

**PHYSIOLOGICAL AND HISTOPATHOLOGICAL
ABERRATIONS INDUCED BY DIFFERENT
INSECTICIDAL AGENTS ON THE DESERT LOCUST,
SCHISTOCERCA GREGARIA (FORSKAL)**

**A Thesis Submitted to The Department of
Entomology, Faculty of Science,
Ain-Shams University**

**In partial fulfillment of requirements for award of
The Master Degree in Entomology**

BY

Noura Mohammed Mahdy El-Said

B.Sc. Entomology, Faculty of Science, Ain-Shams University, 1999

Cairo

2010

**PHYSIOLOGICAL AND HISTOPATHOLOGICAL
ABERRATIONS INDUCED BY DIFFERENT
INSECTICIDAL AGENTS ON THE DESERT LOCUST,
SCHISTOCERCA GREGARIA (FORSKAL)**

**A Thesis Submitted to The Department of
Entomology, Faculty of Science,
Ain-Shams University**

**In partial fulfillment of requirements for award of
The Master Degree in Entomology**

BY

Noura Mohammed Mahdy El-Said

B.Sc. Entomology, Faculty of Science, Ain-Shams University, 1999

Supervisors

Prof. Dr. Reda Fadeel Ali Bakr

Prof. Dr. Abd El-Azim Mohammed El-Gammal

Prof. Dr. Mona Ibrahim Mohammed

Board of Supervision

Prof. Dr. Reda Fadeel Ali Bakr

**Professor of Entomology,
Entomology Department,
Faculty of Science,
Ain-Shams University**

Prof. Dr. Abd El-Azim Mohammed El-Gammal

**Professor of Biochemistry,
Locust and Grasshopper Research Department,
Plant Protection Research Institute,
Agric. Res. Center,
Ministry of Agriculture**

Prof. Dr. Mona Ibrahim Mohammed

**Professor of Entomology,
Entomology Department,
Faculty of Science,
Ain-Shams University**

Thesis examination committee

Prof. Dr. Reda Fadeel Ali Bakr

Professor of Entomology, Entomology Department,
Faculty of Science, Ain-Shams University

Prof. Dr. Abd El-Wahab Abd El-Maqsoud Ibrahim

Professor and Head of Entomology Department, Faculty
of Sci., Benha University

Prof. Dr. Alaa Goda El-Daly

Professor Physiological Entomology, Faculty of Sci., Al-
Azhar University (boys)

Supervisors

Prof. Dr. Reda Fadeel Ali Bakr

Professor of Entomology, Entomology Department,
Faculty of Science, Ain-Shams University

Prof. Dr. Abd El-Azim Mohammed El-Gammal

Professor of Biochemistry, Locust and Grasshopper
Research Department, Plant Protection Research Institute,
Agric. Res. Center, Ministry of Agriculture

Prof. Dr. Mona Ibrahim Mohammed

Professor of Entomology, Entomology Department,
Faculty of Science, Ain-Shams University

Head of Entomology

Prof. Dr. Akeila El-Shafie

Biography:

Date and Place of Birth: 19 May 1976, Cairo.

Date of Graduation: June 1999.

Degree awarded:Very good, B.Sc. Entomology,
1999, Faculty of Science, Ain-
Shams University.

Date of registration for the M. Sc. Degree:
January 2002



Abstract

Laboratory studies were carried out in an attempt to disclose the effect of IGRs (Consult and Lufox) at different concentrations (50, 75 and 100 ppm) on one day old and six day old of the 5th nymphal instar of the desert locust, *Schistocerca gregaria* (Forsk.) by feeding technique.

The results indicated some biological aspects as nymphal and adult mortality, failure of ecdysis to adults reached to 93.33% and 100% in six day old treatment with consult and lufox ,respectively , prolongation in age of nymphal instar and the resulted adults had twisted wings and grey or buff colour, also adultoid appeared from Lufox treatment.

The treatment with Consult decreased the haemolymph, ovaries and testes protein levels but Lufox treatment increased haemolymph protein levels and decreased ovaries and testes protein levels.

Also, both treatments induced differentiation in haemolymph, ovaries and testes protein bands and histopathological aberrations in ovaries and testes.

Key words: *Schistocerca gregaria*- Orthoptera- IGRs- biological studies- biochemical effects-electrophoresis protein pattern-histopathological aberrations.

ACKNOWLEDGMENT

ACKNOWLEDGMENT

First of all, I thank **ALLAH** for the unlimited help, who gave and always gives me the power and patient to go through my life and to undertake this work.

I would like to express my gratitude to my supervisors:

Prof. Dr. Reda Fadeel Bakr, Professor of Entomology, Faculty of Science, Ain-Shams University, for his continuous encouragement, kind help, indispensable advice and valuable comments during the course of this study, providing the valuable facilities and for reading and correcting the manuscript.

Appreciation is also due to Late **Prof. Dr. Abd El-Azim Mohammed El-Gammal**, Professor of Biochemistry, Locust and Grasshopper Research Department, Plant Protection Research Institute, Agric. Res. Center for his guidance of the work interest, advice, revising the manuscript and constructive criticism.

I would like to thank very much **Prof. Dr. Mona Ibrahim Mohammed**, Professor of Entomology, Faculty of Science, Ain-Shams University for offering all facilities and good suggestions during the study.

I would like to express thank to **Prof. Dr. Nagi Sabet Badawy**, Professor of Biochemistry, Locust and Grasshopper Research Department, Plant Protection Research Institute,

ACKNOWLEDGMENT-----

Agric. Res. Center for helpful advice, offering all facilities and his continuous encouragement.

Also, my particularly grateful to **Dr. Ashraf Abd El-Salam Hendy Mangoud**, Senior Researcher of Scale Insects and Mealybug Department, Plant Protection Research Institute, Agricultural Research Centre, Ministry of Agriculture, for helping me in writing and statistical analysis of this thesis.

I feel deeply grateful to **Dr. Rehab Abd El-Motelab**, Researcher, Spray Technology Research Department, Plant Protection Research Institute, Agric. Res. Center and **Dr. Zeinab Fathey El-Sokkary**, Researcher in Locust and Grasshopper Research Department, Plant Protection Research Institute, Agric. Res. Center for helping me in writing this thesis.

Also, deep grateful to all members of the Entomology department, Faculty of Science, Ain-Shams University and also my thanks for members of Locust and Grasshopper Research Department, Plant Protection Research Institute, Agric. Res. Center.

CONTENTS

	Page
I. INTRODUCTION.....	1
II. REVIEW OF LITERATURE.....	3
1. Maintenance of colony	3
2. Toxicological and biological effects of some (IGRs) on insects with special reference to lo- custs.....	5
3. Biochemical effects of some IGRs on hae- molymp and reproductive organs protein contents of locusts.....	31
4. Gonadal histology of <i>Schistocerca gregaria</i> and other Orthoptera.....	34
III. MATERIALS AND METHODS.....	39
1. Maintenance of the colony	39
1.1. Origin of stock colony and rearing in the laboratory.....	39
1.2. Experimental insects.....	39
2. Insect growths regulators used.....	40
2.1. Hexaflumuron (Chitin-synthesis inhi- bitor).....	40
2.2. Lufox (mixture).....	41
3. Bioassays studies.....	42
3.1. Treatment of experimental insects.....	42
4. Biochemical studies.....	43

4.1.Samples collection.....	43
4.1.1. Haemolymph collection and preparation.....	43
4.1.2. Tissue collection and preparation..	43
4.2. Quantitative determination of total protein.....	44
4.2.1. Preparation of protein reagent.....	44
4.2.2.Preparation of standard protein solution.....	44
4.2.3. Procedure.....	45
4.3. Protein electrophoresis.....	45
4.3.1.Protein extraction.....	45
4.3.2. Gels preparation.....	45
4.3.3. Application of samples.....	50
4.3.4. Gel running and staining.....	50
4.3.5. Gel analysis.....	51
5. Histological studies.....	51
5.1.Hematoxylin and eosin staining (Drury and Wallington, 1980).....	51
6. Calculations and data analysis.....	53
IV. RESULTS.....	56
1.Biological effects of Consult and Lufox compounds on <i>Schistocerca gregaria</i> by feeding technique.....	56
1.1. Effects of Consult on some biological	56

aspects of <i>S. gregaria</i>	
1.2. Effects of Lufox on some biological aspects of <i>S. gregaria</i>	60
1.3.Prolongation effect of Consult and Lufox compounds on the desert locust, <i>S. gregaria</i>	69
1.3.1. Effect of Consult.....	69
1.3.2. Effect of Lufox.....	70
1.4. Developmental events of locusts	76
2. Biochemical effects of Consult and Lufox on <i>S. gregaria</i> by feeding technique.....	78
2.1. Determination of total protein.....	78
2.1.1.Effect of Consult on protein levels in haemolymph of the 5 th nymphal instar of <i>S. gregaria</i>	79
2.1.2.Effect of Consult on protein levels in haemolymph of <i>S. gregaria</i> adults.....	84
2.1.3.Effect of Consult on protein levels in ovaries and testes of <i>S. gregaria</i> adults....	88
2.1.4.Effect of Lufox on protein levels in haemolymph of the 5 th nymphal instar of <i>S. gregaria</i>	91
2.1.5.Effect of Lufox on protein levels in haemolymph of <i>S. gregaria</i> adults.....	96
2.1.6.Effect of Lufox on protein levels in	100

ovaries and testes of <i>S. gregaria</i> adults....	
2.2.Fractioned protein patterns by electrophoresis.....	104
2.2.1. Fractioned protein patterns of haemolymph of the 5 th nymphal instar of <i>S. gregaria</i>	104
2.2.2. Fractioned protein patterns of haemolymph of adults of <i>S. gregaria</i>	112
2.2.3. Fractioned protein patterns of ovaries and testes of adults of <i>S. gregaria</i>	121
3. Histopathological effects of Consult and Lufox on ovaries and testes of <i>S. gregaria</i> by feeding technique.....	126
3.1. The ovary.....	126
3.2. The testis.....	130
IIV. DISCUSSION.....	136
1.Biological effects of Consult and Lufox compounds on <i>Schistocerca gregaria</i> by feeding technique.....	136
1.1.Consult (chitin synthesis inhibitor)....	136
1.2.Lufox (mixtures of juvenile hormone mimic and chitin synthesis inhibitor).....	138
2.Prolongation effects of the selected compounds on <i>S. gregaria</i>	139
3. Developmental events.....	142

4.Biochemical studies.....	146
4.1.Detemination of total protein (quantita- tive determination).....	147
4.2.Fractioned protein patterns by electro- phoresis (qualitative determination).....	153
5.Histopathological studies.....	157
5.1.On the ovary.....	157
5.2.On the testis.....	159
V. SUMMARY.....	161
VI. REFERENCES.....	166
ARABIC SUMMARY	1-6

LIST OF TABLES

No.	Title	Page
(1)	Effect of Consult on some biological aspects of the desert locust, <i>Schistocerca gregaria</i> treated as 1-day old of the 5 th nymphal instar	57
(2)	Effect of Consult on some biological aspects of the desert locust, <i>Schistocerca gregaria</i> treated as 6-day old of the 5 th nymphal instar	61
(3)	Effect of Lufox on some biological aspects of the desert locust, <i>Schistocerca gregaria</i> treated as 1-day old of the 5 th nymphal instar	64
(4)	Effect of Lufox on some biological aspects of the desert locust, <i>Schistocerca gregaria</i> treated as 6-day old of the 5 th nymphal instar	67
(5)	Metabolic effect of Consult on haemolymph protein contents of treated one and six days old male and female 5th nymphal instar of the desert locust, <i>Schistocerca gregaria</i>	81
(6)	Metabolic effect of Consult on haemolymph protein contents of male and female moulted adults of treated one and six day old male and female 5th nymphal instar of <i>Schistocerca gregaria</i> after 7 and 10 days.....	85