

BIOCHEMICAL STUDIES ON SOME PLANT EXTRACTS

By

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**B.Sc. Agric. Sci. (Plant Production), Fac. Agric., Cairo Univ., 2001
Diploma of Agric. Chemical Analysis, Fac. Agric., Cairo Univ., 2004**

THESIS

**Submitted in Partial Fulfillment of the
Requirements for the Degree of**

MASTER OF SCIENCE

In

**Agricultural Sciences
(Biochemistry)**

**Department of Biochemistry
Faculty of Agriculture
Cairo University
EGYPT**

2010

APPROVAL SHEET

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ABSTRACT

Three essential oil plant extracts, of Chamomile; *Chamomilla recutita* (L.), Marjoram; *Marjorana hortensis* (L.), and Eucalyptus (*Eucalyptus* sp.) were screened to study their ability for controlling *Tetranychus urticae* Koch. Different concentrations of essential oil extracts (0.5, 1, 2, 3 and 4%) of *C. recutita*, *M. hortensis* and *Eucalyptus* sp. were used as acaricidal activity against *Tetranychus urticae*. Chamomile was asserted to be one of the most efficient agents against *T. urticae* followed by Marjoram and Eucalyptus. The LC₅₀ values of these oils were 0.651, 1.83; 1, 19, 6.26 and 2.18, 7.33 for adults and eggs, respectively.

Herein, the bioassay experiments of the two essential oil of Chamomile and Marjoram proved relationship between essential oil contents and activity of enzyme glutathione S-transferase, non specific esterase and alkaline phosphatase in *T. urticae*.

GC-MS analysis of *C. recutita* and *M. hortensis* proved the presence of 13 and 14 essential oil components, respectively. The major essential oil contents of *C. recutita* are Bisabolol oxide A (35.25%), and Trans beta farersene (7.98%), while the main components of *M. hortensis* are Terpinen-4-ol (23.86%), p-cymene (23.40%) and sabinene (10.90%)

The major components of both plant extracts (Terpinen-4-ol 23.86% and Bisabolol oxide A 35.25% essential oil) may be are responsible for the activity of enzymes of *T. urticae*. (Glutathione S-transferase, non specific esterase, (acid, alkaline) phosphatases and protease.

Key words: Tetranychidae, essential oils, plant extracts, Biology and Enzyme. (Glutathione S -transferase, non specific esterase, (acid, alkaline) phosphatases and protease).

DEDICATION

I dedicate this work to whom my heart felt thanks; to my wife and my mother for their patience and help, as well as to my father and brothers for all the support they lovely offered along the period of my post graduation.

ACKNOWLEDGEMENT

I wish to express my sincere thanks, deepest gratitude and appreciation to Dr. ABD-EL-MONEIM MOHAMED RADWAN AFIFY, Professor of Biochemistry, Faculty of Agriculture, Cairo University, for his kind help, indispensable advice and encouragement from the beginning of this work and revision the manuscript of this thesis. Also, I wish to express my sincere thanks, deepest gratitude and appreciation to MAHMOUD ABD-EL-HALIM MAHMOUD, Professor of Biochemistry, Faculty of Agriculture, Cairo University, for supervision, continued assistance My great indebtedness to Dr. FATMA SAMIR ALI, Professor of Acarology, Faculty of Agriculture, Cairo University for valuable scientific guidance throughout this work. Sincere thanks to Dr. mostaf farag, Professor of Biochemistry, Faculty of Agriculture, Cairo University for supervision.

I would like to thank Dr. MORAD FAHMY, Professor of Acarology, Faculty of Agriculture, Cairo University, for his kind help in all awing to complete my practical work at Acarology laboratory.

Grateful appreciation is also extended to all staff members of Biochemistry Department, Faculty of Agriculture, Cairo University for their valuable co-operation. My thanks to Dr. Reham Ibrahim Abo-Shnaf, Researcher at plant Protection Research Institute Agri. Res. Center for her help during the biology analysis of this thesis.

<p>اسم الطالب: أحمد فؤاد شحاته تركي</p> <p>عنوان الرسالة: دراسات بيوكيميائية على بعض المستخلصات النباتية</p> <p>المشرفون: دكتور: عبد المنعم محمد رضوان عفيفي</p> <p>دكتور: محمود عبد الحليم محمود</p> <p>دكتور: فاطمة سمير علي</p> <p>قسم: الكيمياء الحيوية</p> <p>فرع: الكيمياء</p> <p>تاريخ منح الدرجة: ٧ / ٤ / ٢٠١٠</p>	
<p style="text-align: center;">المستخلص العربي</p> <p>الهدف الرئيسى لهذه الدراسة معرفة التأثير السام لبعض المستخلصات النباتية ضد أكاروس العنكبوت الأحمر ذى البقعتين واستخدمت فى هذه الدراسة الزيوت العطرية الناتجة من كل من عشب الكاموميل والبردقوش والكافور .</p> <p>أظهرت ان زيت الكاموميل كان الاكثر فاعلية على بيض الاكاروس يلية زيت البردقوش بينما اظهر زيت الكافور تاثير ضعيف كما اظهرت النتائج ان زيت الكاموميل والبردقوش ذات فاعلية عالية ضد اناث اكاروس العنكبوت الاحمر ذى البقعتين واظهرت ان زيت الكافور له تأثير متوسطاً ضد الاناث البالغة للاكاروس العنكبوت الاحمر ذى البقعتين. <i>Tetranychus urticae</i></p> <p>وتم دراسة العلاقة بين تأثير المستخلصات النباتية ونشاط الانزيمات واستخدمت الجرعة السامة النصفية بالرش لكلا من زيت الكاموميل وزيت البردقوش على الاناث البالغة للاكاروس العنكبوت الاحمر ثم وضعها فى الحضان لمدة ٢٤ ساعة وتم اخذ الاناث التى ظلت حية بعد ٢٤ ساعة وتم تقدير نشاط بعض الانزيمات.</p> <p>أظهرت النتائج ارتفاع فى مستوى نشاط انزيم الجلوتاثيون ترانس فيريز بالمعاملة بزيت الكاموميل وزيت البردقوش بالمقارنة بالمعاملة Triton X-100 والاكاروس الغير معاملة.</p> <p>وأظهرت النتائج ارتفاع فى مستوى نشاط انزيم الفا استريز وارتفاع فى مستوى نشاط انزيم بيتا استريز كما اظهرت النتائج ايضاً ارتفاع فى مستوى نشاط انزيم اسيد فوسفاتيز واخيراً انخفاض فى مستوى نشاط انزيم الكالين فوسفاتيز وانخفاض فى مستوى نشاط انزيم البروتينز واخيراً تم اختيار الزيوت التى اثبتت فاعلية عالية ضد العنكبوت الاحمر ذى البقعتين مكوناتها بواسطة GC/MS. وتم تعريف مكونات زيت الكاموميل</p> <p>حيث تم تعريف ١٣ مركباً فى زيت الكاموميل وكانت المركبات الرئيسية هى:</p> <p>Trans - farersene (7.98%) , Bisabolol oxide A (35.25%)</p> <p>وأيضاً تم تعريف مكونات زيت البردقوش تم تعريف ١٤ مركباً فى زيت البردقوش وكانت المركبات الرئيسية هى: Sabinene (10.904%) , p -cymene (23.404%) , Terpinene- 4 -ol (23.860%)</p> <p>– Caryophyllene (4.820%), – terpinene (9.034%), –Terpineol (6.421%)</p> <p>الكلمات الدالة : المستخلصات النباتية – انزيم (الجلوتاثيون ترانس فيريز – الفا وبيتا استريز – أسيد والكالين فوسفاتيز – بروتينز – العنكبوت الأحمر ذى البقعتين) .</p>	

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INTRODUCTION

The two-spotted spider, *Tetranychus urticae* Koch is one of the most important pests responsible for yield losses of many horticultural ornamental and agronomic crops. *T. urticae* is a major pest of agricultural systems, mainly annual crops and vegetables (Helle and Sabelis, 1985). A major problem in the control of *T. urticae* is the response to develop resistance to many acaricides (Stumpf and Nauen, 2002). For several years, chemical control of mites has been extensively practiced in Egypt to check mite population increase. Resistance problems and high residual levels in food products may hinder its marketing. Such undesirable consequences have caused alienating effects on the irrational use of chemical agents (Ali, 2004). Therefore, the use of essential oils of plant extracts in pest management programs has recently attracted the attention of many scientists. Pesticides of plant origin seem to be recommended as they generally have a very short persistence on the plant (Isman, 1997 and Carbaras *et al.*, 2002). Chamomile, *chamomilla recutita* L., is a well known medicinal plant in folk medicine cultivated all over the world. Chamomile essential oil is widely used in pharmaceuticals, cosmetics, and food industries. The pharmacological effect of chamomile is mainly connected with its essential oil for its spasmolytic, antimicrobial, and disincentives properties (Koppel and Arak1, 993).

Marjoram (*Marjorana hortensis* L.) is used world wide as a spice and a medicinal source in the form of the essential oil in