

# Certain Aspects of Reproductive Biology of Three Species of Ornamental Loaches (Pisces: Cobitidae) from Upper Brahmaputra Basin, North East India

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## ABSTRACT

Loaches (Cobitidae: Pisces) native to the Brahmaputra basin is a prominent group of ornamental fishes. Selected aspects of reproductive biology of three species of loaches viz., *Botia dario*, *Acanthocobitis botia* and *Canthophrys gongota* have been studied to provide basic information towards development of captive breeding protocol. All the three species were annual breeders, peak spawning season being observed during early monsoon. Relative fecundity of *B. dario* was obtained as 1051 (absolute fecundity between 9075 and 13890), that of *A. botia* was 885 (absolute fecundity ranged between 5690 and 6835) and 310 for *C. gongota* (absolute fecundity ranged from 4980 to 5358). Diameter of mature ova are found to be almost similar in all the three species of loaches, within the range of 0.60- 0.63. In all the cases linear relationships obtained were highly significant.

**Keywords:** Fecundity, ova diameter, *Botia dario*, *Acanthocobitis botia*, *Canthophrys gongota*, upper Brahmaputra basin

## INTRODUCTION

The Brahmaputra basin of North East India is featured among the 'hotspots' of freshwater fish biodiversity for its unique and diverse fish germplasm resources (Kottelat and Whitten, 1996). So far, 200 odd fish species have been reported from the basin, of which 78 species have been identified as highly suitable for aquarium rearing (Das and Biswas, 2008). As such, this basin has been considered as a 'major hub' for collection of tropical ornamental fishes. True loaches (Cobitidae: Pisces) native to this basin is one of the most popular and highly priced groups of freshwater ornamental fishes worldwide for their unique body shape, vibrant colouration pattern, hardness, as well as ease of keeping. Of these loaches, *Acanthocobitis botia* (Hamilton-Buchanan), *Botia dario* (Hamilton-Buchanan) and *Canthophrys (Somileptes) gongota* (Hamilton), inhabiting the streams in the plains of the

region characterized with sandy-beds or soft bottom material and feeble water current (Das and Biswas, 2008), are the most important from the trade potentiality point of view. However, till now no information is available on different aspects of reproductive biology and other life history traits which are supposed to be the pre-requisite for developing strategies for their successful rearing and mass propagation in captivity to cater to the needs of growing market demand in one hand and to formulate effective conservation of the dwindling natural stock of such species. Keeping all these in view, an attempt has been made in the present communication to provide some basic information on selected aspects of reproductive biology of the three species of commercially important loaches from the upper Brahmaputra basin.

## METHODOLOGY

The ornamental loaches selected for the present study were *Acanthocobitis botia* (Hamilton-Buchanan), *Botia dario* (Hamilton-Buchanan) and *Canthophrys (Somileptes) gongota* (Hamilton). About 300 specimens of these three species of loaches (comprising both the sexes as well as of different size groups) were collected from different stream habitats of the upper Brahmaputra basin. The fishes were brought to the laboratory and preserved in 10 % formaldehyde solution. The total length of the specimen was measured to the nearest cm. while the weights of the body as well as ovary were measured to the nearest gm. The maturity index or gonadosomatic ratio of the female specimens has been calculated seasonally following Biswas (1993) while the ova diameter of has been calculated as suggested by Clark (1934). Fecundity of the loaches under study has been calculated according to Bagenal (1978).

## RESULTS AND DISCUSSION

Studies on different life history traits and habitat ecology of fishes are indispensable not only for

understanding biology but also for sustainable utilization of fisheries resources. These, further, forms the pre-requisite for proper planning for species specific conservation and management programme of all economically important fish species. In case of ornamental fish species, prior information or knowledge on different aspects of feeding as well as

reproductive biology and habitat ecology have utmost importance for their successful domestication, rearing and mass propagation in captivity. Selected aspects of reproductive biology of the native stream-dwelling ornamental loaches viz., *A. botia*, *B. dario* and *C. gongota* are given in Table-1.

**Table-1: GSR, ova diameter and fecundity of selected ornamental loaches**

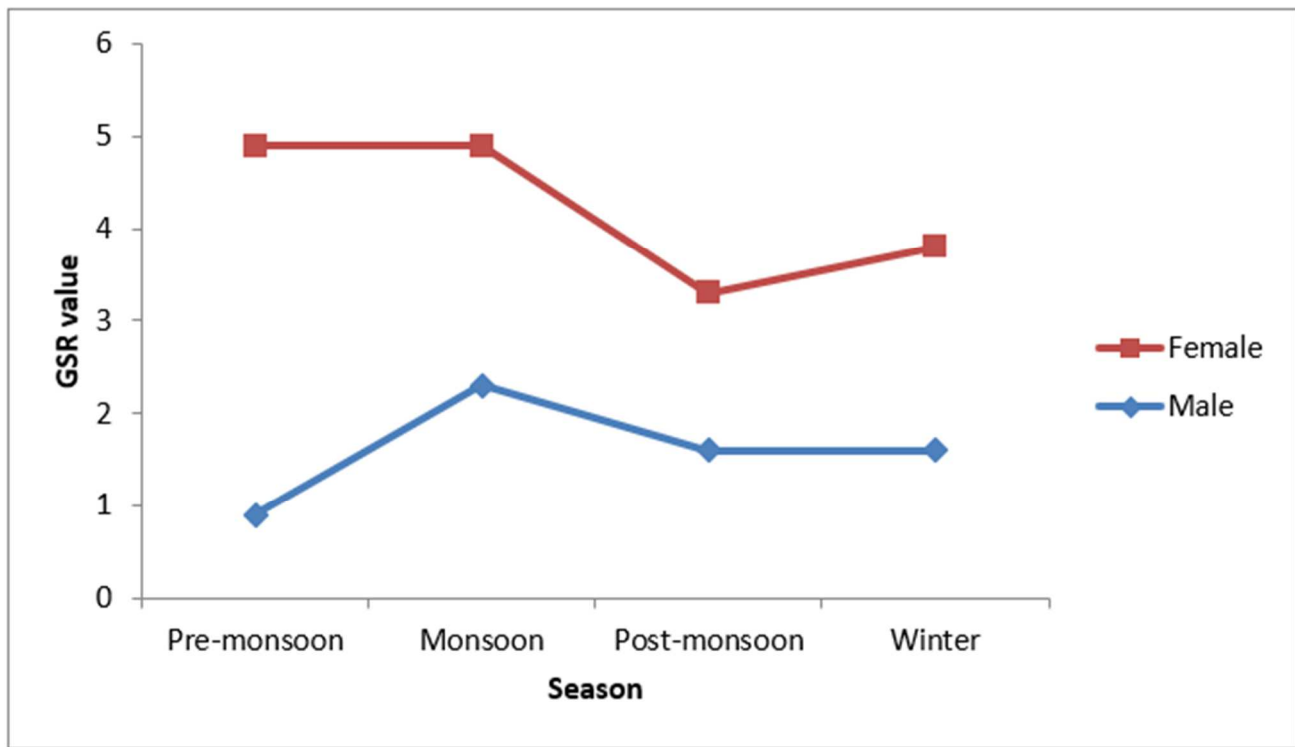
Species	Season	GSR (Female)	Ova diameter (mm)	Fecundity	
				Absolute (range)	Relative
<i>B. dario</i>	Winter	0.67			
	Pre-monsoon	4.0	$0.5 \pm 0.06$	8115 - 11398	915
	Monsoon	4.7	$0.63 \pm 0.08$	9085 - 13990	1151
	Post-monsoon	1.7			
<i>A. botia</i>	Winter	12.4			
	Pre-monsoon	9.2	$0.58 \pm 0.14$	5690 - 6835	885
	Monsoon	17.2	$0.60 \pm 0.07$	7000 - 8998	1015
	Post-monsoon	16.4			
<i>C. gongota</i>	Winter	3.7			
	Pre-monsoon	20.0	$0.57 \pm 0.14$	3820- 4350	279
	Monsoon	20.2	$0.61 \pm 0.14$	4980- 5358	310
	Post-monsoon	9.1			

Pre-monsoon- March-May; Monsoon- June- August;  
Post-monsoon- September- November; Winter- December-February

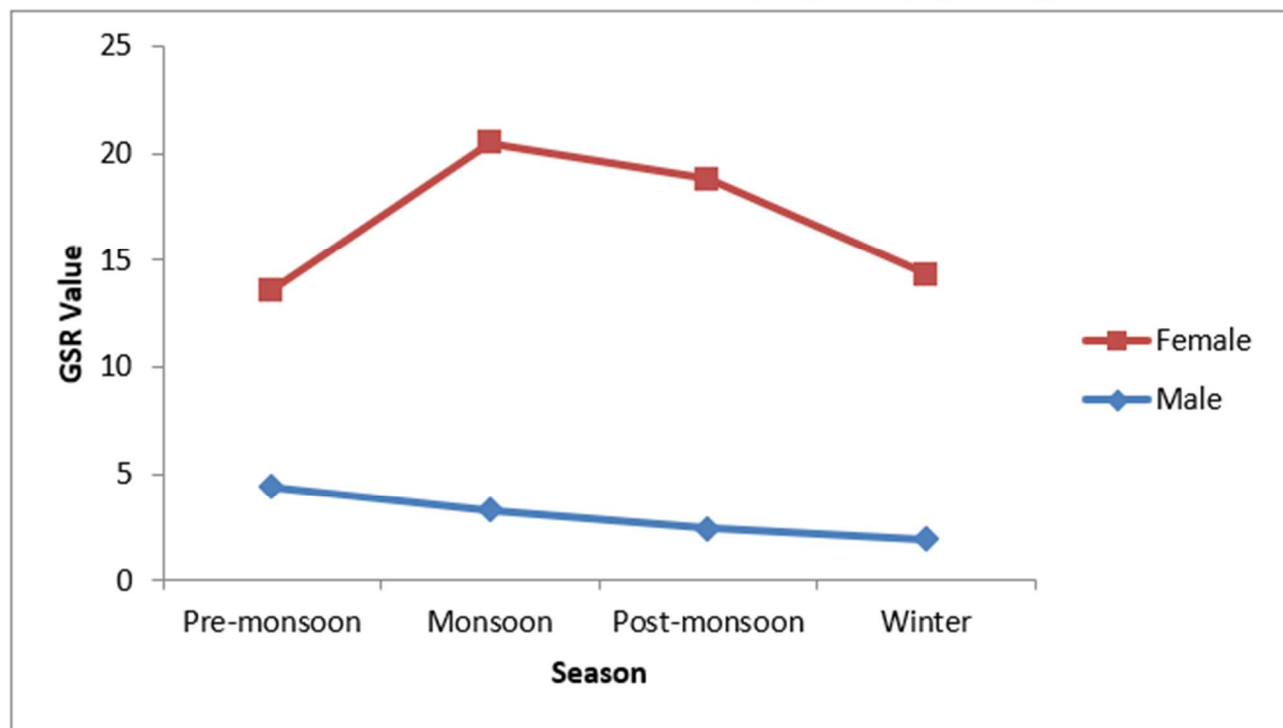
The gonado-somatic ratio (GSR) or the maturity index is a direct indicator of maturity of gonads of a fish. It is evident from the Table-1 that the values of GSR of all the species studied shows gradual increase from winter to monsoon, followed by a sharp fall in post-monsoon. These observations on seasonal variations of GSR values in female sex of the fish species under study suggests that maturation of gonads takes place in monsoon (Fig-1a and 1b). This has been supported by the availability of maximum mature individuals of all the species during the months of May-July.

During the present investigation, the maximum value of GSR in females was observed for *C. gongota* (20.2) followed *A. botia* (17.2) and *B. dario* (4.7) in monsoon. Thus, observation of a peak value of GSR in monsoon for all the three species under study indicates that all of them are annual spawners; spawning being takes place during monsoon.

Determination of ova diameter in all the species (Table-1) shows that ripe ova were found in June-July indicating their peak breeding season. The diameter of mature ova are found to be almost similar in all the three species of loaches, within the range of 0.60- 0.63.



**Fig-1(a): Seasonal variation of GRS in *Botia dario***



**Fig-1(b): Seasonal variation of GSR in *A. botia***

Fecundity is a direct measure of the reproductive capacity of a fish species. Determination of absolute fecundity revealed that *B. dario* has the highest value of fecundity (ranged between 9085 and 13890) among the three species investigated followed by *A. botia* (ranged between 5690 and 6835) and *C. gongota* (ranged from 4980 to 5358) during breeding season. On the other hand, the relative fecundity values

exhibit considerable variation amongst the species under investigation indicating that *C. gongota* is a low-fecund species (with a relative fecundity value 310) while *A. botia* is a moderately fecund species (with a relative fecundity value 885). The same for *B. dario* is 1151 implying that it is the highest fecund species amongst them.

## CONCLUSION

Due to the higher price in the overseas market, these loaches have been exploited as target species from the wild waters of the region unabatedly for trade without considering the sustainability of their natural stock. Further, some of the native loaches either placed in data deficient category while for others the assessment of conservation status. Therefore, information gathered during the present investigation on selected aspects of reproductive biology would be helpful for the development of captive breeding protocol to cater the needs of the global market and to formulate effective conservation measures to lessen the pressure on the already depleted natural stock.

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