

**ANTIFUNGAL EFFECT OF SELECTED PLANT METHANOLIC EXTRACTS
AGAINST *Candida albicans* and *Fusarium oxysporum***

THESIS

MARK MHARDHIN M. FRANCIA

MARLYN L. MOJICA

JETHRO L. PIORES

College of Nursing

CAVITE STATE UNIVERSITY

Indang, Cavite

Cavite State University (Main Library)



T5896

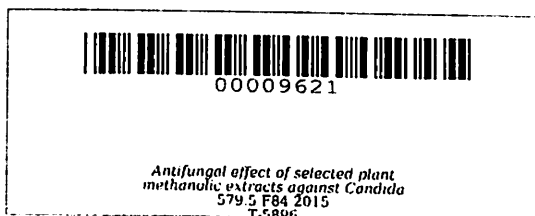
THESIS/SP 579.5 F84 2015

October 2015

**ANTIFUNGAL EFFECT OF SELECTED PLANT METHANOLIC EXTRACTS
AGAINST *Candida albicans* and *Fusarium oxysporum***

Undergraduate Thesis
Submitted to the Faculty of the
Department of Medical Technology
College of Nursing
Cavite State University
Indang, Cavite

In partial fulfillment
of the requirements for the degree
Bachelor of Science in Medical Technology



**MARK MHARDHIN M. FRANCIA
MARLYN L. MOJICA
JETHRO L. PIORES
October 2015**

ABSTRACT

FRANCIA, MARK MHARDHIN M., MOJICA, MARLYN L., & PIORES, JETHRO L. Antifungal Effect of Selected Plant Methanolic Extracts Against *Candida albicans* and *Fusarium oxysporum*. Undergraduate Thesis. Bachelor of Science in Medical Technology. Cavite State University, Indang, Cavite. October 2015. Adviser: Dr. Adelaida E. Sangalang.

The study was conducted at the National Institute of Molecular Biology and Biotechnology (BIOTECH), University of the Philippines Los Baños from April to June 2014. The study generally aimed to compare the levels of antifungal activity of six selected leaf extracts of: *Mangifera indica* (mango), *Averrhoa bilimbi* (kamias), *Psidium guajava* (guava), *Artocarpus heterophyllus* (jackfruit), *Annona muricata* (soursop), and *Carica papaya* (papaya) against *Candida albicans* and *Fusarium oxysporum*.

Plant leaf samples were sent to the University of the Philippines Los Baños Herbarium for authentication. The samples were air dried, ground and extracted using methanol. *Candida albicans* and *Fusarium oxysporum* were procured from Philippine National Collection of Microorganisms (PNCM) at the National Institute of Molecular Biology and Biotechnology (BIOTECH), University of the Philippines Los Baños. Antimicrobial assay was done by cylinder-cup technique and results were obtained by measuring the zone of inhibition (mm) after 2 days and 4 days of incubation for *Candida albicans* and *Fusarium oxysporum*, respectively.

The methanolic leaf extracts of guava and mango exhibited high antifungal activity against *Candida albicans*. On the other hand, kamias, jackfruit, soursop and papaya have a low antifungal activity. Guava and mango leaf extracts were significantly more effective compared to the four leaf extracts. These plant extracts contained a lot of

active antifungal component, such as, tannins, flavonoid, terpenoids and glycosides. *Fusarium oxysporum* showed susceptibility to the fungicide used but yielded resistance to the six plant methanolic extracts. The results indicate that the substrate in which each test fungus cleaved different results. *C. albicans* was significantly inhibited by guava and mango extracts. The extracts can be used as an alternative for the commercial fungicide, such as itraconazole. However, *Fusarium oxysporum* is resistant to all the six methanolic leaf extracts.

TABLE OF CONTENTS

	Page
BIOGRAPHICAL DATA.....	iii
ACKNOWLEDGMENT.....	v
ABSTRACT.....	vii
LIST OF TABLES.....	xii
LIST OF FIGURES.....	xiii
LIST OF APPENDIX TABLES.....	xiv
LIST APPENDIX FIGURES	xv
INTRODUCTION.....	1
Statement of the Problem.....	3
Objectives of the Study.....	3
Significance of the Study.....	4
Scope and Limitation of the Study.....	4
Time and Place of the Study.....	4
Definition of Terms.....	5
REVIEW OF RELATED LITERATURE.....	9
<i>Mangifera indica</i>	9
Health Benefits of <i>Mangifera indica</i>	9
Phytochemistry of <i>Mangifera indica</i>	10
<i>In vitro</i> antimicrobial activity and the major polyphenol in leaf extract of <i>Mangifera indica</i>	11
Antibacterial Activity of <i>Mangifera indica</i>	12
<i>Averrhoa bilimbi</i>	12

Pharmacological Profile of <i>Averrhoa bilimbi</i>	13
Phytochemistry of <i>Averrhoa bilimbi</i>	14
<i>Psidium guajava</i>	14
Health Benefits of <i>Psidium guajava</i>	15
Phytochemistry of <i>Psidium guajava</i>	16
Antimicrobial properties of guava.....	17
Evaluation of Antibacterial Activities of <i>Psidium guajava</i>	18
<i>Artocarpus heterophyllus</i>	18
Health Benefits of <i>Artocarpus heterophyllus</i>	19
Phytochemistry of <i>Artocarpus heterophyllus</i>	20
Antimicrobial Compounds from <i>Artocarpus heterophyllus</i>	20
<i>Annona muricata</i>	21
Health benefits of <i>Annona muricata</i>	21
Phytochemistry of <i>Annona muricata</i>	22
Anti-microbial activity of <i>Annona muricata</i>	22
<i>Carica papaya</i>	23
Health Benefits of <i>Carica papaya</i>	24
Phytochemistry of <i>Carica papaya</i>	25
<i>Candida albicans</i>	26
<i>Fusarium oxysporum</i>	27
Cylinder-Plate Method.....	28
METHODOLOGY.....	29
Gathering of Materials.....	29
Sterilization of Materials.....	29

Plant Collection and Authentication.....	30
Processing and Extraction of Plant Materials.....	30
Preparation of the Test Organisms.....	31
Preparation of Media.....	31
Preparation of Inoculum.....	32
Antifungal Assay.....	33
Clean-up and Disposal.....	35
Experimental Design and Data Analysis.....	35
RESULTS AND DISCUSSION.....	46
Assay of the Antifungal Activity of Selected Plant Methanolic Extracts	46
<i>Candida albicans</i>	46
<i>Fusarium oxysporum</i>	49
SUMMARY, CONCLUSION AND RECOMMENDATIONS.....	51
Summary.....	51
Conclusion.....	52
Recommendations.....	53
REFERENCES.....	54
APPENDICES.....	57

LIST OF TABLES

Table	Page
1 Zone of inhibition (mm) for <i>Candida albicans</i> as affected by different plant methanolic extracts after 48 hours of incubation.....	47
2 Antifungal activity of different plant methanolic extracts against <i>Candida albicans</i> after 48 hours of incubation.....	48
3 Zone of inhibition (mm) for <i>Fusarium oxysporum</i> as affected by different plant methanolic extracts after 4 days of incubation.....	49
4 Antifungal activity of different plant methanolic extracts against <i>Fusarium oxysporum</i> after 4 days of incubation.....	50

LIST OF FIGURES

Figure	Page
1 Schematic Diagram (General Procedure).....	36
2 Processing and extraction of plant materials.....	37
3 Preparation of media (yeast malt extract agar).....	38
4 Preparation of media (potato dextrose agar).....	39
5 Preparation of inoculum (<i>Candida albicans</i>).....	40
6 Preparation of inoculum (<i>Fusarium oxysporum</i>).....	41
7 Antifungal assay of <i>Candida albicans</i> (First part).....	42
8 Antifungal assay of <i>Candida albicans</i> (Second part).....	43
9 Antifungal assay of <i>Fusarium oxysporum</i> (First part).....	44
10 Antifungal assay of <i>Fusarium oxysporum</i> (Second part).....	45

LIST OF APPENDIX FIGURES

Appendix Figure		Page
1	Drying of leaf samples. (a) guyabano, (b) mango, (c) jackfruit, (d) kamias, (e) guava and (f) papaya.....	66
2	Grinding of samples.....	67
3	Preparation of methanolic extracts.....	68
4	Filtered leaf methanolic extracts.....	70
5	Antifungal Susceptibility Testing... ..	71
6	Zone of inhibition (<i>Candida albicans</i>)	72
7	Zone of inhibition (<i>Fusarium oxysporum</i>).....	73
8	Clean-up and disposal.....	74

ANTIFUNGAL EFFECT OF SELECTED PLANT METHANOLIC EXTRACTS AGAINST *Candida albicans* and *Fusarium oxysporum*

**Mark Mhardhin M. Francia
Marlyn L. Mojica
Jethro L. Piores**

An undergraduate thesis manuscript submitted to the faculty of the Department of Medical Technology, College of Nursing, Cavite State University, Indang, Cavite in partial fulfilment of the requirements for graduation with the degree of Bachelor of Science in Medical Technology with Contribution Number SP CON MT No. 2015-07. Prepared under the supervision of Dr. Adelaida E. Sangalang.

INTRODUCTION

The art of medicine consists in amusing the patient while nature cures the disease, truly this the remarkable truth behind the whole idea of medicine. The threat of different public health issues regarding untreatable infections due pathological resistance develop by microorganisms as a result of continuous exposure to the drugs that acts as arsenals of war in the fight against different human pathogens. Fungal infections which is widely disseminated around is one of the emerging concern of public health, thus familiarity of this infection is not only the burden but the long term treatment that is needed to kill it completely. *Candida albicans*, fungi that is specifically a human pathogen that is wide spread among all human beings, having a percentage of 80 in all human population around the globe. They commonly inhibit the gut and clinically cause disease for those who are immune compromised, such as HIV patients, further more they cause two major types of infections local and systemic, sample of local infections that it manifest