International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Reproductive Biology of Estuarine Catfish, *Mystus Gulio* (Hamilton-Buchanan)

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Abstract: ***A preliminary study on reproductive biology of estuarine catfish, M. gulio was conducted using samples collected from Vattakkayal, a part of Ashtamudi estuary which is located is located at 8°55'3" North latitude and 76°32'57" East longitude. The fish samples were collected in February, 2014 to January, 2015. Total length of Mystus gulio was found to be 18.32 ± 4.06 cm in female, and 17.15 ± 3.99 cm in male. The minimum length at first maturity for males and females was 8.3 and 8.5 cm respectively. Their Fecundity was in a range of 5,950 to 1, 41,210 and the mean values for Gonado Somatic Index of females and males were found to be 13.15± 6.44, 1.02±.55 respectively.***

Keywords: M. gulio, Vattakkayal, reproductive biology

1. Introduction

Reproduction is one of the most conservative and yet the most adaptive functions in the propagation and evolution of species. The success of any fish species is ultimately determined by the ability of its members to reproduce successfully in a variable environment and thereby to maintain the viable population. Information on reproductive cycle in relation to the environment is crucial for a better understanding of the biology of any fish population. A detailed knowledge of the breeding biology of fishes is essential in fishery management. Studies on reproduction including size at first maturity, sex ratio, spawning periodicity, fecundity and reproductive load etc. of a fish species, permit quantification of the reproductive capacity of individual fish and are an essential pre requisite for a rational and sustainable management of fisheries. Therefore a detailed investigation on various aspects of reproduction was carried out in the present study.

2. Materials and Methods

Samples of *M. gulio* were collected from Vattakkayal, a part of Ashtamudi estuary. The nets used was 40-50 meters long, 3-5 meters deep with a mesh size of 2.5 mm. Samples of *M. gulio* were collected from February, 2014 to January, 2015. Fifty to 100 fish were obtained every month. The fish samples were placed in a plastic bag and kept in an ice-box and transported to the laboratory. In the laboratory, each individual fish was measured for the total length (TL), standard length (SL) and fork length (FL) to the nearest centimeter and for body weight (BW), recorded to the nearest grams. Each gonad was examined to identify its maturity stages and were assigned as immature (stage I), initial and final maturity (stage II), ripe (stage III) and spent (stage IV) following to Gomes & Araujo (2004), according to the vascular irrigation intensity, color and percent volume of abdominal cavity occupied by gonads. Matured gonads that were needed for the fecundity study were preserved in Gilson's solution in order to loosen the tissues surrounding the eggs. Fecundity was estimated by counting the total number of mature eggs in both ovaries (Nikolsky *et al.* 1973, Nikolsky 1974). The relationship between the oocyte number, FL and body weight was estimated.

3. Results and Discussion

Reproductive strategy and fecundity was necessary to evaluate the reproductive potential of individual fish species (Murua *et al*. 2003). A total of 469 of *Mystus gulio* were studied. *Mystus gulio* belongs to the family Bagridae in the order Cypriniformes. It is an edible fish with therapeutic qualities and is recommended by physicians as diet during convalescence. Of the 469 fishes examined in the present study, the number of female fishes was 405 (86.35%), whereas the number of male fishes was 64 (13.64%). Study showed that general sex ratio was 1: 0.15. The sex ratio was observed to be unbalanced in favour of female fishes. Statistical analysis showed a significant variation between the females and males with chi-square value 3.57 ($P<0.05$). The minimum length at first maturity depends on the nature of the environment in which the population of concern lives (Moyle and Czech, 1988). The study showed that minimum length at first maturity for males and females found to be 8.3 and 8.5 cm respectively. Pantulu (1961) has reported 6.2 cm, while 7.9 cm, 8.2 cm and 5.4 cm has been documented by Kalyamoorthy (1981). The minimum length at first maturity of fish helps to predict harvestable size of the fish. Hence it has great benefits in fishery as well as aquaculture. Fecundity is determined as the total number of ova shed in the spawning season by the ripe fish. For fecundity studies, specimens having total length range of 14.5 - 23 cm, ovary length range from 2.4cm to 8 cm and ovary weight range from 1.72 g to 19.86 g were examined. Fecundity of *Mystus gulio* was found to be in a range of 5,950 to 1, 41,210 during the period of study. The highest fecundity (1,41,210) was observed in the month of July with the fish having a total length of 23 cm and total body weight of 104.38 g. The minimum fecundity (5,950) was found in a fish having a total length 14.5 cm with 21.77g total body weight in the month of April. These results revealed that older fish were

more fecund than the younger one. The present findings are supported by the previous observations of Das *et al*. (1989).

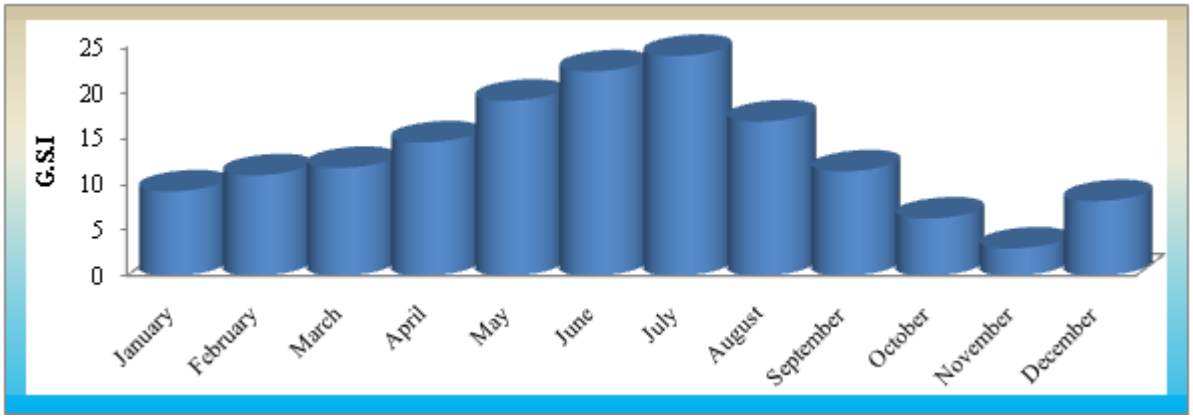

Figure 1: Gonado-somatic index of female *Mystus gulio*

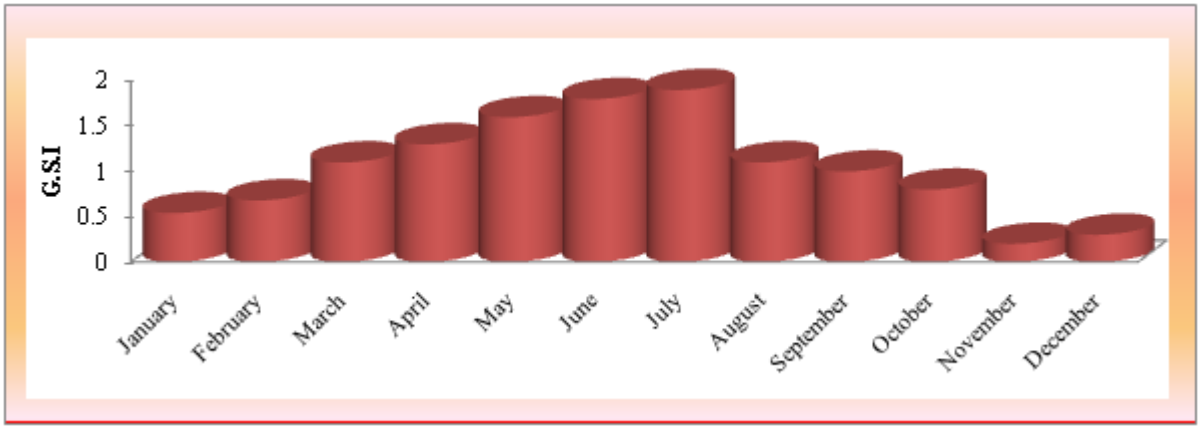

Figure 2: Gonado-somatic index of male Mystus gulio

Gonado-somatic index of female and male fishes are presented in **Fig. 1 and 2**. The maximum and minimum values of G.S.1 were noticed in the month July and November respectively. As in the case of *M. gulio***,** the peak value of gonado-somatic index of female is recorded in the monsoon season especially in June - July. The least value recorded in November. Mean values for G.S.I of females and males were found to be 13.15± 6.44, 1.02±.55 respectively. Statistical analysis showed that there exist significant difference between male and females (meaning that the researcher can be 95% confident that the difference between the means of the two groups is not due to chances (*t* (1.11); p value (0); significance level = 0.05). The present findings are supported by the previous observations of Islam (2008).

4. Conclusion

In conclusion, this study has provided some basic information on the Reproductive biology of fish including minimum length at first maturity, Gonado Somatic Index and fecundity for *M. gulio* that will be helpful to evaluate reproductive potential of individual fish species in similar studies. Further, it would be useful for fishery biologist/manager to impose adequate regulation for sustainable fishery management for the control of exploiting fishing of young individuals and when associated with other information aids in evaluation and prediction of fish stock in the different water bodies of Bangladesh.

5. Acknowledgement

Authors are grateful to Kerala State Council for Science Technology and Environment (**KSCSTE**), Sastra Bhavan, Thiruvananthapuram for the financial support extended to this study.

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