

LETHAL TEMPERATURES FOR *Rhamdia quelen* LARVAE (PIMELODIDAE)¹

TEMPERATURAS LETAIS DE LARVAS DE *Rhamdia quelen* (PIMELODIDAE)

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- SHORT NOTE -

SUMMARY

The lower and upper lethal temperatures (LT_{50}) of *R. quelen* larvae were determined. The larvae were obtained from two spawning periods with hatching temperatures of 21 and 26°C respectively. Larvae were placed in tanks at which the temperatures were either increased 1°C every 15min, or reduced 1°C every 20min until larval movement ceased. This temperature was then maintained for 96h. Minimum mortality ($29.0 \pm 1.5\%$) was observed in the larvae held at hatching temperatures. The lower LT_{50} were 15.01 and 16.72°C, and the upper LT_{50} were 29.25 and 27.83°C for the larvae hatching at 21 and 26°C, respectively. Thus, apparently there is no difference with relation to temperature change tolerance between larvae hatched in both temperatures.

Key words: *Rhamdia quelen*, larvae, lethal temperatures, hatching, silver catfish.

RESUMO

Foram determinadas as temperaturas letais (TL_{50}) inferiores e superiores de larvas de *R. quelen*. As larvas foram obtidas em dois períodos de desova com temperatura de incubação de 21 e 26°C, respectivamente. Larvas foram colocadas em aquários onde a temperatura foi elevada em 1°C, a cada 15min, ou reduzida 1°C, a cada 20min, até as larvas cessarem seus movimentos. Esta temperatura foi então fixada e mantida por 96h. O mínimo de mortalidade foi de $29 \pm 1,5\%$ obtido nas temperaturas de incubação. As TL_{50} inferiores foram 15,01 e 16,72°C

e as TL_{50} superiores foram 29,25 e 27,83°C para as larvas incubadas a 21 e 26°C, respectivamente. Portanto, aparentemente, não há diferença com relação à tolerância a variações de temperatura nas larvas incubadas nas duas temperaturas.

Palavras-chave: *Rhamdia quelen*, larva, temperatura letal, incubação, jundiá.

Temperature is an important ecological factor because it directly affects fish survival. Although thermal limits have been established for several teleost species (TSUCHIDA, 1995), little information is available for tropical and subtropical species. The silver catfish, *Rhamdia quelen*, a freshwater fish, is a native species from Southern Brazil that may have potential in fish culture. The objective of the present study was to determine the lower and upper lethal temperatures for *R. quelen* larvae.

Larvae were obtained from two induced spawning during October 1997 and January 1998 at the fish culture sector of the Federal University of Santa Maria. Females and males of *R. quelen* were injected with 5mg/kg pituitary extract, and pairs were then placed in a Hungarian-model hatchery

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(200L) within a water re-use system. Temperatures were 21°C in October and 26°C in November. After spawning the fish were removed, the eggs were incubated, and the newly hatched larvae were maintained in these hatcheries until absorption of the yolk sac was complete (size of 5.3±0.2mm; mean ± SEM). Larvae were then transferred to continuously aerated 250L tanks using a water re-use system at the same temperature as in the hatchery (21°C and 26°C). At this moment larvae were fed daily, with fishmeal (granulometry 200µm) containing 41% crude protein, prepared according to ULIANA (1997).

In order to access the lethal temperatures (LT₅₀) groups of 40 larvae (two replicates) were transferred to 2 continuously aerated 56L aquaria at the same temperatures (21°C or 26°C). At one aquaria larvae were submitted to lower temperatures, while at the other one larvae were exposed at upper temperatures. A 500W heater was used to increase the temperature, and a cooling system was used to reduce it, and thermostats were incorporated to fix temperatures and hold them constant. The water was continuously aerated to avoid temperature stratification. Temperatures were increased 1°C every 15min, or reduced 1°C every 20min until the first larvae presented loss of movement. These temperatures were then fixed and held for 96h (BREWER, 1976), and mortality was determined at 24h intervals. Larvae were considered dead when presented loss of movement. After this first test, additional experiments were conducted using the same procedure at upper and lower temperatures than that of the initial test (at 2°C intervals), until obtaining the maximal (100%) and the minimum mortality of the larvae. The minimum mortality index was that observed at the hatching temperature. Larvae were fed daily, even during the experiments, with fishmeal described above.

Ammonia was determined by the method of BOYD (1981), pH with a DMPH-2 pHmeter (Digimed), and dissolved oxygen with a DM4 oxygen meter (Digimed). These chemical parameters were determined during the permanence of the larvae in the 250L tanks, and at the beginning and the end of the experiments in the 56L aquaria. Minimum dissolved oxygen levels were 5.6 and 6.5mg/l, maximum non-ionized ammonia levels were 0.019 and 0.070, and pH range were 6.90 – 8.16 and 7.71 – 8.26 at 21 and 26°C, respectively.

These chemical parameters of the water were always at good levels for fish culture, according to data reported by BOYD (1981). Mean LT₅₀ were determined from the results obtained at the end of each experiment (time 96h) using non linear regressions (temperature x mortality) calculated with the Slide Write Plus program (Advanced Graphics Software, Inc., tenth edition, July 1993). LT₅₀ was considered the temperature at which 50% of the group died.

Larvae of *R. quelen* hatched at 21 and 26°C showed 100% mortality at 12°C and 35°C within a period of 48 and 24h, respectively. At 16°C mortality was 32.5% and 65%, and at 31°C was 45% and 75% after 96h in larvae hatched at 21°C and 26°C, respectively. In the present study it was not possible to obtain 100% survival of the larvae. The minimum mortality obtained at 21°C was 30% and at 26°C was 27.5%. High mortality is observed in most fish species throughout the larval stage, which is highly susceptible and requires careful handling procedures. Similar results were obtained with larvae of *Engraulis mordax*, which showed 27.3% mortality at an acclimation temperature of 12°C and 13.3% at 16 and 20°C (BREWER, 1976).

The lower and upper LT₅₀ for larvae acclimated at 21°C were 15.01 and 29.25°C, respectively, while the lower and upper LT₅₀ for larvae acclimated at 26°C were 16.72 and 27.83°C, respectively (Figure 1). Therefore, apparently the tolerance to temperature change of *R. quelen* larvae hatching at 21°C was similar to that of larvae hatching at 26°C. Additional studies with more replicates must be done to solve this doubt.

The mean water temperature in Southern Brazil is 15°C in winter and 28°C in summer (DMAE, 1993), limiting the number of tropical fish species that can be used in fish culture systems. Previous experiments have demonstrated that *R. quelen* fingerlings are well adapted to low water temperatures (CHIPPARI-GOMES *et al.*, 1999). The recommended hatching range temperature for this species is 16 to 26°C (RADÜNZ-NETO, 1981). Some farmers and research centers in South Brazil employ heater systems to maintain *R. quelen* larvae in tanks with water at temperatures near the upper limit of the range described above (24-26°C). However, the present results show that it is not necessary to acclimate *R. quelen* larvae at these temperatures, since mortality at both incubation

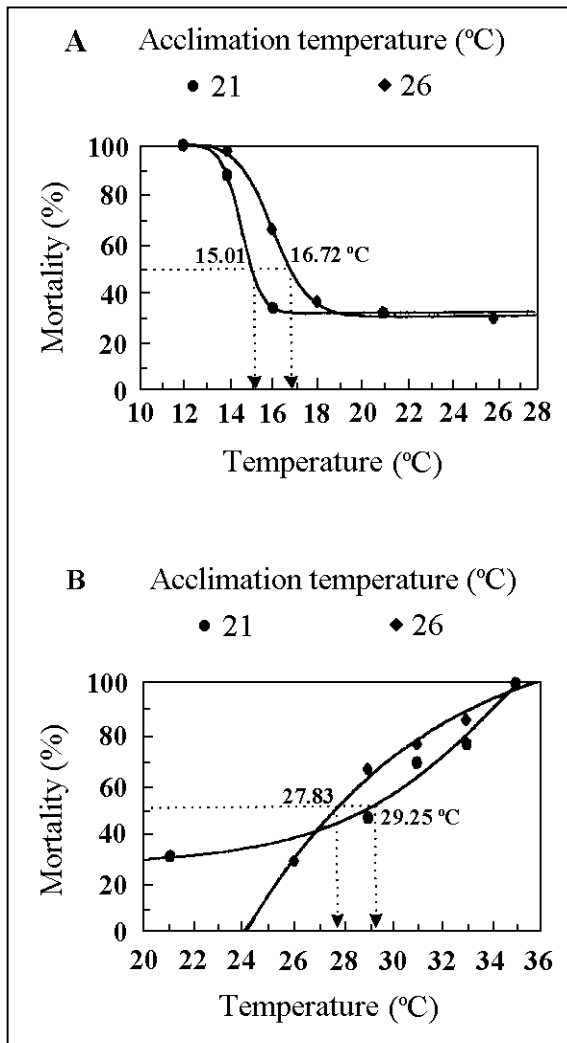


Figure 1 - Lower (A) and upper (B) lethal temperatures (LT_{50}) for *R. quelen* larvae hatched at 21 and 26°C. The LT_{50} was accessed from the results of mortality obtained at the end of each experiment (96h).

temperatures (21 and 26°C) was similar (27.5 and 30%, respectively).

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