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PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 3 (6): 1044-1045, 2000

Study on the Growth Performance and Survival of Hatchery Produced *Macrobrachium rosenbergii* (De Man) Larvae in Natural Brackishwater of Different Grades

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Abstract: A study was undertaken to evaluate the possibility of utilizing natural brackishwater (from Shibsa River) in the hatching operation and larvae culture of *Macrobrachium rossenbergii.* Three treatments each with three replications were tested. Natural brackish water diluting by rainwater (T_1), natural brackishwater diluting by under ground tap water (T_2) and natural brackish water with salinity range from 12 to 20 ppt. (T_3) were considered. In case of dilution (in T_1 and T_2) salinity concentration range was maintain from 4-18 ppt as per requirement of the experiment and stage of brood and larvae. Significant higher survival (23.38%) for T_1 was observed followed by T_3 with 13.63% and T_2 with 4.38% up to post larvae (PL) stage. Significant ($p<0.05$) difference in survival rate of larvae between T_1 and T_2 and T_2 and T_3 was observed. Study reveals that natural brackishwater diluting by rain water can be effectively used in the hatching operation and larvae culture of the freshwater giant prawn, *M. rossnbergii.*

Key words: *M. rosenbergii larvae*, metamorphosis, growth performance, survival rate and natural water

Introduction

Macrobrachium rossenbergii is a freshwater prawn and in Bangladesh most commonly known as Golda chingri found in fresh water rivers with tidal influence. They are also found in ponds, canals, irrigation ditches having connection with tidal water. It is indigenous to the south-east Asia including Bangladesh. But in our country the availability of this species in nature is decreasing day by day demanding its culture practice. In recent time, the heavy demand of this prawn in both for national and international markets due to its good nutritional value as well as deliciousness, expand the culture system of the animal. To date, in our country monoculture of this species are being practiced at Khulna, Bagerhat, Piruzpur, Gopalgong, Madaripur and Narail districts covering a total area of about 9000 hector. Polyculture of prawn with carp in ponds, rice-cum-prawn culture is also being practices in our country (DOF, 1994, 1996). Moreover there is enormous potentiality of mixed culture of freshwater prawn *M. rosenbergii* with brackishwater shrimp *P. monodon* in coastal region of the country particularly in Cox's Bazar and greater Khulna districts (FRI, 1994). But main obstacle in flourishing culture practice of *M. rossenbergii* is the scarcity of seeds from nature as well as from hatcheries due to various difficulties. One of the most practical difficulties of providing prawn seed from natural source is that, it is almost impossible to identify prawn larvae from other freshwater prawn species which prohibits the monoculture system of *M. rosenbergii* directly. Though in the recent year a considerable number of backyard prawn hatcheries started to produce prawn larvae in the country, but depending upon the location of the hatchery, source of saline water/brine and water management in hatchery operation, the production rate of prawn post larvae for most of this hatcheries are found below the standard rate (not more then 20%) which is again another important drawback for prawn culture development. So effort should be directed towards artificial sources with proper water management. Nowadays, giant fresh water prawn's larvae are reared with the conventional techniques where artificial brackishwater of about 12 ppt. Salinity is prepared from seawater. The utilization of natural brackishwater in the hatching and larvae culture of giant prawn has so far received very little attention from aquaculturists. In present study the attempt was taken to utilize the natural brackishwater for hatching and larval rearing of giant prawn.

Materials and Methods

The study was conducted from mid April to late September 1998 at the experimental hatchery unit of Brackishwater Station, Bangladesh Fisheries Research Institute, Paikgacha, Khulna.

For dilution of brackishwater into different required concentrations, natural brackishwater from the nearby Shibsa was used. For removing dirt, suspended particle and microbial cells, collected natural water was at first filtered by primary filtration unit (filter formed by gravel) and stored into under ground water tank from where it was lifted up to overhead tank and passed through sand filtration unit and ultra violet (UV) unit and stored into ground tank then again it was lifted up to overhead tank and finally stored in cistern. Prior to use for the hatching activity and larvae culture, 60% chlorinated bleaching power at the rate of 12 ppm was added to this water for further purification and kept for 2 days for settling followed by treatment with sodium thiosulphate at the rate of 10 ppt. and allowed another 2 days for settle which was followed by agitation using air blower for 1 days. After agitation it was kept 1 days for settle down all waste material. Then supernatant was used for the experimental work.

All necessary equipment's i.e. siphon pipe, bucket, bowl, net pieces etc were washed twice daily prior to use for siphoning and water exchanging by chlorinated water (60% chlorinated bleaching powder) at the rate of 12 ppm. Larvae produced were siphoned off and the number of larvae was estimated by the Aliquot method prior to stock in larval rearing tanks.

Three different water type (considered as treatments) each with three replications were used. The treatments were as follows: T_1 for natural brackishwater mixed with rainwater; T_2 for natural brackishwater mixed with underground tap water and T_3 for natural brackishwater only.

The study was divided into three batches and the experimental treatments were set in randomized block design. In each batch 3 berried females were used as mother prawn. Three rectangular fiberglass tanks each of 152 L holding capacity were filled with the rearing medium three days prior to stocking.

Hatchlings were reared with varying densities as 44.70-66.82 larvae/L and fed with *Artemia* nauplii. *Artemia* nauplii were supplied after 48 hours of hatch at a rate of 5 naupli/ml of water and *Artemia* nauplii as feed were used up to PL stage. During rearing of larvae in the tanks aeration was provided at a rate of 10 L/min with 30 minutes break after continuous one-hour operation. To keep the tanks bottom clear, water exchange was done every morning and evening of the day at the rate of 90 and 50% respectively by siphoning. The rearing process continued till the attainment of about 95% of the stock as post larvae (PL) (Table 1).

Water quality parameters of each rearing medium such as temperature, dissolved oxygen, pH and ammonia were recorded twice daily. The total hardness of each rearing medium was also determined. The salinity of the rearing medium was checked once a week with a hand refractometer.

Table 1: Replication wise dates of hatching, stocking dates and density of hatchlings

Replication	Date		No. of larvae/tank	No. of larval/L
	Hatching	Stocking		
T_1R_1	April 15	April 17	6711	44.70
T_1R_2	April 18	April 20	6923	46.20
T_1R_3	April 23	April 25	6812	45.40
T_2R_1	June 5	June 7	8913	59.40
T_2R_2	June 9	June 11	8125	54.20
T_2R_3	June 13	June 15	9045	60.30
T_3R_1	August 2	August 4	10,023	66.82
T_3R_2	August 6	August 8	8837	58.90
T_3R_3	August 9	August 11	9759	65.00

Table 2: Treatment wise average survival rate of *M. rassenbergii* up to the attainment of post larval stage

Treatment	Survivability (%)			Treatment mean (%)
	R_1	R_2	R_3	
T_1	24.03	22.25	23.87	23.38(±0.985)
T_2	3.68	5.07	4.37	4.38 (±0.695)
T_3	14.03	14.47	12.34	13.63 (±1.125)

Table 3: Duration of metamorphosis of *M. rossenbergii* hatchlings during this larval rearing under different treatments.

Treatment	Metamorphosis (days)			Mean of metamorphosis (days)		Average
	R_1	R_2	R_3	First	Last	(days)
T_1	24-45	29-47	31-42	28	44.66	36.33
T_2	31-47	29-46	33-48	31	47.00	39.00
T_3	34-47	30-47	31-46	31.66	46.66	39.17

Results and Discussion

Significant higher survival (23.38%) of the post larvae was observed in T_1 followed by T_3 (13.63%) and T_2 (4.38%) with significant variation among the treatment average ($p<0.05$). The findings clearly represent the impact of water quality on larval survivability. Because, the maximum survivability in T_1 might due to the better quality of rain water added during dilution than the under ground water, that contains higher amount of iron as well as hardness of water is maximum, those directly influenced larval metabolism and development. Due to variation in water quality and due to presence of some undesirable compound, Ong (1975) and Aniello and Singh (1980) made similar observation on survivability. Different in composition of the rearing media may consider as possible cause of difference in morality rate among the treatments (Table 2).

The other cause of low survival on identified were cannibalism among the members, improper acclimatization of the larvae before stocking in the rearing tank, high iron content of underground water and adhesion of the larvae along the inside wall of rearing tank due to jumping. Larval growth period to first day of metamorphosis was also found variable (Table 3). Data reveals that T_1 had the earliest mean at day 28, followed by T_2 and T_3 at 31th and 31.66th respectively. The table also shows that T_1 had the shortest mean larval cycle of 44.66 days, followed by T_3 (46.66 days) and T_2 (47 days).

The variation in length of larval cycle might due to the impact of temperature of culture environment that has direct effect on metabolism and growth performance of the animal. The course of study as per water parameter record, the T_1 part was performed in a warmer environment than T_2 and T_3. During the operation of T_2 and T_3, due to occasional rain during the period, temperature went down and retards animal's metabolism and growth. Similar observation on larval growth due to variation in temperature was reported by Gibson (1975), Suharto *et al.* (1980) and New and Singholka (1982). Authors also reported that temperature lower than optimum (i.e. below 24-26°C) required more larval rearing time.

In Bangladesh, generally proto type recirculatory *Macrobrachium* sp. hatchery with biofiltration unit does not acceded survivability 25% up to its post larval development and time length required for attaining post larvae 25-30 days (DOF, 1996) which is in both the cases more or less similar with the findings of T_1 where clear rain water was used for alteration of the natural brackishwater up to the required level. So the findings of the experiment indicates that natural brackishwater diluted with rainwater can be effectively used for larvae culture of giant freshwater prawn.

References

Aniello, M.S. and T. Singh, 1980. Some studies on the larviculture of the giant prawn *Macrobrachium rosenbergii*. In: Giant Prawn 1980 IFS Provisional Report No. 9. International Foundation for Science, Stockholm, Sweeden, pp: 50-59.

DOF., 1994. Fish fortnight, 1994. Department of Fisheries, Government of Bangladesh, Ramna Dhaka, pp: 24, (In Bangla).

DOF., 1996. Fish fortnight, 1996. Department of Fisheries, Government of Bangladesh, Ramna Dhaka, pp: 99, (In Bangla).

FRI., 1994. Fisheies development techniques. Fisheries Research Institute, Mymensingh, Bangladesh, pp: 69.

Gibson, R.T., 1975. Identification of some problems in rearing *Macrobrachium rosenbergii* larvae. In: Selected Readings on Prawn Culture *Macrobrachium rosenbergii*. The East-West Centre, Honolulu, Hawaii, pp: 12-15.

New, M.B. and S. Singholka, 1982. Freshwater prawn farming: A manual for the culture of *Macrobrachium rosenbergii*. FAO Fisheries Technical Paper No. 225. Rome.

Ong, K.S., 1975. A brief review of the Macrobrachium culture project in Penang, Malaysia. Proceedings of the International Conferences in Prawn Farming, March 31-April 4, 1975, Vung Tau, Vietnam.

Suharto, H.H., A. Ismail and A. Poemomo, 1980. Breeding technique of *M. rossenbergii* in conical fiber glass tank: Giant prawn 1980. IFS Provisional report No. 9. International Foundation for Science, Stockholm, Sweden, pp: 95-104.