

Studies on the morphometry of *Macrobrachium dayanum* (Decapoda, Palaemonidae)

SEEMA LANGER, ARCHANA KUMARI, YAHYA BAKHTIYAR and ANSHU SAMYAL

Department of Zoology, University of Jammu, Jammu - 180 001 (India).

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ABSTRACT

Eight morphometric characters of *Macrobrachium dayanum* (Henderson), a freshwater prawn were measured from 6 males and 6 females collected monthly for a period of one year (January 2007-December 2007) from three sites viz. Gho-Manhasan, Kheri and Nagri. Morphometric description of the species, *M. dayanum* included the parameters viz. length of specimen, carapace length, rostral length, eyestalk length, pereopod length, pleopod length, uropod length and rostral formula. Comparison of morphometric characters between sexes indicated significant difference in the length of II pereopod. In males, longer II pereopod was observed than the females from all the three sites.

Key words: *Macrobrachium dayanum*, morphometric characters, Jammu.

INTRODUCTION

Allometric or relative growth pattern of various decapod crustaceans has been studied widely^{1,2} including genus *Macrobrachium*³⁻⁶. In Crustaceans, structures such as chelate legs in males, pleopods and abdominal width in females grow abruptly on attaining sexual maturity. This phenomenon is utilized to differentiate the mature and immature population in many decapods, which are not sexually dimorphic². Though the studies on the growth of chelipedes especially that of Brachyuran has drawn detailed attention⁷, similar studies on individuals segments of chelipedes are scanty⁸. The ratio between cheliped length and carapace length is species specific and this character has been subjected to detailed statistical analyses in taxonomy studies⁹. Some workers³ differentiated *M. idella* and *M. scabriculum* on the basis of rostrum length-total relationship. *M. lamarrei*, *M. lamarrei lamarrei* and *M. lamarrei lamarroides* were differentiated⁵ on the basis of rostral characters. Moreover, the genus *Macrobrachium* contains more than 100 species; their identification is quite difficult due to great morphological variations¹⁰. In India, farmers still depend upon natural seed supply for stocking their

ponds. Hence, knowledge on the identity of the species chosen for culture is an impelling necessity to eliminate mixing of species¹¹. With this view, the study was conducted to find out the differences in the morphometric parameters of an endemic freshwater prawn, *Macrobrachium dayanum* (Henderson). Despite its small size, the culture of *M. dayanum* is encouraged due to its commercial and nutritional value^{12,13}.

MATERIAL AND METHODS

A total of 6 males and 6 females of *Macrobrachium dayanum* were collected monthly from three sites viz. Gho-Manhasan (32° 67' N, 74° 79' E), Kheri (32° 37' N, 74° 52' E) and Nagri (32° 30' N, 75° 44' E) in Jammu. The measurement of various morphometric parameters viz. total length of specimen, carapace length, rostral length, eyestalk length, pereopod length, pleopod length, uropod length was taken with the help of divider and scale. Rostral formula was calculated by counting number of teeth of rostrum on the dorsal side and ventral side. Length from the tip of the rostrum to the tip of the telson was taken to be total length and length from the base of the orbit to the tip of the rostrum to be the rostral length.

Since sexual dimorphism is prominent in adult, *M. dayanum*, the data for males and females are analyzed separately. The male and female individuals were kept separate by examining:

1. Second chelate leg (walking leg) which is more robust and stout with sharp terminal claws, chela or pincers in male.
2. Second abdominal appendages of male: In males, each second pleopod bears an additional process the appendix masculine which lies between the appendix interna and the endopodite.
3. Males possess narrower abdomen than those of females.

RESULTS

Morphometric analysis of the species

The present work includes a comparative study of the morphology defining characters (morphometry) of *Macrobrachium dayanum* from three sites, Gho-Manhasan (Site-²), Kheri (Site-²²) and Nagri (Site-²²²).

M. dayanum can be characterized by robust size, translucent exoskeleton, size, shape and number of teeth on rostrum, nineteen pairs of appendages, carapace coalesced with all thoracic segments, paired thoracic appendages ², ²² and III modified as maxillipedes, IV and VIII (5 pairs) are modified as Periopods, I and II Periopods are chelate while the rest are non-chelate¹⁴.

Morphometric description of *M. dayanum* from Site-I

Morphometric description of the species, *M. dayanum* includes the parameters viz, length of specimen, carapace length, rostral length, eyestalk length, Periopod length and pleopods length. Moreover, rostral formula is also calculated. Six males and six females from each site are morphometrically studied monthly from Site-I (Gho-Manhasan) and the annual data thus obtained is subjected to statistical analysis.

Male

Perusal of Table 1 reveals that the male specimens measure 5.2 ± 0.42 in length having translucent body with light brown colour. Rostrum is slightly curved upward, wider in the middle and

tapers distally, shorter (1.60 ± 0.13) than carapace length (1.61 ± 0.13). Rostral teeth are not equidistant, showing rostral formula (7.34 ± 0.39) on dorsal side and rostral formula (5.56 ± 0.43) on ventral side. The length of Periopods is almost similar except I & II Periopods which measures to be 1.54 ± 0.16 & 2.26 ± 0.16 . III, IV and V Periopods being similar measures 1.58 ± 0.19 in length. Pleopods (I-V), Uropod and Eyestalk measurements are calculated to be 0.78 ± 0.07 , 0.87 ± 0.07 & 0.30 ± 0.06 .

Female

Perusal of Table 2 divulges that the total length of female specimens is calculated to be 4.88 ± 1.26 . They are light brownish in colour having rostrum (1.52 ± 0.38) longer than carapace (1.49 ± 0.38). The rostral formula on dorsal side is 7.17 ± 1.81 and on ventral side is 5.35 ± 1.28 . II Periopod being non-chelate measures 2.09 ± 0.66 in length. I Periopod show an average of 1.32 ± 0.37 while III, IV & V Periopods being similar in length, show an average of 1.31 ± 0.38 . Uropod and Eyestalk measurements are calculated to be 0.76 ± 0.20 and 0.26 ± 0.08 respectively.

Morphometric description of *M. dayanum* from Site-II:

From Site-II, six male prawns and six female prawns are morphometrically studied monthly and the annual data thus obtained is subjected to statistical analysis.

Male

Appraisal of Table 3 suggests that the male specimens measure 5.23 ± 0.44 in length having light brown colour. Rostrum is slightly curved upwards, wider in the middle and tapers distally, measuring 1.62 ± 0.11 , same as that of carapace. Rostral teeth are not equidistant, rostral formula on dorsal side and ventral side is calculated to be 7.4 ± 0.46 and 5.56 ± 0.46 . I & II Periopods measure 1.61 ± 0.11 & 2.68 ± 0.14 in length. I, III, IV & V Periopods being similar in length measures, 1.62 ± 0.13 . Pleopods (I-V), Uropod and eyestalk lengths are calculated to be 0.78 ± 0.11 , 0.87 ± 0.11 & 0.33 ± 0.04 respectively.

Female

It is evident from Table 4 that the total length of female specimen is 4.95 ± 1.27 . They are light brown in colour having rostrum (1.48 ± 0.39)

Table 1: Final Morphometric description of *M. dayanum* (Male) (January 2007-December 2007) from Site-I (Gho-Manhasan).

Months	Length of specimen (cm)	Rostral length (cm)	Carapace length (cm)	Eyestalk length (cm)	R.F. on Dorsal side	R.F. on Ventral side	Periopod I	Periopod II	Periopod III	Periopod IV	Periopod V	Pleopod I	Pleopod V	Uropod
Jan	5.56±0.37	1.66±0.18	1.65±0.15	0.35±0.07	8 ±0	5.16±0.37	1.66±0.09	2.78±0.15	1.73±0.17	1.71±0.21	1.71±0.21	1.71±0.21	0.83±0.04	0.9±0.081
Feb	5.4±0.41	1.66±0.16	1.68±0.14	0.3±0.08	7.5±0.5	5.5±0.5	1.56±0.20	2.75±0.17	1.65±0.22	1.65±0.22	1.63±0.25	1.63±0.25	0.81±0.06	0.91±0.06
Mar	5.16±0.41	1.58±0.15	1.6±0.15	0.3±0.08	7.33±0.47	5.33±0.47	1.5±0.17	2.63±0.18	1.53±0.20	1.51±0.21	1.51±0.21	1.51±0.21	0.76±0.07	0.86±0.07
Apr	5.13±0.63	1.56±0.22	1.55±0.25	0.3±0.08	7.33±0.47	5.33±0.47	1.48±0.30	2.63±0.29	1.55±0.30	1.55±0.30	1.55±0.30	1.55±0.30	0.76±0.12	0.86±0.12
May	5.1±0.56	1.6±0.15	1.6±0.15	0.3±0.08	7.33±0.47	5.33±0.47	1.48±0.23	2.65±0.19	1.55±0.22	1.55±0.22	1.55±0.22	1.55±0.22	0.73±0.11	0.81±0.10
June	5.11±0.42	1.56±0.14	1.58±0.14	0.28±0.06	7.16±0.37	5.83±0.37	1.5±0.23	2.58±0.19	1.53±0.23	1.51±0.23	1.5±0.25	1.5±0.25	0.78±0.06	0.85±0.07
July	5.6±0.18	1.75±0.05	1.75±0.05	0.35±0.05	7.5±0.5	5.5±0.5	1.71±0.03	2.85±0.05	1.76±0.07	1.76±0.07	1.76±0.07	1.76±0.07	0.85±0.05	0.91±0.08
Aug	5.13±0.37	1.58±0.10	1.58±0.10	0.31±0.03	7.16±0.37	5.83±0.37	1.55±0.13	2.56±0.14	1.55±0.17	1.53±0.16	1.53±0.16	1.53±0.16	0.78±0.06	0.88±0.06
Sep	5±0.53	1.55±0.15	1.55±0.15	0.31±0.06	7.33±0.47	5.66±0.47	1.45±0.18	2.65±0.18	1.48±0.19	1.48±0.19	1.5±0.19	1.5±0.19	0.78±0.06	0.9±0.08
Oct	5.18±0.33	1.61±0.10	1.61±0.10	0.31±0.03	7.16±0.37	5.83±0.37	1.58±0.17	2.63±0.15	1.58±0.14	1.58±0.14	1.58±0.14	1.58±0.14	0.78±0.06	0.88±0.06
Nov	5.03±0.44	1.56±0.13	1.56±0.13	0.3±0.05	7.16±0.37	5.83±0.37	1.46±0.17	2.63±0.17	1.5±0.18	1.5±0.18	1.5±0.18	1.5±0.18	0.75±0.09	0.85±0.09
Dec	5.2±0.42	1.63±0.12	1.63±0.12	0.3±0.05	7.16±0.37	5.66±0.47	1.56±0.19	2.71±0.16	1.6±0.16	1.63±0.19	1.6±0.19	1.6±0.19	0.78±0.06	0.88±0.06
Total	5.2±0.42	1.60±0.13	1.61±0.13	0.30±0.06	7.34±0.39	5.56±0.43	1.54±0.16	2.22±0.16	1.58±0.18	1.58±0.19	1.58±0.19	1.58±0.19	0.78±0.07	0.87±0.07

. Data presented above is the mean of six readings 1.e. mean ± S.D.

Table 2: Final Morphometric description of *M. dayanum* (Female) (January 2007-December 2007) from Site-I (Gho-Manhasan)

Months	Length of specimen (cm)	Rostral length (cm)	Carapace length (cm)	Eyestalk length (cm)	R.F. on Dorsal side	R.F. on Ventral side	Periopod I	Periopod II	Periopod III	Periopod IV	Periopod V	Pleopod I	Pleopod V	Uropod
Jan	5.01±1.36	1.53±0.40	1.48±0.39	0.26±0.10	7.33±2.03	5.33±1.32	1.4±0.40	2.23±0.68	1.35±0.42	1.31±0.42	1.33±0.42	1.33±0.42	0.65±0.21	0.71±0.22
Feb	4.91±1.31	1.56±0.40	1.5±0.41	0.25±0.08	7.16±1.81	5.33±1.34	1.3±0.38	2.06±0.70	1.28±0.41	1.3±0.40	1.3±0.40	1.3±0.40	0.66±0.20	0.76±0.22
Mar	4.8±1.24	1.5±0.37	1.48±0.38	0.26±0.08	7±1.76	5.5±1.35	1.23±0.35	2.01±0.66	1.23±0.36	1.23±0.36	1.23±0.36	1.23±0.36	0.65±0.18	0.75±0.21
Apr	4.83±1.24	1.53±0.39	1.5±0.38	0.23±0.08	7.16±1.79	5.16±1.29	1.28±0.37	2.01±0.65	1.28±0.38	1.28±0.38	1.28±0.38	1.28±0.38	0.68±0.18	0.78±0.21
May	4.83±1.23	1.46±0.38	1.43±0.38	0.26±0.09	7.16±1.79	5.33±1.32	1.31±0.35	2.08±0.66	1.28±0.37	1.28±0.37	1.28±0.37	1.28±0.37	0.61±0.18	0.7±0.19
June	4.75±1.22	1.51±0.37	1.48±0.37	0.23±0.07	7±1.75	5.33±1.42	1.28±0.35	2±0.64	1.26±0.36	1.26±0.35	1.26±0.35	1.26±0.35	0.66±0.18	0.76±0.20
July	4.96±1.37	1.56±0.42	1.51±0.42	0.28±0.09	7.16±1.81	5.5±1.37	1.3±0.43	2.1±0.74	1.26±0.45	1.26±0.45	1.26±0.45	1.26±0.45	0.71±0.20	0.8±0.21
Aug	5±1.27	1.56±0.39	1.55±0.39	0.28±0.09	7.33±1.82	5.16±1.40	1.38±0.37	2.18±0.62	1.4±0.37	1.38±0.36	1.38±0.36	1.38±0.36	0.73±0.19	0.8±0.21
Sep	5±1.23	1.56±0.38	1.55±0.37	0.28±0.09	7.33±1.82	5.16±0.35	1.36±0.35	2.13±0.65	1.38±0.37	1.4±0.36	1.4±0.36	1.4±0.36	0.7±0.18	0.78±0.21
Oct	4.96±1.26	1.5±0.39	1.46±0.38	0.31±0.07	7.16±1.78	5.5±1.43	1.4±0.38	2.15±0.64	1.4±0.37	1.4±0.37	1.4±0.37	1.4±0.37	0.71±0.18	0.81±0.21
Nov	4.83±1.23	1.5±0.38	1.46±0.37	0.28±0.08	7.16±1.78	5.5±1.43	1.35±0.36	2.08±0.65	1.35±0.36	1.33±0.36	1.33±0.36	1.33±0.36	0.7±0.17	0.8±0.20
Dec	4.78±1.26	1.53±0.40	1.51±0.39	0.26±0.07	7.16±1.78	5.5±1.39	1.31±0.38	2.15±0.66	1.31±0.38	1.31±0.38	1.31±0.38	1.31±0.38	0.68±0.18	0.78±0.21
Total	4.88±1.26	1.52±0.38	1.49±0.38	0.26±0.08	7.17±1.81	5.35±1.28	1.32±0.37	2.09±0.66	1.31±0.38	1.31±0.38	1.31±0.38	1.31±0.38	0.67±0.18	0.76±0.20

. Data presented above is the mean of six readings 1.e. mean ± S.D.

Table 3: Final Morphometric description of *M.dayanum* (Male) (January 2007-December 2007) from Site-II (Kheri)

Months	Length of specimen (cm)	Rostral length (cm)	Carapace length (cm)	Eyestalk length (cm)	R.F.on Dorsal side	R.F.on Ventral side	Periopod I	Periopod II	Periopod III	Periopod IV	Periopod V	Pleopod I-V	Uropod
Jan	5.48±0.42	1.68±0.10	1.68±0.10	0.35±0.05	7.5±0.5	5.5±0.5	1.7±0.08	2.75±0.15	1.73±0.09	1.73±0.09	1.73±0.11	0.8±0.08	0.9±0.08
Feb	5.31±0.51	1.66±0.09	1.66±0.09	0.35±0.05	7.5±0.5	5.5±0.5	1.65±0.11	2.71±0.13	1.66±0.13	1.68±0.12	1.68±0.12	0.78±0.06	0.88±0.06
Mar	5.23±0.46	1.63±0.11	1.63±0.11	0.33±0.04	7.33±0.47	5.66±0.47	1.6±0.11	2.7±0.11	1.56±0.13	1.56±0.13	1.58±0.12	0.76±0.07	0.86±0.07
Apr	5.33±0.45	1.65±0.15	1.65±0.15	0.35±0.05	7.5±0.5	5.33±0.47	1.63±0.14	2.76±0.11	1.65±0.17	1.65±0.12	1.65±0.13	0.81±0.06	0.91±0.06
May	5.13±0.55	1.58±0.17	1.58±0.17	0.35±0.05	7.5±0.5	5.5±0.5	1.61±0.13	2.73±0.14	1.65±0.17	1.63±0.19	1.63±0.19	0.78±0.06	0.88±0.06
June	5.23±0.41	1.61±0.13	1.61±0.13	0.33±0.04	7.53±0.47	5.66±0.47	1.61±0.12	2.68±0.13	1.61±0.13	1.63±0.11	1.63±0.11	0.78±0.06	0.83±0.06
July	5.33±0.45	1.66±0.11	1.65±0.12	0.35±0.05	7.5±0.5	5.5±0.5	1.63±0.14	2.68±0.19	1.63±0.14	1.66±0.14	1.66±0.14	0.8±0.08	0.9±0.08
Aug	5.23±0.47	1.6±0.14	1.6±0.14	0.33±0.04	7.33±0.47	5.5±0.5	1.58±0.13	2.61±0.17	1.6±0.16	1.6±0.16	1.58±0.16	0.76±0.07	0.86±0.07
Sep	5.01±0.51	1.58±0.15	1.58±0.13	0.31±0.03	7.16±0.37	5.83±0.37	1.58±0.15	2.58±0.17	1.56±0.17	1.58±0.20	1.58±0.13	0.76±0.07	0.86±0.07
Oct	5.15±0.49	1.63±0.11	1.61±0.14	0.33±0.04	7.33±0.47	5.66±0.47	1.61±0.10	2.68±0.16	1.63±0.12	1.61±0.11	1.6±0.12	0.8±0.08	0.9±0.08
Nov	5.3±0.30	1.63±0.09	1.65±0.07	0.33±0.04	7.66±0.47	5.33±0.47	1.66±0.09	2.73±0.13	1.63±0.11	1.63±0.11	1.63±0.11	0.78±0.06	0.88±0.06
Dec	5.06±0.33	1.6±0.05	1.58±0.06	0.31±0.03	7.16±0.37	5.83±0.37	1.55±0.09	2.58±0.13	1.55±0.09	1.55±0.07	1.55±0.07	0.75±0.05	0.85±0.05
Total	5.23±0.44	1.62±0.11	1.62±0.11	0.33±0.04	7.4±0.46	5.56±0.46	1.61±0.11	2.68±0.14	1.62±0.13	1.62±0.13	1.62±0.12	0.78±0.11	0.87±0.11

. Data presented above is the mean of six readings 1.e. mean ± S.D.

Table 4: Final Morphometric description of *M.dayanum* (Female) (January 2007-December 2007) from Site-II (Kheri)

Months	Length of specimen (cm)	Rostral length (cm)	Carapace length (cm)	Eyestalk length (cm)	R.F.on Dorsal side	R.F.on Ventral side	Periopod I	Periopod II	Periopod III	Periopod IV	Periopod V	Pleopod I-V	Uropod
Jan	5.18±1.33	1.55±0.41	1.53±0.41	0.31±0.08	7.16±1.81	5.83±1.40	1.45±0.42	2.28±0.66	1.48±0.42	1.48±0.42	1.5±0.41	0.71±0.18	0.81±0.21
Feb	4.93±1.29	1.48±0.41	1.48±0.41	0.3±0.09	7.16±1.81	5.5±1.37	1.5±0.40	2.18±0.67	1.48±0.40	1.51±0.41	1.5±0.41	0.7±0.18	0.8±0.21
Mar	5.0±1.27	1.51±0.39	1.51±0.39	0.28±0.08	7±1.76	5.5±1.39	1.51±0.38	2.3±0.65	1.5±0.37	1.48±0.37	1.48±0.38	0.7±0.18	0.8±0.20
Apr	4.91±1.27	1.45±0.39	1.45±0.39	0.28±0.08	7±1.79	5.83±1.39	1.46±0.38	2.18±0.68	1.45±0.39	1.48±0.39	1.46±0.39	0.71±0.19	0.81±0.21
May	5.15±1.27	1.53±0.39	1.53±.39	0.3±0.09	7±1.79	5.83±1.40	1.51±0.39	2.25±0.66	1.48±0.39	1.5±0.39	1.51±0.39	0.7±0.18	0.8±0.20
June	4.78±1.26	1.41±0.39	1.41±0.39	0.26±0.08	7±1.76	5.66±1.41	1.41±0.39	2.11±0.66	1.41±0.39	1.43±0.40	1.43±0.39	0.7±0.18	0.8±0.21
July	5.03±1.29	1.51±0.40	1.51±0.39	0.31±0.08	7±1.79	6±1.41	1.46±0.39	2.11±0.66	1.46±0.39	1.48±0.40	1.46±0.41	0.73±0.19	0.83±0.21
Aug	5.0±1.27	1.51±0.38	1.5±0.39	0.28±0.08	7±1.76	5.83±0.37	1.5±0.38	2.2±0.63	1.5±0.39	1.53±0.39	1.55±0.38	0.68±0.18	0.78±0.20
Sep	4.93±1.24	1.45±0.38	1.45±0.38	0.25±0.08	7±1.75	5.66±0.47	1.4±0.39	2.2±0.62	1.41±0.38	1.41±0.38	1.38±0.39	0.71±0.18	0.81±0.21
Oct	4.85±1.25	1.48±0.39	1.5±0.39	0.26±0.08	7±1.76	5.66±1.41	1.5±0.39	2.23±0.64	1.5±0.39	1.46±0.39	1.5±0.39	0.73±0.19	0.83±0.21
Nov	4.93±1.31	1.45±0.40	1.43±0.41	0.26±0.08	7.16±1.85	5.5±1.35	1.4±0.39	2.1±0.69	1.4±0.41	1.4±0.41	1.41±0.20	0.68±0.18	0.78±0.21
Dec	4.73±1.24	1.43±0.39	1.41±0.39	0.25±0.08	7±1.75	5.66±1.44	1.4±0.37	2.08±0.63	1.4±0.38	1.41±0.38	1.43±0.38	0.68±0.18	0.78±0.20
Total	4.95±1.27	1.48±0.39	1.47±0.37	0.27±0.08	7.04±1.78	5.70±1.23	1.45±0.39	2.18±0.65	1.45±0.37	1.46±0.39	1.46±0.37	0.70±0.18	0.80±0.19

. Data presented above is the mean of six readings 1.e. mean ± S.D.

Table 5: Final Morphometric description of *M. dayanum* (Male) (January 2007-December 2007) from Site-III (Nagri)

Months	Length of specimen (cm)	Rostral length (cm)	Carapace length (cm)	Eyestalk length (cm)	R.F.on Dorsal side	R.F.on Ventral side	Periopod I	Periopod II	Periopod III	Periopod IV	Periopod V	Pleopod I-V	Uropod
Jan	5.5±0.68	1.53±0.21	1.56±0.20	0.35±0.05	7.83±0.37	5.66±0.47	1.58±0.17	2.76±0.19	1.66±0.29	1.66±0.29	1.68±0.31	0.81±0.08	0.91±0.08
Feb	5.26±0.71	1.51±0.20	1.5±0.19	0.3±0.05	7.5±0.5	5.5±0.5	1.51±0.19	2.68±0.22	1.56±0.30	1.56±0.30	1.56±0.30	0.78±0.08	0.88±0.08
Mar	5.11±0.77	1.37±0.23	1.38±0.27	0.25±0.05	7.5±0.5	5±0	1.43±0.16	2.6±0.23	1.58±0.29	1.6±0.23	1.61±0.21	0.75±0.09	0.85±0.09
Apr	4.98±0.60	1.38±0.146	1.4±0.2	0.26±0.04	7.16±0.37	5.5±0.5	1.43±0.16	2.53±0.22	1.53±0.24	1.56±0.24	1.56±0.24	0.73±0.09	0.83±0.09
May	5.2±0.64	1.46±0.17	1.43±0.18	0.31±0.03	7.5±0.5	5.66±0.47	1.46±0.16	2.7±0.20	1.56±0.22	1.58±0.22	1.56±0.24	0.75±0.09	0.85±0.09
June	5.55±0.57	1.58±0.10	1.59±0.11	0.3±0	7.66±0.47	5.33±0.47	1.6±0.11	2.75±0.18	1.71±0.22	1.7±0.25	1.73±0.24	0.81±0.08	0.91±0.08
July	5.38±0.50	1.55±0.12	1.53±0.11	0.31±0.03	7.5±0.5	5.5±0.5	1.55±0.12	2.7±0.17	1.65±0.23	1.68±0.19	1.66±0.20	0.8±0.08	0.9±0.08
Aug	5.08±0.35	1.425±0.107	1.45±0.111	0.28±0.037	7.16±0.37	5.66±0.47	1.43±0.09	2.55±0.12	1.56±0.13	1.58±0.12	1.58±0.12	0.75±0.07	0.85±0.07
Sep	5.13±0.39	1.45±0.15	1.5±0.11	0.3±0.05	7.16±0.37	5.66±0.47	1.46±0.12	2.56±0.15	1.61±0.14	1.56±0.15	1.6±0.16	0.76±0.07	0.86±0.07
Oct	4.8±0.45	1.36±0.11	1.35±0.15	0.3±0	7.16±0.37	5.83±0.37	1.36±0.11	2.51±0.13	1.48±0.14	1.5±0.14	1.48±0.14	0.75±0.07	0.85±0.07
Nov	5.5±0.57	1.58±0.10	1.53±0.14	0.28±0.03	7.66±0.47	5.16±0.47	1.56±0.11	2.75±0.18	1.75±0.15	1.75±0.15	1.71±0.19	0.85±0.07	0.95±0.07
Dec	5.46±0.47	1.54±0.12	1.53±0.149	0.3±0	7.5±0.5	5.5±0.5	1.6±0.08	2.7±0.14	1.78±0.08	1.76±0.11	1.76±0.16	0.83±0.04	0.93±0.04
Total	5.24±0.55	1.47±0.14	1.47±0.15	0.29±0.03	7.44±0.44	5.49±0.42	1.49±0.13	2.64±0.17	1.61±0.20	1.62±0.19	1.62±0.20	0.78±0.07	0.88±0.07

. Data presented above is the mean of six readings 1. e. mean ± S.D

Table 6: Final Morphometric description of *M. dayanum* (Female) (January 2007-December 2007) from Site-III (Nagri)

Months	Length of specimen (cm)	Rostral length (cm)	Carapace length (cm)	Eyestalk length (cm)	R.F.on Dorsal side	R.F.on Ventral side	Periopod I	Periopod II	Periopod III	Periopod IV	Periopod V	Pleopod I-V	Uropod
Jan	5±1.29	1.48±0.36	1.46±0.37	0.3±0.08	7.0±1.88	6±1.42	1.51±0.37	2.45±0.65	1.71±0.42	1.73±0.41	1.73±0.41	0.71±0.19	0.81±0.06
Feb	4.96±1.25	1.46±0.36	1.45±0.36	0.28±0.07	7.0±1.79	5.83±1.40	1.51±0.36	2.48±0.63	1.71±0.42	1.71±0.41	1.7±0.41	0.73±0.18	0.83±0.21
Mar	4.76±1.23	1.4±0.34	1.38±0.35	0.23±0.06	7.16±1.81	5.5±1.41	1.4±0.34	2.23±0.63	1.51±0.41	1.51±0.41	1.53±0.41	0.71±0.18	0.81±0.20
Apr	4.78±1.18	1.4±0.34	1.41±0.34	0.26±0.07	7.0±1.75	5.66±1.38	1.43±0.35	2.45±0.60	1.56±0.41	1.53±0.41	1.55±0.41	0.68±0.18	0.78±0.20
May	4.56±1.22	1.33±0.35	1.31±0.34	0.25±0.08	7.0±1.79	5.5±1.39	1.33±0.35	2.28±0.64	1.3±0.38	1.35±0.38	1.35±0.37	0.65±0.17	0.75±0.20
June	5.11±1.32	1.5±0.39	1.46±0.39	0.26±0.08	7.16±1.85	5.83±1.39	1.53±0.39	2.48±0.65	1.66±0.42	1.66±0.42	1.66±0.42	0.71±0.19	0.81±0.21
July	4.6±1.28	1.38±0.38	1.33±0.38	0.25±0.08	7.0±1.79	5.5±1.37	1.4±0.37	2.21±0.66	1.51±0.41	1.51±0.42	1.51±0.41	0.66±0.19	0.76±0.21
Aug	4.56±1.21	1.45±0.35	1.38±0.35	0.23±0.07	7.0±1.75	5.33±1.37	1.4±0.352	2.26±0.62	1.38±0.38	1.43±0.38	1.45±0.39	0.66±0.18	0.76±0.20
Sep	4.58±1.24	1.3±0.35	1.31±0.36	0.23±0.08	7.0±1.75	5.33±1.37	1.36±0.36	2.2±0.62	1.53±0.41	1.56±0.39	1.53±0.40	0.63±0.18	0.73±0.20
Oct	4.65±1.16	1.41±0.35	1.36±0.34	0.25±0.08	7.0±1.75	5.5±1.43	1.43±0.35	2.31±0.61	1.53±0.42	1.51±0.39	1.51±0.39	0.68±0.18	0.78±0.20
Nov	4.7±1.30	1.36±0.38	1.41±0.36	0.26±0.07	7.0±1.82	5.66±1.38	1.35±0.38	2.26±0.66	1.45±0.42	1.46±0.42	1.5±0.41	0.66±0.20	0.76±0.04
Dec	4.88±1.30	1.48±0.37	1.45±0.36	0.26±0.08	7.16±1.81	5.83±1.40	1.48±0.38	2.43±0.65	1.65±0.44	1.65±0.43	1.65±0.42	0.73±0.20	0.83±0.22
Total	4.76±1.24	1.41±0.36	1.39±0.35	0.25±0.07	7.04±1.79	5.62±1.39	1.42±0.36	2.33±0.6	1.54±0.40	1.55±0.40	1.55±0.40	0.68±0.18	0.78±0.17

. Data presented above is the mean of six readings 1. e. mean ± S.D

longer than carapace (1.47 ± 0.37). The rostral formula on dorsal side and ventral side is 7.04 ± 1.78 and 5.70 ± 1.23 . I periopod shows an average length, 1.45 ± 0.39 . II Periopod being non-chelate measures 2.18 ± 0.65 . III, IV & V Periopods being similar in size, reveals an average length of 1.46 ± 0.39 . Uropod, Pleopods (I-V) and Eyestalk measurements shows an average of, 0.80 ± 0.19 , 0.70 ± 0.18 & 0.27 ± 0.08 respectively.

Morphometric description of *M. dayanum* from Site-III:

From Site-III (Nagri), six male specimens and six female specimens are morphometrically studied monthly and the annual data thus obtained is subjected to statistical analysis.

Male

Perusal of Table 5 reveals that the male specimens measures 5.24 ± 0.55 in length having dark brown colour. Rostrum is slightly curved upwards, measuring 1.47 ± 0.14 same as that of carapace. Rostral formula on dorsal side and ventral side is calculated to be 7.44 ± 0.44 & 5.49 ± 0.42 . The length of III, IV & V Periopods is similar calculated to be 1.61 ± 0.19 . I & II Periopods show an average length of 1.49 ± 0.13 & 2.64 ± 0.17 . Pleopods (I-V), Uropod and Eyestalk measurements show an average of, 0.78 ± 0.07 , 0.88 ± 0.07 & 0.29 ± 0.03 respectively.

Female

Analysis of Table 6 depicts that the total length of female specimens is calculated to be 4.76 ± 0.36 . They are light brownish in colour with rostrum longer (1.41 ± 0.36) than carapace (1.39 ± 0.35). Rostral formula on dorsal side and ventral side is calculated to be 7.04 ± 1.79 & 5.62 ± 1.39 . I & II Periopods are measured to be 1.42 ± 0.36 & 2.33 ± 0.63 . The measurements of III, IV & V Periopods are 1.54 ± 0.40 , 1.55 ± 0.40 & 1.55 ± 0.40 respectively. Pleopods (I-V), Uropod and eyestalk lengths show an average of 0.68 ± 0.18 , 0.78 ± 0.17 & 0.25 ± 0.07 respectively.

From the present results, it emerges that a little variation is seen in the morphometric aspect of *M. dayanum* populations from the three sites. Male specimen length shows infirmity in all the three sites. In males and females of all the three sites, a variation

is observed in length of II Periopod and between the two sexes; males possess longer II periopod than females.

DISCUSSION

In decapod crustaceans, morphometric studies have been widely used for taxonomic purposes in the genus *Macrobrachium*^{4,15}; in *Brachyura*^{16,17}. It is well known that *Macrobrachium* is a more confusing genus. Recently, some closely related species of *Macrobrachium* were differentiated⁹ on the basis of the relative growth of II periopods. A remarkable difference was found in the chelate segment of males and females of *M. nobilii*¹⁸. He also calculated the total length, carapace length, carapace width of the specimen. Similar observations were made on *Macrobrachium dayanum*¹⁹ that the II Periopod of males shows variation in length than the other Periopods (I, III, IV & V). Presence of sexual dimorphism in II periopod in *M. dayanum* was an agreement with the earlier findings in related species such as *M. rosenbergii*²⁰.

In the present observations, it is revealed that rostral teeth are not equidistant. Rostral formula varies from 7-8 on dorsal side and 5-6 on ventral side. The present findings corroborate the findings of some earlier studies^{14,19}. In contrary to this, some¹⁵ described rostral formula of *M. lamarrei* as 7-10/4-7 on dorsal and ventral sides respectively. Similar observations are also made by some workers²¹ who reported rostral formula of *M. lamarrei* as 7-11/4-8 on dorsal and ventral sides respectively. Many authors^{23,23} reported similar rostral formula in *M. rosenbergii* and *M. dacqueti*, on dorsal side and ventral side as 8-14/6-15 with mode of 12 and 9 teeth. Thus, from the above study, it can be aptly concluded that not much variation in morphometry of *Macrobrachium dayanum* is observed from the three sites and the studied morphometric characters could be used to describe the species.

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