

سامية محمد مصطفى



شبكة المعلومات الجامعية

# بسم الله الرحمن الرحيم



سامية محمد مصطفى



شبكة المعلومات الجامعية



# شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم





سامية محمد مصطفى



شبكة المعلومات الجامعية

# جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



## يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



سامية محمد مصطفى



شبكة المعلومات الجامعية



# بعض الوثائق الأصلية تالفة





سامية محمد مصطفى



شبكة المعلومات الجامعية



# بالرسالة صفحات لم ترد بالأصل



**INTEGRATED CONTROL OF RED SPIDER MITE**  
***TETRANYCHUS URTICAE* KOCH ON**  
**STRAWBERRY PLANTS**

**By**

**El-Sayed Mohamed Ahmad El-Saiedy**

B. SC. Agric., Al-Azhar University, 1992

M. SC. Agric., Menoufia University, 1999

**Thesis**

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

**Of**

**Doctor of Philosophy**

**In**

**Agricultural Zoology**

**(Acarology)**

**Agricultural Zoology and Nematology**

**Department**

**Faculty of Agriculture**

**Cairo University**

**2003**

B

12712



## **Supervision Committee**

**Title of Thesis** : Integrated Control of Red Spider Mite  
*Tetranychus urticae* koch. on Strawberry  
Plants .

**Name of Student** : El-Sayed Mohamed Ahmad El-Saiedy

**Degree** : Ph.D. Agricultural Zoology (Acarology)

### **1- Prof. Dr. A. M. Afifi**

Professor of Acarology, Agricultural Zoology and Nematology  
Department, Faculty of Agriculture, Cairo University

### **2- Prof. Dr. S. A. Shehata**

Professor and head of Vegetable Crops Department, Faculty of  
Agriculture, Cairo University.

### **3- Prof. Dr. A. Y. M. El-Laithy**

Professor of Acarology , Plant Protection Department, National  
Research Center.



**Cairo University**  
**Faculty of Agriculture**  
**Department of Agricultural Zoology**

## **Approval Sheet**

**Title of Thesis** : Integrated Control of Red Spider Mite  
*Tetranychus urticae* koch on Strawberry  
plants.

**Name of Student** : El-Sayed Mohamed Ahmad El-Saiedy  
**Degree** : Ph.D. Agricultural Zoology (Acarology)

### **Approved by:**

1- Prof Dr. Safaa Moustafa Abo-Taka...S. M. Abo-Taka.....

Professor of Acarology, Economic Entomology and  
Agricultural Zoology Department, Faculty of Agriculture,  
Menoufia University.

2-Prof. Dr. Morad Fahmy Hassan...M. F. Hassan.....

Professor of Acarology, Agricultural Zoology and  
Nematology Department, Faculty of Agriculture, Cairo  
University.

3- Prof. Dr. Said. Abd-Alla Shehata...Said A. Shehata.....

Professor and head of Vegetable Crops Department,  
Faculty of Agriculture, Cairo University.

4- Prof. Dr. Abd-Alla. M. Afifi...A. M. Afifi.....

Professor of Acarology, Agricultural Zoology and  
Nematology Department, Faculty of Agriculture, Cairo  
University

(Committee in Charge)

**Date:** 27/ 8/ 2003

**Name of Candidate :** El-Sayed Mohamed Ahmed El-Saiedy      **Degree :** Ph.D  
**Title of Thesis :** Integrated control of red spider mite *Tetranychus urticae* koch on strawberry plants.  
**Supervisors :** Prof. Dr. A. M. Afifi ,  
Prof. Dr. S. A. Shehata,  
Prof. Dr. A. Y. M. El-Lithy  
**Department :** Agricultural Zoology (Acarology)  
**Branch :** Acarology      **Approval :** 2003

### ABSTRACT

The present work aimed to study the population dynamics of both phytophagous and predatory mites associated with two strawberry cultivars (Sweet -Charlie and Comarosa), study the host plant resistance (chemical and physical factors) and effect of fertilization on mite infestation. Also, the efficiency of different control methods (chemical and biological) for controlling these phytophagous mite. The obtained results revealed that:

- 1- The rate of infestation was higher in Comarosa than on Sweet-Charlie cultivar, population density was so higher at Giza followed by Ismailia and Qalubia. The peak of population in all localities was occurred during February and March. Three predatory mites were recorded, *Amblyseius swirskii* (Athias-Henriot), *Amblyseius zaheri* (Yousif & El-Brolosy) and *Amblyseius barkeri* (Huges) at Ismailia, Qalubia and Giza, respectively. The predatory insect (*Oruis* sp.) was recorded at February, reaching its peak during March. The population of *T.urticae* stages had a positive correlation with air temperature, while it had negative correlation with relative humidity.
- 2- Sweet- Charlie cultivar was higher than Camarosa in total phenols and amino acids, while the opposite was recorded for total sugars. Trichomes of Sweet-Charlie are longer and have more sharply and pointed end. Population density of Sweet-Charlie trichomes was higher than those of Camarosa. Fertilization with  $\text{CaSO}_4$  or  $\text{K}_2\text{SO}_4$  reduced and laten infestation by spider mites to the first half of March, annd increased total phenols and amino acids in both cultivars compared with control.
- 3- Evaluation the efficiency of Vertemic, Plant-Guard, Micronised sulfure and Sumite during two seasons was studied. Vertemic revealed that it was the compound which had good reduction percentages in all mite stages, while Sumite and Plant-Guard were the lowest efficiency compounds. Micronised sulfur was moderate efficiency compound. The higher reduction percentages of Vertemic was occurred on immatures, followed by adults, while eggs had the lowest reduction percentages during two seasons.
- 4- The exotic predatory mites *Amblyseius californicus* (McGregor) and *Phytoseiulus persimilis* (Athias-Henriot) gave excellent biological control, while the indigenous species *Euseius scutalis* (El-Badry) and *A. barkeri* (Huges), gave medorate control.
- 5- The Vertemic was the best treatment in increasing of strawberry yield by the exotic predatory mite *A.californicus* and *P.persimilis*, while indigenous predators gave moderate increasing in yield. The other pesticides and both fertilization treatments gave lowest percentage of increasing in strawberry yield.

A.M. Afifi

## ACKNOWLEDGMENT

My thanks are submitted first and foremost to ALLAH who gave me the strength and ability to complete this work.

The author wishes to express his deep thanks to Prof. Dr. A.M. Afifi, Professor of Acarology, Agricultural Zoology and Nematology Department, Faculty of Agriculture, Cairo University, for his supervision, encouragement and for suggesting the problem and offering his help and guidance offered throughout this work.

The author wants to express his sincere appreciation to Prof. Dr. S. A. Shehata, Professor and head of Vegetable Crops Department, Faculty of Agriculture, Cairo University, for his keen interest, valuable suggestions, guidance, reviewing the manuscript and fruitful supervision. His indispensable efforts deserve my deep thanks.

Thanks are also to Prof. Dr. A.Y.M. El-Laithy, Professor of Acarology, Plant protection Department, National Research Center, for his keen interest, valuable suggestions, guidance, reviewing the manuscript and fruitful supervision. His indispensable efforts deserve my deep thanks.

The author would like to extend his deepest gratitude to Prof. Dr. S.M. Abo-Taka, Professor of Acarology, Economic Entomology and Agricultural Zoology Department, Faculty of Agriculture, Menoufia University, for her kind efforts in reviewing the statistical analysis and her help and encouragement providing during this work.

This work is dedicated to my wife and my kids for their patience, love and encouragement, gave me during this study.



# CONTENTS

	Page
<b>INTRODUCTION .....</b>	<b>1</b>
<b>REVIEW OF LITERATURE .....</b>	<b>4</b>
<b>I- <u>Population dynamics of phytophagous and predacious mites</u> .....</b>	<b>4</b>
<b>II- <u>Host plant resistance</u> .....</b>	<b>8</b>
A. Chemical factors .....	8
B. Physical factors .....	11
C. Effect of fertilization .....	13
<b>III- <u>Control of <i>Tetranychus urticae</i> Koch</u> .....</b>	<b>15</b>
A. Chemical control .....	15
B. Biological control .....	19
<b>IV- <u>Effect of different treatments on crop yield</u> .....</b>	<b>26</b>
 <b>MATERIALS AND METHODS .....</b>	 <b>30</b>
- Strawberry cultivars .....	30
- Localities of experimentation .....	30
- General experimental design .....	31
<b>I- <u>Population dynamics of both phytophagous and predatory mites on strawberry plants</u> .....</b>	<b>31</b>
- Sampling procedure .....	32
<b>II- <u>Host plant resistance</u> .....</b>	<b>32</b>
A. Chemical factors .....	33
B. Physical factors .....	34
C. Effect of fertilization .....	34
<b>III- <u>Control studies of <i>T. urticae</i> koch</u> .....</b>	<b>35</b>
A. Chemical control .....	35
B. Biological control .....	37
1- Rearing of <i>T. urticae</i> as prey .....	37
2- Rearing of predatory mites .....	37
3- Mass rearing of predatory mites .....	37

4- Releasing of the predatory mites .....	38
<b>IV- <u>Determination of strawberry yield</u></b> .....	38
<b>V- <u>Statistical analysis</u></b> .....	39
<b>RESULTS AND DISCUSSION</b> .....	40
<b>I- <u>Population dynamics of phytophagous and predatory mites inhabiting two cultivars of strawberry</u></b> .....	40
A. Phytophagous mites .....	40
B. Predatory mites and insects .....	52
C. Effect of certain weather factors on mite numbers .....	57
<b>II- <u>Host plant resistance</u></b> .....	64
A. Chemical factors .....	64
B. Physical factors .....	66
C. Effect of fertilization on mite infestation .....	68
1- Effect of fertilization by $\text{CaSO}_4$ and $\text{K}_2\text{SO}_4$ on the strawberry susceptibility to mite infestation .....	68
2- Effect of fertilization by $\text{CaSO}_4$ and $\text{K}_2\text{SO}_4$ on the chemical constituents of strawberry leaves .....	80
<b>III- <u>Control studies on <i>T. urticae</i> koch on strawberry</u></b> .....	82
A. Chemical controls .....	82
1- Effect of some compounds on the number of <i>T. urticae</i> different stages at Ismailia Governorate .....	82
a) Season 2000-2001 .....	82
b) Season 2001-2002 .....	87
2- Effect of some compounds on the number of <i>T. urticae</i> different stages at Qalubia Governorate .....	92
a) Season 2000-2001 .....	92
b) Season 2001-2002 .....	97
3- Effect of some compounds on the number of <i>T. urticae</i> different stages at Giza Governorate .....	101
Season 2001-2002 .....	101

B. Biological control .....	107
1- At Ismailia Governorate .....	107
a) Season 2000-2001 .....	107
b) Season 2001-2002 .....	112
2- At Qalubia Governorate .....	118
a) Season 2000-2001 .....	118
b) Season 2001-2002 .....	124
3- At Giza Governorate .....	130
Season 2001-2002 .....	130
<b>IV- <u>Effect of different treatments against <i>T. urticae</i> koch on</u></b>	
<b><u>strawberry yields</u> .....</b>	<b>139</b>
1- At Ismailia Governorate .....	139
a) Season 2000-2001 .....	139
b) Season 2001-2002 .....	142
2- At Qalubia Governorate .....	142
a) Season 2000-2001 .....	142
b) Season 2001-2002 .....	174
3- At Giza Governorate .....	174
Season 2001-2002 .....	174
<b>SUMMARY .....</b>	<b>152</b>
<b>REFERENCES .....</b>	<b>157</b>
<b>ARABIC SUMMARY .....</b>	



## LIST OF TABLES

Table	Page
1 Population dynamics of <i>Tetranychus urticae</i> stages on two cultivars of strawberry at Ismailia Governorate during 2000-2001 .....	41
2 Population dynamics of <i>Tetranychus urticae</i> stages on two cultivars of strawberry at Qalubia Governorate during 2000-2001 .....	44
3 Population dynamics of <i>Tetranychus urticae</i> stages on strawberry cultivar (Sweet-Charile) at three localities during 2001-2002 .....	47
4 Population dynamics of <i>Tetranychus urticae</i> stages on strawberry cultivar (Camarosa) at three localities during 2001-2002 .....	50
5 Record of the predatory mites and insects on two strawberry cultivars at Qalubia and Ismailia Governorate during 2000-2001.	55
6 Record of the predatory mites and insects on two strawberry cultivars at Ismailia, Qalubia and Giza Governorates during 2001-2002 .....	56
7 Correlation coefficient (r) of the numbers of <i>T. urticae</i> stages and predacious mites on two cultivars of strawberry and two weather factors (Temperature and Humidity) at Ismailia and Qalubia Governorates during 2000-2001 .....	59
8 Correlation coefficient (r) of the numbers of <i>T. urticae</i> stages and predacious mites on two cultivars of strawberry and two weather factors (Temperature and Humidity) at Ismailia, Qalubia and Giza Governorates during 2001-2002 .....	60
9 Chemical constituents of strawberry leaves for two cultivars at Giza, Ismailia and Qalubia Governorate during different periods of mite infestation .....	65