

Title Determination of thermal diffusivity of freshwater fish during ice storage by using a one-dimensional fourier cylindrical equation

Author D. Jain and P.B. Pathare

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Abstract

Thermal diffusivities of Indian major carp *Catla* (*Catla catla*) and *Rohu* (*Labeo rohita*) fish were determined by using a one-dimensional (1D) Fourier equation applied to a cylinder. Experiments were conducted by cooling the different quantities of individual fish with ice in an insulated box. Time-temperature records were used to determine the thermal diffusivity. The values of thermal diffusivities of fish cooling with ice were ranged from 6.6012 to $3.2475 \times 10^{-8} \text{ m}^2 \text{ s}^{-1}$ and 6.6481 to $5.4267 \times 10^{-8} \text{ m}^2 \text{ s}^{-1}$ for *Catla* and *Rohu* fish, respectively. It was observed that the thermal diffusivity decreases with an increase in the weight of the fish. A logarithmic model adequately described the relationship between thermal diffusivity α and mass of fish m , with values for the coefficient of determination of 0.9949 and 0.9996, and standard errors of 0.088 and 0.0006 for *Catla* and *Rohu* fish, respectively.