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Global Warming Challenges for Aquaculture

Md Shahjahan

Laboratory of Fish Ecophysiology
 Department of Fisheries Management
 Bangladesh Agricultural University
 Mymensingh-2202, Bangladesh
 mdshahjahan@bau.edu.bd

Increase of water temperature as a consequence of global warming is anticipated to affect the physiological activities of fish, especially in tropical regions. To understand the effect of high temperature on embryogenesis and growth, the commercially important rohu carp (*Labeo rohita*) was selected for the present study.

In the first trial, embryos and larvae were reared at four different temperatures (30, 32, 34 and 36°C), and indices of their hatching, development, and mortality were observed throughout early development. In the second trial, growth performance of fingerlings was evaluated after rearing in the three temperature conditions (30, 33 and 36°C) for 60 days. Embryos exposed to 30 and 32°C showed normal development with highest rates of hatching success. Embryos at 34°C displayed evidence of damaged zygotes, cellular deformities, damaged yolk sac coupled with shortest incubation time and the lowest rates of hatching success. No hatching was observed at 36°C. Larvae of rohu exposed to 34 and 36°C showed developmental deformities (fusion in the eye, axial curvature, yolk sac ulceration, blood coagulation, tail shortening and ulceration) and minimal survival. The growth parameters - final weight gain, percent weight gain and specific growth rate were the highest at 33°C and the lowest at 36°C. Lowest FCR value was found at 33°C.

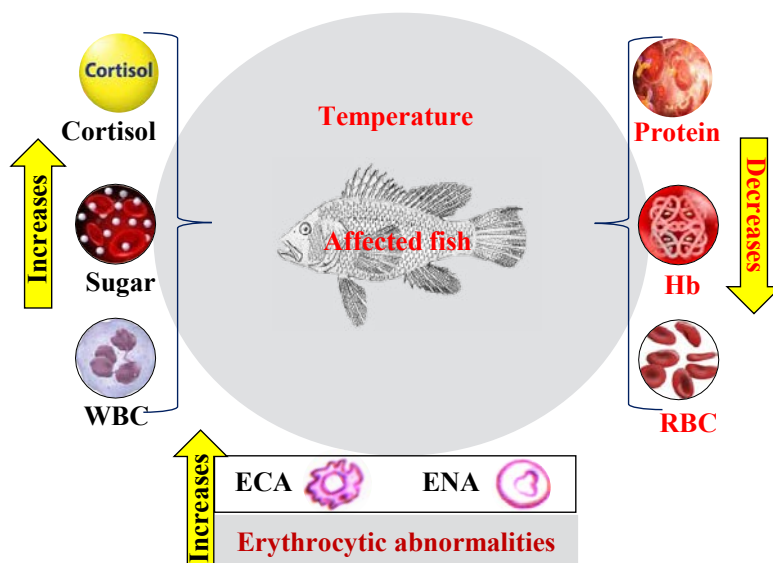


Figure 1 Schematic illustrations of the effects of temperature on hemato-biochemical parameters of fish.

The effects of high temperature on hemato-biochemical parameters and erythrocytes cellular and nuclear structures in rohu were studied (Figure 1). Exposure to high temperature decreased Hb & RBCs and increased the WBC and blood glucose levels of the fish. Frequencies of ECA and ENA were found to be increased at high temperature. High temperature significantly increased the number of neutrophils whilst decreased the number of lymphocytes. Overall, this study confirmed that exposure to high temperature is stressful to Indian major carp rohu.