Cibtech Journal of Zoology ISSN: 2319–3883 (Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/cjz.htm
2015 Vol. 4 (3) September-December, pp.12-14/Rani
Research Article

SURVIVAL RATE OF CATFISH IN RESPONSE TO WATER TEMPERATURE

***Sudesh Rani**
Department of Zoology, Maharshi Dayanand University, Rohtak (124001), Haryana, India
**Author for Correspondence*

ABSTRACT
This study was done to observe the survival rate of catfish, singhi, *Heteropneustus fossilis* (length 12.3 ± 0.5 cm and weigh 30.4 ± 3.6 g) in response to water temperature subjected to laboratory temperature condition (water temperature range was 32±0.5°C). The fishes were fed twice a day with formulated diet. The experiment lasted for 4 days. At the last day of experiment survival rate was only 6.67% at water temperature 32±0.5°C. 93% mortality was observed at this temperature in month of September under laboratory conditions.

Keywords: *Temperature, Mortality, Catfish*

INTRODUCTION
An environmental factor such as temperature is most important abiotic factor which has significant impact on the performance of fish like survival, growth, feeding and metamorphosis. For example, temperature can influence juvenile metabolism rate of fishes and subsequently influence their physiological performance, such as growth, development and behaviour. Hence, Water temperature is one of the imperative abiotic factor which is directly related to growth and survival of fish (Johnston, 2006; Árnason *et al.*, 2009).

Dissolved oxygen level, pH, salinity, type of food, type of pollutants and stocking density are many other factors known to affect the survival rate of various fish species. Under controlled conditions, however, variations in temperature are often most critically examined. Water temperature is an ever-present parameter that has been expansively investigated for reason of its direct influence on the survival activity and metabolic processes of fish. It also indirectly effects the survival of fish through dissolved oxygen level and cost of maintenance. Abrupt maximum and minimum lethal temperatures for a particular species have to be avoided; hence it is equally important to determine the most favourable temperature for growth and survival. For most species, the temperature on which the maximal growth rate tends to occur is being described as the optimal or most favourable temperature for the species. McCormick *et al.*, (1972) reported in his study that the suitable range of temperature responsible for growth and survival of young brook trout *(Salvelinus fontinalis)* is from 9.8 to 15.4°, out of which the optimum temperature lies between 12.4 and 15.4°C. However, the optimal rearing temperature for *Mugil cephalus* larvae was recorded 22°C by Kuo *et al.*, (1973). Hence this study was designed to study the effect of temperature on survival rate of catfish, *Heteropneustus fossilis.*

MATERIALS AND METHODS
Experimental Animal
H fossilis catfish used in the present study were obtained from Delhi fish market of length 12.3 ± 0.5 cm and weighing 30.4 ± 3.6 g. The fishes were brought to laboratory during early morning to avoid the high day temperature which is main cause of mortality.

Experimental Design
Fish pool of size 3’ diameter x 2’ high was used for this experiment. The water temperature of the aquaria ranging from 32.0 ± 0.5°C under laboratory conditions during the period of experiment. Total 15 fishes were taken for the preset study. The catfish were fed two times (at 0800 hrs and 1500 hrs) a day with formulated diets. Excess amount of food were siphoned out after 2hrs of feeding. The water was aerated throughout the experimental period. Half of the water together with the faecal wastes from aquaria was changed daily in the morning before feeding. We changed aquaria water with tank water which was filled

with fresh water at night. This was done because chlorine in water is one of important factor which influence the survival of fish. The experiment was conducted for 4 days.

Survival rate: Survival rate was estimated (Sevier *et al.,* 2000) as the following-

$$\text{Survival rate (\%)} = \frac{\text{Number of fish that survived}}{\text{Number of fish stocked}} \times 100$$

RESULTS AND DISCUSSION

Water temperature plays an important role in the survival of catfish. Results of the present study showed that 93% mortality was observed at temperature 32.0 ± 0.5°C. Only 6.67% fishes were survived at the end of experiment (Table 1). With increasing temperature, the food mass departure time has been shown to be progressively reduced (Edwards, 1971; Jobling and Davies, 1979). Any factor which reduces the time a meal remains in the gastrointestinal tract could reduce absorption effectiveness (Jobling *et al.,* 1977) but not the rate of gastric digestion within the normal temperature range of a species. Since gastric acid and enzyme oozing vary directly with the meal size and temperature (Gregory, 1965; Smit, 1967). Thus the needs for food intake are increased as temperature increases further than the optimum range (Winberg, 1956). As we know that the energy available for growth is not equal with the digestion rate. Therefore, the persistent capacity to consume and digest does not necessarily entail an availability of more energy for growth, when the fish are maintained at a temperature above the optimal for the species concerned. Since

Table 1: Survival rate of *H. fossilis* under water temperature

Temperature 32±0.5°C	Parameters	Days 1	2	3	4
	live weight (g)	30.4 ± 3.6 g	30.4 ± 3.6 g	30.4 ± 3.6 g	30.4 ± 3.6 g
	length	12.3 ± 0.5 cm	12.3 ± 0.5 cm	12.3 ± 0.5 cm	12.3 ± 0.5 cm
	Survival rate (%)	93.33	66.67	33.33	6.67

Values are mean S.E of mean

catfish singhi at 32.0 ± 0.5°C failed to show significantly survivability. Hence, the survival rate was not significant during the study period. This indicates that a water temperature of 32.0 ± 0.5°C is not suitable for the growth of *H. fossilis.*

REFERENCES

Árnason T, Björnsson B and Steinarsson A (2009). Allometric growth and condition factor of Atlantic cod (*Gadus morhua*) fed to satiation: effects of temperature and body weight. *Journal Applied Ichthyology* **25** 401–406.

Edwards DJ (1971). Effects of temperature on the rate of passage of food through the alimentary canal of the plaice *(Pleuronectes platessa L.). Journal of Fish Biology* **3** 433-439.

Gregory RA (1965). Secretory mechanisms of the digestive tract. *Annual Review of Physiology* **27** 395-414.

Jobling M and Davies PS (1979). Gastric evacuation in plaice, *Pleuronectes platessa L.:* effects of temperature and meal size. *Journal of Fish Biology* **14** 539-546.

Jobling M, Gwyther D and Grove DJ (1977). Some effects of temperature, meal size and body weight on gastric evacuation time in the dab. *Limanda limanda* (L.). *Journal of Fish Biology* **10** 291-298.

Johnston IA (2006). Environment and plasticity of myogenesis in teleost fish. *The Journal of Experimental Biology* **209** 2249–2264.

Kuo CM, Shehadeh ZH and Nash CE (1973). Indueced spawning of captive grey mullet *(Mugil cephalus* L.) females by injection of human chorionic gonadotropin. *Aqiiacultiire* **1** 429-432.

McCormick JH, Hokanson KEF and Jones BR (1972). Effects of young brook trout, *Salvelinus fontinalis. Journal of the Fisheries Research Board of Canada* **29** 1107-1112.
Sveier H, Raae AJ and Lied E (2000). Growth and protein turnover in Atlantic salmon (Samo salar L.); the effect of dietary protein level and protein particle size. *Aquaculture* **185** 101-120.
Smit H (1967). Influence of temperature on the rate of gastric juice secretion in the brown bullhead *(Ictalurus nebulosus). Comparative Biochemistry and Physiology* **21** 125-132.
Winbero GG (1956). *Rate of Metabolism and Food Requirements of Fishes,* translated from Russian by: *Fisheries Research Board of Canada, Translation Series* No. 194 (1960).