

Studies on sex ratio of freshwater prawn *Macrobrachium scabriculum* (heller – 1862) from the river Cauvery, Thanjavur, Tamilnadu, India

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ABSTRACT

The River Cauvery is one of the major perennial river in the peninsular India. Which originates from Coorg District, Karnataka and flows through Tamilnadu state and enters into Bay of Bengal. The fishery resources are high in the River Cauvery. In the present investigation the sex ratio of *Macrobrachium scabriculum* was estimated for the period of two years from July 2010 to June 2012. A total of 1474 prawns, the males were 729 and females were 745. The overall sex ratio of males and females were found to be 1:1 ratio. The chi-square (χ^2) test analysis indicated that the value slightly deviated from the expected 1:1 ratio in the two years. The females were predominant in several months of the study period. Level P confidence for whole year has no significant deviation from the expected 1:1 ratio. The pooled data for both the years conformed to the expected 1:1 ratio. Physico-chemical factors of the aquatic environment either directly or indirectly influence the sex ratio. The preponderance of female in all the months than males. The predominance of female may poachaps be due to the continuous breeding habits and possible migration of females towards the river.

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Introduction

The freshwater prawn *Macrobrachium scabriculum* belongs to the phylum *Arthropoda* inhabiting in freshwater bodies showed significant difference exist between the male and female. Number of female and male is responsible for breeding in the natural ground. The sex ratio of the prawn is to become essential in the ground to produce juvenile for the future exist (Berglund, 1981). The sex ratio of *M. equidense*, female found to be predominant during monsoon months (Krishnamurthy *et al.*, 1987 and Country *et al.*). The ratio of sexes will be varied due to seasons. During monsoon the availability of food and oxygen supply will be favourable to the species and it shows the significance in the sex ratio (Saifulla *et al.*, 2005, Maciel *et al.*, 2011). Sex population of *Macrobrachium assamense peninsularie* (Bahuguna, 2013). Moreover differences in abundance, sex ratio proportion of ovigerous female and prawn size were also considered. Hence the present study is aimed to study the sex ratio of freshwater prawn *Macrobrachium scabriculum*.

Materials and Method

The both sexes of females and males of *Macrobrachium scabriculum* were collected and fixed in 5 percent neutralized formalin, during of 24 hrs and transferred to laboratory and stored in 70 percent alcohol. The separated specimens sex was determined by appendix masculine, shape of the endopod of second pleopod or observation of reproductive organs under a stereoc-microscope were the former was obscure. Carapace length (CL). The shortest distance between the posterior margin of the orbit and middorsal posterior edge of the carapace was measured using a vernier caliper.

$$\text{Sex ratio} = \frac{\text{No. of the female prawns}}{\text{No. of the male prawns}}$$

$$\chi^2 = \frac{(O - E)^2}{E}$$

Chi-square was employed to test the difference in sex ratio.

Results and discussion

In the present study the data shows that the sex ratio of freshwater prawn *M. scabriculum* was related to the sex is depicted in table 1 and 1a and fig.1 and 2. The results clearly indicated that there was a slight variation in the male and female nearly among the total of 1474 prawns, the males were 729 and females were 745. The overall sex ratio of male and females were found to be 1:1 ratio. The Chi-square (χ^2) test analysis indicated that the value slightly deviated from the expected 1:1 ratio in both the years. The females were predominant in several months of year 2010-2012. Level P confidence for the whole year has no significant deviation from the expected 1:1 ratio.

The occurrence of male and female individuals in a population of a particular species depends on many factors. Physico-chemical factors of the aquatic environment either directly or indirectly influenced the sex ratio. In the present investigation the sex ratio of freshwater prawn *Macrobrachium scabriculum* showed a significant result, indicating the preponderance of female in all months than males. The predominance of female may poachaps be due to the continuous breeding habits and possible migration of female towards the river, similar observations have been reported by earlier workers (Castello and Allen, 1970) ; country *et al.*, 1996; Woor douw *et al.*, 2005; Maciel *et al.*, 2011; Florence Ole le *et al.*, 2012; Sethi *et al.*, 2014).

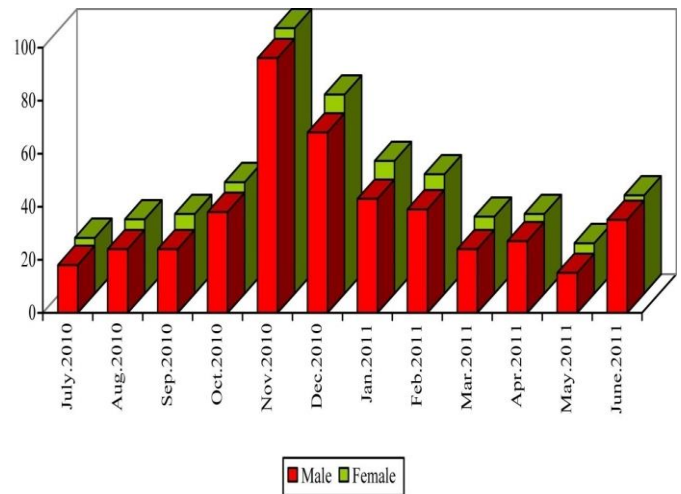
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Generally the penaeid prawns of south east coast of India. The preponderance of female have been observed as reported by earlier authors (Menon, 1957), George and Rao (1967), while working on sex ratio of both penaeid and Caridean shrimps. The deviation of sex ratio from the overall expected 1:1 the preponderance of females in due to partial segregation of ripe forms, either through habitat preference or schooling behaviour (Reynolds, 1974). In *Palaemon adespersus* and *P.squilla* sex ratio is reduced since the male energy investments in growth may decrease either risk of predation (Berglund, 1981). According to Krishnamurthy *et al.*, (1987). The sex ratio of *Macrobrachium equidens* was found to be 1:2:55 in the predominance of female was significant only in October and November. In *Penaes pelibiyus* sex ratio was found to be 1:1 which in nearest to the expected ratio, but the ratio for infavourable to females. However, predominance of one sex in the catch may be due to the selectivity of the mesh size between sexes (Country *et al.*, 1996). The few population selective on species of *Atya margaritacea* have generally reported a predominance of males over females. It in possible that male predominance in an intrinsic - characteristic of species of the genus (Martinez - Mayen and Roman Contreras, 2000). In *Metapenaes monoceros* the distribution female and male catches in various months significantly differ, which affected the sex ratio (Nandakumar, 2001). In *Penaes indicus* the monthly chi square (χ^2) of sex ratio showed significant difference from 1:1 expected ratio but in *P.monodon* the sex ratio was not significant from a 1:1 expected ratio (Taikwa and Mgaya, 2003). Saifulla *et al.*, (2005) reported that the freshwater prawn *Macrobrachium*, *lamarrei*, *M.malcolmsonii* and *M.dayanus* the females were more common than males in each species being the sex ratio of 1:1.75, 1:1:1, 1:2.6 and 1:1.6 respectively. In *M.gangeticum* and *M.malcolmsonii*, the females were predominant than males (Prasad and Kanauja, 2006).

In the freshwater prawn *Palaemon paucidens*, the sex ratio of female is higher than males expecting in some months of the year (Kim *et al.*, 2008). In *Macrobrachium equidens* the observed sex ratio is 1:2.55 which deviated from expected 1:1, the female being observed throughout the year, but, relatively more common in the dry seasons of the months (Maciel *et al.*, 2011). In the *Pseudopalaemon bouveri* sex ratio deviated from 1:1 ratio (Carnivel *et al.*, 2012). The seasonal variation of sex ratio observed in *Macrobrachium vollenhovenii* may be associated with breeding activities (Kingdom and Erond, 2013). The ovigerous females observed significantly in August. (Oben *et al.*, 2015).



Sex ratio of *M. scabriculum* from the river Cauvery during 2010-2011

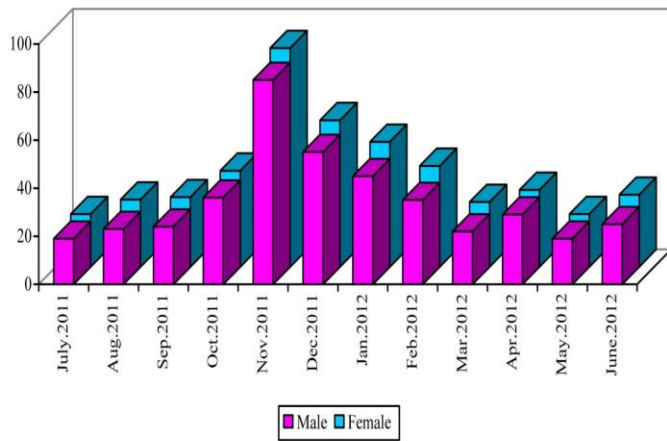
Figure 1

Table 1. Sex ratio of *M. scabriculum* from the river Cauvery during 2010-2011.

| Month and Year | Female | Male | Total | % of female | % of male | Ratio | X ² (Chi-square) |
|----------------|--------|------|-------|-------------|-----------|--------|-----------------------------|
| July 2010 | 40 | 37 | 77 | 51.95 | 48.05 | 0.92:1 | 0.12 |
| August 2010 | 32 | 27 | 59 | 54.24 | 45.76 | 0.84:1 | 0.42 |
| September 2010 | 38 | 32 | 70 | 54.29 | 45.71 | 0.84:1 | 0.52 |
| October 2010 | 24 | 28 | 52 | 46.15 | 53.85 | 1.17:1 | 0.30 |
| November 2010 | 33 | 35 | 68 | 48.53 | 51.47 | 1.07:1 | 0.06 |
| December 2010 | 30 | 36 | 66 | 45.45 | 54.55 | 1.20:1 | 0.54 |
| January 2011 | 27 | 38 | 65 | 41.54 | 58.46 | 1.41:1 | 1.86 |
| February 2011 | 27 | 31 | 58 | 46.55 | 53.45 | 1.15:1 | 0.28 |
| March 2011 | 26 | 32 | 58 | 44.83 | 55.17 | 1.18:1 | 0.62 |
| April 2011 | 39 | 28 | 67 | 58.21 | 41.79 | 0.72:1 | 1.80 |
| May 2011 | 36 | 27 | 63 | 57.14 | 42.86 | 0.75:1 | 1.28 |
| June 2011 | 28 | 33 | 61 | 45.90 | 54.10 | 1.81:1 | 0.40 |

Table 1 a. Sex ratio of *M. scabriculum* from the river Cauvery during 2011-2012.

| Month and Year | Female | Male | Total | % of female | % of male | Ratio | X ² (Chi-square) |
|----------------|--------|------|-------|-------------|-----------|--------|-----------------------------|
| July 2011 | 33 | 24 | 57 | 57.89 | 42.11 | 0.73:1 | 1.44 |
| August 2011 | 22 | 28 | 50 | 44.00 | 56.00 | 1.27:1 | 1.72 |
| September 2011 | 37 | 30 | 67 | 55.22 | 44.78 | 0.81:1 | 0.74 |
| October 2011 | 28 | 24 | 52 | 53.85 | 46.15 | 0.86:1 | 0.30 |
| November 2011 | 31 | 42 | 63 | 42.47 | 57.53 | 1.35:1 | 1.66 |
| December 2011 | 27 | 35 | 62 | 43.55 | 56.45 | 1.29:1 | 1.04 |
| January 2012 | 32 | 27 | 59 | 54.25 | 45.75 | 0.84:1 | 0.44 |
| February 2012 | 29 | 20 | 49 | 59.18 | 40.82 | 0.69:1 | 1.66 |
| March 2012 | 26 | 37 | 63 | 41.27 | 58.73 | 1.42:1 | 1.94 |
| April 2012 | 26 | 18 | 44 | 59.09 | 40.91 | 0.69:1 | 1.46 |
| May 2012 | 35 | 28 | 63 | 55.56 | 44.44 | 0.80:1 | 0.78 |
| June 2012 | 39 | 32 | 71 | 54.93 | 45.07 | 0.82:1 | 0.70 |



Sex ratio of *M. scabriculum* from the river Cauvery during 2011-2012

Figure 1 a

Conclusion

In the present study, sex ratio of the freshwater prawn *M.scabriculum* showed slight deviation from the expected ratio 1:1, female were found to be predominant during all the months of the study period. The chi-square (χ^2) value in slightly deviated from the expected 1:1 ratio.

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