

**LETHAL TEMPERATURES TO CARDINAL TETRA,  
*PARACHEIRODON AXELRODI*, AN AMAZONIAN ORNAMENTAL  
FISH**

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**Introduction**

The trade of ornamental fish in Amazonas State is one of the most profitable and sustainable extractive activities in the region (Chao et al., 2001). The cardinal tetra (*Paracheirodon axelrodi*) is the Amazonian ornamental fish most requested in the world market, dominating the fish exports from Brazil, and representing 80% of the total fish exported annually from Amazon State. High rates of mortality had been reported by importers, contributing for market loss. Several factors cause fish mortality during commercialization, but water quality and the maintenance of the stability of water conditions are the most important factors that have been pointed out as one of the causes for the high fish mortality rates (Waichman et al., 2001). One parameter that suffers great variation mainly during exportation process is temperature. The objective of the present paper was to establish the lower and higher lethal temperatures (LC<sub>50</sub>) for cardinal tetra *Paracheirodon axelrodi*,

**Material and Methods**

The specimens of cardinal tetras (0,08 ± 0,003 g) were collected at the forest streams (igarapés) on the middle Rio Negro basin in the municipality district

of Barcelos, Amazonas State. In the laboratory, the fish were maintained in a tank with aerated flow-through water supply, temperature of  $24 \pm 1^\circ\text{C}$  and fed regularly with commercial ration for three weeks. Thermal tolerance tests were performed in four test chambers of 40 L equipped with an air compressor and a programmable thermostate bath, which controlled the gradual rising or lowering of the temperature to its desired point. Twenty-four hours prior to the experiment, four groups of ten fish were transferred to test chambers where the water quality was preserved. The tested temperatures, control ( $24^\circ\text{C}$ ), high (25, 27, 29, 31, 33,  $35 \pm 1^\circ\text{C}$ ) and low (21, 19, 17 and  $15 \pm 1^\circ\text{C}$ ), were done with four replicates in a period of 96 h each. During that period, pH, dissolved  $\text{O}_2$  and temperature were measured twice a day and the water samples were collected for total ammonia, nitrite and electric conductivity analysis.

High and low lethal temperatures ( $\text{LC}_{50}$ ) values in bioassays were calculated using the Trimmed Spearman-Kärber method (Hamilton et al., 1977).

## Results and Discussion

We observed water quality uniformity among the replicates of each tested temperature, with no significant difference among physical and chemical parameter values. At lower temperatures, fish mortality increased after  $19^\circ\text{C}$  and reached a total mortality index at  $15^\circ\text{C}$ . In tests with high temperatures (25 to  $35^\circ\text{C}$ ), fish survival was 100% at 29 and  $31^\circ\text{C}$ , being lethal above  $35^\circ\text{C}$ . These results corroborate those obtained by Waichman et al., (2001) on the evaluation of the water quality used for transportation of ornamental fish, whose capture and fishing camp temperatures fluctuated from 29 to  $31^\circ\text{C}$  for the cardinal tetra.

According to the lethal temperatures found in this study cardinal tetra, a tropical fish has no tolerance to low temperatures. Therefore, the water temperature may be responsible for fish mortality, mainly when the cardinal tetra is exposed to temperatures exceeding the lethal limits ( $< 19^\circ\text{C}$ ), which probably occurs during transportation in North American and European countries.

## References

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