

Observation on the Fecundity and Gonado-Somatic Index of *Mystus gulio* in Brackishwaters of Bangladesh

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Abstract : Investigations on the fecundity and gonado-somatic index (GSI) of *Mystus gulio* were carried out from March 1999 to December 2000. Fecundity was determined at different length, weight and ovary ranges of different individual fishes. At different length ranges from 10-20cm of fish showed different fecundity and significantly highest mean fecundity was found 21589 (19394-23481) from 20-22 cm length ranges of fish. Whereas significantly lowest mean fecundity was 11887 (11436-12712) from 10-12cm length ranges of fish. Fecundity was also determined from a wide weight ranges (15-110g) of fishes. Study revealed that significantly highest mean fecundity was found 22546 (19741-23009) from 90-110g weight ranges of fishes. Whereas lowest mean fecundity was 10982 (10831-12481) from 15-20g ranges of fish. Ovary weight ranges from 16-18g showed significantly highest mean fecundity 21378 (19611-22825). This study stated that the fecundity of fish increased with the increase in size, weight and gonad weight as well. The highest GSI values were found in July. Furthermore, GSI showed that *M. gulio* has a wide spawning season.

Key words: *Mystus gulio*, fecundity, gonado-somatic index (GSI)

Introduction

A clear knowledge of the fecundity plays a significant role to evaluate the commercial potentialities of fish stock and also be used to assess the abundance and reproductive potential of the spawning stock. Now a days the knowledge of fecundity has been applied for detecting the different populations of the same species of fish in different location.

Mystus gulio supports an important commercial catfish occurring estuarine and brackishwater environments of Bangladesh. It is found almost throughout the year with peak during rainy season, June-August. It is popular and cheaply available which can survive easily in low depth coastal waters. In view of significance of this fish as a cultivable species in most of the traditional shrimp farms *M. gulio* is the important additional crop in the coastal region because of its excellent growth rate, hardy nature, high market value and breeding in confined waters.

Only few workers have been studied the fecundity of some species of fishes in Bangladesh. Among them Doha and Hai (1970), Karim and Hossain (1972) and Shafi and Mustafa (1978) are mentionable.

But no work on this aspect is available for *M. gulio* in the brackish waters of Bangladesh. In case of freshwater *tengra*, *M. tengra* some aspects of biology, fecundity and taxonomy have been reported by Bhuiyan (1964); Day (1888) and Khan *et al.* (1992). This study on the fecundity of *M. gulio* was conducted with a view to assess danger if any, to its population due to the indiscriminate capture ovigerous females and in addition to contribute some information for more intensive research works on this fish.

Materials and Methods

To determine the fecundity of *M. gulio* were collected from Paikgacha local market under Khulna district during March 1999 to December 2000, a period which covered major and minor spawning months. Fecundity was determined from 54 berried females at different length ranges, 59 berried female at different weight ranges and 57 ovaries (both the lobes together). The collected specimens were brought to the laboratory. They were firstly cleaned, measured, weighed and then the ovaries of fish were removed very carefully and preserved in 5% formalin (Plate 1). The preserved ovaries were weighed and then samples from anterior, middle and posterior regions of each lobe of the pair were weighed accurately. The numbers of matured and maturing eggs

were then found out by counting with the help of a needle and magnifying glass. Gravimetric method (Islam and Talbot, 1968; Evans, 1969; Doha and Hai, 1970) was followed for determining the fecundity of the fish. Analysis of variance (ANOVA) and Duncan's new multiple range test was carried out to find out any significant variations in fecundity at different length, weight and ovary ranges of *M. gulio* (Gomez and Gomez, 1984).

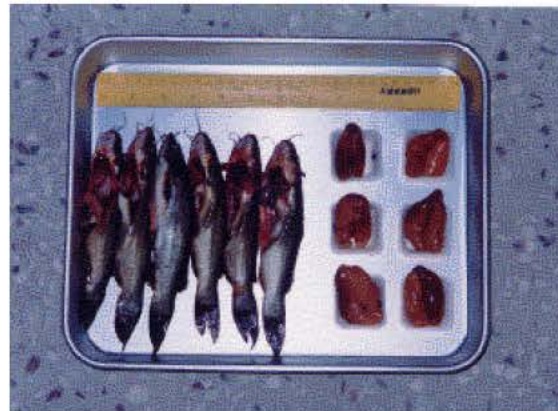


Plate 1: Dissected *M. gulio* and their ovaries

Results and Discussion

Fecundity: Fecundity defined as the number of eggs produced by an individual female (Laglar, 1949). Its values for the different length ranges of fish showed remarkable variations (Table 1). It may be cited that the minimum number of eggs observed (11436-12712) was in a fish length range 10-12cm having with 4.8-6.2g of ovary weight. The maximum numbers of fecundity 19394-23481, in a fish measuring 20-22cm which having with 14.8-21.2g of ovary weight. It is clear to mention that significantly ($p < 0.05$) higher values of fecundity were noticed to some extent in the higher length ranges. In this connection, it may be pointed out that Khan *et al.* (1992) studied with *M. tengra* from minimum 720 to maximum 5233 eggs in fishes having a total length of 6.7cm and a total length of 6.8cm. In all the fishes the number of eggs increased with the increase in their length (Devan

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Table 1: Fecundity and ovary weight of *Mystus gulio* at different length ranges

Length range (cm)	No. of fish	Ovary weight (g)		Fecundity	
		Range	Average	Range	Average
10-12	8	4.8-6.2	5.3c	11436-12712	11887c
12-14	10	5.1-7.6	6.4c	12618-14932	13551c
14-16	13	6.3-9.5	8.2c	13112-16276	15748b
16-18	11	10.4-16.1	13.6b	17485-19782	18037a
18-20	7	12.2-19.4	16.3a	18636-21554	19082a
20-22	5	14.8-21.2	18.1a	19394-23481	21589a

Table 2: Fecundity and ovary weight of *Mystus gulio* at different weight ranges

Weight range (g)	No. of fish	Ovary weight (g)		Fecundity	
		Range	Average	Range	Average
15-20	10	5.1-6.4	5.6c	10831-12481	10982c
20-30	7	5.9-8.3	7.1c	11363-14218	12714c
30-0	14	7.3-10.7	8.5c	13715-16454	14637bc
40-60	13	10.4-14.8	13.2b	15932-18107	17539b
60-90	9	13.6-17.7	15.8a	17866-20934	19431a
90-110	6	14.2-20.8	17.4a	19741-23009	22546a

Table 3: Relationship between ovary weight and fecundity of *Mystus gulio*

Ovary weight range(g)	No. of ovaries examined (both the lobes together)	Fecundity	
		Range	Average
4-6	3	9426-13229	11224c
6-8	7	11842-14318	12863c
8-10	11	12663-16436	14972c
10-12	14	15756-18076	17369b
12-14	10	17249-19703	18683ab
14-16	8	18419-21309	19706a
16-18	4	19611-22825	21378a

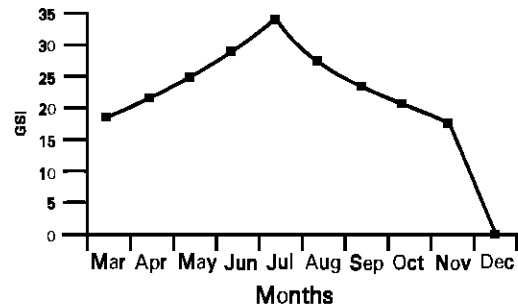


Fig. 1: Monthly variation of GSI for *Mystus gulio*

and Doha, 1979). The results (Table 2) showed that larger the weight ranges and ovary weights of fish obtain maximum the fecundity. In these investigation maximum weight ranges (90-110cm) fish having with 14.2-20.8g ovary weight showed significant ($p < 0.05$) highest fecundity ranging from 19741-23009. On the other hand minimum weight ranges (15-20cm) of fish having with 5.1-6.4g ovary weight shows significantly ($p < 0.05$) lowest fecundity range (10831-12481). This findings gives additional support to the same conclusion for *M. tengra*. Khan *et al.* (1992) and observed that a significant relationship with fecundity and the total length, body weight and gonad weight respectively. From the fact that *M. gulio* having ovary weighing 16-18g have been able to produce 19611-22825 ova and having ovaries weighing 4-6g have been able to produce 9426-13229 ova (Table 3). It is evident that there is direct relation between the weight of ovary and fecundity of *M. gulio*.

Gonado-somatic Index (GSI): Applying the method of June (1953)

and Yuen (1955), the relative weight or gonado-somatic index of *M. gulio* was calculated by using the formula:

$$\text{Gonado-somatic Index (GSI)} = \frac{\text{Weight of ovary}}{\text{Weight of fish}} \times 100$$

Monthly average GSI values of females are graphically represented in Fig. 1. From the figure it is evident that GSI values were found to increase from March onwards reaching a peak in July followed by a gradual decrease up to November. Increase in GSI values of females indicate development of the gonads during March to July and a sudden drop observed in December which indicates spent stage of fish. The monthly variation in the GSI offer not only additional proof for the spawning season but also are indicative of the major phages of reproductive cycles. In this study GSI clearly shows that *M. gulio* has a wide spawning season (March-November) in brackishwater environments of Bangladesh.

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References

Bhuiyan, A. L., 1964. Fishes of Dhaka. Asiat. Soc. Pak, Dhaka. Pub. No. 13, pp: 148.
 Day, F., 1888, Fishes of India. Test Supplement, London, pp: 485.
 Dewan, S. and S. Doha, 1979. Spawning and fecundity of certain pond fishes. Bangladesh J. Agric., 4: 1-8.

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- Doha, S. and M. A. Hai, 1970. Fecundity of Padma river *Hilsa ilisha* (Hamilton). Pakistan J. Sci., 22 : 176-188.
- Evans, D. H., 1969. Life history studies of the Eahontan redside, *Richardsonius egregius*, in Lake Tahore. Calif. Fish and Game, 55: 197-212.
- Gomez, K. A. and A. A. Gomez, 1984. Three of more factors experiment: In: Statistical procedure for agricultural research. A Wille Interscience Publication, pp: 130-240.
- Islam, B. N. and G. B. Talbot, 1968. Fluvial Migration, spawning and fecundity of Indus river hilsa, *Hilsa ilisha*. Trans Amer. Fish. Soc., 97: 350-355.
- June, F. C., 1953. Spawning of yellow fin tuna in Hawaiian waters. U.S. Fish. Wildl. Serv. Fish. Bull., 54:47-64.
- Karim, M. A. and A. Hossain, 1972. Studies on the biology of *Mastacembalus pancalus* (spiny eel, Hamilton) in artificial ponds. Part II. Sexual maturity and fecundity, Bangladesh J. Biol. Agril. Sci., 1: 15-18.
- Khan, S., N. Banu and B. Isabella, 1992. Studies on some aspect of the biology and fecundity of *Mystus tengra* (Hamilton-Buchannon, 1822). Bangladesh J. Zool., 20: 151-160.
- Laglar, K. F., 1949. Studies in freshwater fishery biology. Ann. Arbor, Michigan, USA, pp: 119.
- Shafi, M. and G. Mustafa, 1976. Observations on some aspects of the biology of the climbing perch, *Anabas testudineus* (Bloch). Bangladesh J. Zool., 4: 21-28.
- Yuen, H. S. H., 1955. Maturity and fecundity of big eye tuna in the pacific. U.S. Fish. Wildl. Serv. Spc. Sci. Rept. Fish, 1950, pp:130.