

Diurnal Variation of pH and Temperature in Fresh Water Fish Culture Pond

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Abstract

The present study deals with the seasonal variation of pH and temperature in a freshwater fish culture pond. The pH and temperature of water have direct effect on fish growth and on the survival of fish food organisms. Diurnal variation of water pH was studied in a fish culture pond of Lumding Town of Assam, India. The pH reached peak values (8.2) during after noon between 1200 to 1600 hours and the water temperature ranged from 21 to 24 C and ambient temperature 26 to 32 C, and declined in the evening reaching at low levels (pH 6.0) during 1800 hours (this time ambient temperature was 27 C and water temperature was 21 C). The lowest pH (6.0), air temperature (26 C) and water temperature (21 C) were observed in the morning at 0600 hr. A positive corelationship was observed between pH and temperature of fresh water fish culture pond.

Key words : pH, Diurnal variation, Water temperature, Fish culture pond.

Lumding town is situated in Nagaon district of Assam, India. Though it is a railway junction Town of Assam and the people are railway employees, but there are no of people who lives on agriculture and fishery. Several water bodies like fish ponds, water tanks, community tanks are present for fishery, hatchery, eco-hatchery, poultry-cum-hatchery, piggery-cum-hatchery. Pisciculture is an important source for survival and economic benefit to the people of the town. To achieve healthy fish production pH of water should be monitored regularly to ensure optimum range. Because optimum range of pH in body fluids at a given temperature plays essential role of the regulatory systems for the homeostasis in aquatic animals (1). In this study, diurnal variations of pH in freshwater fish culture pond of Lumding town of Assam has been discussed. The area of the pond where present study was made is 4,320 sq ft (401.34 sq/m). Types of fish cultured in a local pond are IMC, common carp, tilapia, koi, magur, singhi, sarpathi, bhagna. Total annual yield is approximately 200 quintals in the same pond.

Methods

The study was made on the pond by using boat.

pond water was sampled and analyzed at an interval of every two hours (from 600 h to 1800 h of the same day) during July 2010. Water and air temperatures were recorded by using standard mercury in glass thermometer and a pocket pH meter were used to take appropriate water pH at every two hours intervals.

Results and Discussion

Table 1 shows the diurnal variation of pH of pond water ranges from 6.0 to 8.2 and water temperature ranges from 21 to 32 C. Low-level pH (6.0) was recorded in early in the morning at 0600 h when the water temperature 24 C. Higher level of pH (8.2) was recorded between 1400 to 1600 h when the water temperature ranged from 27 C to 21 C. Values of pH and

Table 1. Diurnal variation of temperature and pH in fish culture pond.

Parameters	Time of collection (h)						
	6	8	10	12	14	16	18
Ambinet tempera- ture (C)	24	25	26.5	28.5	29	32	27
Water tempera- ture (C)	25	26.5	27	30	32	30.5	25
pH	7.5	7.8	8.0	8.1	8.2	8.1	7.5

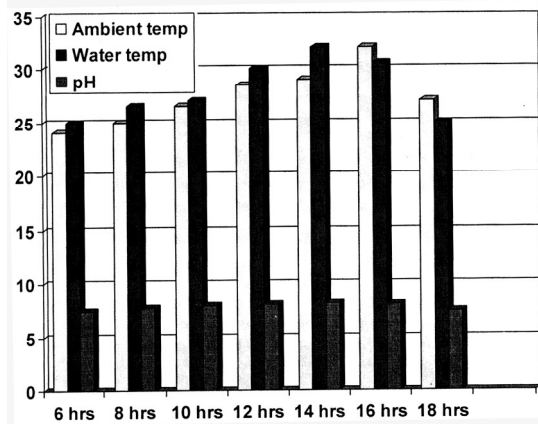


Figure 1. Diurnal variation of temperature and pH.

temperature were gradually declined during the evening hours i.e. pH 6.0 was recorded during 1800 hours when the water temperature was 21 C (Table 1, Fig. 1).

In the present study the diurnal range of pH (7.5—8.2) showed the pond water was alkaline. The carbon dioxide in solution is slightly acidic, so that plants remove the water becomes more alkaline. Two processes, respiration and photosynthesis, exercise along side the other, to being the dominant photosynthesis during the day. Thus, during daylight hours plants have a net alkalinizing period. However, during the night, stopping photosynthesis in plants, but normal respiration continues, so that they remove oxygen from the water and excrete carbon dioxide

under normal breathing, with a net acidifying effect. In low buffering capacity of water it can cause large diurnal fluctuations (over 24 hours) of pH. Tripathi and Pandey (2), reported in his communication that water temperature played an important role in influencing the activity of phytoplanktons and it had a direct relationship with total plankton.

High pH (8.2) was observed in afternoon due to high water temperature ranges from 25 to 32 C. High temp of water fasten the photosynthesis. In this process, aquatic animals increase the consumption of oxygen and rapidly release carbon dioxide. In this biological activity hydrolysis of carbonates might have occurred forming hydroxide leading to increase in pH (3—5). During morning (0600 h) and evening (at 1800 h) photosynthetic activity by aquatic flora there was poor removal of CO₂ causing lower values of pond water pH.

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