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Effect of different salinities on Survival of Freshwater Prawn (*Macrobrachium rosenbergii*) Larvae at Seed Production Unit Hawksbay Karachi -Pakistan

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Abstract

Present study conducted to observe the effect of different salinities on survival of freshwater prawn (*Macrobrachium rosenbergii*) larvae. The hatched larvae were kept in different salinities (8, 10 and 12 ppt) during rearing period. Survival rate at larval stage were 50.83 %, 8.93 % and 0.83 % on 12, 10, 8 ppt respectively which is significantly different from each other (P>0.05). Survival rate at Post larval stages were 34.42 %, 20 % and 7.46 % on 12, 8 and 10 ppt respectively which is also significantly different from each other (P>0.05). The larval cycle completed within 36 to 40 days. Water quality parameters recorded throughout the study period were found within the tolerable ranges for freshwater prawn larvae and post larvae such as mean temperature 33.2±0.14°C, mean dissolved oxygen 7.5±0.05 mg/L, pH 8.0±0.06, ammonia from 0.12 ± 0.01 mg/L, hardness 145 ± 1.4 mg/L and nitrite 0.125 ± 0.01 mg/L. These results show that 12 ppt salinity is better for larval to post larval stages than post larvae converted slowly and gradually on 0 ppt.

Key words:*Macrobrachium rosenbergii*, salinities, larvae and *Artemianauplii.*

Introduction

All farmed freshwater prawns belong to the genus *Macrobrachium.* The largest species in the genus is *Macrobrachium rosenbergii*, hence the name giant freshwater prawn. The species thrive in many tropical and subtropical areas of the world. It is native to the Vietnam, Malaysia, Myanmar, Indonesia,India, Bangladesh, Thailand,Pakistan Philippines, and Australia. It has been introduced for culture in other areas beyond its natural distribution such as in United State of America, China and other American countries. The species live in freshwater environments with links to saline waters since the larvae of the species require brackish water for complete development (Maria et al., 2011). Freshwater prawn *Macrobrachium rosenbergii* commonly called as Giant freshwater prawn and commonly called as Ghangut/ Saano. This is commercially important species belonging to crustacean cultured broadly throughout Southeast Asia. Giant freshwater prawn have always been concerned as a suitable species for aquaculture because it can be grown in both fresh and low salinity waters (Saeed et al., 2009). About 125 species has great demand for both in national and international market (Soundarapandian, et al., 2009). Species of the freshwater prawn genus *Macrobrachium* are distributed throughout the tropical and subtropical zones of the world (Saeed et al., 2009). They are found in most inland freshwater areas such as lakes, brooks, marshes, irrigation channels, canals and ponds, as well as in estuarine areas. Many species needbrackish water in the initial stages of their life cycle (and therefore they are found in water that is directly or indirectly connected with the sea) though some complete their cycle in saline ground water and standing freshwater. Few species select riverinetransparent water, although others are live in very turbid environments. *M. rosenbergii* is an example of the final. Giant freshwater prawn (*Macrobrachium rosenbergii*) is a species which plays an important role in the aquaculture and fisheries industry, Aquaculture production in 37 countries is more than 30 000 ton per annum, Production is now valued above $1 billion annually. However, over 98% of production occurs in Asia (Saeed et al., 2009). Freshwater prawn farming is popular in South East Asian countries but it has not gained much progress in Pakistan newly, prawns are a high valued product and have a high market demand in both domestic and export markets. In Pakistan the largest species that are of interest for aquaculture are *Macrobrachium rosenbergii* and *Macrobrachium malcolmsonii* respectively, these two species are indigenous and can be farmed in monoculture or

in polyculture with harmonious carps (Mukhopadhyay et al., 1985, Kanaujia et at., 1996 & 1997, Reddy et al., 1988, Durairaj et al., 1991, Langer et al., 1993 and Rashid & Behera, 1998). This species selected for culture in the freshwater water bodies such as rice paddies, ponds and flooded areas due to highly commercial values of Giant freshwater prawn (Ministry of Fisheries 1999). Giant freshwater prawn culture has been planned to culture in an area of 32,000 ha and to achieve a production of 60,000 tons by the year 2010 (Decree No. 224/1999/QD-TTg.).The natural seed resources are not sufficient to meet the demand and are also not uniform in size. Their identification is a big problem in post larval time. So economically feasible technology is need of the time. Salinity is the most important factor that influences mating, fertilization, incubation and hatching rhythm of freshwater prawns (Jeyalakshmy and Natarajan, 1996). However, no serious attempt has been made on the optimum salinity requirement of the hatched larvae to post larvae of freshwater prawns. So the present study is aimed to know the optimum salinity requirement of the larvae survival in captivity.

Materials and Methods

The study was conducted in 6 fiber glass tanks having 2 ton each water holding capacity at Seed Production Unit Hawksbay, Directorate of Fisheries, Research & Development, Karachi, Govt of Sindh. Brooders of gravid females nine (09) numbers having body weight 32.6 ± 3.4 were collected from River Indus district Thatta, Sindh-Pakistan and transported to the research center (SPUH) by using Insulated Plastic Containers along with the aeration facility and immediately immersed in a prophylactic dip of 20-ppm formalin for 30 minutes than transferred into fiber glass tanks (500 liter capacity) at zero ppt salinity for acclimatization. During the acclimatization period they were feed cow lever daily at the rate of 5 % of total biomass. Grey colored berried females were transferred into spawning tanks at 5.0 ppt salinity. All female shunted completely within 8 to 10 days after that shunted females removed from spawning tanks and hatchlings were collected with scoop net and transferred into Larval Rearing Tanks (LRT) having 2 ton water holding capacity time to time on different salinities (8, 10 & 12 ppt) and fed on Live Brine Shrimp nauplii (*Artemia*) as a live food for Freshwater Prawn larvae till Post Larval stage. We have no dynamic closed or biological filter system, so we depend upon static closed or water exchange system, 20-30 % water exchange along with bottom cleaning.

The water quality parameters such as Temperature, pH, Dissolved Oxygen (DO), Ammonia, Hardness and Nitrite were monitored daily throughout the study. Temperature was examined with the help thermometer (Celsius). Dissolve Oxygen was examined by using an oxygen meter (JENWAY 9500 DO2 Meter). A pH meter (EZDO-6011 CE) was used to measure the pH of water. API NH4+/NH3 Ammonium test kit is used to determine the values of Nitriteand Ammonia. Hardness is examined by (Hanna HI3812) Hardness Kit. All data were analyzed in the Seed Production Unit Hawksbay KarachiLaboratory.

Results

The study was conducted to observe the effect of different salinities on survival of larval and post larval stages of Freshwater Prawn (*Macrobrachium rosenbergii*) at Seed Production Unit Hawksbay Karachi. Berried nine (09) number of females having mean body weight 32.6 ± 3.4 g were used, 180000 number of hatchlings were collected (Table. 1) and stocked on different salinities that is 8, 10 and 12 ppt in Larval Rearing Tanks (LRTs) with tow replica at the density of 30000 per tank.

Survival rate at larval stage were 50.83 % on 12 ppt which is higher than 8.93 % and 0.83 % , 10 & 8 ppt respectively which is significantly different from each other (P>0.05) shown in figure 2. Survival rate at Post larval stages were 34.42 % on 12 ppt which also higher than 20 % and 7.46 % on 8 and 10 ppt respectively which is also significantly different from each other (P>0.05) shown in figure 2. The larval cycle completed within 36 to 40 days.

Water quality parameters recorded throughout the study period were found within the tolerable ranges for freshwater prawn larvae and post larvae such as temperature 33.2±0.14°C, mean dissolved oxygen 7.5±0.06 mg/L, pH 8.0±0.06, ammonia from 0.12 ± 0.01 mg/L, hardness 145 ± 1.4 mg/L and nitrite 0.125 ± 0.01 mg/L which is shown in Table 2. These results show that 12 ppt salinity is better for larval to post larval stages than post larvae converted slowly and gradually on 0 ppt.

Discussion:

Salinity plays a vital role on rearing and survival of larvae of Freshwater Prawn (*Macrobrachium rosenbergii*). Among several environmental parameters, ideal salinity was found to be very important for larval rearing of Macrobrachium species (Jayalakshmy and Natarajan1996), results of the present study shows higher survival on 12 ppt which is significantly different than 8 and 10 ppt respectively.

The post larvae appeared after 36 to 40 days (0-12 ppt) rearing periods these results were different from previous work reported by (Soundarapandian *et al.*, 1995),however,survival rate in the present study is lower thanprevious findings(Soundarapandian *et a.*,1995 and Soundarapandian *et al.*,1997). The water quality parameters were recorded throughout the study period and were within the acceptable ranges such as water temperature 33.2±0.14°C, dissolved oxygen 7.5±0.06 mg/L, pH 8.0±0.06, ammonia 0.12 ± 0.01 mg/L, hardness 145 ± 1.4 mg/L and nitrite 0.125 ± 0.01 mg/L. thesereported by (Narejo et al., 2010; Hannibal, 2011 and Shah et al., 2014, Abdul Malik et al., 2014).These results show that 12 ppt salinity is better for larval to post larval stages than post larvae converted slowly and gradually on 0 ppt.

We got these results which are lower than pervious finding may be due to climatically difference and semi-covered environmental conditions and may be due to not dynamic closed or biological filter system. But larvae converted into Post larvae stagessuccessfully first time in Pakistan. Now we are able to conduct breeding again in future and will try to get maximum survival in captivity and will supply mass seed to local farmers to culture this species at their ponds in this way Freshwater Prawn farming will be promoted in country.

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Table.2. Shows the fecundity rate with body weight and survival at larval stage of Fresh Water Prawn (*Macrobrachium rosenbergii*) at Seed Production Unite Hawksbay Karachi.

S. No.	Body Weight (g)	Fecundity	Survival (larval stage)	Survival (%)
1	35	21000	5400	26
2	31	19000	5000	26.3
3	32	20000	5100	25.5
4	30	19500	4500	23.1
5	31	19500	5000	25.6
6	30	19000	5000	26.3
7	30	19000	5000	26.3
8	35	21000	5600	26.6
9	40	22000	6000	27.3
Total	**294**	**180000**	**46600**	**233**
Mean	**32.6**	**20000**	**5177.7**	**25.9**

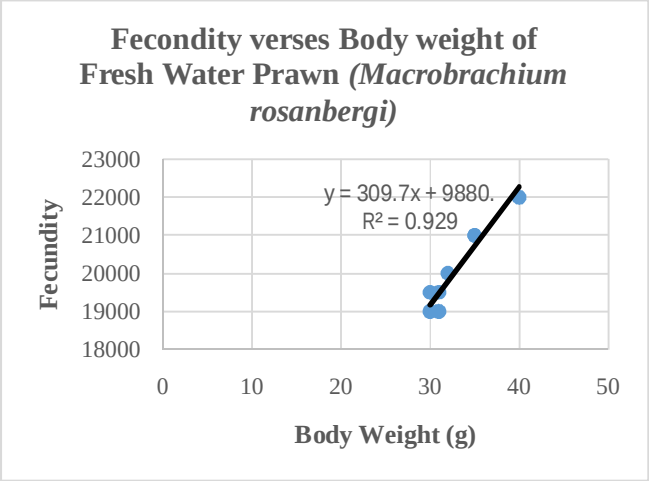

Figure 1. Regression analysis shows the comparison between BodyWeight and Fecundity of Freshwater Prawn (*Macrobrachium rosenbergii).*

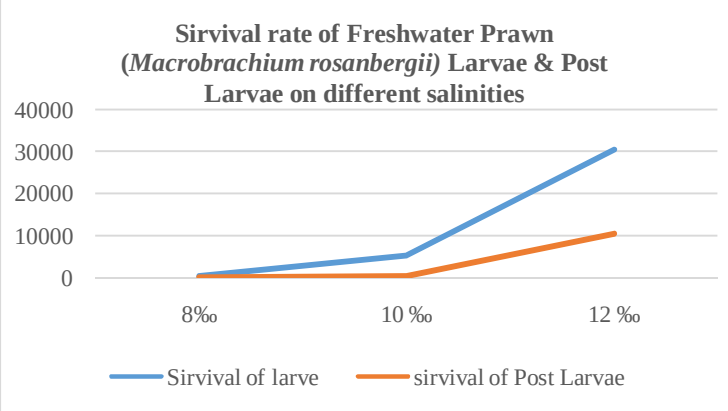

Figure 2. Graph shows the survival rate of Fresh Water Prawn (*Macrobrachium rosenbergii*) at larval & post larval stages on different salinities.

Table 3. Water quality parameters throughout the study period.

Parameters	**Mean Values**
Temperature (°C)	30.2 ± 0.14
Dissolve Oxygen (mg/L)	6.2 ± 0.26
pH (mg/L)	7.6 ± 0.15
Ammonia (mg/L)	0.50 ± 0.03
Hardness (mg/L)	150 ± 2.4
Nitrite (mg/L)	0.162 ± 0.004