

STUDIES ON FECUNDITY OF FRESH WATER PRAWN *MACROBRACHIUM SCABRICULUM* (HELLER, 1862) FROM THE RIVER CAUVERY, THANJAVUR, TAMIL NADU, INDIA**R. Athiyaman* and K. Rajendran**

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ABSTRACT

The river Cauvery is one of the major perennial river in the peninsular India which originates Talakaveri, Coorg District, Karnataka and flows through Tamil Nadu State and enters in to Bay of Bengal. The fishery resources including prawns are high in river Cauvery. In the present investigation the fecundity of *Macrobrachium scabriculum*, was estimated for the period of two years from July 2010 to June 2012. A total of 92 berried females were examined. The total number of eggs in female was significantly varied among the size groups of the prawns. In the minimum size group of prawns (30-35 mm) having the mean wet egg mass weight was 0.340 g with a mean total number of eggs 1.575. In the maximum size class (50-60 mm) having the mean wet egg mass weight was 0.859 g with a mean total number of eggs per female was 2815. The mean total wet weight of the eggs per female as well as the mean number of eggs female were increased with increasing length and weight. Fecundity (F) was related to total length (TL) and Total weight (TW) respectively $Y = 4.98 \pm 29.01, X = 0.978$ and $Y = 0.213 \pm 1.657, X = 0.193$. There is a direct relationship noticed between total length of prawn and total number of eggs.

KEYWORDS: Fecundity, *Macrobrachium scabriculum*, River Cauvery.**INTRODUCTION**

The freshwater prawn *Macrobrachium scabriculum* belongs to the phylum *Arthropoda* inhabiting in fresh water bodies showed significant difference exist between the male and female. The pleura of the abdomen of the female form a brood chamber in which the eggs are carried between laying and hatching. Fecundity is a measure of the reproductive capacity of brood of prawns, also a population is a function of the fecundity of the females (Abowei *et al.*, 2006). Fecundity in the number of eggs carried by a female is affected by numerous factors and intensities by specific features at different environments (New and Singholka, 1982; Gjedrem, 1983). The evaluation of fecundity becomes necessary because it is considered a measure of the reproductive fitness of Crustacean (Nazaari *et al.*, 2003) and is directly influenced by natural selection (Hines, 1991). Furthermore, fecundity, as well as breeding frequency is characteristics directly related to species life strategy. Fecundity of crustaceans showed direct relationship to total length (Battacharjee and Dasgupta, 1989; Valenti, *et al.*, 1989; Bal and Rao, 1990; Bilgin and Samsun, 2006). The egg mass weight is direct proportional to the length and weight of the animal (Oh and Hartnoll, 2004; Patimar, 2008). *M. scabriculum* increased linearly with the size of females in their fecundity (Rao, 1998; Kutty *et al.*, 2000; Chockley and Mary, 2003; Taikwa and

Magaya, 2003; Lima *et al.*, 2015). Hence the present study is aimed to study the fecundity of fresh water prawn *Macrobrachium Scabriculum*.

MATERIALS AND METHOD

Berried females were collected and were individually packed in plastic bags and transferred to laboratory. The length and the width of the carapace were measured to nearest millimeter. The weight of the animals were noted and eggs were removed by forceps and blotted with filter paper to remove the excess of water. Then the eggs were weighed accurately on possible nearest to 0.01 mg. The samples were taken at different places and the weight of the sample was noted. The fecundity was estimated by the method of Kwei (1978). From the weight of the egg mass, the total number of egg present in the brood was calculated using this formula (Zar, 1999).

$$F = \frac{\text{Number of eggs}}{\text{Weight of the sample}} \times \text{Total egg mass weight}$$

The correlation and linear relationship between carapace width and total number of eggs were also calculated (Parson, 1988).

RESULTS AND DISCUSSION

In the present study the data shows that the number of eggs in fresh water prawn *M. scabriculum* was related to the size group is depicted in table 1, 1a and Fig.1. In the minimum size group having the mean wet egg mass weight was 0.340 g with a mean total number of eggs 1.575. In the maximum size having mean wet egg mass weight was 0.859 g with a total mean number of egg`s per female was 281.5. The mean total wet weight of the egg per females as well as the mean number of egg, females were increased with increasing length and weight. Fecundity (F) was related to the length (TL) and total weight (TW) by the equation $Log_{10} F = a + b \log(TL) \text{ or } (TW)$ $Y=4.987 \pm 29.01, X=0.978$ and $Y=0.213 \pm 1.657 = 0.913$.

An actual increase in total number of eggs appear to be related to both carapace length and body weight of the animal. Fecundity is the total number of eggs found in a brood. The mean total length, mean fecundity, the mean relative fecundity and egg diameter of *M. scabriculum* showed significant result. There is a direct relationship noticed between total length and total number of eggs. However there was a slight variation observed in total number of eggs of the same size group. The prawn is a continuous breeder and subsequent brood may possibly liberalized within the spawning period. The number of eggs may be more in the first time and may show a tendency to decline in the subsequent brood. Similar observations were made by early workers (Manna and Raut, 1991; Albertoni *et al.*, 2002; Patimar, 2008; Almeida *et al.* 2010; Sethi *et al.*, 2014 and Lima *et al.*, 2015).

In *Macrobrachium rosenbergii*, the total number of eggs varied from 100,000 to 700,000 as the size increases the number of eggs also increased (New and Singholka, 1982). According to Gjedrem (1983) the fecundity of same species differs significantly due to several variations such as physico-chemical property of aquatic environment or geographical position and nature of food availability. The number of eggs shed by different species of prawn may vary considerably (Battacharjee and Dargupta, 1989). Valenti *et al.*, (1989) reported that a fecundity of *Macrobrachium equideus* was lower than those *Macrobrachium acanthurus*. The individuals of the same species produced varying number of eggs

depending on their age, length, weight and environmental conditions (Bal and Rao, 1990). In *Macrobrachium* species, the fecundity is extremely associated with the age of female and may increase when the female attains maturity (Graziani *et al.*, 1990).

The fecundity of species was under both genetic and environmental control and was measure of fitness, which was affected by specific feature of different (Hines, 1991). In *Macrobrachium rosenbergii* the total number of eggs ranges from 20,000 to 700,000 (Rao, 1998) with a good preferential for aquaculture (Kutty *et al.*, 2000). The coral shrimp, *Scenopus hispidus* the clutch size has been highly correlated with the size of the individuals (Chockley and Mary, 2003). The increase in the number of eggs with an increase in the size of female prawn (Taikwa and Mgaya, 2003). In *Macrobrachium potiuna* and *M. olfersi*, the fecundity indicates their reproductive fitness (Nazaari *et al.*, 2003). The fecundity of *Macrobrachium lamarrei* ranging from 82-308 for females at a size of 5.7-7.4 c.m. similarly *Macrobrachium rosenbergii* ranging from 24225-191092 for female at a size of 14.3 to 23.5 cm and *M. malcolmsonii* ranging from 3500 and 94000 for females at a size of 5.4-16.5 cm (Sharma and Subba, 2005).

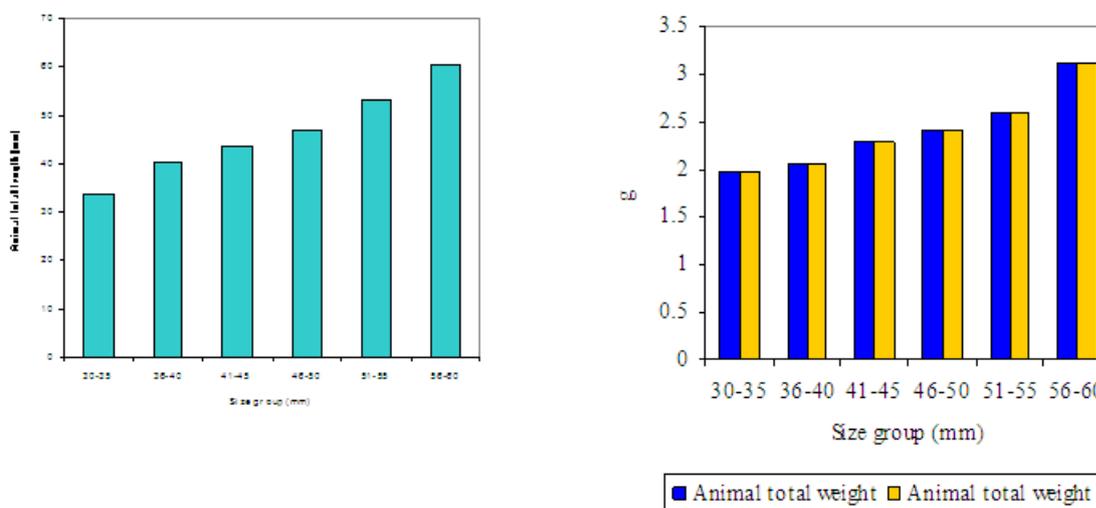
Fecundity in freshwater prawn is found to be directly related to the total length, standard length and total weight of the animal (Bilgin and Samsun, 2006). In *Macrobrachium macrobrachion* a high correlation between female weight and the number of eggs (George *et al.*, 2013). Fecundity increase with the carapace length, the number of egg also increases with increasing in weight of *M. macrobrachion* (Deekae and Abowei, 2010a). Ovary weight also shows significant positive correlation with total length, body weight and fecundity of *P. semisulcatus* by Sarada (2010). An increase in number of eggs with an increasing size of female in *M. vollenhovenii* and *Pellonula leonensis* (Kingdom and Alison, 2011; Kingdom, 2012; Kingdom and Eronadu, 2013). The fecundity of *M. rosenbergii* was found to be higher / lower and *M. malcolmsonii* (Aldur Rashid, *et al.*, 2013). Lima *et al.* (2015) while studying fecundity of *M. surinamicum* increased linearly with the size of females. The fecundity of prawn exhibited a directed relationship between the body length and the total number of eggs.

Table 1: Fecundity on *Macrobrachium scabriculum* from the station I and II during 2010-2012

S. No.	Size group (mm)	No. of animal	Animal total length (mm)	Animal total weight (g)	Total egg mass weight (g)	No. of eggs
1.	30-35	9	33.89	1.979	0.340	1.575
2.	36-40	12	40.48	2.056	0.362	1750
3.	41-45	14	43.82	2.275	0.412	2000
4.	46-50	15	46.92	2.401	0.562	2345
5.	51-55	20	53.17	2.600	0.689	2650
6.	56-60	22	60.57	3.125	0.859	2815

Table 1a. The regression equation values for the fecundity on *M. scabriculum* from station I and II

S. No.	Characters	Regression value
1.	No. of eggs (X) Vs Animal total length	$Y = 4.987 + 29.01 X = 0.978$
2.	No. of eggs (X) VS Animal total weight (g)	$Y = 0.213 + 1.657 X = 0.913$

**Fig.1. Fecundity on *M. scabriculum* from the station I and II during 2010-2012**

CONCLUSION

In the present study, fecundity of the freshwater prawn *M. scabriculum* exhibited a direct relationship between the body length and the total number of eggs. In small size groups of 30 to 35mm having the mean wet egg mass weight 0.340g, with mean total number of eggs 1,575. In large size group 50 to 60 mm prawn having the mean wet egg mass weight 0.859g, with mean total number of eggs per female being 2815

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