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The Environmental Regulation of Reproduction in Cat Fish (*Clarias Batrachus*) With Special Reference to the Role of Photoperiod

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Abstract: *Development, growth and reproduction are influenced by daily and seasonal variations of photoperiod in teleost fish. Experiments were carried out to investigate the environmental regulation of reproduction in cat fish (Clarias batrachus) with special reference to the role of photoperiod. The effect of the photoperiod and temperature regimes on reproductive function was assessed by GSI and histological techniques. The Photo regimes taken up for the study were; 5hr L / 19 hr D at 22 ^{0}C ,9 hr L / 15 hr D at 22^{0}C and 18hr L / 6 hr D at 22^{0}C . The results reveal the advancement in reproduction of fishes by changing photoperiodic regimes. Gonadosomatic index(GSI) have been calculated. GSI values was high in 18hr L/6 hr D.*
Key words: *Clarias batrachus, reproduction, histology, photoperiod , GSI,*

I. Introduction

Photoperiod plays a role in the modulation of the mechanisms regulating gonadal functions in several vertebrates (Hoar, 1969; Peter, 1981).Photoperiod plays an important role in reproduction of Cat fish. Environmental factors such as photoperiod and temperature affected teleost reproductive cycles (Garg and Jain, 1984). Many investigators have studied the influences of environmental factors on reproductive activity in fish particularly, the effects of photoperiod and water temperature on gonadal development (Lam, 1983). Photoperiod strongly affected the timing of puberty and sexual maturation (Norberg, et al., 2004).Annual fluctuations in the duration of light or photoperiod constitute one of the major and regular environmental variables, which appear to perform an important role in the regulation of or in synchronization of the reproductive cycle in teleost fish species. The reproductive cycle of many temperate zone fishes are regulated by seasonally changing day length (Vlaming, 1974). Information on photoperiodic effects on gonadal activity in a few species of air-breathing fish, which are easy to maintain under laboratory conditions for experimental studies, has also been investigated (Chaudhuri ,1997; Acharia et al . 2000). In the present study, attempt has been made to analyse the effect of photoperiod ,as an environmental cue on the reproduction of Cat Fish, *Clarias batrachus*.

II. Material and Method

Eperimental fish (*Clarias batrachus*) were collected from a commercial dealers and local suppliers . In laboratory, the animals were kept in glass aquaria. Fish were acclimatized in laboratory conditions for 45 days. The aquaria glass was approx. 5-6 mm thick made of wired glass. The effect of the photoperiod- temperature regimes on reproductive function was assessed by GSI and histological techniques. Fish were sacrificed and fixed in aqueous bouins fixative. Paraffin sections were cut at 5-7μm and stained with haemotoxylin and eosin. The fish were divided in three groups in aquariums. The light period were set by standard time switches. Fish were exposed to three photoperiod regimes.

1. 5 hr L / 19 hr D at 22 ^{0}C
2. 9hr L / 15 hr D at 22 ^{0}C
3. 18hr L / 6 hr D at 22^{0}C

Gonadosomatic index (G.S.I) weight of gonad is expressed as percentage of the total body weight.

$$\text{GSI (\%)} = \frac{\text{gonad wieght (g)} \times 100}{\text{total body weight (g)}}$$

III. Results and Discussion

Our aim is to explore the role of the environmental regulation of reproduction in cat fish (*Clarias batrachus*) with special reference to the role of photoperiod.

In the first experimental regime 5 hr L / 19 hr D at 22 ^{0}C the gonadosomatic index in male 2.40±0.01 and in female 2.96±0.63 showed in (fig.-7). In this experiment ovary remained immature. Primary oocytes

were not much developed, yolk vesicles appeared throughout cytoplasm. Mature testes seems to be dorsoventrally flattened. Long day stimulates body fattening and ovarian growth while short day length are inhibiting in stimulation of this response (Sarkar and Arora, 2001),this experiment supports this fact.

Fig-1 shows T.S ovary of *C. batrachus* under 5 hr L / 19 hr D at 22 ^{0}C

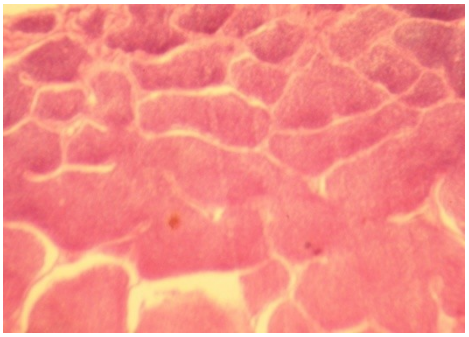

Fig-2 shows T.S testes of *C. batrachus* under 5L/19D photoregime and 22^{0}C

In the second photoperiod 9hrL/15hrD at 22^{0}C the gonadosomatic index was higher in comparison to 5hrL/19hrD photoperiod. Male showed 5.10±0.01 and female showed 5.90±0.05 (fig-7). Under this experimental regime ovary was not much developed and testes was very fine and colourless. Histology of ovary showed that cytoplasm contained few primary oocytes, young oocytes and nucleus of oocytes growing rapidly. Follicular epithelium was still visible. Histology of testes showed nucleus of spermatogonium with centrally-located nucleolus.

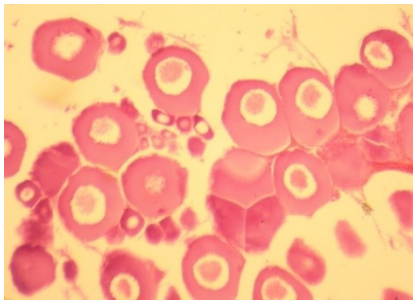

Fig-3 shows T.S ovary of *C. batrachus* under 9L/15D photoregime and 22^{0}C

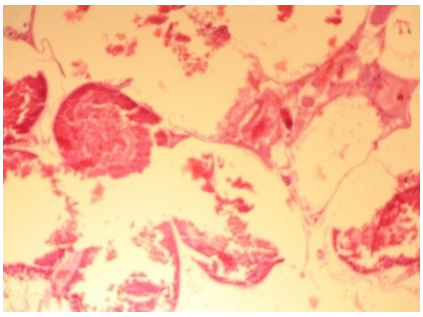

Fig-4 shows T.S testes of *C. batrachus* under 9L/15D photoregime and 22^{0}C

Under the third experiment ,photoperiodic regime was 18hr L / 6 hr D at 22^{0}C the gonadosomatic index was high in comparison to other experimental regimes .Male showed 4.43±0.02 and female showed 8.10±0.04 (fig-7). The ovary looked yellowish and yellow-white and testes are bulged and dark reddish. Ovary was filled

completely with mature eggs, young oocytes, mature oocytes, follicular tissue much reduced and nucleoli reduced in numbers. In testes nucleus finely formed spermatids.

In the present study, effect of photoperiod were examined to study the regulation of reproduction in *C. batrachus.* In experiment-III our laboratory results clearly suggests that photoregimes 18L/6D at 22^0C is more effective than other two experimental regimes. In this regime GSI values is high.

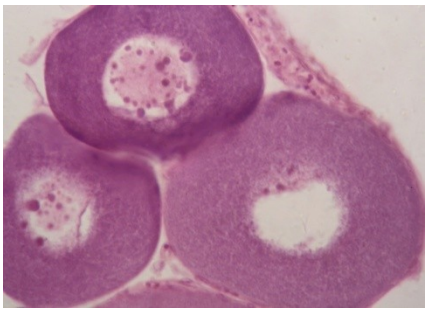

Fig-5 shows T.S ovary of *C. batrachus* under 18L/6D photoregime and 22^0C

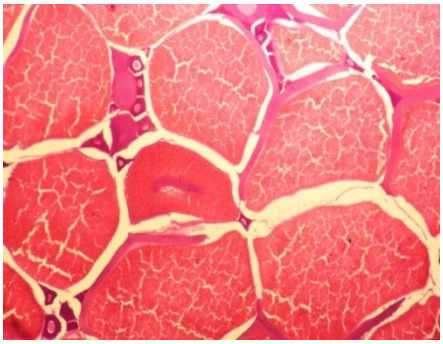

Fig-6 shows T.S testes of *C. batrachus* under 18L/6D photoregime and 22^0C

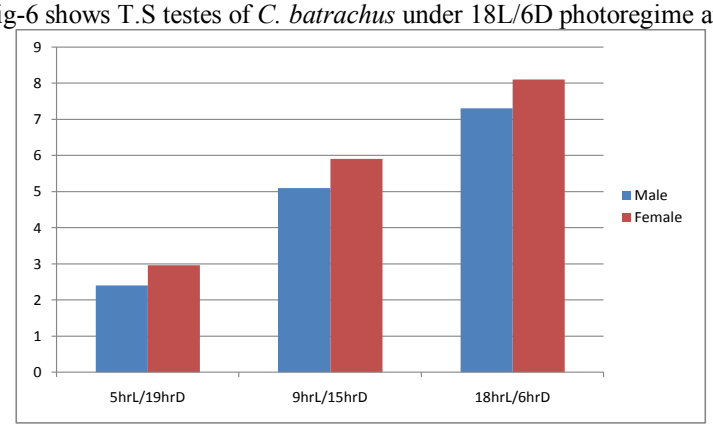

Fig-7 shows effect of different photoperiodic regimes on G.S.I.(%) in male and female *C.batrachus* under different photoregimes.

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