بسم الله الرحمن الرحيم

∞∞∞

تم رفع هذه الرسالة بواسطة / سامية زكى يوسف

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لا يوجد

Ain Shams University
Faculty of Science

Aquatic insects as bioindicator for assessment of the environmental health

A Thesis
Submitted to the Department of Entomology,
Faculty of Science, Ain Shams University
For the award of the M. Sc Degree
(Entomology)

By

Omnia Adel Abass Sobhy
B. Sc. 2016

Supervisors

Prof. Dr. Rawda Mohamed Badawy
Professor of Insect Taxonomy and Ecology, Entomology Department, Faculty of Science, Ain Shams University

Dr. Asmaa Anas Haggag
Assistant Professor of Entomology Department, Faculty of Science, Cairo University

Dr. Eman Essa Fahmy
Lecturer of Entomology Department, Faculty of Science Ain Shams University

Entomology Department
Faculty of Science
Ain Shams University
2022

Biography

Name: Omnia Adel Abass Sobhy.

Date and place of Birth:1 October 1994, Cairo, Egypt.

Degree awarded: B.Sc. (Entomology –Chemistry), 2016.

Faculty: Science

University: Ain Shams

Date of graduation: June 2016.

Board of Supervision

Prof. Dr. Rawda Mohamed Badawy

Professor of Insect Taxonomy and Ecology, Entomology Department, Faculty of Science, Ain Shams University.

Dr. Asmaa Anas Haggag

Assistant Professor of Entomology Department, Faculty of Science, Cairo University.

Dr. Eman Essa Fahmy

Lecturer of Entomology Department, Faculty of Science, Ain Shams University.

Acknowledgement

*First and foremost, many thanks are due to Almighty **Allah**, greater of all, for giving me the ability and effort to achieve this work.*

*It is with great pleasure, deep satisfaction, and gratitude that I acknowledge the collaboration of **Prof. Dr. Rawda Mohamed Badawy,** Professor of Insect Taxonomy and Ecology, Entomology Department, Faculty of Science, Ain Shams University, for her great supervision and following up the course of the work. Also, for her continuous encouragement, advice, and criticism, and for great efforts and long time she gave me. I deeply express my appreciation and thanks to her and I will always still grateful.*

*No word can express my deep appreciation to **Dr. Asmaa Anas Haggag** Assistant Professor of Insect taxonomy, Faculty of Science, Cairo University, for her constant guidance, sincere encouragement and for providing all possible laboratory facilities to accomplish the practical part of this study.*

*It is a great pleasure to express my gratitude to **Dr. Eman Essa Fahmy,** Lecturer of Entomology, Ain Shams University, for her efforts, encouragement and for providing all possible laboratory facilities to accomplish the practical part of this study.*

*It is a great pleasure to express my gratitude to **Prof. Dr. Soheir** Head of Entomology department. Big thanks to my Department, **Entomology Department, all staff, and employers** and special thanks to **Sherif Hamed** and **Eman Abdelnasser,** for their advice and help.*

*Very special thanks to my beloved **father, motherand my aunt Latifa**, for their continuous love and their interest they showed in my studies and the motivation they gave me during those tiring times. I can't express my gratitude for them in words. I would like to thank my sister, **Retag** and my brothers **Ahmed, Mohamed, Anas and my cousin Mostafa** for all their help, encouragement, and patience which made my task so much easier. I wish to extend my thanks to my beloved close friends **Aya Ahmed, Aml Sameh**, for inspiring my final effort despite the enormous work pressures we were facing together.*

I would like to express my deepest gratitude and appreciation to all those who made this work possible.

Abstract

Insects are the furthermost abundant biotas in most ecosystems, they are more strictly and quickly affected by pollutants in their ecosystem, their response as a bioindicator to determine the effect of chemical and physical properties of water is an ideal technique to assess water quality. The impact of water quality on the aquatic insect's population density, eveness and rishness, was studied throught seasonal collection of aquatic insects from opened drain stream and comparing them to speciemns collected from the normal Nile River stream at Abu Zabal (Al Akhankah, Al Qalyubia governorate, Egypt). Water samples were analyzed, the results ensured the positive effect of the aquatic insects as a monitor to evaluate the water quality. The maggots of the drone fly *Eristalis tenax* (L., 1758) (Diptera: Syrphidae), the dominant species of the first stream have survived in habitats with extreme microbial contamination at this Alakrasha opened drain. So, the cuticle surface that play as the first physical barrier, have investigated using scanning electron microscopy, which revealed lattice-like array of high-density microstructures (Nanopallires) that are narrow, sharp, and pointed, appear to make it difficult for bacteria to colonize on its surface and acts as a defense against bacterial infection. Antimicrobial susceptibility testing for the Rat-tailed maggot extract of the whole body shows a high level of antibacterial activity.

Keywords: Aquatic insects, Bioindicator, Water quality, *Eristalis tenax* (L.), cuticle surface, Nanopillars, maggot extraction, antibacterial activity.

List of Contents

Title Page No.

List of Tables

List of Figures

List of Figures *(Cont…)*

List of Figures *(Cont…)*