



Variation in Reproductive cycle of a Teleost Fish *Rasbora Daniconius* of Shahdol District, MP, India with Special Reference to Gonadosomatic Index: A Quantitative Study

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Abstract

The present piece of research work carried out to explore the variations in reproductive physiology in an experimental teleost fish, *Rasbora daniconius* at the different ecological habitats. The experimental fish species was collected from the different selected experimental sites at regular intervals and the gonadosomatic index was observed. A great deal of variation in gonadosomatic index was observed in fishes collected from the different sites. At a particular site the gonadosomatic index value was very diminished in comparison to other sites. The diminished value of GSI at a particular site was due to heavily intoxicated water reservoir.

Keywords: *Rasbora* sps., Gonadosomatic index, experimental sites.

Introduction

Life arose in aquatic medium. There is no existence of life without water. Aquatic dwellers are therefore said to be the progenitors of the present day bio diversified faunal species. Aquatic vertebrates are of course the ancestors of all living vertebrate creatures. Fishes are the first evolved gnathostomes with all possible vertebrate features.

The experimental fish, *Rasbora daniconius* is commonly known as Slender Rasbora, usually belonging to Class –Actinopterygii, Order – Cypriniformes and inhabiting a variety of water bodies like ditches, ponds, sandy streams and rivers in Indian continents (figure-1). The genus *Rasbora* includes about 83 recognised species¹. It exhibits a peculiar social behaviour as it forms a large school. It is small sized teleost fish with an average body length of 8.0 cm and exhibits surface feeding habit and mainly feeds on aquatic insects and detritus. It breeds during rainy season².

Shahdol district is surrounded by a large number of water reservoirs including small and large ponds, narrow canals and different rivers. Three sites have been selected for conducting experimentation. All the three sites lie under the boundary of Shahdol district. These sites are – Dhangawan, Birhouli and Diyapipar, situated within a periphery of 50 kms distance.

These selected sites are very prone as it faces an overload of pesticide pollution by the local farmers for the maximum yield of crops. Besides it also has chemical pollution, discharged by the different industries located nearby the experimental sites.

Material and Methods

The experimental teleost fish, *Rasbora daniconius* was collected at regular intervals from all the three selected experimental sites for a complete year and brought to laboratory with full care. The collected fishes were measured and weighed. The collected fishes were dissected and the gonads were removed. The gonads were measured and weighed. After taking volume and weight, the gonads were fixed and slides were prepared for the histological studies.

Observation: In any teleost fish, the efficacy of gonadal functioning is measured by the gonadosomatic index value. In the present experimental teleost fish, *Rasbora daniconius* the gonadosomatic value has been calculated by adopting the following formula:

$$\text{GSI} = \frac{\text{Weight of the Gonad}}{\text{Weight of the Body}} \times 100$$



Figure-1
Rasbora daniconius

A bird's eye review on gonadosomatic index of the experimental teleost fish, *Rasbora daniconius* explains that the value of gonadosomatic index of the collected fishes from all the three sites is maximum in the month of August, the onset of rainy season, also evidenced by Kottelat and Tan^{3,4}.

During spawning period the value of GSI is at the peak in both the fishes collected from Dhangawan and Diyapipar, whereas the value of GSI is lesser in the fishes collected from the Birhouli site (table-1 and figure-2).

During pre-spawning period the increasing pattern of GSI value shows normal trend in the fishes collected from Dhangawan and Diyapipar while the trend shows abnormal pattern in the fishes collected from Birhouli site.

The abnormal pattern of GSI value is the indicator of abruption in reproductive cycle of the fishes collected from Birhouli site, similar facts observed by Rehman et. al.⁵.

Results and Discussion

Based on facts observed it is evident that the reproductive cycle in the fishes collected from Birhouli is not functioning normally, rather it shows irregular gonadal physiology as supported by the observed lesser gonadosomatic value. The water reservoir of such experimental site gets much more toxic pesticide residue used by the local farmers of the area as well as the industrial wastes and thermal wastes are also drained in the reservoir, as evident by the findings of Kumar and Katare⁶ showing water of the experimental site with acidic pH, higher value of TDS, dissolved carbon dioxide and salinity while lower value of Dissolved Oxygen and nitrate contents.

The irregular functioning of gonads might be due to highly intoxicated water in the water reservoir. As the experimental fish constitutes one of the most important food chain in pond ecosystem thus it gives an alarming signal of threat on life of all the water dwellers.

The drained wastes (both industrial and thermal) must be treated well before draining into the nearby water reservoir.

Table-1
Average Value of gonado-somatic index of *Rasbora daniconius* collected from the selected experimental sites throughout a year

Month	Average Values of Gonado-somatic Index		
	At Dhangawan	At Birhouli	At Diyapipar
January	0.6261	0.5819	0.5374
February	0.8263	0.7237	0.7813
March	0.9357	0.8104	0.9142
April	1.8534	1.2109	1.5379
May	4.7930	3.0304	4.6391
June	7.0874	5.0910	6.9674
July	12.0063	10.1014	11.9354
August	13.0147	11.0041	12.8043
September	6.3472	7.7842	7.9821
October	3.0031	2.0092	3.3049
November	0.9342	1.0434	1.0093
December	0.1378	0.0124	0.3217

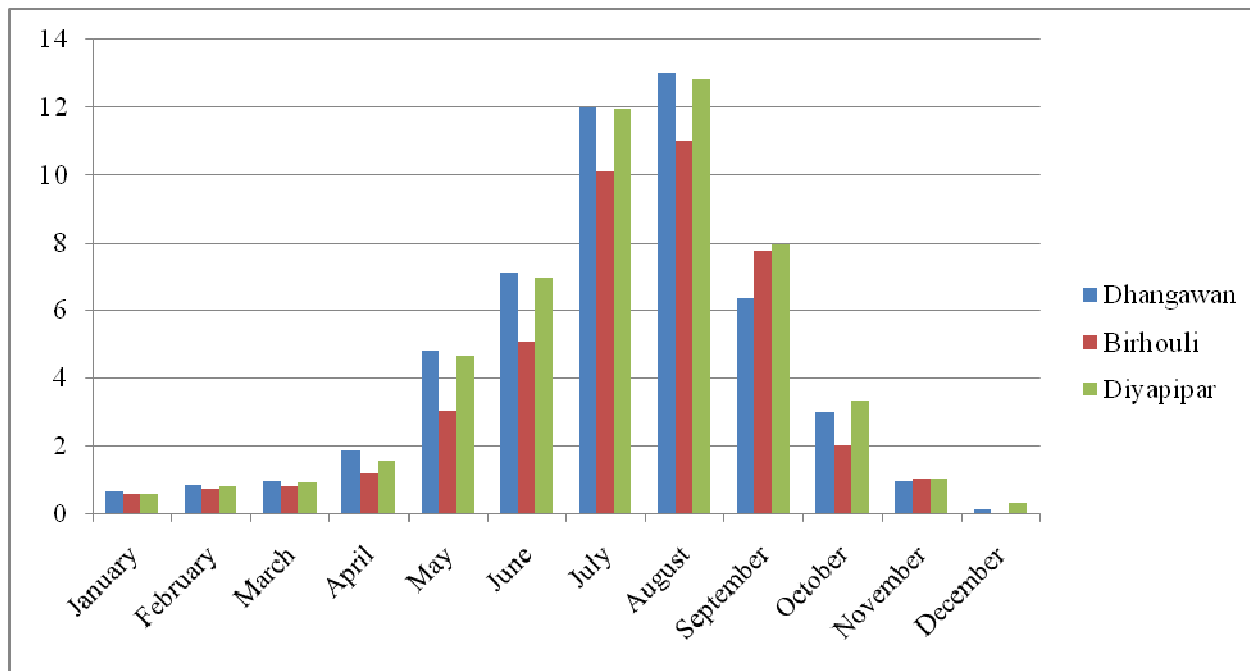


Figure-2
Column diagram of Average Value of gonado-somatic index of *Rasbora daniconius* at experimental sites

Conclusion

On the basis of observation it seems that the water contents in the water reservoir in one of the experimental site, i.e. Birhoulis is getting more toxic effluents discharged from the nearby industries and pesticide residues after agricultural use. The released pollutants are polluting the water bodies slowly but continuously as evidenced by the observed deteriorating gonadosomatic index value in the collected fishes. If it is not being checked, it would result in extinction of many fish species and thus destabilises the aquatic ecosystem and natural environment.

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References

1. Doha S. and Hye M.A., Fecundity of Padma river *hilsa*, *Pak. J. Sci.*, **22**, 176 –184 (1970)
2. Nikolsky G.V., Ecology of Fishes, *Academic Press*, London, (1963)
3. Kottelat M. and Tan H.H., *Rasbora atranus*, a new species of fish from central Borneo (Teleostei: Cyprinidae), *Ichthyological Exploration of Freshwaters*, **22(3)**, 215-220 (2011)
4. Kottelat M. and Tan H.H., *Rasbora cryptica*, a new species of fish from Sarawak, Borneo (Teleostei: Cyprinidae), *Ichthyological Exploration of Freshwaters*, **23(1)**, 37-44 (2012)
5. Rehman S., Islam M.L., Shah M.M.R., Mondal S. And Alam M.J., Observation on the Fecundity and Gonosomatic index (GSI) of Grey Mullet *Liza Persia* (Ham), *J. Biol. Sci.*, **2(10)**, 690-693 (2002)
6. Kumar K. and Katare P., Water Quality Assessment with reference to Aquatic Life, *Madhya Bharti*, LIX, 116-118 (2015)
7. Froese Rainer and Daniel Pauly eds., *Species of Rasbora in Fish Base, December 2013 version*, (2013)
8. Hossain M.A., Taleb A. and Rahman M.H., Reproduction and fecundity of *Ompokpabda* (Ham), *Bangladesh J. Sci. Res.*, **101**, 49-52 (1992)