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## Study of the Gonadosomatic Index of an ornamental fish, *Brachydanio rerio* (Ham)

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### Abstract

The present study was undertaken to trace precisely the spawning period of an important ornamental fish species, *Brachydanio rerio*. Gonadosomatic index (GSI) expresses the relative change in gonad weight to the percentage of body weight. In the present study two peaks are observed in the GSI of *Brachydanio rerio*, first peak is observed in the month of June and the second in the month of October.

**Keywords:** Gonadosomatic index, ornamental fish, *Brachydanio rerio*

### 1. Introduction

In India, especially Northeastern region, a number of fish species exists in natural water bodies, which have a good ornamental value due to their beautiful colour, shape, manageable size, hardness, compatibility and longevity. Survey in the wholesale market at Hatibagan in Kolkata and information from exporters revealed that a large group of indigenous fish has increased demand in overseas market like Japan and the Middle East. Although its price at the collecting site is nominal, the ultimate price is quite high so, there is a scope of developing the trade with varieties of indigenous fish species<sup>[3]</sup>. Culture and breeding of indigenous fresh water ornamental fish species (OFS) of North Eastern Region (NER) are very little known due to lack of awareness and interest among the fish farmers. Among the 196 OFS of NER, the exporter of Kolkata and Chennai through some local suppliers exports nearly 27 OFS from NER<sup>[1]</sup>. These OFS are all traded on wild caught and none venture for their culture and breeding. Therefore, the population of these valuable ichthyo-species are gradually declining due to over exploitations from their natural stock. The commercial organized export of freshwater OFS of NER depends primarily on assured and adequate supply as and when demand arises which is possible only through the mass breeding technique. The scientific management for obtaining high yields of fish production eventually calls the adequate and in-depth study of breeding mechanism. In order to complete the task, the present study was undertaken to trace accurately the spawning period of *B. rerio*. This is reported in terms of gonadosomatic index which express the relative change in gonad weight to the percentage of body weight.

### 2. Methodology

Material for the study was obtained from Deepor Beel and wetlands of Guwahati University Campus. Matured fishes were weighed along with the weight of gonads monthly. Later percentage of gonad weight in relation to the total body weight was calculated by using the following formula

$$GSI = \frac{\text{Total ovary weight}}{\text{Total weight of the body}} \times 100$$

Gonado-somatic index (GSI) is considered as an indicator of spawning frequency. And the index is also used to study the maturity of ovaries. The Gonado-somatic index (GSI) is studied for individual matured female fish after LeCren (1951),<sup>[2]</sup> Marichamy (1984)<sup>[4]</sup> and Wootton (1973, 1982)<sup>[5, 6]</sup>. Gonadosomatic index of fish increases with maturation being maximum during peak periods of maturity and abruptly declines after spawning.

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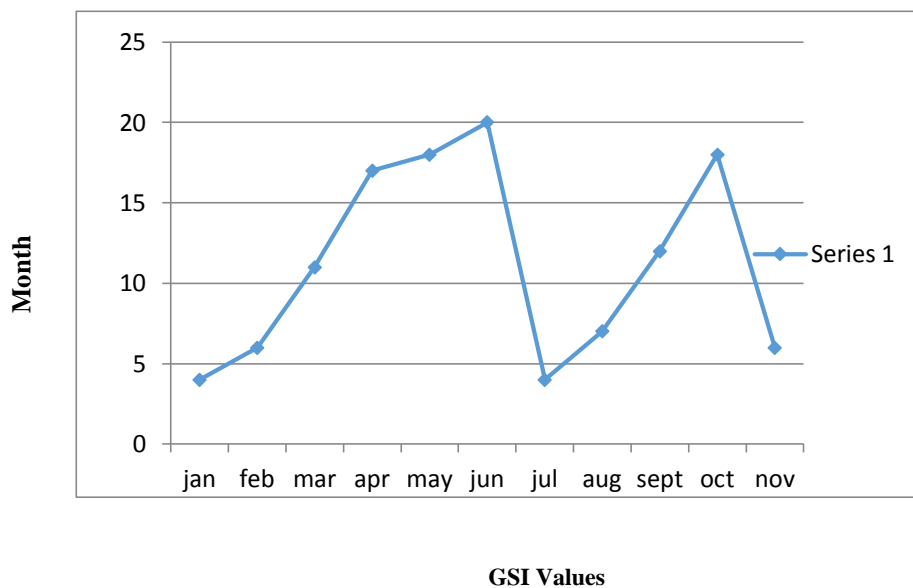
### 3. Results and Discussions

The GSI of *B. rerio* was estimated monthly for females and values are expressed as percentages in Table 1. It increases from 11.63% in March to 20.26% in June indicating the peak period of maturity. There is sharp decrease in GSI to 4.43% in July indicating the post spawning period. GSI values again increase gradually from 7.42% in August to 12.16% in September indicating the preparatory period. The GSI reaches peak of 18.50% in October indicating the second spawning period. There is decline in GSI from November onward. Thus, from above observations it is inferred that there are two peak periods of spawning in *B. rerio*.

The monthly trend of the GSI ranges with mean  $\pm$  SD of four freshwater ornamental species are given below in a Table 1.

**Table 1:** *Brachydanio rerio*

| Months    | Range GSI     | Mean GSI $\pm$ SD |
|-----------|---------------|-------------------|
| January   | 4.36 — 4.73   | 4.49 $\pm$ 0.166  |
| February  | 5.99 — 8.00   | 6.84 $\pm$ 0.771  |
| March     | 11.76 — 13.75 | 11.63 $\pm$ 1.999 |
| April     | 15.16 — 19.80 | 17.06 $\pm$ 1.810 |
| May       | 19.6 — 20.9   | 18.82 $\pm$ 1.396 |
| June      | 19.6 — 20.9   | 20.26 $\pm$ 0.605 |
| July      | 4.0 — 4.87    | 4.43 $\pm$ 0.345  |
| August    | 6.90 — 7.82   | 7.42 $\pm$ 0.437  |
| September | 11.99 — 12.39 | 12.16 $\pm$ 0.148 |
| October   | 18.23 — 19.13 | 18.50 $\pm$ 0.369 |
| November  | 5.90 — 7.0    | 6.48 $\pm$ 0.479  |



**Fig 1:** Graphical Representation of Gonadosomatic Index of *B. rerio*

In the test species seasonal cyclicity in GSI is observed. An ascending trend in the GSI is indicative of ovary maturation and decline in this index follows spawning. In the spent or resting female the lowest GSI is recorded. However, recovery in GSI values indicated by a nominal increase of the index is observed in fishes which are proceeding towards in a new breeding cycle. An additional GSI peak is observed in *B. rerio* indicating dual cyclicity in the GSI index. The second peak in this species leads to speculate on the presence of secondary breeding period (SBP). Indeed, the SBP is not found successful as the primary breeding period in terms of spawning. Nonetheless the trend is considered important in designing a breeding and rearing schedule for the OFS on commercial scale.

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