## **UNIVERSITI TEKNOLOGI MARA**

# ANTIMICROBIAL ACTIVITY OF SELECTED AROMATIC PLANTS AND QUALITATTIVE ANALYSIS OF THEIR COMPOUNDS

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### ABSTRACT

Aromatic plant is a type of plant with nice aroma and also used as an ingredient in cooking. Natural based products are now used in many applications which include food preservatives. The antimicrobial activity of Murraya koenigii leaves, Citrus hystrix leaves, Ocimum basilicum var thyrsiflora and Cymbopogon citratus stalk were tested against Staphylococcus aureus, Bacillus cereus, Salmonella typhi, Escherichia coli, Aspergillus niger, Candida albicans Microsporum canis and Cryptococcus neoformans. Plant extraction was done by using distilled water as a solvent. Agar disc diffusion and microbroth dilution methods were used for the antimicrobial activity study while Ultra High- Performance Liquid Chromatography (UHPLC) and Liquid Chromatography Mass Spectrometry (LCMS) were used for the chemical compound analysis. It was found out that at the lowest concentration of 150 mg/ml, *M. koengii* displayed the largest diameter of inhibition zone against S. aureus measuring at  $8.00 \pm 0.57$  mm while at the highest concentration of 300 mg/ml O. basilicum var thyrsiflora extract was observed to produce largest diameter of inhibition zone against S. aureus measuring at  $12.33 \pm$ 0.33 mm. C. hystrix extract and O. basilicum var thyrsiflora extract did not show any antibacterial activity against B. cereus but C. citrarus extract was only sensitive to B. *cereus* whereby  $8.5 \pm 1.0$  mm was the largest diameter of inhibition zones produced. Unfortunately, no antifungal activity observed when it was tested with all extracts. Based on the minimum bactericidal concentration/minimum inhibitory concentration ratio, M. koenigii extract is bactericidal to all of the foodborne pathogens while C. hystrix and O. basilicum var thyrsiflora are bactericidal to S. aureus, E. coli and S. typhi. C. citratus is only bactericidal against B. cereus. Based on the chromatogram obtained from the UHPLC there were peaks on the chromatogram which showed active compounds. These show the extracts contain bio active compound.

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## TABLE OF CONTENT

AUTHOR'S DECLARATION ABSTRACT ACKNOWLEDGEMENT TABLE OF CONTENT LIST OF TABLES LIST OF TABLES LIST OF FIGURES LIST OF SYMBOLS LIST OF ABBREVIATIONS CHAPTER ONE: INTRODUCTION 1.1 Research Background 1.2 Problem Statement 1.3 Significance of Study 1.4 Objectives 1.5 Scope and Limitation CHAPTER TWO: LITERATURE REVIEW 2.1 Foodborne pathogens 2.1.1 Staphylococcus aureus 2.1.2 Bacillus cereus 2.1.3 Escherichia coli 2.1.4 Salmonella typhi 2.2 Fungal infections 2.2.1 Candida albicans 2.2.2 Aspergillus niger 2.3 Microsporum canis 2.2.4 Crantacoccus macformers	CON	NFIRMATION BY PANEL OF EXAMINERS	ii
ABSTRACT ACKNOWLEDGEMENT TABLE OF CONTENT LIST OF TABLES LIST OF FIGURES LIST OF SYMBOLS LIST OF ABBREVIATIONS CHAPTER ONE: INTRODUCTION 1.1 Research Background 1.2 Problem Statement 1.3 Significance of Study 1.4 Objectives 1.5 Scope and Limitation CHAPTER TWO: LITERATURE REVIEW 2.1 Foodborne pathogens 2.1.1 Staphylococcus aureus 2.1.2 Bacillus cereus 2.1.3 Escherichia coli 2.1.4 Salmonella typhi 2.2 Fungal infections 2.2.1 Candida albicans 2.2.2 Aspergillus niger 2.2.3 Microsporum canis 2.4 Cryntococcus aureus	AUTHOR'S DECLARATION ABSTRACT ACKNOWLEDGEMENT TABLE OF CONTENT LIST OF TABLES LIST OF FIGURES LIST OF SYMBOLS		iii
ACKNOWLEDGEMENT TABLE OF CONTENT LIST OF TABLES LIST OF FIGURES LIST OF SYMBOLS LIST OF ABBREVIATIONS CHAPTER ONE: INTRODUCTION 1.1 Research Background 1.2 Problem Statement 1.3 Significance of Study 1.4 Objectives 1.5 Scope and Limitation CHAPTER TWO: LITERATURE REVIEW 2.1 Foodborne pathogens 2.1.1 Staphylococcus aureus 2.1.2 Bacillus cereus 2.1.3 Escherichia coli 2.1.4 Salmonella typhi 2.2 Fungal infections 2.2.1 Candida albicans 2.2.2 Aspergillus niger 2.2.3 Microsporum canis 2.2.4 Cryntococcus andommany			iv
TABLE OF CONTENT         LIST OF TABLES         LIST OF FIGURES         LIST OF SYMBOLS         LIST OF ABBREVIATIONS         CHAPTER ONE: INTRODUCTION         1.1       Research Background         1.2       Problem Statement         1.3       Significance of Study         1.4       Objectives         1.5       Scope and Limitation         CHAPTER TWO: LITERATURE REVIEW         2.1.1 Staphylococcus aureus         2.1.2 Bacillus cereus         2.1.3 Escherichia coli         2.1.4 Salmonella typhi         2.2       Fungal infections         2.2.1 Candida albicans         2.2.2 Aspergillus niger         2.2.3 Microsporum canis         2.24 Cryptococcus and conis			v
LIST OF TABLES LIST OF FIGURES LIST OF SYMBOLS LIST OF ABBREVIATIONS CHAPTER ONE: INTRODUCTION 1.1 Research Background 1.2 Problem Statement 1.3 Significance of Study 1.4 Objectives 1.5 Scope and Limitation CHAPTER TWO: LITERATURE REVIEW 2.1 Foodborne pathogens 2.1.1 Staphylococcus aureus 2.1.2 Bacillus cereus 2.1.3 Escherichia coli 2.1.4 Salmonella typhi 2.2 Fungal infections 2.2.1 Candida albicans 2.2.2 Aspergillus niger 2.2.3 Microsporum canis 2.2.4 Cruntococcus narformans			vi
LIST OF FIGURES LIST OF SYMBOLS LIST OF ABBREVIATIONS CHAPTER ONE: INTRODUCTION 1.1 Research Background 1.2 Problem Statement 1.3 Significance of Study 1.4 Objectives 1.5 Scope and Limitation CHAPTER TWO: LITERATURE REVIEW 2.1 Foodborne pathogens 2.1.1 Staphylococcus aureus 2.1.2 Bacillus cereus 2.1.3 Escherichia coli 2.1.4 Salmonella typhi 2.2 Fungal infections 2.2.1 Candida albicans 2.2.2 Aspergillus niger 2.2.3 Microsporum canis 2.2.4 Cryptococcus pacformans			xi
LIST OF SYMBOLS LIST OF ABBREVIATIONS CHAPTER ONE: INTRODUCTION 1.1 Research Background 1.2 Problem Statement 1.3 Significance of Study 1.4 Objectives 1.5 Scope and Limitation CHAPTER TWO: LITERATURE REVIEW 2.1 Foodborne pathogens 2.1.1 Staphylococcus aureus 2.1.2 Bacillus cereus 2.1.3 Escherichia coli 2.1.4 Salmonella typhi 2.2 Fungal infections 2.2.1 Candida albicans 2.2.2 Aspergillus niger 2.2.3 Microsporum canis 2.2.4 Cremtococcus neoformans			xii
LIST OF ABBREVIATIONS CHAPTER ONE: INTRODUCTION 1.1 Research Background 1.2 Problem Statement 1.3 Significance of Study 1.4 Objectives 1.5 Scope and Limitation CHAPTER TWO: LITERATURE REVIEW 2.1 Foodborne pathogens 2.1.1 Staphylococcus aureus 2.1.2 Bacillus cereus 2.1.3 Escherichia coli 2.1.4 Salmonella typhi 2.2 Fungal infections 2.2.1 Candida albicans 2.2.2 Aspergillus niger 2.2.3 Microsporum canis 2.2.4 Crantococcus ucoformans			xiii
<ul> <li>CHAPTER ONE: INTRODUCTION</li> <li>1.1 Research Background</li> <li>1.2 Problem Statement</li> <li>1.3 Significance of Study</li> <li>1.4 Objectives</li> <li>1.5 Scope and Limitation</li> <li>CHAPTER TWO: LITERATURE REVIEW</li> <li>2.1 Foodborne pathogens <ul> <li>2.1.1 Staphylococcus aureus</li> <li>2.1.2 Bacillus cereus</li> <li>2.1.3 Escherichia coli</li> <li>2.1.4 Salmonella typhi</li> </ul> </li> <li>2.2 Fungal infections <ul> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.3 Microsporum canis</li> <li>2.4 Cruntococcus naoformans</li> </ul> </li> </ul>	LIST	Γ OF ABBREVIATIONS	xiv
CHAPTER ONE: INTRODUCTION         1.1       Research Background         1.2       Problem Statement         1.3       Significance of Study         1.4       Objectives         1.5       Scope and Limitation         CHAPTER TWO: LITERATURE REVIEW         2.1       Foodborne pathogens         2.1.1 Staphylococcus aureus         2.1.2 Bacillus cereus         2.1.3 Escherichia coli         2.1.4 Salmonella typhi         2.2         Fungal infections         2.2.1 Candida albicans         2.2.2 Aspergillus niger         2.3 Microsporum canis         2.4 Cryptococcus peoformans			
<ul> <li>1.1 Research Background</li> <li>1.2 Problem Statement</li> <li>1.3 Significance of Study</li> <li>1.4 Objectives</li> <li>1.5 Scope and Limitation</li> <li>CHAPTER TWO: LITERATURE REVIEW</li> <li>2.1 Foodborne pathogens <ul> <li>2.1.1 Staphylococcus aureus</li> <li>2.1.2 Bacillus cereus</li> <li>2.1.3 Escherichia coli</li> <li>2.1.4 Salmonella typhi</li> </ul> </li> <li>2.2 Fungal infections <ul> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryptococcus peoformans</li> </ul> </li> </ul>	CHA	APTER ONE: INTRODUCTION	1
<ul> <li>1.2 Problem Statement</li> <li>1.3 Significance of Study</li> <li>1.4 Objectives</li> <li>1.5 Scope and Limitation</li> <li>CHAPTER TWO: LITERATURE REVIEW</li> <li>2.1 Foodborne pathogens <ul> <li>2.1.1 Staphylococcus aureus</li> <li>2.1.2 Bacillus cereus</li> <li>2.1.3 Escherichia coli</li> <li>2.1.4 Salmonella typhi</li> </ul> </li> <li>2.2 Fungal infections <ul> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.3 Microsporum canis</li> <li>2.2 4 Cryptococcus neoformans</li> </ul> </li> </ul>	1.1	Research Background	1
<ul> <li>1.3 Significance of Study</li> <li>1.4 Objectives</li> <li>1.5 Scope and Limitation</li> <li>CHAPTER TWO: LITERATURE REVIEW</li> <li>2.1 Foodborne pathogens <ul> <li>2.1.1 Staphylococcus aureus</li> <li>2.1.2 Bacillus cereus</li> <li>2.1.3 Escherichia coli</li> <li>2.1.4 Salmonella typhi</li> </ul> </li> <li>2.2 Fungal infections <ul> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryntococcus neoformans</li> </ul> </li> </ul>	1.2	Problem Statement	3
<ul> <li>1.4 Objectives</li> <li>1.5 Scope and Limitation</li> <li>CHAPTER TWO: LITERATURE REVIEW</li> <li>2.1 Foodborne pathogens <ul> <li>2.1.1 Staphylococcus aureus</li> <li>2.1.2 Bacillus cereus</li> <li>2.1.3 Escherichia coli</li> <li>2.1.4 Salmonella typhi</li> </ul> </li> <li>2.2 Fungal infections <ul> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryntococcus neoformans</li> </ul> </li> </ul>	1.3	Significance of Study	4
<ul> <li>1.5 Scope and Limitation</li> <li>CHAPTER TWO: LITERATURE REVIEW</li> <li>2.1 Foodborne pathogens <ul> <li>2.1.1 Staphylococcus aureus</li> <li>2.1.2 Bacillus cereus</li> <li>2.1.3 Escherichia coli</li> <li>2.1.4 Salmonella typhi</li> </ul> </li> <li>2.2 Fungal infections <ul> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryntococcus neoformans</li> </ul> </li> </ul>	1.4	Objectives	5
<ul> <li>CHAPTER TWO: LITERATURE REVIEW</li> <li>2.1 Foodborne pathogens <ul> <li>2.1.1 Staphylococcus aureus</li> <li>2.1.2 Bacillus cereus</li> <li>2.1.3 Escherichia coli</li> <li>2.1.4 Salmonella typhi</li> </ul> </li> <li>2.2 Fungal infections <ul> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryntococcus neoformans</li> </ul> </li> </ul>	1.5	Scope and Limitation	5
<ul> <li>2.1 Foodborne pathogens</li> <li>2.1.1 Staphylococcus aureus</li> <li>2.1.2 Bacillus cereus</li> <li>2.1.3 Escherichia coli</li> <li>2.1.4 Salmonella typhi</li> </ul> 2.2 Fungal infections <ul> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryptococcus peoformans</li> </ul>	CHA	APTER TWO: LITERATURE REVIEW	6
<ul> <li>2.1.1 Staphylococcus aureus</li> <li>2.1.2 Bacillus cereus</li> <li>2.1.3 Escherichia coli</li> <li>2.1.4 Salmonella typhi</li> </ul> 2.2 Fungal infections <ul> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryptococcus neoformans</li> </ul>	2.1	Foodborne pathogens	6
<ul> <li>2.1.2 Bacillus cereus</li> <li>2.1.3 Escherichia coli</li> <li>2.1.4 Salmonella typhi</li> <li>2.2 Fungal infections</li> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryptococcus neoformans</li> </ul>		2.1.1 Staphylococcus aureus	7
<ul> <li>2.1.3 Escherichia coli</li> <li>2.1.4 Salmonella typhi</li> <li>2.2 Fungal infections</li> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryptococcus neoformans</li> </ul>		2.1.2 Bacillus cereus	7
<ul> <li>2.1.4 Salmonella typhi</li> <li>2.2 Fungal infections</li> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryptococcus neoformans</li> </ul>		2.1.3 Escherichia coli	7
<ul> <li>2.2 Fungal infections</li> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryptococcus neoformans</li> </ul>		2.1.4 Salmonella typhi	8
<ul> <li>2.2.1 Candida albicans</li> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryptococcus neoformans</li> </ul>	2.2	Fungal infections	8
<ul> <li>2.2.2 Aspergillus niger</li> <li>2.2.3 Microsporum canis</li> <li>2.2.4 Cryptococcus neoformans</li> </ul>		2.2.1 Candida albicans	9
2.2.3 Microsporum canis		2.2.2 Aspergillus niger	9
224 Cryptococcus neoformans		2.2.3 Microsporum canis	10
2.2.+ Crypiococcus neojorniuns		2.2.4 Cryptococcus neoformans	10

## CHAPTER ONE INTRODUCTION

#### 1.1 Research Background

An antimicrobial is a type of agent that can kill and slow down the growth of microbes. In the past few years, there has been a gaining interest to search and develop new antimicrobial drugs from many resources especially plant to fight with microbes with antibiotic or antifungal resistance. Infections by microbes to human are getting more common in these years. Food poisoning can occur in any country including Malaysia. These infections are usually either caused by bacteria, fungus, viruses and also parasites. Foodborne pathogens are microorganisms that can cause illness through contaminated food or water. One of the major problems that cause harm to human and food spoilage are microorganisms contaminating the food. In addition, outbreaks of foodborne illness are also common. Foodborne illness outbreaks occur when more than two people get sick from the same source of contaminated food and beverages (U.S Food & Drug Administration (FDA), 2022). The survival of microbes in food is a crucial issue which can lead to spoilage and reduce the quality of food products and also cause harm to human if ingested (Celiktas et al., 2007). A study has shown that in the United States, 9.4 million cases of diseases are caused by pathogens considered as foodborne agents (Scallan et al., 2011). In South Korea, the approximate number of patients warded for foodborne diseases is estimated to be 20 times higher than the number of reported cases by the Ministry of Health of South Korea (Kim et al., 2013). In Malaysia, the main cause of food infection is caused by poor food hygiene and also unhealthy food handling system. It has been reported that in Malaysia the cases of food poisoning are increasing by the rate of 62.47 cases in 100,000 people (Soon *et al.*, 2011).

Foodborne illness is one of the most common diseases in the world which is caused by food infection or food intoxication. Food poisoning is usually caused by ingesting food contaminate with live microbes or its toxins. The bacteria would usually produce toxin and also gas in which will give bad effects to humans. One example of bacteria that had caused outbreak of food poisoning in the commercial airline industry is *Salmonella* spp. The incubation period of the bacteria would depend on what kind of bacteria that have been ingested by a human. The symptom of food poisoning can only be seen after the