UNIVERSITI PUTRA MALAYSIA

EFFECTS OF STOCKING DENSITY AND SALINITY ON GROWTH AND SURVIVAL OF RED TILAPIA, Oreochromis sp. FRY

MUHAMMAD HAFIS BIN ABD RAZAK

FP 2013 103

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MUHAMMAD HAFIS BIN ABD RAZAK

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MUHAMMAD HAFIS BIN ABD RAZAK

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

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CERTIFICATION OF APPROVAL

DEPARTMENT OF AQUACULTURE

FACULTY OF AGRICULTURE

UNIVERSITI PUTRA MALAYSIA

Name of student : Muhammad Hafis bin Abd Razak

Matric number : 163579

Programme : Bachelor of Agriculture (Aquaculture)

Name of supervisor : Dr. Annie Christianus

Title of project : Effects of Stocking Density and Salinity on Growth And Survival of Red Tilapia, *Oreochromis* sp. fry

This is to certify that I have examined the final year project report and all corrections have been made as recommended format stipulate in the AKU 4999 project guidelines, Department of Aquaculture, Faculty of Agriculture, and University Putra Malaysia.

Signature and official stamp of supervisor:

Dr. Annie Christianus

Date:

ACKNOWLEDGEMENTS

My sincere appreciation is extended to my supervisor Dr. Annie Christianus for her interest, invaluable guidance, tireless advice and support provided during the planning and preparation of this thesis. Her countless patience, encouragement and generosity cannot be emphasized.

I am greatly indebted to entire academic staff of Aquaculture Department of Universiti Putra Malaysia and also supporting staff especially Mr. Azmi, Mr. Norzainal, Mr. Zawawi, Madam Shafika, Ms, Azlina, Ms. Saufinas and all Aquaculture Laboratory members. Their valuable cooperation leads to smooth progress of my work for which I am grateful. I am also thankful especially to Mr. Argungu, Mr. Faizul and Mrs. Intan Khairulnisa students under Dr. Annie Christianus for guidance in the experiments that I have done.

Last but not least, to my beloved ones especially my father Mr. Abd Razak, my mother Madam Norsiah, my brothers and sister, Muhammad Safuan, Muhammad Taufiq, Muhammad Noorzaini, Muhammad Fahmi, Muhammad Aliff Fitri, Norazatul Iman and all my friends for helping me in the sampling Mr. Hariz, Madam Carlina Freddie, Tahir and my organization Permanis UPM thanks for their endless patience, love, care, sacrifices and critics.

ABSTRACT

Oreochromis sp. has become increasingly popular because it's similar appearance to marine red snapper and contributes approximately 90% of the total production of freshwater fish in Malaysia. The aim of this study were to determine the length and weight increment of *Oreochromis* sp. fry reared at different stocking densities and effects of different salinities on the growth and survival. This study was conducted at the Aquaculture Research Station in University Putra Malaysia, Puchong, Selangor. First study was stocking densities, three different stocking densities used were 50, 100 and 150 fry/L. Second studies, four different salinities used were 0, 3, 6 and 9 ppt. Each treatment was prepared in three replications. Arrangements of the treatment were randomly. Every 3 day the data of water parameter were collected before water changes. The experiments were tested by using one way ANOVA analysis of variance and comparison between treatments with Duncan test. The length and weight of fry was measured once a week until 4 week cultured period. Results showed that 50 fry/L was the significantly highest ($P<0.05$) in weight increment, total length (TL) and survival. 3 ppt of salinity was the significantly highest ($P<0.05$) salinity in this experiment followed by 0, 6 and 9 ppt. *Oreochromis* sp. fry had a better growth in 50 fry/L in stocking densities and growth well in 3 ppt of salinity without any adverse effect.

ABSTRAK

Oreochromis sp. telah menjadi semakin popular kerana menyerupai ikan merah dan menyumbang kira-kira 90% daripada jumlah pengeluaran ikan air tawar di Malaysia. Tujuan kajian ini adalah untuk menentukan penambahan panjang dan berat badan fry *Oreochromis* sp. yang diternak pada kepadatan stok berbeza dan kesan-kesan perbezaan saliniti terhadap kadar pertumbuhan dan kelangsungan hidup. Kajian ini dijalankan di Stesen Penyelidikan Akuakultur, Universiti Putra Malaysia, Puchong, Selangor. Kajian yang pertama adalah stok kepadatan, tiga kepadatan stok yang berbeza yang digunakan adalah 50, 100 dan 150 fry/L. Kajian kedua, empat saliniti berbeza yang digunakan iaitu 0, 3, 6 dan 9 ppt. Setiap rawatan telah disediakan dalam tiga replikasi. Susunan rawatan adalah secara rawak. Satiap 3 hari parameter air diambil sebelum air ditukar. Eksperimen telah dianalisis dengan menggunakan ANOVA analisis varians sehala dan perbandingan antara rawatan dengan menggunakan ujian Duncan. Berat (g), panjang (TL) dan kadar kelangsungan hidup daripada benih adalah diukur sekali seminggu sehingga tempoh 4 minggu kultur. Keputusan menunjukkan bahawa 50 fry/L dengan perbezaan ketara yang tertinggi ($P < 0.05$) daripada kenaikan berat badan (g), jumlah panjang (TL) dan kadar kelangsungan hidup fry *Oreochromis* sp., 3 ppt saliniti adalah yang terbaik untuk percubaan saliniti yang menunjukkan dengan perbezaan ketara tertinggi ($P < 0.05$) diikuti oleh 0, 6 dan 9 ppt. Benih mempunyai pertumbuhan yang lebih baik dalam kepadatan stok 50 fry/L dan membesar di dalam 3 ppt salinity tanpa menggangu kesan tumbesaran.

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^{o}C	Degree Celsius
g	Gram
ppt	Part Per Thousand
L	Liter
TL	Total Length
%	Percent
ANOVA	Analysis of Variance
cm	Centimeter
mg	Miligram

CHAPTER 1

INTRODUCTION

Increased demand for aquatic-based products as important source of food available for human consumption. According to the Department of Fisheries, aquaculture is the fastest growing food-producing sector, contributing to nearly 50 percent of the world's food fish. Aside from providing work opportunities it also an income source for farmers.

Tilapia under the family of Cichlidae is a freshwater species which can tolerate brackish water condition. This family includes three main genera *Tilapia, Sarotherodon* and *Oreochromis* (Rafael *et al*., 2008). In Malaysia, tilapia is one of the main contributors to aquaculture production. Morphologically, red tilapia is very similar to red snapper, thus the higher market value (Popma and Masser, 1999). The price for red tilapia in the market is around MYR8.00 to12.00/kg according to the grade and size, also depending on the place such as urban and rural.

Tilapia can be cultured in different culture system such as pond, tank and cages. In addition, this fish also can be used in polyculture with other species in the same system, i,e. African catfish (*Clarias gariepinus*), Sultan fish (*Leotobarbus hoeveni*) and carp (*Ctenopharyngodon idelius*). Many red tilapia breeders choose to breed the fish in tanks and use recirculating aquaculture system (RAS) to get

the best red tilapia quality as well as reduce the fishy smell. Other than that, it is the most popularly cultured fish species that can feed natural foods of low tropic level at detritus and plankton, and also can survive and tolerate a wide salinity range (Derun *et al.*, 2010).

Meanwhile, the value of tilapia is being complimented with the increased of public awareness on safe and healthier source of protein. Tilapia and catfish are lower-fat fish that contained omega-3s. United States Department of Agriculture statistics showed that tilapia and catfish contained higher omega-6 fatty acid than omega-3 (William, 2008). Omega-6 has been categorized as a heart-healthy nutrient which should be included in diet.

1.1 Importance of the study

In order to improve the larval rearing and culture practice, it is relevant to determine the suitable stocking density and effect of saline water condition on the growth and survival of red tilapia.

Results from the studies can be useful to those hatcheries in the production of tilapia seedlings, particularly in Malaysia where tilapia is one of the main cultured species.

Tilapia can easily breed but survival rates for this fry is still level of concern as well as diseases problem. Tilapia is known to be susceptible to many pathogens such as *Pseudomonas* and *Streptococcus* (Chen *et al*., 2004). This infection can harm and cause high mortality to fish besides it can have negative impact to fish farmers and entrepreneurs. The improvement in culture technique can increase the confidence to breed this fish in large quantities and good quality.

1.2 Objective

Thus the objectives of this study were;

1. To determine the effect of stocking density on the length and weight increment of red tilapia fry
2. To determine the effects of saline condition on the growth and survival of red tilapia fry

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