IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 8, Issue 5 Ver. I (May. 2015), PP 17-19
www.iosrjournals.org

Survival and Growth Performance of Pacific White Shrimp Litopenaeus Vannamei (Boone1931) Under Different Stocking Densities

Praveen Kumar, D[1] and Krishna, P.V[2]

Abstract: *Density is one of the crucial factors for White leg shrimp Littopenaeus vannamei in determining the survival and growth. Five ponds were selected with 0.5hac each in low saline water. They were stocked with 20,30,40,50 and 60pcs/m². The survival (%) and AVG was observed as 84.5; 83.5; 82.5; 79.5; 69.12 and 28.42g, 27.52g, 26.4g, 25.2g and 19.5g in ponds P1, P2, P3, P4 and P5, respectively. Fortnight sampling was taken at 7am.*

Key words*: L.vannamei, pH, salinity, temperature, density, survival and growth .*

I. Introduction

Litopenaeus vannamei, is one of the most intensively cultivated shrimp all over the world (Perez Farfante and Kensley 1997) because of the reduced risk of catastrophic diseases and favorable environmental conditions (Boyd 2002; Zhu et al., 2006). Many studies have aimed to increase the shrimp production through manipulating of stocking density, fertilization and artificial feeding (Varghese et al., 1975; Chakraborti et al., 1985; Krishna, 2006), Several authors described about the growth in shrimp culture systems based on stocking density (Cailout et al., 1976; Sedgwick 1979; Maguire and Leedow 1983) and some authors have reported an inverse relationship between growth and stocking density (Lee et al., 1986; Sandifer et al., 1987; Daniels et al., 1995).

II. Material And Methods

Low saline semi intensive ponds were selected at Gangapatnam in Nellore district, Andhra Pradesh. Analysis of physical parameters for all the ponds was carried using standard methods (APHA, 1989). Field test instruments were used to analyze water pH (Digital mini – pH meter, model 55), Temperature & dissolved oxygen (YSI-58). The experimental ponds were stocked with 20,30,40,50 and 60pcs/m² in P1, P2, P3, P4 and P5, respectively. PL with a size of 0.67g was taken from Cp Hatchery, Gudur. Cp feed was given four times a day. Paddle wheel aerators were used and check trays were maintained for 120 days of culture.

At each sampling weights for growth increments were recorded. The growth and water quality parameters were statistically analyzed by two ways ANOVA.

III. Results

The productions were obtained as 2401.49, 3434.49, 4307.62, 4942.91 and 4043.5kg in P1, P2, P3, P4 and P5. The FCR, SGR and ADG were observed as 2.04; 2.12; 2.24; 2.76; 2.92; and 2.63; 3.09; 3.05; 3.01; 2.8; and 0.23; 0.22; 0.21; 0.20 and 0.15 /20pcs/m², 30pcs/m², 40pcs/m², 50pcs/m² and 60pcs/m² respectively.

IV. Discussion

The physical parameters of water play crucial role in the culture systems. Maintenance of water quality is essential for optimum growth and survival of shrimp. Excess feed, fecal matter and metabolites will exert tremendous influence on the water quality of shrimp farm (Soundarapandian and Gunalan, 2008). Karthikean, 1994 and Gunalan et al., 2010 reported the good growth and survival of L.vannamei in brackish water ponds of 10-35ppt which was ideal for shrimp culture. However, the shrimp tolerates the salinity even 2.45ppt (Parker et al., 1974). In the present study the salinity was maintained at 6.5-12.5ppt and maximum ADG was observed at a salinity of 9.89ppt. Wang et al., (2004) reported the favorable pH form 7.6-8.6 for L.vannamei and it was observed at a pH of 7.5 in p1. Fast and Lannan, 1992 stated best shrimp growth was observed in a temperature range from 24-32˚c. During the experimental period the temperature was recorded between 32-35˚c.

Hanson and Goodwin (1977); Maguire and Leedow (1983) and Allan and Maguire (1992) reported the growth reduction in shrimp at higher densities. In the present study it was clearly indicated that at 60pcs/m² the yield was decreased compared to the 50pcs/m². At the density of 50pcs/m² yield was 4942.91kg and ADG was reduced to 0.2g/pcs/day. This agrees with Haran et al., (2004); and Arnold et al., (2006), who reported that high densities lead to greater dominance and hierarchy placement of large organisms over small ones. Tidwell et al., (1999) Apud et al., (1981); Maguire and Leedow (1983) and Sandifer et al., (1987) also stated the possibility of

best economic results at optimum stocking density. Similar results were observed at 20pcs/ m² with an FCR of 2.04. Wyban et al., (1987) also stated the suitable stocking densities of L.vannamei at 5 to 21pcs/m². It was observed that the survival rate was maximum at 20pcs/m² and minimum at 60pcs/m².

Table -1 Summary of water parameters for L.vannamei under different stocking densities

Parameter	20/m²	30/m²	40/m²	50/m²	60/m²
Temperature(°C)	33.3±1.23	34.92±1.25	33.57±1.24	34.67±1.26	33.78±1.25
DO(mg/l)	6.13±1.35	5.93±1.78	5.7±1.98	4.92±2.2	4.85±2.01
pH	7.51±0.2	7.31±0.2	7.26±0.19	7.01±0.1	7.07±0.19
Salinity(ppt)	9.89±2.7	8.21±2.5	10.92±2.4	9.82±2.4	11.1±2.3

Line graph-1

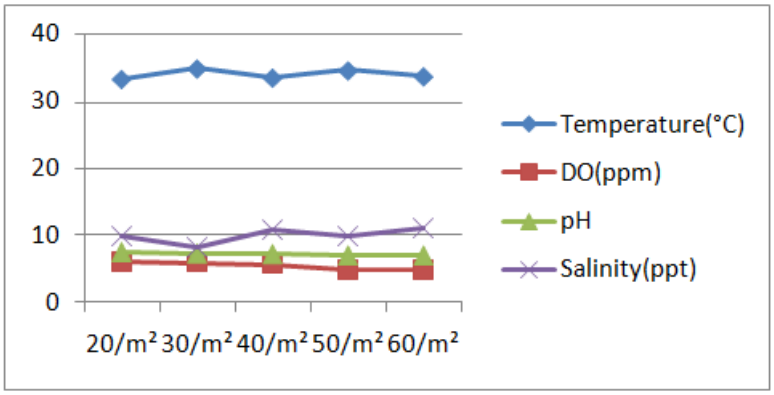
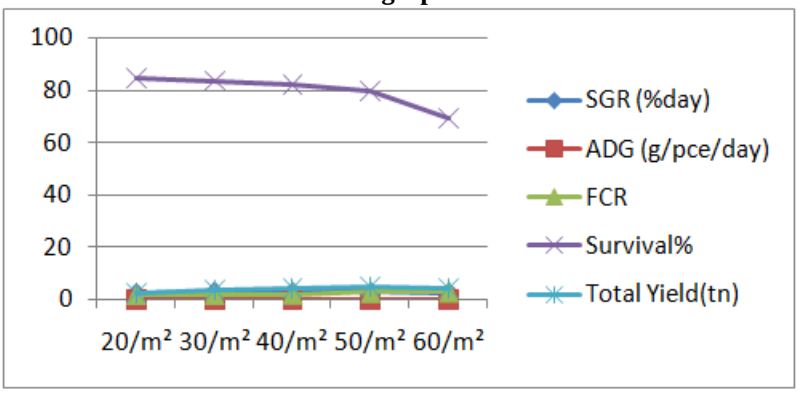


Table - 2.Growth parameters of L.vannamei at different stocking densities

Parameter	20/m²	30/m²	40/m²	50/m²	60/m²
SGR (%day)	2.638559	3.096159	3.056786	3.011783	2.809077
ADG (g/pce/day)	0.23125	0.22375	0.213167	0.201667	0.156917
FCR	2.04	2.12	2.24	2.76	2.92
Survival%	84.50	83.5	82.05	79.5	69.12
Feed consumption	4763.444	7046.56	8983.895	10918.04	10362.92
Total Yield(kg)	2401.490	3434.496	4307.625	4942.913	4043.52

Line graph-2



V. Conclusion

Fortnight sampling was taken for observing ADG and SGR. Final yield, survival rate and feed consumption were compared at the end of culture.

References

[1]. Allan, G.L. and G. B. Maguire.1992. Effect of stocking density on production of Penaeus monodon model farming systems, Aquacult., 107: 49-66.

[2]. A.P.H.A., (American Public Health Association) 1989. Standard methods for the examination of water and wastewater,17th edition. Washington, D.C., U.S.A.

[3]. Apud F.D, K. Gonzalez and N. Deatras.1981. Survival, growth and production of Penaeus monodon Fabricus at different stocking densities in earthen ponds with flow- through system and supplemental feeding. Fish. Res. J. Philipp., 6(2): 1-9.

[4]. Arnold, S.J., Sellars, M.J., Crocos, P.J. and Coman, G.J.2006. Intensive production of juvenile tiger shrimp Penaeus monodon: An evaluation of stocking density and artificial substrates. Aquaculture, 261: 890-896.

[5]. Boyd, C.E. 2002. Standardize terminology for low salinity shrimp culture. Global Aquaculture Advocate 5(5):58-59.

[6]. Cailout, C. W., J. P. Norris, E. J. Heald, and D. C. Tabb. 1976. Growth and yield of pink shrimp (Peneaus duorarum) in feeding experiments in concrete tanks. Transactions of the American fisheries Society 105:259-266.

[7]. Chakraborti, R. K., Ravichandran, P., Halder, D. D., Mandal, S. K., and Sanfui, D.1985. Some physio-chemical characteristics of Kakadwip brackishwater ponds and their influence on the survival, growth and production of Penaeus monodon (Fabricius). Indian Journal of Fisheries, 32: 224-35.

[8]. Daniels, W.H., D'Abramo, L.R. Fonden., Durant.M.D.1995. Effects of stocking density and feed on pond production characteristics and revenue of harvested freshwater prawns Machrobrachium rosenbergii stocked as size – graded juveniles. J. world Aquacult. 26(1), 38-47.

[9]. Gunalan, B., Soundarapandian, P and Dinakaran, G.K.2010. Asian Journal of Agricultural Sciences2010, 2(1): 5-8.

[10]. Haran, N., Mallo, J., Fenucci, J., 2004. Density influence on the growth and development of the petasma in juvenile shrimps Pleocticus muelleri (Decapoda, penaeoidea). Invest, Mar, 32, 11- 18.

[11]. Hanson, J.E. and H.L. Goodwin (1977). Shrimp and Prawn farming in the western hemisphere. Dowden, Hutchinson and Ross, Stroudsberg, PA, 439 pp.

[12]. Karthikean, J.1994. Aquaculture (Shrimp farming) its influence on environment. Technical Paper submitted to the Seminar Our Environment-Its challenges to development projects. American Society of Civil Engineers Culcutta, India.

[13]. Krishna, P.V.2006. Production of Penaeus monodon using modified extensive systems in Repalle area, Guntur District, Andhra Pradesh, Aquacult, vol. 7(1), 37-41.

[14]. Lee, C. S., J. N. Sweeney, and W. K. Richards Jr. 1986. Marine shrimp aquaculture: a novel waste treatment system, Aquacultural Engineering 5:147-160.

[15]. Maguire, G. B. and M. I. Leedow.1983. A study of the optimum stocking density and feed for school prawns Metapenaeus maleayi (haswell) in some Australian brackish water farming ponds. Aquaculture 30:285-297.

[16]. Parker JC, Conte FS, Macgrath WS, Miller BW, Proc. World Maricult. Soc. 1974. 5:65-79.

[17]. Pérez Farfante, I. and B. Kensley. 1997. Penaeoid and Sergestoid shrimps and prawns of the world. Key and diagnoses for the families and genera. Mémoires du Muséum national d'Histoire naturelle, Paris, 175:1-233.

[18]. Soundarapandian, P., Gunalan, B. 2008. Recent technology for the survival and production of giant shrimp Penaeus monodon along south east coast of India. Int. J. Zool. Res., 4(1): 21-27.

[19]. Sandifer, P.A., Hopkins, J.S., and A.D. Stokes.1987. Intensive culture potential of Penaeus vannamei. J. World Aquacult. So., 18 (2): 94-100.

[20]. Sedgwick, R. W. 1979. Effect of ration size and feeding frequency on the growth and feed conversion of Juvenile Peneaus merguensis de Man. Aquaculture 16:279-298.

[21]. Tidwell, J.H.. Coyle, S., Weibel, C and Evans, J.1999. Effects and interactions of stocking density and added substrate on production and popouation structure of fresh water prawns Macrobrachium rosenbergii. J. World Aquaculture Society 30: 174- 179.

[22]. Verghese, P.U., Ghosh, A.N and P.B.Das. 1975. On growth, survival and production of Jumbo Tiger Prawn, Penaeus monodon Fabricius in brackishwater ponds. Bull. Dept. Mar. Sci. Univ. Cochin, 7(4): 781-789.

[23]. Verghese, P. U., A. G. Varghese, K. K. Chandran, Alexander Thomas and John.1982. Improved prawn production through selective stocking. Proc. Symp. on Coastal Aquaulture. 1**;** 388-391.

[24]. Wang, X., Ma, M., Dong, S and Cao, M.2004. Effects of salinity and dietary carbohydrate levels on growth an denergy budget of juvenile L.vannamei. J. of. Shell fish Research.23, 231-236.

[25]. Whay-Ming, R. and C. Yew-Hu. 1992. Effects of stocking density and sediment on tiger prawn, Penaeus monodon, nursery system. Aquaculture 104:231-248.

[26]. Williams, A. S., Davis, D.A., Arnold, C.R.1996, Density-dependent growth and survival of Penaeus setiferus and Penaeus vannamei in a semi-closed recirculating system, J. World Aquac. Soc. 27, 107-112.

[27]. Wyban, J.A., Lee, C.S., Sato, V.T., Sweeney, J.N., Richards Jr., W.K.1987. Effect of stocking density on shrimp growth rates in manure-fertilized ponds. Aquaculture 61, 23–32.

[28]. Wyban, J.A., Sweeney, J.N., Kanna, R.A.1988. Shrimp yields and economic potential of intensive round pond systems. J. World Aquacult. Soc., 19, 210-217.

[29]. Zhu, C., S.L. Dong, and F. Wang. 2006. The interaction of salinity and Na/K ratio in seawater on growth, nutrient retention and food conversion of juvenile Litopenaeus vannamei. J. Shellfish Res. 25(1):107-112.