

## Fecundity of fresh water prawn *Macrobrachium Assamense Penensularae* from Khoh River, India

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### Abstract

This study presents fundamental information on the reproductive capacity of freshwater prawn, *Macrobrachium assamense peninsularae*. Sampling was carried out monthly from Khoh-River during the months from June 2010 to August 2010. The maximum fecundity estimated for a prawn measuring 49mm length and weighing 2279mg was 84 whereas the minimum fecundity was 07 in the prawn length measuring 26mm and weighing 466mg. The fecundity was mostly more dependent on prawn ovary weight ( $r=0.9214$ ) and prawn body weight ( $0.8336$ ) as compared to the prawn body length ( $0.8229$ ) and prawn ovary length ( $r=0.8043$ ). In view of its body size, *Macrobrachium assamense peninsularae*, an ornamental prawn fish has good breeding capacity.

**Keywords:** *Fecundity* | *Macrobrachium assamense peninsularae* | *Khoh-River*

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### Introduction

Fresh water Prawns are Decapod crustaceans belonging to the Palaemonidae family. According to Tiwari (1955a), the genus Palaemon has marine origin and has acquired fresh water habitat by immigration from the sea to the interior of the land through river. The process of adaptation of fresh water is not yet complete, because many species are not found in estuaries and still depend on brackish water for breeding. Several species have become completely acclimatized to fresh water and are found in inland rivers and hill streams. The vast majority of fresh water Prawn species of commercial interest belonging to the *Macrobrachium* genus is found in the tropical and subtropical regions of the world (Bowman and Abele, 1982, Chace, 1992). *Macrobrachium assamense peninsularae* (Tiwari, 1955b) is indigenous in North India or Peninsular region, and only found in Khoh river from Garhwal region (Bahuguna et. al., 2010). Lobao et. al., (1985) reported that the information of the reproductive capacity is important to evaluate prawn species potential for commercial farming. Santos (1978) defined the fecundity as the number of eggs laid by one female per

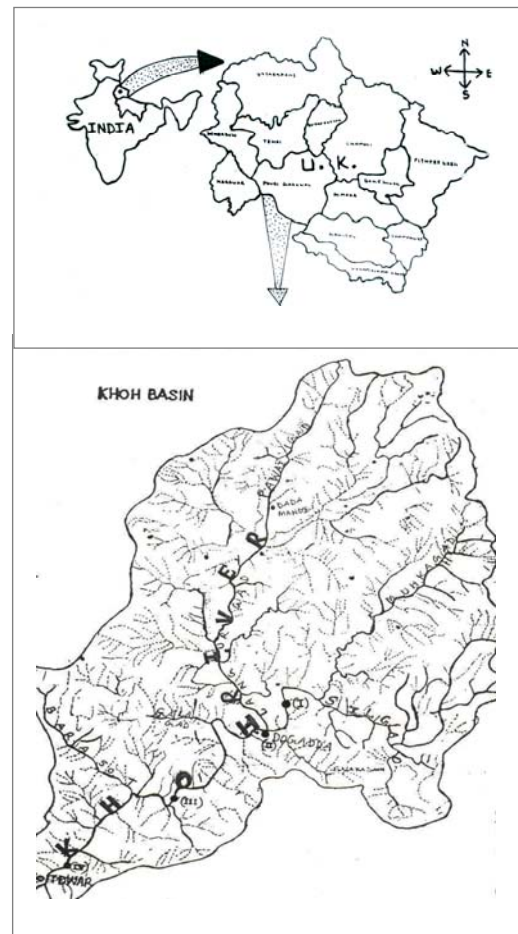
hatching. A special *Macrobrachium assamense peninsularae* species presents is considered economically feasible for ornamental Prawn fish farming which certain characteristic such as small size, high fecundity and low aggressiveness. The fresh water ornamental prawn farming is simpler and economical than the salt water prawn farming because of, since the ponds can be built is small size and can be located on the inland.

Some basic research has been conducted in the several different Prawns by Ching and Velez (1985), Walker and Ferreira (1985), Magathaes and Walker (1988), Graziani *et al.* (1993), Bhattacharjee and Dasgupta (1989), Sharma and subba (2005), Mejia-Ortiz *et al.* (2001), Cavalli *et al.* (2001), Nazari *et al.* (2003), Bhuiyan *et al.* (2007) and Flavia *et al.* (2010). Due to lack of proper information about the reproductive potential of *Macrobrachium* in Garhwal region, this work is aimed at determining fecundity of this species and its relationship with prawn length, prawn weight, prawn ovary length and prawn ovary weight.

### Sampling Sites

The samples were collected from the Khoh River in Khoh-basin which is geographically situated in between 78.30 ° E to 78.40 ° E longitude and from 29.45° N to 29.55° N latitude. Khoh is a spring fed perennial river in the foot hills of Garhwal Himalaya, which is formed by the confluence of two parent streams, the Langurgad (originating from the southern slopes of Dwarikhal) and the Silgad (originating from western slopes of south-east Lansdowne). Both these parent tributaries confluence near Dogadda town to form the main stream Khoh. Ecologically, the river has two parts, the upper part with fast flowing

water current and pebbly bottom surrounded by big boulders while the lower part has sandy bottom and slow speed of water current. On the way it joins other rain fed tributaries originating from south east mountain slopes of Hathikund and Kohllu Chaur. At Saneh Bhabar, the river confluent with Saneh river and enters into the Bijnor district (U.P.), and near Dhampur (Uttar Pradesh) it confluent with the major Ramganga river (Map.1).



Map 1: Sampling Site of Khoh River

### Material and Methods

The Prawn described in this paper was identified following the procedures adopted by Tiwari (1955a) and Cai *et al.* (2004) as *Macrobrachium assamense peninsularae*, a fresh water small Prawn, commonly known as

“Geega machi”. The mature female *Macrobrachium assamense peninsularae* belonging to the family Palaemonidae were collected from Dugadda-Pauri teraha (I), Dugadda Nursery (II), Durga Devi (III) and Sidhbale Mander (IV) sampling sites of Khoh River with the help of local fishermen and brought to the laboratory of Zoology Department of Post Graduate College Pithoragarh. The required number of females with fertilized eggs was preserved in 5% formalin to study their fecundity. The estimation of fecundity (31 Prawns) was carried out during June 2010 to August 2010. The body length and weight of fresh water female prawns were recorded before removing the egg mass from their brood pouch with the help of forceps and counting the number of eggs. Since, the number of egg was not so high; sub sample method was not used for the estimation of fecundity.

For the estimation of relationships between fecundity and independent body parameters (Prawn length, Prawn Weight, Prawn ovary length and Prawn ovary weight), the method of least square was used as  $Y = a + b x$ . Where  $Y =$  Fecundity (dependent variable),  $x =$  Body parameters (independent variables),  $a =$  Slope and  $b =$  Intercept. The coefficient of correlation ( $r$ ) of each of the relationship was also assessed.

### Results and Discussion

The length of fresh water prawn, considered for the present study, ranged from 26mm to 49mm. Data on the fecundity of *Macrobrachium assamense peninsularae* are presented in the table 1. These relationships were traced with the help of regression analysis. The prawns ranged from 26 to 49mm in length and 51 to 2279 mg in body

weight. The maximum fecundity was 84 calculated for a prawn measuring 49mm length and weighing 2279mg whereas the minimum fecundity was 07 in the prawn of length measuring 26mm and weighing 466mg.

In the present investigation four linear relationships were traced out between fecundity and body parameters (Prawn length, Prawn weight, ovary length and ovary weight) for *Macrobrachium assamense peninsularae* (Table.2). It was noticed that the fecundity was highly correlated with Prawn ovary weight  $F = -15.4879 + 417.2919 OW$  ( $r = 0.9214$ ), followed in decreasing order by Prawn weight  $F = 0.4372 + 28.1659 PW$  ( $r = 0.8336$ ), Prawn length  $F = -62.3237 + 27.0707 PL$  ( $r = 0.8229$ ) and Prawn ovary length  $F = -43.8783 + 8.3961 POL$  ( $r = 0.8043$ ).

*Macrobrachium assamense peninsularae*, an ornamental prawn fish has good breeding capacity considering its body size. It is definitely conducive if developed as an aquarium prawn fish. The hill stream prawns show a great variation in their breeding potential. It mostly depends on the habitat ecology of the prawn fish. In *Macrobrachium assamense peninsularae* the breeding capacity ranges from 07 to 84 and increases with an increase in all the body parameters. The straight-line relationship has been observed between the Prawn length and fecundity, Prawn weight and fecundity, Prawn ovary length and fecundity, Prawn ovary weight and fecundity. The fecundity was more dependent on prawn ovary weight ( $r = 0.9214$ ) and prawn body weight (0.8336) than the prawn body length (0.8229) and prawn ovary length ( $r = 0.8043$ ). The fecundity was particularly more closely related to the prawn ovary

weight. The breeding season of *Macrobrachium assamense peninsularae* was found to be from July to August month depending on the available monsoon as well as suitable water temperature.

The breeding season of *Macrobrachium malcolmsonii* in India is from April to December, with a peak in August to November, depending upon the monsoon. The fecundity of *Macrobrachium malcolmsonii* has been reported to range from about 3,500 to 94,000 for females of 54 to 165 mm Rajyalakshami (1980). According to Ling (1969), the breeding of *Macrobrachium rosenbergii* was found to be July to September on monsoon period. Walker and Ferreira (1985) reported a range of fecundity from 6 to 30 *Macrobrachium inpa* in the central Amazonian river, Tarumamirim. Magathaes and Walker (1988) while studying the fecundity of *Macrobrachium ferreira* it to be in a range of 25 to 35. Magathaes (1985) reported a fecundity range of 289 to 2259 in *Macrobrachium amazonicum*.

Magathaes and Walker (1988) working in *Macrobrachium nattereri*, he noticed a fecundity range of 34 to 150. Valenti et. al. (1989) observed *Macrobrachium acanthurus* females hatched about 18,000 eggs. Mahapatra, et.al, (1996) noticed the fecundity of *Macrobrachium rosenbergii* ranged from 24,225 and 1, 91,092 for females of 143 mm to 235 mm body length. Garcia- Davila et al., (2000) estimated a range of fecundity from 15 to 168 in *Macrobrachium brasiliense*. The fecundity of *M. potiuna* was 35 eggs and *M. olfersi* was 1917.0 eggs noticed by Nazari et al. (2003) in Ratones basin, Santa Catarina Island, Brazil. Sharma and Subba (2005) reported that the breeding season of *Macrobrachium lamarrei* was found to be

April to September with a peak period in August and September, depending on monsoon as well as suitable temperature. The mean body length and mean fecundity of *Macrobrachium lamarrei* ranged from 57-74 mm and 82-308 respectively. The females *M.hainanense* produced only a single brood of 20-75 eggs each breeding season (Mantel and Dudgeon, 2005). The mean fecundity was 1,227 eggs per female (mean total length: 39.9 mm) with a positive correlation between fecundity and female body size. Bhuiyan et al. (2007) stated that fecundity of *Macrobrachium dayanum* showed that the number of eggs in this species range from 43 to 195. Flavia et al., (2010) reported that the fecundity varied between 40 to 3375 eggs per females in *M. amazonicum* on Combu Island (Amazon estuary).

The variations found in fecundity may be attributed to different conditions of female physiology and riverin environment or season. Graziani et al. (1993) reported that *Macrobrachium* species has the fecundity which is associated with the female age and increases as the female becomes mature.

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S.No.	Prawn Length (mm)	Prawn Weight (mg)	Ovary Length (mm)	Ovary Weight (mg)	Fecundity
1	2.6	0.466	07	051	07
2	2.9	0.551	07	059	08
3	2.9	0.391	07	065	10
4	3.1	0.533	08	071	12
5	3.1	0.676	08	075	13
6	3.2	0.734	08	087	18
7	3.2	0.849	08	093	26
8	3.2	0.897	09	109	34
9	3.3	1.472	09	137	39
10	3.3	1.031	08	149	43
11	3.4	1.300	08	165	32
12	3.4	0.976	09	167	40
13	3.4	0.833	10	98	29
14	3.6	0.833	10	109	32
15	3.7	1.023	10	126	37
16	3.8	1.353	09	140	39
17	3.8	1.091	09	169	45
18	3.8	1.726	10	172	49
19	3.9	1.573	11	111	42
20	4.1	1.789	11	072	19
21	4.1	1.691	11	074	22
22	4.4	2.023	11	179	48
23	4.4	1.300	09	162	40
24	4.4	2.040	12	121	36
25	4.4	2.055	12	172	55
26	4.5	2.127	10	174	67
27	4.5	2.179	12	179	63
28	4.5	2.191	13	184	70
29	4.6	2.209	13	191	79
30	4.7	2.252	14	197	71
31	4.9	2.279	14	209	84

**Table 1:** Data on the fecundity of *Macrobrachium assamense peninsularae* (Tiwari, 1955) from Khoh-River during July 2010 to August 2010.

S.No	Relationship		Value of "a"	Value of "b"	Value of "r"
	Dependent variable	Independent variable			
1	Fecundity	Prawn Length	-62.3237	27.0707	0.8229
2	Fecundity	Prawn Weight	0.4372	28.1659	0.8336
3	Fecundity	Ovary Length	-43.8783	8.3961	0.8043
4	Fecundity	Ovary Weight	-15.4879	417.2919	0.9214

**Table 2:** Values of regression coefficient "b", intercept "a" and coefficient of correlation "r" in Fecundity / Prawn Length, Fecundity / Prawn Weight, Fecundity / Ovary Length and Fecundity / Ovary Weight

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