

INFLUENCE OF NATURAL CAROTENOID (*Hibiscus tiliaceus*) ON  
COLOURATION AND GROWTH RATE OF GOLDEN GOURAMI

HIDIR ARIFFIN

FACULTY OF MARITIME STUDIES AND MARINE SCIENCE  
UNIVERSITI MALAYSIA TERENGGANU  
MALAYSIA .

2013

ph: 9530

1100091325



LP 10 FMSM 2 2013



1100091325  
Influence of natural carotenoid (*Hibiscus tiliaceus*) on  
colouration and growth rate of golden gourami / Hidir Ariffin.

PUSAT PEMBELAJARAN DIGITAL SULTANAH NUR ZAHIRAH  
UNIVERSITI MALAYSIA TERENGGANU (UMT)  
21030 KUALA TERENGGANU

1100091325		

Lihat Sebelah

INFLUENCE OF NATURAL CAROTENOID (*Hibiscus tiliaceus*) ON  
COLOURATION AND GROWTH RATE OF GOLODEN GOURAMI

By

Hidir bin Ariffin

Research Report submitted in partial fulfilment of  
the requirement for the degree of  
Bachelor of Science (Marine Biology)

Department of Marine Science  
Faculty of Maritime Studies and Marine Science  
UNIVERSITI MALAYSIA TERENGGANU

2013

This project should be cited as:

Hidir, A. 2013. Influence of Natural Carotenoid (*Hibiscus tiliaceus*) on Colouration and Growth Rate of Golden Gourami. Undergraduate Thesis. Bachelor of Science (Marine Biology), Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu, Terengganu. 84p.

**No part of this project report may be reproduced by any mechanical, photographic, or electronic process, or in the form of photographic, recording, nor may it be stored in a retrieval system, transmitted, or otherwise copied for public or private use, without written permission from the author and supervision(s) of the project.**

P  
10  
H  
2013



DEPARTMENT OF MARINE SCIENCE  
 FACULTY OF MARITIME STUDIES AND MARINE SCIENCE

DECLARATION AND VERIFICATION REPORT  
 FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled:

INFLUENCE OF NATURAL CAROTENOID ON COLOURATION  
AND GROWTH RATE OF GOLDEN GOURAMI

by HIDIR BIN ARIFFIN, Matric No. UK22232

have been examined and all errors identified have been corrected. This report is submitted to the Department of Marine Science as partial fulfillment towards obtaining the Degree OF SCIENCE OF MARINE BIOLOGY, Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

Verified by:

Principal Supervisor

Name: DR. SAFIAH BT JASMANI  
 Pensyarah  
 Institut Akuakultur Tropika  
 Universiti Malaysia Terengganu  
 21030 Kuala Terengganu

Date: 19.6.2013

Second Supervisor

Name: PROF. MADYA DR. SITI AISHAH ABDULLAH  
 @ CHRISTINE A. OROSCO  
 PENTELARAS PROGRAM BIOLOGI MARIN  
 JABATAN SAINS MARIN  
 FAKULTI PENGAJIAN MARITIM DAN SAINS MARIN  
 UNIVERSITI MALAYSIA TERENGGANU ( UMT )  
 21030 KUALA TERENGGANU

Date: 19.6.2013

## **Acknowledgement**

I would like to express my sincere appreciation to all those who providing me support in preparing this report. A special thanks goes to my supervisor, Dr Safiah binti Jasmani who always encouraged, taught and guiding me for finishing my project successfully. Besides, thanks a lot towards my second supervisor, Prof Madya Dr. Siti Aishah binti Abdullah particularly for both motivation and financial support.

Additionally, acknowledgement should be given towards both Faculty of Maritime Studies and Science Marine (FMSM) and Institute of Tropical Aquaculture (AKUATROP) which providing me equipment, necessary material and laboratory amenities to complete my research. A special gratitude I give towards my friends, Mohd Farhan bin Tahir and Mohd Aslah bin Mohammad who always providing me solution for overwhelming difficulties in this research. Finally, I would like also to appreciate panels and my team mates in journal club, for any comments and guidance given during my presentation particularly.

## Table of content

Content	Page
Table of content	ii
List of table	iv
List of figure	v
Abbreviation	vi
Abstract	vii
<b>CHAPTER 1 INTRODUCTION AND OBJECTIVES</b>	<b>1</b>
1.1 Introduction	1
1.2 Objectives	3
<b>CHAPTER 2 LITERATURE REVIEW</b>	<b>4</b>
2.1 General overview of carotenoid	4
2.2 Main function of carotenoid in current study	5
2.3 Other function of carotenoid	6
2.4 Sources of carotenoid	6
2.5 Factors which contribute to the colouration of ornamental fishes	7
2.6 General overview of previous researches which study the effect of dietary pigment on fishes colouration and growth	10
2.7 Dietary pigment in recent study	27
2.8 Experimental fish ( <i>Trichogaster</i> sp.)	30
<b>CHAPTER 3 METHODOLOGY</b>	<b>33</b>
3.1 Overview	35
3.2 Feeding preparation	37
3.3 Proximate composition	37
3.3.1 Moisture determination	35
3.3.2 Ash determination	38

3.3.3	Lipid determination	39
3.3.4	Fibre determination (method 1)	41
3.3.5	Fibre determination (method 2)	42
3.3.6	Protein determination	44
3.3.6a	Distillation	44
3.3.6b	Titration	45
3.4	Growth rate	46
3.5	Spectrophotometer analysis	47
3.6	Fish photograph	48
3.7	Data collection	48
3.8	Data Analysis	48
<b>CHAPTER 4</b>	<b>RESULTS</b>	
4.1	Proximate composition of flower	49
4.2	Proximate composition of fish feed	50
4.3	Survival rate of <i>Trichogaster</i> sp.	51
4.4	Growth rate of <i>Trichogaster</i> sp.	52
4.5	Fish photographing	52
4.6	Spectrophotometer analysis	53
<b>CHAPTER 5</b>	<b>DISCUSSION</b>	
5.1	<i>H. tiliaceus</i> and feed composition	54
5.2	Survival rate of <i>Trichogaster</i> sp.	55
5.3	Observation of fish colouration	56
5.4	Growth rate of <i>Trichogaster</i> sp.	57
5.5	Total carotenoid content of <i>Trichogaster</i> sp.	60
<b>CHAPTER 6</b>	<b>CONCLUSION</b>	66
<b>CHAPTER 7</b>	<b>REFERENCES</b>	67
<b>CHAPTER 8</b>	<b>APPENDICES</b>	76



## List of table

<b>Vol</b>	<b>Title</b>	<b>Page</b>
2.5	Factors which contribute to the colouration of fishes	8
2.6	Summary table of previous researches which were study the effect of dietary pigment on fish colouration	10
2.7	Previous research on flower which used for enhancing the colour of the fishes	27
4.0	Summary table of methodology had been used in previous study which similar with recent study	34
4.2	Concentration of <i>H. tiliaceus</i> inserted into the fish feed and proximate composition of fish feed after the flower being added	50
4.4	Initial weight, final weight, weight gained and SGR	52

## List of figure

<b>Vol</b>	<b>Title</b>	<b>Page</b>
2.6a	Photo of the cichlid at the end of study	11
2.6b	Image of male Flame red dwarf gourami	16
2.6c	Japanese ornamental carp	17
3.1.1	Experimental design for total carotenoid analysis	36
3.1.2	Experimental design for specific growth rate	36
4.1.1	Moisture percentage of <i>H.tiliaceus</i> flower	49
4.1.2	Proximate composition analysis, total carotenoid content and chlorophyll a content of <i>H.tiliaceus</i> flower	50
4.2.1	Comparison of proximate composition analysis of fish feed of each treatment	50
4.3	Survival rate of <i>Trichogaster</i> sp.	51
4.5	Image of <i>Trichogaster</i> sp. after 45 days experiment	52
4.6	Total carotenoid content of fin and body of <i>Trichogaster</i> sp.	53

## **Abbreviation**

SGR	: Specific growth rate
HCL	: Hydrochloric acid
Anova	: Analysis of variance
TCC	: Total carotenoid content
Ca	: Chlorophyll A

## Abstract

The influence of natural carotenoid on colouration and growth rate of Golden Gourami was investigated in this study. Golden gouramis were cultured for 45 days in 4 treatment with 3 replicates each treatment. The commercial feeds were combined with 3 different *H. tiliaceus* flower concentrations which were 0.45g/0.9g/1.35g per 100g. The purpose of the project is to study the effect of *H. tiliaceus* on Golden gourami growth rate and colour enhancement. The fishes were fed once per day and the analysis of carotenoid content was conducted at 0 day, 30 days and 45 days while growth rate experiment was conducted for a month in different experiment. The carotenoid content in the **body of fishes** showed apparent increment after 45 days for treatment 2, 3 and 4, with 8.85mg/kg, 11.00 mg/kg and 8.43 mg/kg respectively except for control that slightly decrease (5.54 mg/kg) when compared to initial day (6.91 mg/kg). The carotenoid content in the **fin of the fishes** also indicated the same pattern which treatment 3 was the highest 62.25mg/kg followed by treatment 2 (54.53 mg/kg) and treatment 4 (37.99 mg/kg). Additionally the carotenoid in the fin part was higher compared to the body part of the fishes. There was no significant effect of *H. tiliaceus* on fish's growth rate ( $p > 0.05$ ). Therefore, the *H.tiliaceus* flower may have potential as pigment colour enhancer for ornamental fishes particularly with yellow-orange ornamental fishes.

## Abstrak

Satu eksperimen mengenai pengaruh karotenoid semulajadi ke atas pewarnaan dan kadar tumbesaran ikan sepat kuning (Golden Gourami) telah dijalankan selama 45 hari. Ikan-ikan ini telah dipecahkan kepada 4 kumpulan dan setiap kumpulan mempunyai 3 replikasi. Makanan ikan komersial telah dicampurkan dengan 3 kepekatan bunga *H. tiliaceus* berbeza iaitu 0.45g/0.9g/1.35g per 100g dan diberikan kepada ikan-ikan tersebut. Ikan-ikan telah diberi makan sehari sekali dan analisis karotenoid telah dijalankan pada hari 0, 30 dan 45 manakal eksperimen tumbesaran ikan dijalankan berasingan selama sebulan. Hasil kajian pada hari ke 40 mendedahkan terdapat peningkatan ketara pada jumlah karotenoid **badan ikan** bagi kumpulan 2, 3 dan 4 dengan jumlah 8.85mg/kg, 11.00 mg/kg and 8.43 mg/kg masing-masing manakala terdapat penurunan jumlah karotenoid pada kumpulan control (6.91 mg/kg). Jumlah karotenoid pada **sirip ikan** juga menunjukkan corak yang sama apabila kumpulan ke 3 menunjukkan bacaan karotenoid yang tinggi (62.25mg/kg) diikuti kumpulan 2 (54.53 mg/kg) and kumpulan 4 (37.99 mg/kg). Hasil kajian juga menunjukkan bahawa jumlah karotenoid pada sirip ikan jauh berbeza berbanding badan ikan. Tiada kesan yang significant oleh bunga *H. tiliaceus* terhadap tumbesaran ikan. Secara ringkasnya, bunga *H. tiliaceus* berkemungkinan mempunyai potensi dalam mempertingkatkan warna pigmen ikan hiasan terutama ikan yang bewarna kuning keemasan.