

ROLE OF CERTAIN ECONOMIC SPIDERS AS PREDATORS OF HARMFUL PESTS IN GREENHOUSES

By

DOAA MAHMOUD ABDEL HAMID ABDEL GHANI

B.Sc. Agric. Sci. (Entomology), Fac. Agric., Ain Shams Univ., 2003

M.Sc. Agric. Sci. (Zoology), Fac. Agric., Ain Shams Univ., 2009

THESIS

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

DOCTOR OF PHILOSOPHY

In

**Agricultural Sciences
(Agricultural Zoology)**

**Department of Zoology and Agricultural Nematology
Faculty of Agriculture
Cairo University
EGYPT**

2018

Format Reviewer

**Vice Dean of Graduate
Studies**

APPROVAL SHEET

ROLE OF CERTAIN ECONOMIC SPIDERS AS PREDATORS OF HARMFUL PESTS IN GREENHOUSES

**Ph.D. Thesis
In
Agric. Sci. (Agricultural Zoology)**

By

DOAA MAHMOUD ABDEL HAMID ABDEL GHANI

B.Sc. Agric. Sci. (Entomology), Fac. Agric., Ain Shams Univ., 2003

M.Sc. Agric. Sci. (Zoology), Fac. Agric., Ain Shams Univ., 2009

APPROVAL COMMITTEE

Dr. ASHRAF ABD EL-HAFIZ RAHIL.....

Professor of Acarology, Fac. Agric., Al-Fayoum University

Dr. MOHAMED SAMY EL-SAED NAWAR.....

Professor of Acarology, Fac. Agric., Cairo University

Dr. MOHAMED ABD EL-AZIZ ZAHER.....

Professor of Acarology, Fac. Agric., Cairo University

Dr. MORAD FAHMY HASSAN

Professor of Acarology, Fac. Agric., Cairo University

Date: 12 / 11 /2018

SUPERVISION SHEET

**ROLE OF CERTAIN ECONOMIC SPIDERS AS
PREDATORS OF HARMFUL PESTS IN
GREENHOUSES**

**Ph.D. Thesis
In
Agricultural Sci. (Agricultural Zoology)**

By

DOAA MAHMOUD ABDEL HAMID ABDEL GHANI

B.Sc. Agric. Sci. (Entomology), Fac. Agric., Ain Shams Univ., 2003

M.Sc. Agric. Sci. (Zoology), Fac. Agric., Ain Shams Univ., 2009

SUPERVISION COMMITTEE

Dr. MORAD FAHMY HASSAN

Professor of Acarology, Fac. Agric., Cairo University

Dr. MOHAMED ABDEL AZIZ ZAHER

Professor of Acarology, Fac. Agric., Cairo University

Dr. GIHAN MOHAMED EL SAYED SALLAM

**Head Research of Acarology, Plant Protection Research Institute,
A.R.C.**

Name of Candidate: Doaa Mahmoud Abdel Hamid Abdel Ghani **Degree:** Ph.D.
Title of Thesis: Role of Certain Economic Spiders as Predators of Harmful Pests in Greenhouses
Supervisors: Dr. Morad Fahmy Hassan
 Dr. Mohamed Abdel Aziz Zaher
 Dr. Gihan Mohamed El Sayed Sallam
Department: Zoology and Agricultural Nematology
Branch: Agricultural Zoology
Approval: 12 / 11 /2018

ABSTRACT

The present work aimed to through light on the spiders occurrence on some plants in greenhouses in Giza governorate to conduct families and species in this ecosystem to maximize its role to reduce the population of some pests. Random samples were collected twice a month from the vegetables Tomato, Eggplant and Green bean and the fruit trees Mango and Citrus in the commercial greenhouses structure, gutter connected. There were (46) species belonging to (18) families; Dictynidae, Dysderidae, Gnaphosidae, Linyphiidae, Lycosidae, Oecobiidae Oonopidae, Pholcidae, Philodromidae, Salticidae, Scytodidae, Sicariidae, Synsphyridae, Theridiidae, Thomisidae and Titanoecidae on vegetable plants. In addition to these families except the family Pholcidae the two families Eutichuridae and Uloboridae were found on fruit trees. The most abundant spider family on vegetable plants was Linyphiidae, while that on fruit trees was Eutichuridae.

There was evident relationship between *Cheiracanthium isiacum* and its prey *Phyllocnistis citrella*. In the mango orchard there were 13 spider families on the ground of which the family Salticidae had the highest number and six families on the foliage with Eutichuridae had the highest number. There were 27 species recorded new locality in Giza governorate and one species as a new record in Egypt. Some biological aspects of the two spider species and its food range were studied on *Nigma conducens* of the family Dictynidae and *Theridion hannoniae* of the family Theridiidae as a first rearing. *N. conducens* fed and developed on two types of prey, *Drosophila melanogaster* and *Pealius mori*. Social behavior was observed on this spider species. Type of prey had a statistical significant effect on the duration of the developmental stages and also on the female fecundity. Female life cycle averaged 75.91 and 107.19 days on *D. melanogaster* and *P. mori* respectively. The second species *T. hannoniae* fed and developed on *Tetranychus urticae*. Female and male life cycle averaged 94.1 and 103.06 days respectively.

Key words: Greenhouse, spiders, biological control, gut content analysis, Dictynidae, Theridiidae and biological studies

ACKNOWLEDGMENT

Firstly, Ultimate Thanks to Allah

*I wish to express my special thanks, deepest gratitude and appreciation to **Dr. Mohamed Abd El Aziz Zaher and Dr. Morad Fahmy Hassan** , Professors of Acarology, Faculty of Agriculture, Cairo University, for suggesting the problem, their supervision, their continued assistance and guidance through the course of my study and for their revision of the manuscript of this thesis.*

*Thanks are also due to Prof. **Dr. Gihan Mohamed El Sayed Sallam**, Head research of the fruit Acarology Department, Plant Protection Research Institute, Agriculture Research Center. For her kind help.*

*Grateful appreciation is also extended to **Colonel Hisham Kamal El-Din El-Hennawy** (Arachnid Collection of Egypt) whose educating taxonomic aid, helping hand and references provided are truely appreciated.*

CONTENTS

	Page
INTRODUCTION	1
REVIEW OF LITERATURE.....	5
1. Spiders in Greenhouses.....	5
2. Horticulture of Mango in Green houses.....	9
3. Gut Content Analysis	13
4. Biology of Dictynid and Theridiid spiders.....	19
MATERIALS AND METHODS.....	29
RESULTS AND DISCUSSION.....	37
1. Ecological behavior	37
a. Spider families that spin web	37
b. Spider families that not spin web.....	39
1. Active hunter spider families.....	39
2. Passive hunter spider families.....	41
2. Description of the structure of female genitalia	47
3. Dominance and occurrence of spider species in greenhouses in Giza governorate	64
a. Vegetable plants in greenhouses.....	69
b. Fruit trees in greenhouses.....	83
4. Predator-prey relationship.....	95
a. Population dynamic.....	95
b. PCR assay.....	98
5. Biological study.....	101
a. Range of prey-food types	101
b. Developmental stages of <i>N. conducens</i> (O. Pickard- Cambridge, 1876)	102
c. Food consumption.....	105
d. Developmental stages of <i>T. hannoniae</i> Denis, 1944.....	114
SUMMARY.....	118
REFERENCES.....	122
ARABIC SUMMARY	

LIST OF TABLES

No.	Title	Page
1.	Occurrence of spider species on different plants and their habitat in greenhouses at Giza governorate	65
2.	Spider species that recorded a new locality and its behavior in vegetable and fruit greenhouses	68
3.	Dominance of spider families on vegetable plants in greenhouse.....	69
4.	Effect of the type of vegetable plants on the dominance of spider families in greenhouse.....	72
5.	Species list with (♂/♀) per type of plants during four months	76
6.	Occurrence of spider families as juveniles of Eggplant plants in greenhouse two times during four months.....	80
7.	Occurrence of spider families as juveniles of Green bean plants in greenhouse two times during four months	81
8.	Occurrence of spider families as juveniles of Tomato plants in greenhouse two times during four months	82
9.	Dominance of spider families on fruit trees in greenhouse.....	84
10.	Dominance of spider families on Citrus in greenhouse	86
11.	Dominance of spider families on Mango in greenhouse	86
12.	Spider families occurred on ground of Mango trees ...	88
13.	Spider families occurred in foliage of Mango trees	89
14.	Occurrence of spider families as Juveniles of Mango trees in greenhouse during six months	90
15.	Species list with (♂/♀) per number of sampling times of mango trees during six months	92
16.	Development, longevity and life span of <i>N. conducens</i> males fed on adults <i>D. melanogaster</i> and <i>P. mori</i>	106
17.	Development, longevity and fecundity of <i>N. conducens</i> females fed on adults <i>D. melanogaster</i> and <i>P. mori</i>	108

18.	Food consumption of male and female of <i>N. conducens</i> fed on whitefly	112
19.	Developmental stages of <i>T. hannoniae</i> males and females fed on <i>Tetranychus urticae</i>	116