

MEMORIAL ARTICLES OF THE ZERO
CULTURE OF *Agaricus bisporus*

CHENG HUAN HONG

FAKULTI SAINS DAN TEKNOLOGI
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA
2005

n/205

1100036798

LP 5 FST 1 2005



1100036798

Antimicrobial activities of in vitro culture of aglaonema simplex / Cheong Kwan Yee.



PERPUSTAKAAN

**KOLEJ UNIVERSITI SAINS & TEKNOLOGI MALAYSIA
21030 KUALA TERENGGANU**

1100036798

1100036798		

Lihat sebelah

**HAK MILIK
PERPUSTAKAAN KUSTEM**

ANTIMICROBIAL ACTIVITIES OF *IN VITRO* CULTURE OF
Aglaonema simplex

By

Cheong Kwan Ying

Research Report submitted in partial fulfillment of
the requirements for the degree of
Bachelor of Science (Biological Sciences)

Department of Biological Sciences
Faculty of Science and Technology
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA
2005

This project should be cited as:

Cheong, K.Y. 2005. Antimicrobial activities of *in vitro* culture of *Aglaonema simplex*. Undergraduate thesis, Bachelor of Science in Biological Sciences, Faculty of Science and Technology, Kolej Universiti Sains dan Teknologi Malaysia, Terengganu. 46p.

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

1100036798



JABATAN SAINS BIOLOGI
FAKULTI SAINS DAN TEKNOLOGI
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA

**PENGAKUAN DAN PENGESAHAN LAPORAN
PROJEK PENYELIDIKAN I DAN II**

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: Antimicrobial Activities of *In Vitro* Culture of *Aglaonema simplex* oleh Cheong Kwan Ying, no. matrik: UK6754 telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahagian daripada keperluan memperoleh Ijazah Sarjana Muda Sains-Sains Biologi, Fakulti Sains dan Teknologi, Kolej Universiti Sains dan Teknologi Malaysia.

Disahkan oleh:

Penyelia Utama

Nama:

Cop Rasmi:

DR. AZIZ BIN AHMAD (Ph.D)
LECTURER
Dept of Biological Sciences
Faculty of Science and Technology
University Collage of Science
and Technology Malaysia
21030 Kuala Terengganu.

Tarikh: 14/4/05

Penyelia Kedua (jika ada)

Nama:

Cop Rasmi

Tarikh:.....

Ketua Jabatan Sains Biologi

Nama:

Cop Rasmi:

PROF. MADYA DR. NAKISAH BT. MAT AMIN
Ketua
Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Kolej Universiti Sains dan Teknologi Malaysia
(KUSTEM)
21030 Kuala Terengganu

Tarikh: 14/4/05

ACKNOWLEDGEMENT

There is no way that I can adequately express my gratitude to Dr. Aziz Ahmad, my project supervisor. Dr. Aziz has graciously devoted an immense amount of time and effort for guiding and helping me throughout the course of my project.

I would like to thank my family for their support, encouragement and patience.

My sincere appreciation to Puan Zarina, Encik Mazrul, Saat, Rokiah, Rodziah and Nyuk Ling and those who have giving me a lot of information and assistance throughout the project.

Finally, I would like to thank my beloved housemates, coarse mates and friends for their willingness to supporting and sharing everything all the time with me.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENT	ii
LIST OF TABLES	v
LIST OF FIGURES	vi
LIST OF ABBREVIATIONS/SYMBOLS	vii
LIST OF APPENDICES	viii
ABSTRACT	ix
ABSTRAK	x
CHAPTER 1 INTRODUCTION	1
CHAPTER 2 LITERATURE REVIEW	
2.1 Plant Secondary Metabolites	3
2.2 Bioactive Properties and Other Usages of Araceae Plants	5
2.3 <i>Aglaonema simplex</i>	8
2.4 Plant Tissue Culture: An Alternative for Useful Metabolites Production	10
2.5 Microbial Diseases	11
2.6 Developments of Antimicrobial Agents	13
2.6.1 Physical Agents of Microbial Control	14
2.6.2 Chemicals Agents of Microbial Control	15
2.7 Antimicrobial Susceptibility Methods	17
2.7.1 Disc Diffusion Tests	17
2.7.2 Dilution Methods	18

CHAPTER 3 MATERIALS AND METHODS	
3.1 Plant Material	20
3.2 Culture Treatments	20
3.3 Preparation of Crude Extract	22
3.4 Microorganisms	22
3.5 Bioassay Procedures	23
3.5.1 Preparation of Assay Medium for Bacteria	23
3.5.2 Qualitative Antimicrobial Method	23
3.5.3 Quantitative Antimicrobial Method	24
CHAPTER 4 RESULTS	26
CHAPTER 5 DISCUSSION	34
CHAPTER 6 CONCLUSION	37
REFERENCES	38
APPENDICES	42
VITAE	46

LIST OF TABLES

Table		Page
2.1	Summary of the bioactive properties and other usages of Araceae plants.	7
4.1	Dry weight and colors of the methanol extracts obtained.	26
4.2	Inhibition zone diameters of test discs impregnated with methanol extracts in concentrations ranging 25 to 500 mg/ml.	29
4.3	Antimicrobial activities of <i>Aglaonema simplex</i> methanol extracts (300 µg/ disc) against bacteria tested.	30
4.4	The minimal inhibition concentration (MIC, mg/ml) of <i>Aglaonema simplex</i> methanol extracts against bacteria tested.	30

LIST OF FIGURES

Figure		Page
2.1	<i>Aglaonema simplex</i> in an aquarium.	9
3.1	<i>In vitro</i> culture of <i>Aglaonema simplex</i> . (a) Plant of 30 days, (b) Plant of 60 days.	21
4.1	Inhibition zones of 30-day extract and 60-day extract against <i>Bacillus cereus</i> at (a) 50 mg/ml, (b) 100 mg/ml, (c) 400 mg/ml.	31
4.2	Inhibition zones of 30-day extract and 60-day extract against <i>Aeromonas hydrophila</i> at (a) 100 mg/ml, (b) 200 mg/ml, (c) 300 mg/ml.	32
4.3	Inhibition zones of 30-day extract and 60-day extract against <i>Bacillus subtilis</i> at (a) 25 mg/ml, (b) 50 mg/ml, (c) 100 mg/ml, (d) 250 mg/ml.	33

LIST OF ABBREVIATIONS/SYMBOLS

BAP	Benxylaminopurine
DMSO	dimethyl sulfoxida
NA	nutrient agar
L	Liter
ml	milliliter
μ l	microliter
mm	millimeter
nm	nanometer
g	gram
mg	milligram
μ g	microgram
mg/L	milligram per liter
mg/ml	milligram per milliliter
$^{\circ}$ C	degree Celsius
CFUmL ⁻¹	colony forming units per milliliter

LIST OF APPENDICES

Appendices		Page
APPENDIX A DATA ANALYSIS		
Table A.1	Inhibition zone diameters (3 replications) around test discs (mm) at MIC level.	42
Table A.2	Data analysis of bacteria susceptibility responses to the methanol extract by using ANOVA: Two-factor with replication.	43

ABSTRACT

The antimicrobial activities of methanol extract of *Aglaonema simplex* cultures were investigated. The crude samples were obtained from dried leaves and petioles of 30 and 60-day plants macerated in 45ml of 60% methanol. The antimicrobial activity was evaluated using Kirby-Bauer method and the minimal inhibition concentration (MIC) values on eleven species of bacteria. Both extracts had inhibitory effects on the growth of eight types of bacteria including *Bacillus cereus*, *Bacillus subtilis*, *Enterococcus faecalis*, *Staphylococcus aureus*, *Streptococcus agalataiae*, *Aeromonas hydrophila*, *Proteus mirabilis* and *Pseudomonas aeruginosa*. The inhibition zones and MIC values for the microorganisms sensitive to the methanol extracts of *A. simplex* cultures were in the range of 7-17 mm and 20- 500 mg/ml, respectively. The lowest MIC value of 30-day extract was 25 mg/ml and for 60-day extract was 20 mg/ml. This may indicate that the 60-day extract showed higher antibacterial activity than 30-day extract. The highest activity was shown against *Bacillus cereus*. The overall results suggested that longer cultivation time may be needed to produce high quantitative and qualitative antimicrobial of this plant.

ANTI-MIKROORGANISMA AKTIVITI BAGI TUMBUHAN KULTUR, *Aglaonema simplex*

ABSTRAK

Penyaringan aktiviti anti-mikroorganisma bagi tumbuhan kultur, *Aglaonema simplex* telah dikaji. Ekstrak telah dihasilkan daripada bahagian batang dengan daun bagi tumbuhan berusia 30 dan 60 hari masing-masing yang direndam dalam 45ml methanol 60%. Penyaringan aktiviti anti-mikroorganisma dapat ditaksir dengan menggunakan Kaedah Kirby-Bauer dan juga nilai-nilai MIC bagi 11 spesies bakteria. Kedua-dua ekstrak dapat merencatkan pertumbuhan lapan jenis bakteria yang dikaji iaitu *Bacillus cereus*, *Bacillus subtilis*, *Enterococcus faecalis*, *Staphylococcus aureus*, *Streptococcus agalataiae*, *Aeromonas hydrophila*, *Proteus mirabilis* and *Pseudomonas aeruginosa*. Saiz bagi zon perencatan dan nilai MIC tercatat adalah dalam lingkungan 7-17 mm dan 20-500 mg/ml masing-masing. Nilai MIC yang paling rendah tercapai bagi ekstrak 30 hari ialah 25 mg/ml dan bagi ekstrak 60 hari ialah 20 mg/ml. Maka, ekstrak 60 hari dibuktikan mempunyai kesan anti-bakteria yang lebih tinggi daripada ekstrak 30 hari. Aktiviti anti-mikroorganisma yang paling berkesan adalah terhadap *Bacillus cereus*. Keputusan keseluruhan kajian ini mencadangkan bahawa masa tempoh kultur yang lebih panjang diperlukan bagi tumbuhan ini untuk menghasilkan sebatian anti-mikroorganisma yang lebih dan berkualiti.