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Population structure of freshwater crab *P. masoniana* (Henderson) in the lower reaches of Chenab river, J&K state, India.

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Abstract

The population structure of freshwater crab of *Paratelphusa masoniana* (Henderson) was studied in the lower reaches of river Chenab in J&K, India. Crabs were randomnly sampled on monthly basis from June 2010- May 2011, a total of 581 crabs were obtained of which 283 (48.37%) were males and 302 (51.62%) were females. The overall sex ratio was found to be 1:1.07 indicating that females were numerically more in compared to males. However sex ratio never remain constant but exhibited fluctuation pattern throughout year especially in the month of June-July and December- January when it was recorded to be almost less than unity (1:0.40, 1,1:0.6 and 1:0.55 respectively). The present population represents non normal size frequency distribution with male reaching greater size (5-6 cm cw) than females (4-5 cm cw).

Key words: *Paratelphusa masoniana* (Henderson), population structure, sex ratio.

Introduction:

Among the macroinverterbrates commonly found in freshwater, brachyuran crabs constitute one of the important taxa. Crabs constitute an important component of ecosystem as grazer, predators as well as detritivores. More than thousand species of freshwater crabs have been described throughout tropic (Sterberg and Cuberlidge, 2001) but surprisingly only a handful of them have been studied so far. In term of their basic morphology, freshwater crabs are similar to marine counterpart but form taxonomically a very distinct group of Decapoda (Dobson, 2004). Freshwater crabs are vulnerable as their marine counterpart and play a key role in transferring the

energy not only within an aquatic ecosystem but also to the terrestrial environment as they are consumed by fishes, birds (Skov and Hartnoll, 2001; Skov *et al*., 2002 and Litulo, 2004) and human being also (Akin-olora *et al*., 2005). For the culture of an organisms require correct knowledge of some of fundamental aspects such as sex ratio, size frequency distribution and size at maturity. While sex ratio depicts the level of competition faced by crabs for reproduction, size frequency distribution helps in determininig the dominant class size as well as maximum size gained by both the sexes of crabs.

Except for few reports (Mecan, 1937; Chacko and Thyagarajan, 1952; Ali, 1955 and Dutta, 1978) nothing much is available about *Paratelphusa masoniana* (Handerson) from India in general and in Jammu region of J&K state in particular.

Presently a maiden endevour has been done to study the population structure of crab *P. masoniana* (Handerson). Such studies would be very rewarding as it will help to generate first hand data which can form basis of future research on this crab species.

Material and methods:

The studies were carried out in lower reaches of river Chenab. Crabs were collected by using drag net, segregated sex wise and number of males as well as females were recorded. Based on data sex ratio was determined by using the formula:

$$\text{Sex ratio (S.R.)} = \frac{\text{No. of females crabs}}{\text{No. of males crabs}}$$

Carapace width of each crab was measured by suing vernier caliper scale and measurement were recorded.

Results:

Sex ratio:

During the study out of total number of crabs caught (585), 48.37% (283) were males and 51.62% (302) were females and thus overall sex ratio comes to be 1:1.07. Sex ratio, however, never remained to be consistent year round but rather exhibited seasonal variation (table I) and marked fluctuation recorded especially in the months of June-July and December-January when it was found to be even almost less than unity (i.e. 1:0.41, 1, 1:0.6 and 1:0.55 respectively.) Also it is only during these months only when sexually mature females were caught.

Size frequency distribution: Based on measurement of carapace width different class size were constructed for each sex (table 2 & 3 and figure 4 & 5). Size of male crabs ranged from 2-3cm (20-30 mm) cw to 6-7 (60-70mm) cm cw and maximum size of 6.4 cm cw with the modal class recorded to be 5-6 cm (50-60 mm) cw. In females, the size range was observed to be 2-3 cm (20-30mm) cw to 5-6 cm (50-60 mm) cw with the largest female of 5.6 cm cw and the modal class recorded to be 4-5

cm (40-50 mm) cw. Comparatively males maintain larger size than females. Also at no point of time during the study period females ever surpassed males in size.

Study further revealed that for the sexes, crab population had been invariably observed to comprise predominantly of adult individuals (size> 3 cm cw). Small crabs were rarely spotted and that too in the months of ending July and February-March.

Table 1: Monthly variation of sex ratio of crab *P. masoniana* during the study period (June, 2010- May 2011).

Months	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Sex Ratio (S.R.)	1:0.40	1	1:1.7	1:1.4	1:1.56	1:1.33	1:0.6	1:0.55	1:1.75	1:1.55	1:1.65	1:1.5

Table 2: Total no. of male crab *P. masoniana* of different class size carapace width (cw) (1 cm interval) during the study period (June, 2010-May,2010).

Months (c.w) cms.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb	Mar.	Apr.	May
1 -2	0	0	0	0	0	0	0	0	0	0	0	0
2 – 3	0	0	2	1	0	0	0	0	0	4	0	0
3 – 4	8	6	4	3	3	3	8	7	2	5	4	7
4 – 5	14	7	3	5	5	7	13	8	4	7	7	5
5 – 6	25	10	5	6	8	8	22	12	10	4	9	8
6 – 7	2	0	0	0	0	0	2	0	0	0	0	0

Table 3: Total no. of female crab *P. masoniana* of different class size carapace width (cw) (1cm class interval) during the study period (June, 2010-May, 2011).

Months (C.W) Cms.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb	Mar.	Apr.	May
1 -2	0	0	0	0	0	0	0	0	0	0	0	0
2 – 3	0	0	5	4	0	0	0	0	0	0	0	0
3 – 4	8	5	8	6	5	9	7	5	10	12	10	6
4 – 5	12	14	11	9	16	12	17	6	12	14	16	19
5 – 6	0	4	0	3	4	3	3	4	6	5	7	5
6 – 7	0	0	0	0	0	0	0	0	0	0	0	0

Discussion

Sex ratio: Deviation of sex ratio from 1:1during the month of June-July and December-January attributed to reason that these were the months when sexuallly mature females were caught only during these months only. Cobo (2002) held that

breeding months of crabs are those when sexually mature females were recorded. Increase in number of males during breeding season as observed presently can be attributed mainly to (a) migration of male crabs towards the sexually mature females for breeding purpose and (b) burrowing habit of ovigerous females after mating. Contrary to present findings, migration of females rather than male crabs has been held as one of the main causative of deviation in sex ratio in marine (Miquel, 1985; Tongdee; Johnson, 2003; Xia, 2004 and Jirapunpipat, 2008) and in land crabs (Hartnoll, 2009).

Migration of male crabs towards sexually mature females during breeding season has been held presently to be one of the main causative responsible for fluctuation in sex ratio. It is based on the fact that males have been observed to abruptly increase during these breeding months (June-July and December-January) compared to other part of year during study period. Pattern of fluctuation in sex ration of presently studied crabs also finds relation with categoric absence of ovigerous females in the study area that possibly undergo burrowing a commonly observed phenomenon among ovigerous females in breeding season as also held (de Revera, 2003).

Review of literature (Henmi, 2000 and Macia *et al*., 2001) reveals that burrowing by ovigerous females is undertaken for (a) incubation of eggs and (b) protection of brood. Fact that functionally mature females were caught but no oveigerous females could ever be recorded during breeding season in the study area simply authenticates view point that ovigerous females always remain deeply in burrow for incubation of eggs and brood protection . similar findings have also been reported in fiddler crabs (Sallam, 2005) and *Uca crenulata* (de Rivera, 2003) where in they reported the burrowing habit of ovigerous females.

Besides this differentiate growth rate, fighting among males (Johnson, 2003 and Collins, 2006) and claim of locals that crabs are occassionaly eaten by them also be additional contributory factors for influencing sex ratio of crabs to some extent

Size frequency distribution: Differences in size of males and females during study period may be because of two reasons; females usually invest most of their energy towards reproductive process such as maturation of gonads, incubation of eggs and protection of brood. So females tends to mature with inferior size that males who on other hand rather use energy Principally for somatic growth. Similar to present findings other workers (Diaz and Conde, 1989; Greco, 2000 and Mantelato, 2003) also held reduced growth rate in females to be because these crabs utilize maximum of their energy for breeding purposes. (b) geater size in males may be helpful to them during intraspecific fights, mating with females as males with greater size expectedly have more chance to mate with more number of females. Moreover it is commonly seen that females usually reject smaller sized males (Swartz, 1976)

Further low presence of small crabs (size<3cm cw) can be due to the fact that probably juveniles may be present at some yet to be examined/unexamined habit or burrows. Similar to present view point small size crabs were recorded during collection (Sallam, 2005). In land crabs *Johngnathia lagostoma* numerically less crabs was attributed to their unexamined habitat (Hartnoll, 2009). It can be proposed that possibly these juveniles remain in burrow and get released only when they attain a good enough size to with stand the environmental vagaries.

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