

## Study on Sex Ratio and Gonadosomatic Index of Fresh Water Fish *C. Gachua* (Ham.1822)

Navjyoti Ranjan Verma

Research Scholar, PG Department of Zoology, Tilka Manjhi Bhagalpur University, Bhagalpur, Bihar, India

### ABSTRACT

Aspect of reproductive biology of fresh water murrel *C. gachua*, such as sex ratio and Gonadosomatic Index were investigated from the pools, ditches and even from river Ganga in and around the area of Bhagalpur, Bihar for a complete year span. On the basis of the monthly variation, the overall sex ratio was recorded 1:1.22(M:F). The spawning season extends from June to August. Gonadosomatic Index in female fish reaches maximum in May with 44.50%. The GSI recorded minimum in September with 5.71% followed by Oct with 7.21%. GSI in male *C. gachua* was also studied and found the maximum in the month of June with 4.86%, closely followed by the month of July with 4.06%. The GSI was found the minimum in the month of January with 0.57% closely followed by the month of February with 0.84%.

**KEYWORDS:** GSI, Spawning, Sex ratio

### INTRODUCTION

The reproductive biology of fish is greatly influenced by season. As fishes are seasonal breeder, the season affects its different reproductive aspects like sex ratio, GSI and even condition factor. With the approaching spawning all the reproductive aspects become maximum. The Gonadosomatic index of the fish increases with the maturation of fish, being maximum during the peak period of maturity and declining abruptly after spawning. The monthly studies were made to go through the GSI of *C. gachua* in detail. The spawning takes place between June to August every year.

The sex ratio was also recorded for the complete year period. The findings clearly shows that the ratio of male and female fishes show an increment during the spawning season. Sex ratio also decreases after the spawning period ends, although it is very marginal.

Nazir et. al. 1978 in *Barbusleutus*; Sindhe et. al. 2004 in *Notopterus notopterus* and many others have studied the same on various fishes. However no such studies were made on *C. gachua*, so this study is aimed on this dwarf snake headed murrel *C. gachua*.

**How to cite this paper:** Navjyoti Ranjan Verma "Study on Sex Ratio and Gonadosomatic Index of Fresh Water Fish *C. Gachua* (Ham.1822)" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-6 | Issue-3, April 2022, pp.19-22, URL: www.ijtsrd.com/papers/ijtsrd49449.pdf



Copyright © 2022 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



### MATERIALS AND METHODS

From the surrounding areas of Bhagalpur i.e. Bhairwa pond of T M Bhagalpur University campus, river Ganga, different pools and ditches, the dwarf snake headed *C. gachua* was collected monthly and brought to the laboratory. Studies were made on the fish to go through its GSI, sex ratio. Each of the fish was studied thoroughly before and after the dissection (removing its gonads) to go through its different reproductive aspects i.e. sex ratio and GSI. The present study is based on the sample brought to the laboratory. The sexes were counted and the ratio were calculated for all the seasons.

Specimen were collected and measured for total length (cm/mm), total weight (gm), gonads wt. and length. Afterward the specimen were anesthetized, dissected and preserved in 10% formalin for further anatomical studies.

**Sex ratio:** The sex and maturation stage of each specimen was determined nanoscopically considering coloration, transparency, superficial vascularization and for gonads the visualization and appearance of the ova and testis.

The maturity stages of the male and female gonads were classified according to Biswas(1993) and computed monthly to ascertain the breeding season. The overall frequencies of the stages were also estimated. Spawning season was observed between June to August every year.

### GONADOSOMATIC INDEX (GSI)

The GSI was calculated according to Vazzolar(1996):  $GSI = \frac{\text{wt. of gonad}}{\text{total body weight}} \times 100$ , was plotted monthly to identify the spawning.

### RESULT AND DISCUSSION

SEX RATIO was studied in the laboratory. A total of 409 specimen of fishes were brought to laboratory for the study of gonads to find out the sex ratio (F: M) The superficial vascularization was made for the visualization and appearance of the gonads i.e. ovary and testis. The findings were collected in the form of Tab (A). The average of the findings shows the ratio of 1. 22: 1(F: M) following chi-square method ( $X^2$ ).

**Tab (A) Sex ratio in *C. gachua*.**

Month	Total no. of samples	No. of Female	% Female	No. of Male	% male	Sex ratio (F: M)
January	35	19	54. 29	16	45. 71	1. 18: 1
February	32	18	56. 25	14	43. 75	1. 28: 1
March	24	12	50. 50	12	50. 00	1. 00: 1
April	40	22	55. 00	18	45. 00	1. 22: 1
May	37	20	54. 06	17	45. 94	1. 17: 1
June	33	18	54. 55	15	45. 45	1. 20: 1
July	30	18	60. 00	12	40. 00	1. 50: 1
August	34	20	58. 83	14	41. 17	1. 42: 1
September	39	21	53. 85	18	46. 15	1. 16: 1
October	34	19	55. 89	15	44. 11	1. 26: 1
November	41	22	53. 66	19	46. 34	1. 15: 1
December	30	16	53. 34	14	46. 66	1. 14: 1
Total/Avg	409	225	55. 01	184	44. 99	<b>1. 22: 1</b>

GSI of *C. gachua* was estimated for females.

Tab (B-1) shows the value of GSI (%) in females. GSI

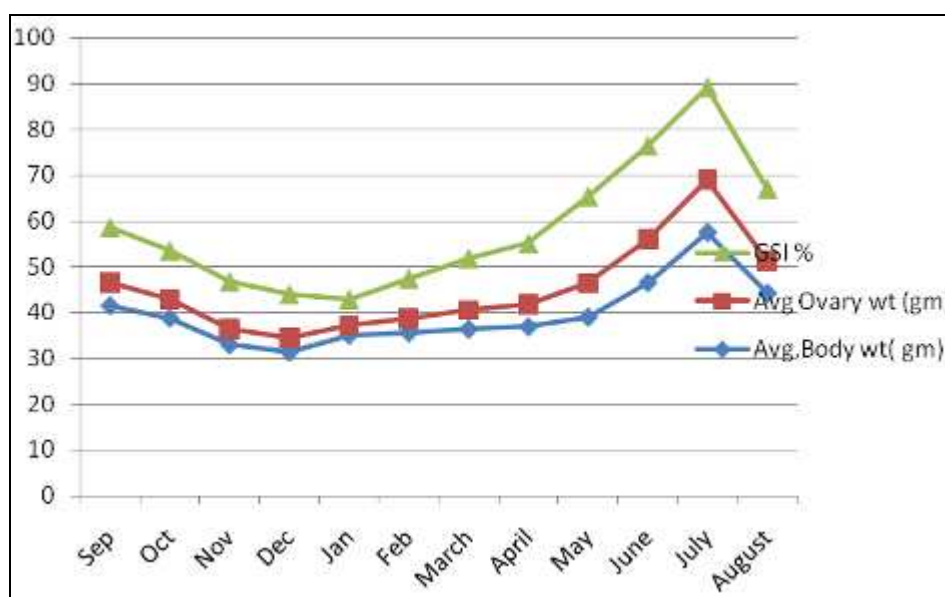
value rises from 13. 27 % in April to 20. 43% in June. It shows the pre spawning period. The GSI gradually decreases from 20. 43% in June to 15. 83 % in August. It means it is the spawning period. Furtheran abrupt decrease was observed from 12. 04% in September to 9. 55% in December. This phase can be said as post spawning phase. GSI in the month of January was calculated 5. 69% and is increased up to 11. 26 % in March indicating the preparatory period. GSI in male was observed the maximum in the month of maximum in the month of June with 4. 86%, closely followed by the month of July with 4. 06%. The GSI was found the minimum in the month of January with 0. 57% closely followed by the month of February with 0. 84%.

From the above findings we observed that in *C. gachua* the peak value of the GSI is found only once in a year i.e. in the month of June, which clearly indicates only one spawning period in *C. gachua* i.e. from June to August.

Similar observations were found by Nazir *et al*1978 in *Barbus luetus*; Brewer *et al.* 2008; Sindhe *e. t al.* 2004 in *Notopterus notopterus*; Brewer, 2008 in small riverine fishes, Mechalin Musri Musman, 2010 in *Rasbora towarensis*

**Tab. (B-1) GSI of female *Channa gachua*.**

Month	Avg. Body wt. (gm)	Avg Ovary wt. (gm)	GSI %
Sep	41.5	5.0	12.04
Oct	38.8	4.1	10.56
Nov	33.0	3.4	10.30
Dec	31.4	3.0	9.55
Jan	35.1	2.0	5.69
Feb	35.6	3.1	8.70
March	36.4	4.1	11.26
April	36.9	4.9	13.27
May	39.0	7.4	18.97
June	46.5	9.5	20.43
July	57.4	11.6	20.20
August	44.2	7.0	15.83



**Chart (I) shows GSI % in Female *C. gachua***

**Table (B-2) GSI of male *C. gachua***

Month	Avg wt. of Fish(gm)	Avg wt. of testis(gm)	GSI %
Jan	35.0	0.2	0.57
Feb	35.6	0.3	0.84
March	36.2	0.4	1.10
April	37.0	0.7	1.89
May	38.0	1.0	2.63
June	43.2	2.1	4.46
July	50.6	2.3	4.06
August	42.4	1.0	2.35
Sep	38.5	0.5	1.29
Oct	35.6	0.7	1.96
Nov	34.2	0.3	0.87
Dec	32.8	0.2	0.60

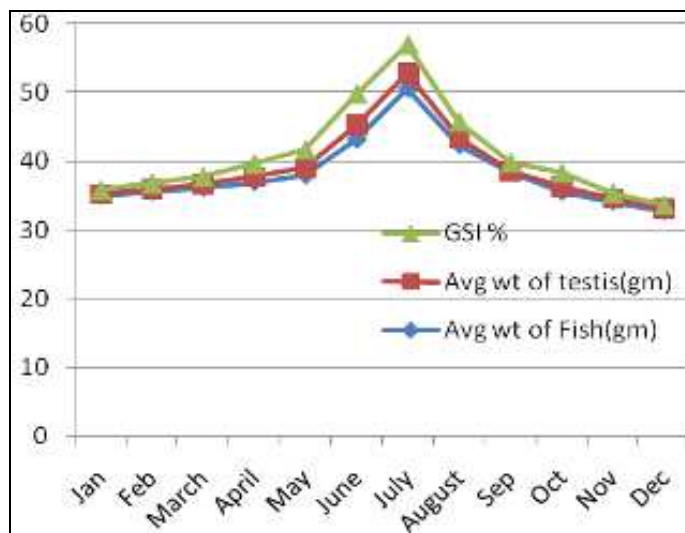


Chart (II) showing GSI % in male *C. gachua*.

#### LITERATURE CITED:

- [1] Avsar, D. 1988; "Fisheries biology and population dynamics.", University of Cukurova, Faculty of fisheries, Adana, Turkey, p 303.
- [2] Biswas, S. P. 1993; "Manual of method in fish biology." South Asian Publisher Pvt. Ltd. New Delhi. Pp 145.
- [3] Brewer, S. K. 2008; "Comparing histology and Gonadosomatic Index for determining spawning condition of small bodied riverine fishes." Ec. Fresh water fish. 17(i): 54-58.
- [4] Hossain, M. Y. 2012; "Ovarian biology of spotted snake head from natural Wetlands of Sylhet, Bangladesh. 2(3): 64-76. [http://naturepub.org/archive/avas/v2/i3/AVAS.2\(3\)-4.pdf](http://naturepub.org/archive/avas/v2/i3/AVAS.2(3)-4.pdf)
- [5] James Milton. 2018; "Ovarian development and histological observations of threatened dwarf snakehead fish, *C. gachua* (Hamilton, 1822)", Saudi journal of Biological Sciences. 25 pp, 149-153.
- [6] Kirti, T. 2014; "Study of gonadosomatic Index of fresh water fish *C. gachua*". Sci Res Pub 2014; 4(5): 1-2.
- [7] Muchlisin, Z. A., M. Musman. 2010; "Spawning seasons of *Rasbora. towarensis*." (Pices: Cyperinidae) in Lake Laut Tawar, Aceh Province, Indonesia. Reproductive Biology and Endocrinology, 8: 49-69.
- [8] Nazir, B. M. 1978; "Annual cyclic changes in testicular activity of a fresh water teleost, *Barbus Luteus* (Hackel) from chatt-Al-Arab, I IraqJ. Fish Biol. 13: 321-236
- [9] Siddique, M. 2012. "Characterisation of *C. maurulius* population in various water Bodies", Department of Environmental Sciences, Faculty of Science and technology, GC University, Faisalabad, Pakistan. pp 1-5.
- [10] Sindhe, V. R. 2004. "Gonadosomatic hepatosomatic indices of fresh water fish *Notopterus notopterus* (pallas) in response to some heavy metal exposure. J. Environ. Biol., 25(3): 365-8.
- [11] Quayam, A., Quasim, S. Z. 1966; "The growth of the fresh water murrel, *Ophiocephalus punctatus* Bloch. Hydrobiologia 27, 289-316.
- [12] Vazzolar, A. E. A. de M. 1996; Biologia de Reproducao de peixes Teleosteos: Teoria e pratica. Eduem, Maringa p. 169.
- [13] Winemiller, K. O. 1987; Feeding and Reproductive Biology of the Currito, *Hoplosternum Littorale*, Environmental Biology of Fishes. 20: 219-227[pdf]