بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY

Ain Shams University
Faculty of Science
Microbiology
Department

Studies on the effect of oils extracted from medicinal plants on foodborne pathogens and their enzymatic activities

A Thesis

Submitted for the degree of Doctor of Philosophy in Science in Microbiology

By

Sofia Mostafa Asim

B.Sc. (Microbiology), Botany Department, Faculty of Science, Tanta University (2009)
M.Sc. In Microbiology, Botany Department, Faculty of Science, Zagazig University (2014)

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2021

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بسم الله الرحمن الرحيم

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
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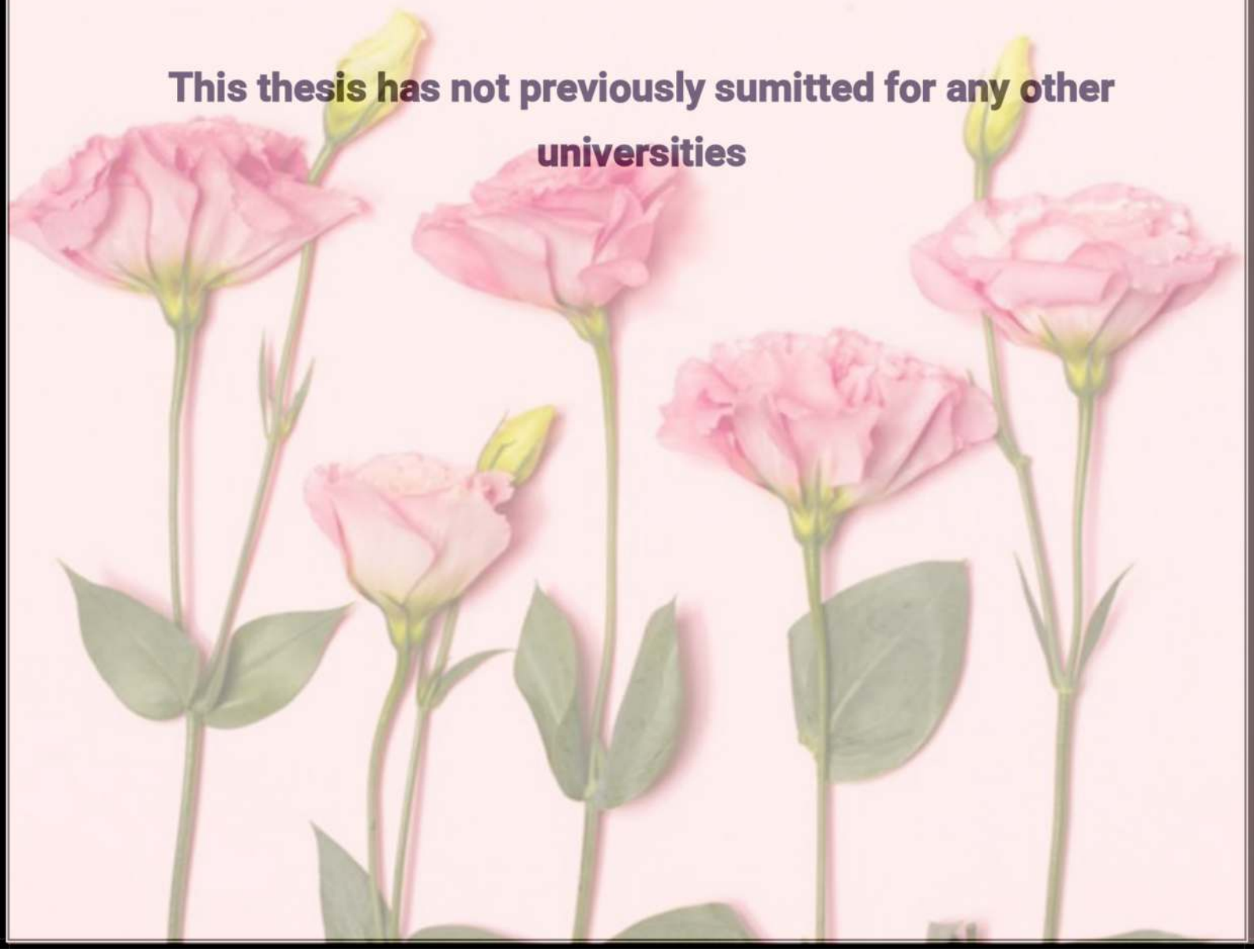

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Sofia Mostafa Asim

Abstract

Abstract

Essential oils (EOs) are naturally occurring antimicrobials found in many plants that have been shown to be effective in a variety of applications by decreasing growth and survival of microorganisms. In addition, EOs exhibit antimicrobial properties that may make them suitable alternatives to antibiotics. These potential attributes and an increasing demand for natural food additive options have led to an interest in the use of EOs as potential alternative antimicrobials.

This study was to determine the efficacy of essential oils as antimicrobial against foodborne pathogens. Foodborne pathogens were isolated from different food sources as meat, chicken, fish, luncheon meat, bread, butter milk, liver of chiken shrimp, yogurt, pancake, tuna, mango juice, cocktail juice, cheese and tomato. The most common microorganisms were bacteria of (*E. coli, Pseudomonas sp., Klebsella sp. and Bacillus sp.*) and fungi of (*Aspergillus flavus, Aspergillus terreus, Aspergillus fumegatus*,). In this study, ten commercially available essential oils were used (*Tea tree oil, Lavender oil, Eucalyptus oil, Rosemary oil, Lemongras oil, Basil oil, Olbaum oil, Cumin oil, onion oil and Cress oil*) as antimicrobial against the isolated foodborne pathogens. The antimicrobial activity of the essential oils was assayed using the agar diffusion method.

The minimum inhibitory concentration (MIC) of the essential oils on the tested microorganisms was determined and the most effective essential oils as antibacterials were: *Lemongras* oil against *Pseudomonas sp.* with MIC of 0.031 µg/µl and *Eucalyptus* oil and *Tea tree* oil against *Bacillus sp*. with MIC of 0.125 µg/µl. The most effective essential oils as antifungals were: *Tea tree* oil against *Aspergillus flavus* with MIC of 0.125 µg/µl, *Tea tree oil* against *Aspergillus teries* with MIC of 0.062 µg/µl and *Lemongras* oil against *Aspergillus flavus* with MIC of 0.03 µg/µl.

It was found also that the selected essential oils had effect on the activity of (protease, lactase, lipase and amylase) enzymes of foodborne microorganisms. It was observed that enzyme activity for the microorganisms decreased with 80% after adding the essential oils to the growth media. GC mass was made to the most effective essential oil and the most effective components.

Keywords: Essential oils, Foodborne pathogens, *Lemongras oil, Basil oil, Olbaum oil,* protease, lactase, amylase, *Pseudomonas sp., Bacillus sp, Aspergillus flavus, Aspergillus teries, Aspergillus fumegatus*.

List of Abbreviations

Symbols	List of Abbreviations
%	Percent
^{o}C	Degree centigrade
µg	Microgram
µl	Microlitre
CFU	Colony forming units
g	gram
hrs	hours
TTO	Tea tree oil
Lav.	Lavender
Euc.	Eucalyptus
Ros.	Rosemary
Lmn.	lemongrass
Olb.	Olbaum
Cum.	Cumin
CAZ	Ceftazidime
AMB	amphotericin B
MIC	Minimum inhibitory concentration
MBC	Minimum Bactericidal Concentration
MFC	Minimum Fungicidal Concentration
TEM	Transmission electron microscopic
FL	Fibrillar layer
CW	Cell wall
PM	Plasma membrane
SP.	Space
V	Vacuole
TLC	Thin Layer Chromatography
GC-MS	Gas chromatography–mass spectrometry

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