GONADOSOMATIC INDEX OF THE FISH *CIRRHINUS FULUNGEE* FROM RIVER GODAVARI, MAHARASHTRA

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One of the methods of studying the spawning season is to follow the seasonal changes in gonad weight in relation to body weight expressed as the gonadosomatic index (Qasim, 1966; Bhatt, 1971; Ahirrao, 2002). Gonads undergo regular seasonal cyclical changes in weight, particularly in females. Such cyclical changes are indicative of the spawning season.

The gonadosomatic index (GSI) is one of the important parameter of the fish biology which gives the detail idea regarding the fish reproduction. GSI is one of the measures which can be used to assess the degree of ripeness of the ovary. GSI is an indicator of breeding period in fish (Gupta, 1974). The reproductive cycle in fishes involves large changes in the weight of gonads which are usually reported in terms of GSI expressed in terms of the gonadal weight as a percentage of the whole body weight. There have been numerous studies in which GSI has been used as an indicator of gonad development. The gonadosomatic index is an indicator of the status of gonads i.e. ovary and testis in terms of maturity and denotes the phase of reproductive cycle.

GSI is generally used for the study of maturation and spawning biology. It is also used to assess the degree of ripeness of the ovary. Gonadosomatic index is an indicator of breeding period in fish calculated at different intervals for adult female fish after taking the total weight of each fish into consideration (Gupta, 1974).

Material and Methods

For present investigation 10 female fishes of each fish species were randomly selected each month, from each station during 2 years tenure of study. They were weighed properly and their weight was noted. After dissecting the fish, ovary was removed carefully and preserved in 10% formalin for few days. After few days ovaries were dried by using blotting paper and then they were weighed carefully to note down their weight.

The GSI was calculated by following formula :

GSI = weight of gonad/weight of fish × 100.

Observations and Results

In present investigation, GSI of *Cirrhinus fulungee* ranged from 4.13 to 13.37 (Table 1). The maximum GSI was observed in the June month and minimum in October. Thus in present investigation the value of GSI indicate pre-spawning season i.e. January, February, March and April consisting of immature population. Gradual increase in the GSI values indicate prolonged spawning season in the months of May, June, July and August, indicating population of fully matured individuals, which is followed by sudden fall in the GSI values, which confirms the post spawning season in the months of September, October, November and December, showing the population of matured and spent individuals. Similar observations were also recorded by previous workers as Varghese (1971), Sharma et al., (1996) and Ahirrao (2002), which confirms the findings of the present investigation.

Discussion:

The percentage of gonad in the total weight of fish is known as GSI and these values are an index of maturation of fishes (Varghese, 1973). Nautiyal (1984) stated that the high value of GSI and relative condition of fishes are the indicator of peak activity of gonads. July-August which is also peak of the spawning season i.e. high values of GSI indicate high

Table 1. Calculation of Gonadosomatic Index of Fish *Cirrhinus fulungee*.

	Month	Average weight of fish (gm)	Average weight of ovary (gm)	GSI
1	July 2008	16	2.200	13.75
2	August 08	40	4.695	11.73
3	September 08	28	1.020	3.64
4	October 08	29	1.200	4.13
5	November 08	23	1.150	5.00
6	December 08	30	1.580	5.26
7	January 2009	30	1.600	5.33
8	February 09	32	2.035	6.36
9	March 09	34	2.500	7.35
10	April 09	45	3.540	7.86
11	May 09	32	3.600	11.25
12	June 09	30	4.010	13.37
13	July 09	32	4.250	13.28
14	August 09	38	4.265	11.22
15	September 09	33	1.550	4.69
16	October 09	28	1.280	4.57
17	November 09	30	1.650	5.50
18	December 09	32	1.825	5.70
19	January 2010	30	1.975	6.58
20	February 10	31	2.300	7.41
21	March 10	32	2.645	8.26
22	April 10	38	3.125	8.22
23	May 10	28	2.485	8.87
24	June 10	20	2.225	11.12

value of relative condition (Nautiyal, 1985).

Pawar et al. (2007) observed that the GSI of *Macrones bleekeri* showed two peaks, one during March and other during June. The relatively smaller peak during March was mainly due to maturation of a small fraction of the population of this species during the period and higher water temperature and lower level of the Lake water. Slight fall of GSI in April and May indicated first attempt of spawning. The higher peak during June indicated greater number of fish maturing during this period. The decline following peak further suggested the onset of spawning. The monthly changes in the GSI show that the spawning season of *Mystus bleekeri* spreads over a long period of time; beginning in April and extending up to November, with a main peak season in June, July and August.

The measurement of GSI is an important tool in determining gonadal state (Neelakantan et al., 1989) and it has been used in a variety of fishes and crab species under normal and experimental conditions to show the state of gonads. Pathre & Patil (2011) reported the GSI in *Barytelphusa cunicularis* for female crab. It was high in the month of June, July and August. The highest ovarian index was found in the month of July, while the highest testicular index in the month of August.

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Gecko's Foot to Clean Dust

A Novel Method for Removal of Dust from Solid Surfaces using Polymeric Micropillars

The sticky pads of gecko feet are helpful for climbing walls—but they could also help clean up dust, too. Researchers from Yale University have found that microscopic structure could be used to gather ultrafine dust that's otherwise devilishly hard to capture.

Look at the surface of a gecko's foot under a microscope and you won't see a smooth surface, but thousands of tiny pillars. Those pillars help generate electrostatic charges that provide at least part of the creature's ability to clamber up vertical surfaces with relative ease.

But electrostatic charges could also be used to attract dust particles, the researchers figured—so they decided to build a new material that mimics the microstructure of the gecko foot. The result is a sheet of a polymer called polydimethylsiloxane (PDMS), with pillars over its surface that range in size from two to 50 microns in diameter.

Unlike a gecko foot, the electrostatic charge created by the pillars is too weak for a sheet of the material to stick to a surface—but it is strong enough to attract dust particles. The team tested it on a series of different surfaces, where it appears to work effectively and causes no damage to the objects it's being used to clean. Now we need to wait for their clever cleaning cloths to become a commercial reality.