MICROBIOLOGICAL STUDIES ON HONEY BEE STRAINS AND OTHER HONEY BEE PRODUCTS

By

RASHA SAMIR AHMED MOHAMED

B.Sc. (Biotechnology), Fac. Agric., Cairo Univ., 2006.
M.Sc. (Agricultural Microbiology), Fac. Agric., Cairo Univ., 2013.

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APPROVAL SHEET

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APROVAL COMMITTEE

Dr. ZEINAB MOHAMED ABD EL GHANY ……..…….
Head researcher of food and feed contamination, Agricultural Research Center

Dr. OLFAT SAYED MAHMOUD BARAKAT……..……..….
Professor of Microbiology, Fac. Agric., Cairo University

Dr. MAHMOUD WAFIK SADIK……..……..……..
Associate Professor of Microbiology, Fac. Agric., Cairo University

Dr. GALAL MAHMOUD KHALAFALLA……..……
Professor of Microbiology, Fac. Agric., Cairo University

Date:2 /5 /2019

SUPERVISION SHEET

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SUPERVISION COMMITTEE

Dr. GALAL MAHMOUD KHALAFALLA
Professor of Microbiology, Fac. Agric., Cairo University

DR. MAHMOUD WAFIK SADIK
Associate Professor of Microbiology, Fac. Agric., Cairo University

DR. MAHMOUD ABDEL-SAMIE MOHAMED ALI
Professor of Economic Entomology and Apiculture, Fac. Agric., Ain Shams University

Name of the candidate: Rasha Samir Ahmed Mohamed **Degree:**Ph.D.
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Supervisors: Dr. Galal Mahmoud Khalafalla
Dr. Mahmoud Wafik Sadik
Dr. Mahmoud Abd El-Samie Mohamed Ali
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ABSTRACT

A total of 209 microbial isolates obtained from honey bee products and the gut of honey bees in different life stages in three feeding seasons (sugar feeding season, citrus feeding season and clover feeding season) in Egypt were assessed for *in vitro* antagonistic activity against human pathogens. Screening for the isolates that have antagonistic effect was done. 64 isolates have an antagonistic effect against one or more pathogens. The most active isolates were identified based on 16S rRNA and 18S rRNA genes for bacteria and yeast identification, respectively**.** Five isolates out of 64 showed a high potential to act as probiotics. They are identified by molecular means as *Wickerhamomyces anomalus, Lachancea thermotolerans, Zygosaccharomyces mellis, Bacillus licheniformis and Paenibacillus polymyxa*. The antagonistic mechanisms were analyzed using cylinder diffusion assay and transmission electron microscopy. All the five isolates exhibited antimicrobial activities with variable spectrum against 6 human pathogens. They show high tolerance to low pH up to 1.5 and tolerate high bile salt concentration up to 3% after 3 hours of incubation. GC/MS analysis of ethyl acetate extract revealed the presence of Heptadecane, Palmitic acid, Dodemorph, Paradehyde, Octadecnonic and Fenoprofen which may inhibit the growth of pathogenic bacteria and *Candida albicans*. Although it seems unconventional to use yeast strains and non-lactic acid bacteria as probiotics, these five isolates have a high potential to be used as probiotics for animals and humans.

Keywords: probiotics,*Wickerhamomyces anomalus, Lachancea thermotolerans, Zygosaccharomyces mellis, Bacillus licheniformis, Paenibacillus polymyxa.*

DEDICATION

I dedicate this work to whom my heart felt thanks; to my Mother ,my late Father, my brothers, my husband and my kids for their patience and help, as well as to my Supervisors for all the support they offered along the period of my post graduation.

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