



UNIVERSITI PUTRA MALAYSIA

***EFFECT OF pH ON THE BREEDING AND LARVAL
DEVELOPMENT OF CARDINAL TETRA, *Paracheirodon axelrodi****

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**This project report is submitted in partial fulfillment of the requirements
for the degree of Bachelor of Agriculture (Aquaculture)**

**DEPARTMENT OF AQUACULTURE
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2013

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DEPARTMENT OF AQUACULTURE
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This is to certify that I have examined the final project report and all corrections have been made as recommended by the panel of examiners. This report complies with the recommended format stipulated in the AKU4999 project guidelines, Department of Aquaculture, Faculty of Agriculture, Universiti Putra Malaysia.

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ABSTRACT

This study focused on the spawning, embryonic development and larval rearing of Cardinal tetra, *Paracheirodon axelrodi*. Matured fish with length ranged from 2.2 - 3.0 cm were used in a ratio of 1 male to 2 females for spawning trials. Water in spawning tanks were prepared at 3 different pH, 6.0, 6.5 and 7.0. Tank with pH 6.5 water produced the highest spawning success, however pH 7.0 has the highest number of larvae hatched. Eggs of *P. axelrodi* are adhesive and round in shape with diameter ranged from 0.9 - 1.0 mm. Eggs took about 30 hours to hatch at temperature between 25 - 26.5 °C. Various embryonic stages were observed during the embryonic development period. After hatching, the larvae were observed for 40 days until the end of metamorphosis. Size increment observed daily from larvae to juvenile stage. Percentages of survival were recorded. Yolk sac was fully absorbed at 5 days after hatching (DAH) and exogenous feeding started at 6 DAH. The fry reached juvenile stage at 40 DAH evident with iridophores fully pigmented at iris and lateral line.

ABSTRAK

Kajian ini bertumpu kepada pembiakan, perkembangan embrio dan perkembangan larva Cardinal tetra, *Paracheirodon axelrodi*. Ikan yang matang bersaiz dalam 2.2 – 3.0 cm dibiak dalam nisbah 1 jantan : 2 betina. Air dalam tangki pembiakan telah disediakan dalam 3 pH yang berlainan, iaitu 6.0, 6.5 dan 7.0. Induk dalam tangki berisi air pH 6.5 menunjukkan kejayaan pembiakan yang paling tinggi, dan pH 7.0 menghasilkan larva yang paling banyak. Telur *P. axelrodi* bersifat melekat dan berbentuk bulat dengan diameter 0.9 – 1.0 mm. Telur menetas dalam masa 30 jam pada suhu 25 - 26.5 °C. Pelbagai peringkat embrio telah diperhatikan semasa tempoh perkembangan embrio. Selepas telur menetas, larva ikan diperhatikan dalam tempoh 40 hari sehingga tamat peringkat metamorfosis. Penambahan saiz diperhatikan setiap hari dari peringkat larva ke juvenil. Kadar hidup telah direkodkan. Yolka diserap sepenuhnya pada hari ke-5 selepas menetas (DAH) dan larva mula makan pada 6 DAH. Anak ikan mencapai peringkat juvenil pada 40 DAH jelas dengan iridophores berpigmen sepenuhnya pada bahagian iris dan garis lateral.

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LIST OF ABBREVIATIONS AND SYMBOLS

MYR	Ringgit Malaysia
DAH	Day(s) after hatching
DO	Dissolved oxygen
hr	Hour(s)
cm	Centimeter
mm	Millimeter
%	Percent
°C	Degree Celsius
µS	Microsiemen
dH °	Degree of hardness
dGH	Degree of general hardness
mg/L	Milligram per liter
L	Liter

CHAPTER 1

INTRODUCTION

Cardinal tetra, with the scientific name *Paracheirodon axelrodi*, belongs to the family Characidae. It is closely related to two other species, which are the Neon tetra, *P. innesi* and Green neon tetra, *P. simulans* (Chapman *et al.*, 1998).

This small characin species is endemic to the tributaries, smaller affluents, and the forest lakes of the Rio Negro in Brazil (Burton, 1997; Walker, 2004). According to Walker (2004), *P. axelrodi* is one of the ornamental fish in Amazon State, Brazil that is most intensively commercialized and there is a significant demand globally (Burton, 1997). However, based on Burton (1997), the *P. axelrodi* exported worldwide is mostly through the wild catches of the fishes by the local fishermen. This phenomenon is being concerned with the issue of over-fishing and eventually this species may have to face extinction (Walker, 2004). Additionally, based on Burton (1997), the spawning of *P. axelrodi* in captivity is still difficult although several attempts had been done with random results and the scientific documentation is also limited. Hence, several studies on the biology and ecology of *P. axelrodi* are still being conducted to get a better understanding of this species for the purpose of breeding and culturing in captivity on large scales (Brito and Bazzoli, 2009).

Therefore, the successful breeding and culture of *P. axelrodi* in captivity will bring good news to the ornamental fish industry and also contribute to the economy status through mass production. Currently, the market price of *P. axelrodi* in Malaysia is ranging from MYR 2.00 to MYR 3.00 for each individual. The availability of *P. axelrodi* in the Malaysia market also depends seasonally, as according to the local ornamental fish seller in the Selangor and Kuala Lumpur area. This is probably due to the limited amount of *P. axelrodi* being bred locally in Malaysia.

In order to breed *P. axelrodi* in captivity, the most important factor that needs to be taken into consideration is the water chemistry in the spawning tanks (Burton, 1997). The water type in the tributaries of Rio Negro where the wild *P. axelrodi* lives is the blackwater in which the acidity is in the range of pH 5.0 - 6.0 (Burton, 1997; Matsuo and Val, 2006). The lack of scientific documentations in the breeding and larval rearing of *P. axelrodi* focusing on water pH leads to this study.

Thus, the objectives of this study were:

- i) To determine the effect of pH level on the spawning success of *P. axelrodi*.
- ii) To observe and describe the embryonic and larval development of *P. axelrodi*.
- iii) To determine the length increment and survival of *P. axelrodi* larvae cultured at different pH level.

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