

STUDY ON THE CULTURE PRACTICE OF

L. VANNAMEI IN THE FRESHWATER POND

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ABSTRACT

The investigation was carried out on the culture of *L. vannamei* in the freshwater Agriculture pond in Danti, Valsad district, Gujarat, India. The investigation was done in three culture ponds at different stocking densities in monsoon season from July to October. In the present research water parameters such as temperature, pH, Salinity and dissolved oxygen of pond water were analyzed every fortnight. Also growth rate and harvesting data of all shrimp culture ponds were recorded. Water quality parameters such as temperature and Dissolved oxygen were maintained throughout the culture period but salinity was low and pH was higher. Harvesting data such as average body weights of the shrimp for ponds 1, 2 and 3 were 21g, 25g, and 20 g; survival rates were 67, 88, and 86 %; FCR was 1.5, 1.4, and 1.45 respectively were recorded after 112 days of pond culture period. The relationship between average body weight and stocking density is highly significant ($p < 0.01$). From the present investigation we concluded that *L. vannamei* culture is successful in fresh water ponds and the growth of shrimp is directly related to stocking density.

KEYWORDS: Litopenaeus Vannamei, Growth Rate, Stocking Densities, Water Quality, Statistical Analysis

INTRODUCTION

Valsad taluka (Gujarat) of India is developing fast in different aspects, in the field of education, industries, saltpan, fisheries, shrimp farming and agriculture. Coastal belt of Valsad taluka covers villages of Danti, Dandi, Bhagal, Hingraj, Kosamba, Tithal and Magoddungari. Many new shrimp farms are also set up in Valsad taluka. It has so many salty lands which are not useful for agriculture purposes. The culture of marine shrimp mainly occurs in near-coastal zones using waters of estuarine.

Shrimp culture is a highly lucrative business. It is now evident that white shrimp (*L. vannamei*) is farmed and is playing a major significant role in shrimp aquaculture production. *L. vannamei* is very tolerant to low salinity and ready availability of postlarvae (PL), it is currently grown in inland waters ranging from 0.5ppt to 30 ppt in salinity. There are very few investigations done on the culture of *L. vannamei* with different stocking densities in fresh water ponds in India. So the present study was an investigation to assess the survival rate, growth rate, and FCR of *L. vannamei* culture in the fresh water with different stocking densities.

MATERIALS AND METHODS

The present investigation was undertaken at a fresh water pond in Dandi, Valsad district, Gujarat, India. The study was carried out in three fresh water agriculture ponds in monsoon season. Three ponds (1, 2 and 3) were 0.4 ha and pond 2

was 0.2 ha in area. All the shrimp culture ponds were 1.2 -1.5m deep. Ponds were prepared by drying, tilting to remove predators and oxidize bottom soil) and liming (500 kg/ha) to correct the pH of the soil. Organic fermenter (200kg rice + 25 kg sugar + 5kg yeast in 200 lit water) were applied to enrich the natural food organisms in the water. Crab fencing and bird netting was done before filling water to prevent the auto competitors. Only Rain water was used for culture. After filling water kept stand one day without any disturbance for sedimentation. After that the water was chlorinated (250Kg/ha) after that excess chlorine was neutralized by dechlorination process which took 72 hours. After dechlorination, the water enriched with probiotic for the good beneficial bacterial environment. The bloom was observed slowly in the ponds.

The PL-14 *L. vannamei* seeds were purchased from Skyline Private Ltd, hatchery. Before purchase Seeds were tested to confirmed negative for the white spot syndrome virus (WSSV) and Taura syndrome virus (TSV) by the polymerase chain reaction method and acclimated to a salinity level of 4 ppt. for the acclimatization the seeds were brought to the farm site and seeds were kept in the tank water for some time and Then the pond water was added slowly into the seed bag to adjust the salinity and pH. Subsequently the seeds were released slowly in to the ponds.

Avanti feed pellets were used for feeding to the stocked post larvae for four times daily at 6.30am, 10 am, 2.30 pm and 6 pm. At regular intervals Water from the reservoir was added to culture pond due to evaporation or soil seepage. Sampling was done after the 50 days of culture (DOC) by cast net used every seven days for monitoring shrimp health and growth rate.

The water parameters like salinity, pH, temperature, and dissolved oxygen were measured by using hand refractometer, pH pen, thermometer, and dissolved oxygen meter respectively. Aeration was given to the entire culture period for all ponds. During harvest all the water from culture ponds drained out.

RESULTS AND DISCUSSIONS

Water parameter analyses for the culture ponds were described in Table 1. Water parameter of the culture pond such as pH (7.9 to 8.8), DO (4.0 to 8.0 ppm) and temperatures (22 to 29° C) were recorded in the early morning. During the culture period the salinity was recorded between 0 to 5 ppt in all the ponds. Lime 100kg/ha, Zeolite 25kg/ha, Mineral 25kg/ha, Probiotic 10kg/ha were applied in pond to maintain water and soil quality. In the present investigation water parameter such as temperature, pH and DO were maintained throughout culture period but salinity was lower due to rain. Many factors, including pH of water, acidity of bottom soil and shrimp culture inputs and biological activity were changed the pH of pond water. For *L. vannamei* culture, the favorable pH range was from 7.6-8.6[1]. A salinity range of 10 – 35 ppt was ideal for shrimp culture [2, 3]. However, the white shrimp, *L. vannamei* tolerates the salinities of 2-45 ppt [4,5]. Growth of *L. vannamei* was higher in low-saline (2 ppt) water than in sea water [6, 7].

SPSS 19.0 ANOVA was used between Average body weight (ABW) and stocking density. The p value was less than 0.01. It was showed the relationship between average body weights and stocking density is highly significant. Fortnight averages body weights of shrimp of all culture ponds were presented in Table 2. So ABW of shrimp was rises with lower stocking density.

Harvesting data such as average body weights of the shrimp for pond 1, 2 and 3 were 21g, 25g, and 20 g; survival rate were 67, 88, and 86 %; FCR was 1.5, 1.4, and 1.45 respectively were recorded after 112 days of pond culture period. The growth of *L. vannamei* is higher in low-saline (2 ppt) water than in sea water [6, 7]. The feed consumed in pond P3was

maximum followed by P1 and P2. In the present investigation the average FCR was 1.4 for all ponds. For survival rate and FCR similar results were documented by various workers [8, 9 and 10]. Also similar finding for survival rate was observed in low salinity desert groundwater [11]. Shrimp survival was quite well considering the dimension of the pond and the sanitary risks of outdoor-reared shrimp [12, 13]. The average production of shrimp culture pond was 3.0, 2.75 and 4.5 ton/ha for P1, P2 and P3, respectively (Table 3). For healthy shrimp growth various gut probiotics 10gm/kg, vitamin c 10gm/kg, minerals 10gm/kg and binder 10gm/kg mixed with Avanti brand feed.

CONCLUSIONS

For every shrimp culture pond expenditure analysis was worked out. Total Production expenditure for 1kg shrimp (44 counts) was calculated as Rs 314.5. The feed consume expenditure was Rs 104.55/kg, followed by seed expenditure Rs. 47.44/kg. The overall production of farm was 3.478 ton and total used feed was 5.2 ton. The average of shrimp farm FCR was 1.4, average ABW was 23 g and average stocking density was 20 numbers / m². The total farm Profit per kg shrimp was Rs 425 and overall total profit was Rs 384500 (Table 4).

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APPENDICES

Table 1: Average Water Quality Parameters

Parameters	Optimum Range
Salinity (ppt)	0 – 5
Temperature °C	22 – 29
pH	7.9 - 8.8
Dissolved oxygen (ppm)	4.0-8.0

Table 2: Weekly Growth Performances (g)

Parameters	Days of Culture (DOC)				
	50	65	80	95	110
Ponds					
P1	8	10	13	16	21
P2	9	12	14	17	25
P3	8	11	13	16	20

Table 3: Pond Performance Details

Details	Pond 1	Pond 2	Pond 3
Area (Ha)	0.4	0.2	0.4
Initial Stocking (Numbers)	80000	25000	100000
Density (Numbers/m ²)	20	12	25
Culture Period	115	103	120
Harvest Size (g)	23	25	21
Count (numbers/Kg)	45	40	48
Shrimp Harvest (Kg)	1200	550	1800
Survival percentage	67.5	88	86.4
Total Feed Used (Kg)	1870	685	2640
FCR	1.5	1.4	1.4
ADG	0.2	0.25	0.17
Production(Kg/Ha)	3000	2750	4500

Table 4: Average Cost Analysis

		Cost Rs./kg
Area (ha) 3.3	1	
Density (Numbers/m ²) 54	20	
Harvest size (g) 19.2	23	
Count (numbers/kg) 52	44	
Doc 119	112	
Survival (%) 84	76	
FCR 1.36	1.4	
Production (kg)	3478	
Total feed (kg)	5195	
Seed cost Rs.	165000	47.44
Feed cost Rs.	363650	104.55
Pond preparation cost Rs.	10000	2.87
Water treatment cost Rs.	30000	8.62
Feed probiotic cost Rs.	25000	7.19
Water probiotic cost Rs.	50000	14.37
Bottom probiotic cost Rs.	50000	14.37
Minerals cost Rs.	10000	2.87
Chemicals cost Rs.	25000	7.18
Feed supplement cost Rs.	10000	2.87
Diesel cost Rs.	200000	57.5
Labour cost/kg 3.85	80000	23
Maintenance & repair Rs.	25000	7.19
Other expenses Rs.	50000	14.37
Total production cost (Rs)	1093650	314.5
Material price (Rs)	1478150	425
Total Profit (Rs)	384500	

