate of 50 kg/ha and 100 kg/ha respectively fifteen days before stocking to increase plankton production.

Experiments were done in salt water that accumulated by lateral seepage from sea as well as by north-east monsoon rains during November-January. Evaporation loss was compensated by pumping lagoon salt water in February and from sea in March.

Water level at stocking was 70 cm and it gradually increased to 130 cm by end of December due to rains and then decreased to 70 cm by end of January. From February onwards water level was maintained at 80-90 cm. Besides pumping water daily to maintain desired level in ponds, 65% of water was replaced once on day 107 and later on day 120.

**Seed production and stocking:** Seeds for stocking purpose was raised in the hatchery, Regional Centre of CMFRI, Mandapam by using wild spawners from Gulf of Mannar. Postlarvae (PL 40) of 29.83 mm average total length were stocked in both ponds on 15-11-93 at the rate of 50,000/ha in the evening hours. Growth was monitored by sampling initially after 29 days and then every fortnight. Hydrological parameters such as temperature, salinity and dissolved oxygen were recorded once in fifteen days.

**Feed and Feeding schedule:** "Biofeed", imported from Singapore (protein (min. 35%), fat (min. 2.8%), fibre (max. 3%), ash (max. 18%), moisture (max. 13%) was given to stock in both ponds during the entire culture period. Criteria followed for determining daily feed ration based on average body weight of shrimp, assumed survival rate and estimated total biomass; is given in Table 2. Crumbled "Biofeed" (BEX 1) was given for first 30 days; crumbled BEX 2, was given during next 38 days; final 68 days BEX 4, in pellet form (2.2mm dia x 6-8mm<sup>-1</sup>) was given. Part of the feed was placed in check-tray and the rest cast in the peripheral region once daily in evening hours. Feed was picked

TABLE 1

Particulars of Experimental Culture of *P. semisulcatus* in two Earthen Ponds at Mandapam

S.No.	Parameter	Experimental Pond I (800 m <sup>2</sup> area)	Experimental Pond II (800 m <sup>2</sup> area, with 1m width sea grass bed in peripheral region)
1.	Stocking size		
	Average total length in mm	29.83	29.83
2.	Stocking size		
	Average weight in g	0.3	0.3
3.	Stocked Number	4,000	4,000
4.	Harvested size (Average TL in mm)	124.11	112.13
5.	Harvested Size (Average weight in g)	16.74	11.95
6.	Harvested Number	1,736	3,041
7.	Survival in %	43.4	76.02
8.	Total production (kg)	29.06	36.34
9.	Total production/ha(kg)	363.25	454.25
10.	Total number/kg at harvest time	60	84
11.	Sold Price (Rs./kg)	185	130
12.	Quantity of feed consumed (kg)	60.9	79.3
13.	Food Conversion Ratio (FCR)	2.09 : 1	2.18 : 1



TABLE 2

Criteria Followed for Determining the Daily Feed Ration, Total Feed Requirement and food conversion Ratio in two experimental ponds during culture period

Pond No	Duration in days	Average body Weight of prawn (g)	Assumed survival %	Estimated Biomass in kg	Feeding Rate (% of Biomass)	Daily feed Ration (kg/day)	Total feed required for duration (kg)	Food conversion ratio at the end of duration
I	0-30	0.3	100	1.2	8.0	0.100	3.000	03 : 1
	31-48	3.57	70	9.996	4.0	0.400	7.200	0.58 : 1
	49-68	6.7	65	17.420	3.0	0.505	9.500	0.75 : 1
	69-83	10.9	60	26.160	2.25	0.580	8.700	0.93 : 1
	84-99	13.75	55	30.250	2.00	0.600	9.600	1.24 : 1
	100-122	15.30	50	30.600	2.00	0.600	13.800	1.79 : 1
	123-136	16.00	45	28.800	2.25	0.650	9.100	2.09 : 1*
<b>Total feed required</b>							<b>60.900</b>	
II	0-30	0.3	100	1.2	8.0	0.100	3.000	0.3 : 1
	31-48	3.4	95	12.920	4.0	0.500	9.000	0.55 : 1
	49-68	6.0	90	21.600	3.0	0.650	13.000	0.99 : 1
	69-83	7.4	85	25.160	2.75	0.700	10.500	1.13 : 1
	84-99	9.75	80	31.200	2.50	0.800	12.800	1.55 : 1
	100-122	10.38	75	31.140	2.50	0.800	18.400	2.18 : 1
	123-136	10.88	70	30.464	2.95	0.900	12.600	2.18 : 1*
<b>Total feed required</b>							<b>79.300</b>	

\* Based on Harvested production

up by shrimps when fed during night and when fed during day it was found they were not eaten. Check tray inspection was used as an index to increase or decrease the feed ration.

**Hydrological parameters and Growth pattern (Table 3):** Pond water temperature increased gradually from 26 °C in November to 35 °C in March i.e. rainy season to summer. Salinity steadily decreased from 35‰ in November to 12‰ in December due to North-east monsoon rains and then increased to 35‰ by end of March because of evaporation. Dissolved oxygen varied between 4.0 ml/l and 7.0 ml/l during culture period.

The initial stocking size, common for both the ponds was 29.83 mm TL and 0.3 g weight. It progressed to 124.11 mm TL and 16.74 g weight in pond I and to 112.13 mm TL and 11.95 g weight in pond II after 136 days of culture period. At harvest the average growth for male was 120.7 mm TL and 15.00 g weight and 120.7 mm and 11.6g weight in pond I and II respectively. The size of female at harvest was 126.9 mm and 17.32 g in pond I and 116.05 mm TL and 13.0 g weight in pond II. Female had faster growth than that of male in both ponds. Growth performance in two ponds varied after 29 days and the same trend continued upto the harvest. Shrimps in pond I have grown faster than those in pond II after 29 days due to mortality in initial stage in pond I which resulted in thinning. Male and female ratio in percentage was 28:72 in pond I and 60:40 in pond II at the end.

*Penaeus semisulcatus* is an eminently suitable potential shrimp species for culture, as an alternative species to *Penaeus monodon* (Tiger shrimp). Experiments conducted by the authors in the culture of the species have given good results.

**Harvest and Economics:** On 31-3-1994, after 136 days of culture, crop was harvested. The production was 29.06 kg (363.2 kg/ha/crop) in pond I and 36.4 kg (454 kg/ha/crop) in pond II. Out of 4,000 seed stocked in each pond, 1,736 (43.4%) were recovered from pond I; and 3,041 (76.02%) prawns were recovered from pond II. As the weight per prawn at harvest in pond I was 16.74 g (60 count/kg) it fetched Rs. 185/kg. The average weight per prawn being 11.95 g (84 count/kg) in pond II and smaller when compared to pond I it fetched Rs. 130/kg. The seagrass bed in pond II would have facilitated the juveniles to have a nursery ecology as in nature. Good growth in pond I as compared to that of pond II resulting in fetching high price is because of thinning of stock due to mortality before day 29. The total feed consumption was 60.9 kg resulting in 2.09 : 1 FCR in pond I; and 79.3 kg resulting in 2.18 : 1 FCR in pond II (Table 1).

Table 4 gives the economics of the experimental culture in two earthen ponds. Seed

cost is not included as it was produced in the department hatchery. Pumping facility was not exclusively established for these two ponds but established facility for the farm was utilized and the cost included. The gross profit excluding operational cost was Rs. 1,862 (Rs. 23,275/ha/crop) and Rs. 437 (Rs. 5,465/ha/crop) respectively from pond I and pond II. If the crop was harvested on day 122, it would have been more economical.

**Remarks:** These grow-out culture experiments were done in stagnant and impounded water for a period of 136 days. During the entire culture period 65% water was replenished twice only on day 101 and day 114. Shrimps were fed with feed formulated for *P. monodon*; and as there is no formulated feed for *P. semisulcatus* till to date. Production could be increased by providing increased periodical water exchange and giving suitable feed. As the hatchery technology for seed production of the green tiger prawn *Penaeus semisulcatus* has been already perfected by CMFRI, the present encouraging results will go a long way in motivating the prawn farmers to venture on this species, particularly in south-west coast of India. (Tables 3 & 4 on next page)

**Acknowledgement:** We are grateful to D. P.S.B.R. James, former Director, CMFRI for providing facilities, and to Dr. P. Vedavyasa Rao, Director, CMFRI and founder of sea ranching programme on *P. semisulcatus* at Mandapam, for his encouragement and valuable suggestions.



TABLE 3

Growth Performance of *P.semisulcatus*, water salinity, Temperature and dissolved Oxygen in the two Experimental Ponds during culture period

Pond No.	Parameter	Stocking time	After stocking						
			29 days	47 days	67 days	82 days	98 days	121 days	136 days
I	Total length (mm)	29.83	71.84	89.4	110.45	113.25	119.6	121.79	124.11
	Weight (g)	0.3	3.57	6.7	10.9	13.75	15.3	16.0	16.74
	Salinity (ppt)	31.0	26.4	16.0	16.0	24.8	32.0	35.2	30.4
	Temperature ( $^{\circ}$ C)	26.4	29.7	28.0	29.0	31.0	33.4	34.8	35.0
	Dissolved oxygen (ml/l)	4.5	5.1	6.25	4.7	4.4	4.4	6.3	7.0
II	Total length (mm)	29.83	70.85	87.1	94.95	98.4	102.22	106.87	112.13
	Weight (g)	0.3	3.4	6.0	7.4	9.75	10.38	10.88	11.95
	Salinity (ppt)	33.4	25.6	16.0	12.8	24.0	35.2	35.2	32.8
	Temperature ( $^{\circ}$ C)	26.3	28.5	28.3	29.3	31.0	34.0	34.8	35.0
	Dissolved oxygen (ml/l)	4.3	5.9	4.9	5.7	4.4	4.0	5.6	7.0

Table 4  
Economics of Culture Experiments on *P.semisulcatus* conducted during 1993-94

Experiment I (800 m <sup>2</sup> area)			Experiment II (800 m <sup>2</sup> area)		
I.	Amount recovered on sale of product 29.06 kg x Rs. 185 =	Rs. 5,376.00	I.	Amount recovered on sale of product 36.34kg x Rs. 130 =	Rs. 4,724.20
II.	Expenditure		II.	Expenditure	
a.	Cost of manure (Inorganic manure)	Rs. 56	a.	Cost of manure (Inorganic manure)	Rs. 56
b.	Cost of feed 60.9 kg x Rs. 42 =	Rs. 2,558	b.	Cost of feed 79.3 kg x Rs. 42 =	Rs. 3,331
c.	Amount spent on diesel and engine oil	R. 450	c.	Amount spent on diesel and engine oil	R. 450
d.	Amount spent on watch and ward during night	Rs. 450	d.	Amount spent on watch and ward during night	Rs. 450
	<b>Total expenditure</b>	<b>Rs. 3,514</b>		<b>Total expenditure</b>	<b>Rs. 4,287</b>
		Rs. 3,514.00			Rs. 4,287.00
	Amount of profit = I - II	<b>Rs. 1,862.00</b>		Amount of profit = I - II	<b>Rs. 437.20</b>
	Amount of profit for one hectare/crop (800 m <sup>2</sup> x 12.5)	Rs.23,275		Amount of profit for one hectare/crop (800 m <sup>2</sup> x 12.5)	Rs.5,465.00