REDVET - Revista electrónica de Veterinaria - ISSN 1695-7504
Vol 25, No. 1 (2024)
http://www.veterinaria.org
Article Received: 13/03/2024, Revised: 05/04/2024, Accepted: 28/04/2024

Culture Of Litopenaeus Vannamei At Pittalanka Krishna (Dist.)

Kalikota Pavan Kumar[1*], Rampuram Amulya[2], Dr. T. Jagadeeshwara chari[3], Bhukya Saikumar[4], Badawath Govind kumar[5], Dharavath Ram Kumar[6]

[1*]Lecturer in fisheries (Government Arts & Science College (A), Kamareddy, Telangana, India kalikotapavan7@gmail.com
[2]Post graduate in Fisheries science - Andhra University amulyarampuram666@gmail.com
[3]Lecturer in Fisheries (Government degree college (Autonomous), Siddipet), Telangana,India drtjcou@gmail.com
[4]MSc Student (Government degree college (Autonomous), Siddipet),Telangana, India saikumarrathod9695@gmail.com
[5]Post graduate (Government degree college (Autonomous), Siddipet), Telangana, India govindfisheries@gmail.com
[6]Lecturer in Fisheries (Government degree college (Autonomous), Siddipet), Telangana, India drkfisheries2023@gmail.com

Abstract:
Litopeneaus vannamei and Peneaus vannamei are the same one & there are various common names such as Pacific white shrimp, white shrimp, vanamei shrimp. In India, the aquaculture industry is creating at an exasperating rate bewildering a few major impediments (sickness flare-up and defilement) during its advancement (Lightne r& Redman 1998). The higher stocking thickness and down-and-out water quality organization might be the reason for the ailment scene. To overcome these issues, an extraordinary and viable shrimp developing unit is required. Hatchlings choose a basic as it will choose the execution and era of the lakes. The objective of larvae selection larvae is to obtain best survival and growthin the pond. Get post-hatchlings from authorized SPF-specific pathogen-free hatcheries and select the hatching centres that have made awesome shrimp in the past or have an awesome reputation. Standard checking, disease expectation, and capable development sharpen contribute to a viable and useful aquaculture operation.

Keywords: *Litopeneaus vannamei*, Hatchlings choice, SPF-Specific pathogen free hatcheries, Water quality administration

Introduction:
The Litopenaeusvannamei is a local of the Pacific coast of Mexico and South America. The conventional culture of vannamei is noticeable in those regions. Asia has been a conventional refined Dark Tiger. As Dark Tiger is inclined to malady rates the need for SPF and SPR strains has made the agriculturists take up elective species. This made vannamei a top-choice candidate species for shrimp culture. L.vannamei was presented in Asia tentatively from 1978-79, but commercially since 1996into Territory China and Taiwan territory of China followed by most of the other coastal Asian nations in 2001. Indian shrimp ranchers were adapted up raise Pacific white shrimp after the government cleared the way for the species introduction into the nation in 2008. Accessibility of quality SPF brooders and ease of seed generation procedure made accessibility of seed circular the year. Being euryhaline species can endure a wide run of salinities permitted it to create in indeed moo saline ranges and in inland saline regions. Higher resistance to malady compared with numerous other shrimp and moo protein necessity, cheaper generation taken a toll, and column environment of vannamei permits it for serious generation in brief periods. Where heightened driven to the culture framework is more feasible by bringing down the utilization of water and arrival assets. With the coming of CAA outline work and Best Overseeing Hones directions made by CAA made a difference to the ranchers to overcome rehashed trim disappointments. With these major focal points vannamei become a favorite candidate species for farmers.

Litopeneausvannamei and Peneaus vannamei are the same one & there are numerous common names such as Pacific white shrimp, white shrimp, vanamei shrimp In India, the aquaculture industry is developing at a disturbing rate astounding a few major obstacles (infection episodes and contamination) amid its advancement (Lightne r& Redman 1998). The higher stocking thickness and destitute water quality administration might be the reason for malady flare-ups. To overcome these issues there is a requirement of a great and feasible shrimp cultivating unit. The show thinks about bargains with shrimp cultivating hone in a lake at, "GOPAL KRISHNA PONDS, PITTALANKA VILLAGE, KRISHNA Locale, ANDHRA PRADESH, INDIA". Shrimp cultivating has developed a conventional, small-scale trade in 8 Southeast Asia into a worldwide industry(1). In India, broad generation frameworks of shrimp culture are more productive than the other culture frameworks. Mechanical progress has driven to development of shrimp at indeed higher densities. Nearly all the cultivated shrimp are penaeid gather of the family Penaeidae and as it were two shrimp species tiger shrimp Penaeusmonodon and Pacific white shrimp Litopennaeus vannamei occupied more than 90% of the cultivated shrimp generation. Krishnan and Birthal (2002) have moreover clarified that due to the request and development of coastal water culture in India, it too has been very a promising division for quickening the trades and progressing the outside trade. The shrimp has been presented and cultivated in Asia since the mid-1990s. Advancement of shrimp cultivation is an imperative action in the coastal waters of Andhra Pradesh in India. The shrimp generation developed at a marvelous rate amid the

REDVET - Revista electrónica de Veterinaria - ISSN 1695-7504
Vol 25, No. 1 (2024)
http://www.veterinaria.org
Article Received: 13/03/2024, Revised: 05/04/2024, Accepted: 28/04/2024

year 1992-1994 and afterward began diminishing due to episodes of illnesses. The quick development of shrimp cultivating has driven a financial boom but, the outbreak of viral maladies has expanded the financial dangers and moderated the industry's advancement. (Table 1.1)

1 Material and methods

Shrimp feed, Litopenaeus vannamei, Black soil sediment, bleaching powder, pH meter

2.1 AREA OF STUDY: The current study carried out at "GOPAL KRISHNA FARMS, PITTALANKA VILLAGE, KRISHNA DISTRICT, ANDHRA PRADESH, INDIA".

***** PITTALANKA is the area it lies between the latitude is 15.9411828 and longitude 80.5466129 and with a population of 19,874. It is a highly farming region of prawns and major carps. Generally, farmers of the district culture both L. vannamei and major carps, because of itshigh market value, water, feed and health management followed by the farmers. *(Fig.1.1 & 1.2)*

The lake was at first subjected to dry and split to increment the capacity of oxidation of hydrogen sulfide gas and dispense with angel eggs, predators, crab hatchlings, and a few other sea-going living. The foot of the lake was rejected utilizing a tractor edge up to 5–10 cm profundity to dodge the best soil. Along these lines the lake foot was furrowed vertically and on a level plane of a profundity of 30–50 cm to expel the harmful gasses, oxygenate the foot soil, discoloration of the dark soil to expel the hydrogen sulfide scent, and increment the richness of the soil. The soil pH was recorded in the lake with the offer assistance of a cone sort of pH meter. The normal pH was famous and calculated around the lake and the required sum of lake lime was connected to keep up the ideal pH in the soil. At first, the water level in the lake was kept up at 50–70 cm level for sprouting and was fertilized with fertilizers. Commonly utilized fertilizers were ground nut oil cake, rice bran, and dry bovine fertilizer, they were splashed in water overnight and the extricate was connected to the culture lake. After three days the water color of the lake turned to a light green color it appears sprouts were adjusted (Phytoplankton). The water level was raised up to 150 cm tall of the lake and a few amounts of molasses and urea were included to progress the phytoplankton development. After the ideal algal sprouts were set in the lake by utilizing natural fertilizer, the straightforwardness was checked by utilizing a "Secchi disk" which extended from 30 to 50 cm profundity. These parameters were checked and kept up some time recently seed stocking in the lake. Soil ought to be dry to avoid illnesses and dark soil is generally favored

- Pond cleaning method in the form is dry method
- No fertilizers are used till the pl-15 stage are for further stages
- Number of aerators used in the farm are 4/acre and 25/hectare
- Liming depends on the water pH :
- Calcium carbonate (neutral)
- Bleaching powder
- Hydrated lime (below 5 pH)
- In the above farm bleaching powder is used.

POND PREPARATION: Pond preparation includes a number of activities that must be carried out before each subsequence op. The main objective of preparation is to provide the shrimp with a clean pond bottom and appropriate stable water quality. There is a high amount of organic matter deposition in pond bottom during culture period in intensive culture systems. These sediments should be removed and treated after every crop. In the pond preparation several steps are involved like drying, liming, ploughing and soil enrichment by using some essential elements and microbial products. The main purpose of ploughing / tilling during the pond preparation is to allow the oxygen to penetrate the bottom of pond and accumulated waste. Ploughing helps soil to absorb more oxygen and oxidize the organic matter in the soil faster.

POND BOTTOM PREPARATION

We used wet method

Wet Method: In this process the waste remain after harvest is washed away without drying (Flushing the water 2-3 times or jet flushing). This method is only applicable during monsoon or rainy Season. During this process the pond is allowed to dry till the soil cracks. Sludge removed is required in the ponds stocked with high stocking density or accumulation of high organic matter on the pond bottom or disease outbreak in the previous crop. Thus, the sludge should Be completely removed and disposed outside the ponds. After removal of the sludge completely the pond should be ploughed (tilling) thoroughly in both ways (i.e. horizontally and vertically), then the soil is allowed to dry on 2 - 3sunny days for better oxidation of black soil or organic matter, this allows diffusion/removal of obnoxious gases. Check the pH of the soil by pH meter by randomly selecting 5-10 spots. The optimal soil pH should fall within the range of 6.5-7.0 Application of lime is done if required and the dosage of lime application recommended for soil pH adjustment Liming Requirements MT/ha). After adjustment of soil pH compaction can be done. Soil compaction is done by rolling a roller in pond bed or levelling by tractors in dry ponds. After the pond is ready soi enrichment process is carried out in pond bottom which is a very important aspect in present aquaculture practice. Ponds in which Shrimp culture is been practiced regularly, there

REDVET - Revista electrónica de Veterinaria - ISSN 1695-7504
Vol 25, No. 1 (2024)
http://www.veterinaria.org
Article Received: 13/03/2024, Revised: 05/04/2024, Accepted: 28/04/2024

is a chance that the essential nutrient may lose in consecutive crops. These nutrients in soil maintain the pH, alkalinity and phytoplankton production in pond ecosystem and also required in shrimp body metabolism. (Fig 1.3)

INSTALLATION OF EQUIPMENTS

BIOSECURITY

Biosecurity is essential group of tools for the prevention, control and eradication of infectious diseases and the preservation of shrimp, culturing pond and environmental health. It helps in prevention of the entry or spread of unwanted pests and infectious disease agents from the system. (Fig 1.4)

WATER MANAGEMENT (PRE STOCKING MANAGEMENT)

Once the pond bottom is ready with all aspects water is allowed to run into the pond by means proper filtration (3 stage filter) i.e.1st-20 mesh, 2nd- 60 mesh, 3rd- 100-120 mesh cloth, and fill water is required levels (1.5-2.5m). After water filling has reached to the optimum level, aerators are installed in respective positions as per requirement (i.e. stocking density), at rail unto be carried-out to check and effect in installation. (Fig 1.5)

FERMENTED YEAST AND PROBIOTIC APPLICATION

After pumping the water to the culture pond, application of fermented yeast (yeast1kg+Jaggery 10kg+DOB-50+GOC-10kg/ha) in pond said sin plankton development prior to 1 week of stocking. Probiotic application. Dissolved oxygen is one of the most common causes of mortality and growth reduction shrimp ponds. Air which contains about 21% of oxygen serves as a big reservoir for oxygen. Oxygen in water is limited by its solubility. A major source of oxygen in pond water is through photosynthesis of phytoplankton. Mechanical aerators are the other source for dissolved oxygen in culture ponds. (Fig 1.6)

AERATORS

Aerators will increase DO when below saturation level and also help in mixing water avoid stratification. The number of aerators used in the shrimp pond depends on the stocking density. It is strongly recommended that 1Hpaeration holding 450kg biomass. (Fig 1.7)

POST LARVAL SELECTION AND STOCKING

Larvae selection an important as it will determine the performance and production of the ponds. The
objective of larvae selection larvae is to obtain best survival and growth in the pond. Obtain post larvae from licensed SPF-Specific pathogen free (we collected larvae from Sunrise hatchery at cheerala) hatcheries and choose the hatcheries which have produced good shrimp the pastor has good reputation.

Stress Test: Once the postlarvae reach PL10,a stress testcan be carriedout. Thereare several stress tests, and the most common method is to place a randomly selectedsample of about 300 animals in a beaker with reduction/ increment of 10 ppt salinity,leave them for 1hour. The survivors are counted and the percentage of resistantindividuals calculated (90%is recommended).

External Features: For a healthy PL, the antennal scales of head portion areclosed together. Whereas the tail fan (uropod) is widely opened. Closed uropods are indicative of younger fry which is not suitable for stocking. (Fig 1.8)

TRANSPORTATION

Transport of the larvae should be done in the early morning in order to avoid the heatshock upon reaching the grow out pond post larvae should be counted. The most common method of transportation is by placing the post larvae in plastic bagsfilled with 1/3rd of water and filling the other 2/3rd with oxygen before sealing them.

FEED & FEED MANAGEMENT

Managementoffeedisoneofthemostimportantaspectsofsuccessfulshrimpproduction, feed is major inputs in the culture system. Initial first month, blind feeding is practiced based on the stocking density in the pond.

FEED STORAGE

Feed should be stored in farm warehouse with proper ventilation. Feed bags to be placed without touching the side walls or roof warehouse should be clean and dry to avoid moisture coming in contact with feedbag. Proper air circulation should be maintained. (Fig 1.9)

CHECK TRAY FEED MANAGEMENT

- If feed is finished in all checktrays, increase feed by 5 - 10% in next meal. If feed is left out in the check trays, reduce next meal by 10-20%.

REDVET - Revista electrónica de Veterinaria - ISSN 1695-7504
Vol 25, No. 1 (2024)
http://www.veterinaria.org
Article Received: 13/03/2024, Revised: 05/04/2024, Accepted: 28/04/2024

- If 10-20% of feed is left out in the check trays, reduce extremely by 30-50%. If feed more than50% is left over in all the check trays, stop next meal. (Fig 1.10)

CHECK TRAY INCREASEMENT BASED ON BODY WEIGHT

- Fecal length: short feeding (proper feeding); full length(overfeeding);
- Fecal color: feed color (proper feeding); Black/dark brown color;(underfeeding) presence of sand and small stones/pebble in check tray indicate sunder feeding.

ROLE OF MINERALS IN VANNAMEI CULTURE

Minerals inorganic components required for shrimp. They are present in fresh feed, artificial feed or feed supplements. Based on requirements classified into two

Micro Minerals: Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chloride, Nitrogen and Sulphur

Trace Minerals: Iron, iodine, Manganese, Copper, Cobalt, Zinc and Selenium

Balance of minerals in water is always be concern as calcium and magnesium Ca, Mg ratio must maintain in water as 1:2-3.5. Whereas, sodium, potassium ratio must be 30:1. As these 4 macro minerals play key role in survival and growth in shrimp. In addition to these macro minerals supplementation of trace minerals to water provides good condition of shrimp. To avoid mineral deficiencies.

ROLE OF MINERALS IN SHRIMP

Minerals play an important role in shrimp physiology, i.e., moulting, osmoregulation, and nervous, muscular system, Blood pH regulation.

METHODS OF HARVEST

Harvestingmay be carried out in two methods either Partial or Complete based on the situation

Partial Harvest

Partial harvest is usually done after taking into consideration the existing biomass relative to the pond carrying capacity as well as the pond condition and to increase opportunity profit. It can be carried out effectively using a lift net to avoid disturbing the pond bottom. In some countries, the lift net is used to remove shrimp for the live market, where shrimp quality is of utmost importance. Partial harvest should be carried out when the pond and animal condition is very good like optimum water quality parameters (DO (>4ppm), total ammonia (1ppm),etc). Feed intake must be good Animal health condition must be good (Take few shrimps and keep out of water for 30sec which may show normal means healthy and opaqueness or whitish muscle indicates un healthy animal)

Complete Harvest

The most common method of harvesting is through the use of bag net at sluice gate. In this method the presence of proper pond slope will ensure fast and efficient harvest. Ideally that harvest should begin in the early morning and should be completed before noon. The shrimps collected regularly in chilled condition and placed in creates before loading on to the insulated trucks for subsequent shipment to the market or processing plants The other common method of harvest is by drag netting the shrimp in the pond. In this method the water level of the pond is brought down to about 0.5m and an electric net or normal seine net is used. In this method the pond bottom is distributed thus the quality of prawn will be reduced if harvests not completed fast. In these two methods once, the pond was completely drained and left out shrimps had to be handpicked fast, cleaned and iced to safeguard the quality and freshness completely drained and left out shrimps had to be handpicked fast, cleaned and iced to safeguard the quality and freshness. (Fig 1.11)

3 RESULT & DISCUSSION

There has been impressive increment in the culture of brackish water shrimp due to its taste, advertise request both in national and universal markets. In arrange to anticipate numerous issues confronted by shrimp development, maintainable shrimp cultivating is the require of the hour. When a lake is prepared for operation, the ideal stocking thickness of seeds in a lake was decided in agreement with the generation capacity of the lake and the culture framework, which included he soil and water quality, nourishment accessibility and regular varieties, target generation and ranchers encounter. The stocking thickness between 10- 20 PLs/m2 is perfect for effective shrimp ranches. In the show think about the seeds were supplied at the stocking thickness of 20/m2.The upkeep of great water quality is basic for ideal development and survival of shrimps. The levels of physical, chemical and organic parameters control the quality of lake water. The level of metabolites in lake water can have an unfavorable impact on the development. Great water quality is characterized by satisfactory oxygen and constrained level of metabolites. Abundance bolster, fecal matter and metabolites apply huge impact on the water oxygen in all the culture lakes. Consequently basic water quality parameters are to be observed

REDVET - Revista electrónica de Veterinaria - ISSN 1695-7504
Vol 25, No. 1 (2024)
http://www.veterinaria.org
Article Received: 13/03/2024, Revised: 05/04/2024, Accepted: 28/04/2024

carefully as antagonistic conditions may have lamentable impact on the developing shrimps. Saltiness is one of their vital parameters to control development and survival of L.Vannamei

Classification	
Kingdom	Animalia
Phylum	Arthopoda
Sub-phylum	Crustacea
Class	Malacostraca
Sub-class	Eumalacostraca
Order	Decapoda
Sub-order	Dendrobranchiata
Family	Penaeidae
Genus	Litopenaeus
Specie	vannamei

Table 1.1 Classification

Water parameter	**Optimum level**	**Comment**
Salinity	10 - 25 ppt	Daily fluctuation <5 ppt
pH	7.5 – 8.3	Daily fluctuation ,0.5
DO	> 4 ppm	Not less than 4 ppm
Alkalinity	>100 ppm	Not more than 200 ppm
Hardness	>1000 ppm	
Secchi disk	35 – 45 cm	
H_2S	< 0.02 ppm	More toxic at low pH
Total Ammonia	< 1.0 ppm	More toxic at high pH andtemperature
Unionized Ammonia	<0.1 ppm	
Nitrite	< 0.01 ppm	More toxic at low salinityand low pH
Ca : Mg	1.2 : 3.5	Minimum Mg is 350 ppm
Na : K	30 : 1	Minimum K is 50 ppm

Table 1.2 :-Optimum levels of water Quality parameters for culture of *L. vannamei*

Total **Agedays**	**Feed number**	**Total /feedin kgs,**	**Avg.size of shrimp weight (gm)**	**Daily feedfor 1 lakhseed**	**Check tray feed ingms**	**Checking time hours**
1-7	1	20	0.02-0.4	-	1	3 hours
8-14	1 + 2		0.7	6	2	3
15-21	2	75	1.2	8	3	3
22-28	2+ 3		2.0	12	4	2 ½
29-35	3	180	3.1	16	5	2 ½
36-42	3 + 3P		4.4	20	5	2 ½
43-49	3P	270	5.8	24	5	2
50-56	3P + 3S		7.5	26	5	2
57-63	3S		9.2	28	6	2
64-70	3S	600	10.9	29	7	2
71-77	3S+3M		12.6	33	8	2
78-84	3M	1100	14.5	36	10	2
85-91	3M		16.6	40	10	2
92-98	3M		18.7	41	10	2
99-105	3M +3L	900	20.8	42	10	2
106-112	3L		22.9	44	10	1½
113-120	3L		25	45	10	1½

Table :-Total Culture Feeding Chart for *L. Vannamei*

Total Production: 4000 Kgs (35 Count)

Total Investment = 7,70,000 Rs

REDVET - Revista electrónica de Veterinaria - ISSN 1695-7504
Vol 25, No. 1 (2024)
http://www.veterinaria.org
Article Received: 13/03/2024, Revised: 05/04/2024, Accepted: 28/04/2024

Total Income ***= 4,000 kgs X 320 Rs***
(1kg 320 /- Market Price) = 12,80,000 Rs
Total economical profit = 12,80,000 – 7,70,000 = **5,10,000** Rs

Total economical profit of L. *vannamei* culture =5,10,000 Rs

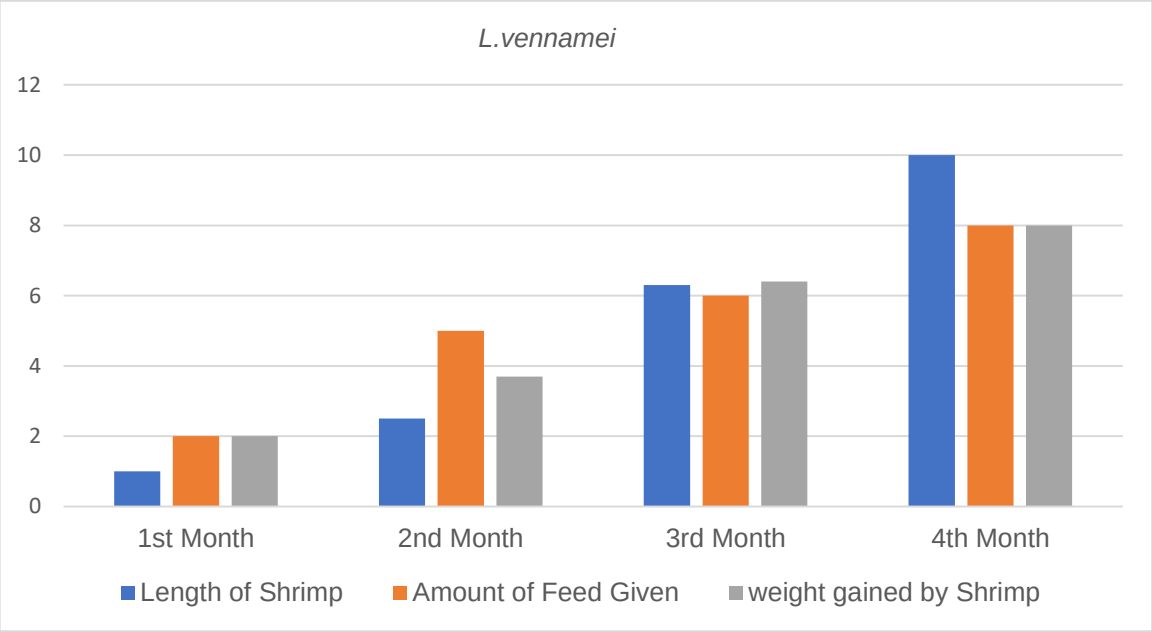

Fig 1.1 Satalite image of lake

Fig 1.2 Pond view

Fig 1.3 Wet method

Fig 1.4 Biosecurity

Fig 1.5 Water management

Fig 1.6 Probiotics

Fig 1.7 Aerators

Fig 1.8 Post larvae selection

REDVET - Revista electrónica de Veterinaria - ISSN 1695-7504
Vol 25, No. 1 (2024)
http://www.veterinaria.org
Article Received: 13/03/2024, Revised: 05/04/2024, Accepted: 28/04/2024

Fig 1.9 Feed

Fig 1.10 Check tray

Fig 1.11 Harvesting

4 CONCLUSION

With this we conclude that, successful *Vannamei* shrimp culture demands careful management of water quality, temperature, and nutrition. Regular monitoring, disease prevention, and efficient farming practices contribute to a sustainable and profitable aquaculture operation.

Acknowledgment

Special thanks to farmer Sri. GopalaKrishna c/o Pittalanka, Andhra pradesh for providing their guidelines and support during our culture.

References

1. K.Pavan kumar,et.al 2024 Types of disease and management in litopenaeus vannamei, IJCSP24A1072,IJCSPUB,Volume 14, issue 1 February 2024 ISSN 2250-1770 653-664
2. Boyd, C.E. & Clay, J.W. 2002. Evaluation of Belize Aquaculture Ltd:A super intensive shrimp aquaculture system. Report prepared under the World Bank, NACA, WWF and FAO Consortium Programon Shrimp Farming and the Environment. Published by the Consortium and obtainable through NACA, Bangkok, Thailand. 17 pp.
3. Briggs, M., Funge-Smith, S., Subasinghe, R. & Phillips, M. 2004. Introductions and movement of Penaeus vannamei and Penaeusstylirostris in Asia and the Pacific. FAO Regional Office for Asia and the Pacific. RAP Publication 2004/10:1–12.
4. Browdy, C.L., Moss, S.M., Lotz, J.M., Weirich, C.R., Otoshi, C.A., Ogle, J.T., Macabee, B.J., Montgomeries, A.D. & Matsuda, E.M.2003. Recent USMSFP advances in the development of biosecure environmentally sound super intensive shrimp production systems.
5. p. 35 In: Abstracts of Aquaculture America 2003. World AquacultureSociety, Baton Rouge, Louisiana, USA.
6. FAO. 1995. Code of Conduct for Responsible Fisheries.
7. FAO,Rome, Italy. 41 pp.Macabee, B.J., Bruce, J.W., Weirich, C.R., Stokes, A.D. &Browdy,C.L. 2003.
8. Parker, J.C., Conte, F.S., MacGrath, W.S. & Miller, B.W. 1974. An intensive culture system for penaeid shrimp. Proceedings of the World Mariculture Society, 5:65–79.
9. Pérez Farfante, I. 1969. Western Atlantic shrimps of the genus Penaeus. Fishery Bulletin, 67(3): 461–591.
10. Pérez Farfante, I. &Kensley, B. 1997. Penaeoid and sergestoid shrimps and prawns of the world. Keys and diagnoses for thefamilies and genera. Memoires du Museum Nationald'HistorieNaturelle, Paris, France. 233 pp
11. Samocha, T.M., Lawrence, A.L., Collins, C.A., Castille, F.L., Bray, W.A., Davies, C.J., Lee, P.G. & Wood, G.F. 2004. Production of the Pacific white shrimp, Litopenaeusvannamei, in high-density greenhouse enclosed raceways using low-salinity groundwater.
12. Taw, N. 2005. Indonesia Shrimp Production. Presented in the Indonesian shrimp farmers session of World Aquaculture 2005, May9–13, 2005, Nusa Dua, Bali, Indonesia. Charoen Pokphand, JakartaIndonesia. 18 pp.
13. Wyban, J.A. & Sweeney, J.N. 1991. Intensive shrimp productiontechnology. High Health Aquaculture, Hawaii, USA