Comparative Toxicity of Garlic Extract and *Bacillus thuringiensis* to Insects.

A Thesis Submitted

To

Department of Entomology
Faculty of Science, Ain Shams University
For The Award of the Ph. D. Degree
(In Entomology)

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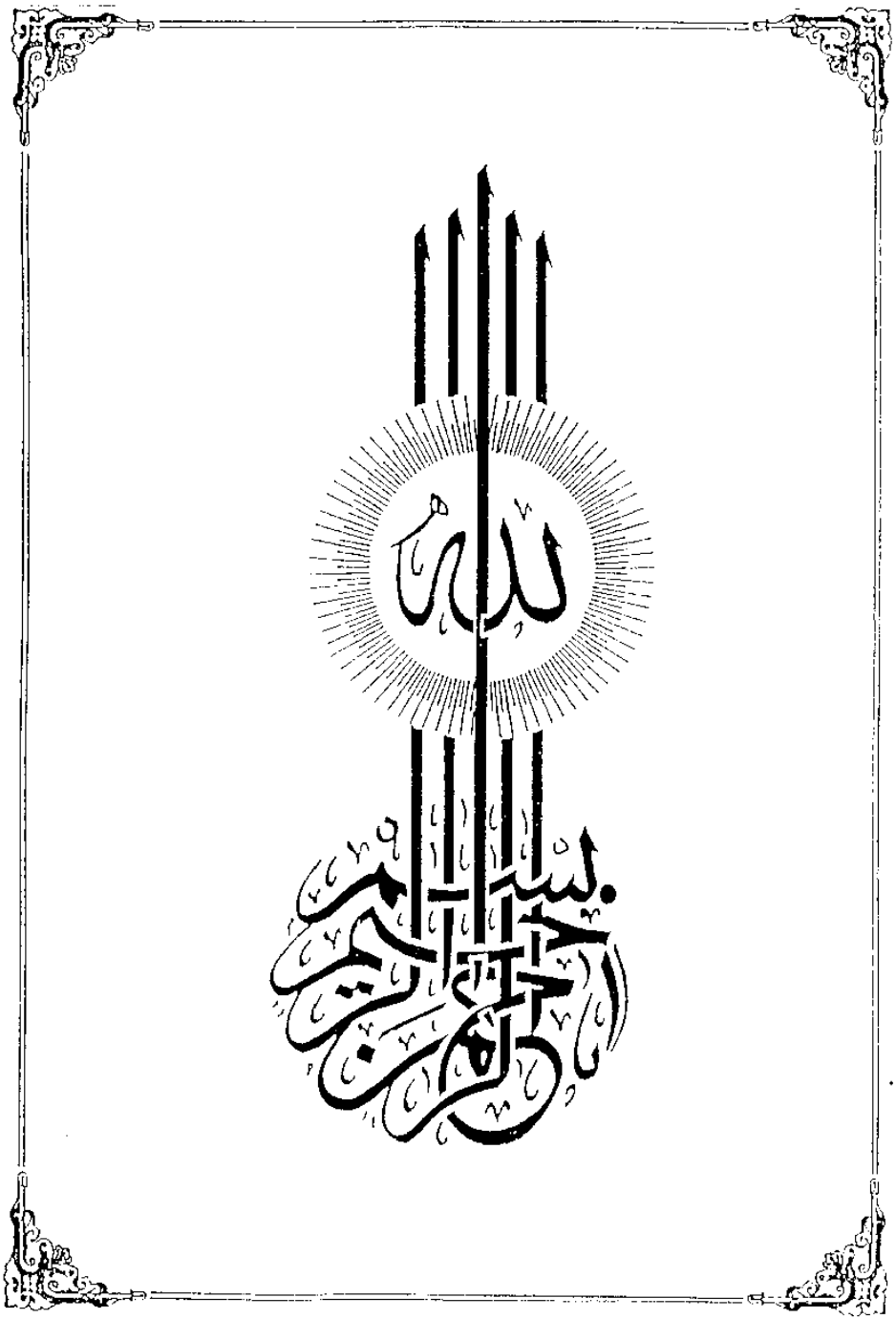

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ACKNOWLEDGMENTS

The author wishes to express her deep gratitude and thanks to **Prof. Dr. Soad A. El-Seoud**, Professor of Entomology, Faculty of Science, Ain Shams University for her invaluable criticism and advice, supervision, guidance, continuous encouragement and revising the manuscript.

Heart felt thanks are also extended to **Dr. Magda H. Radi**, Assistant Professor of Entomology, Faculty of Science, Ain Shams University, for her suggestion of the idea, kind supervision, energetic guidance and valiable suggestions in performing and writing the manuscript. I admire her caring for the people in her group beyound caring about their science.

The author considers with great appreciation the role of **Dr. Mohamed Sayed Salama**, Assistant Professor of Entomology, Faculty of Science, Ain Shams University, for his continuous help and support, direct guidance and for reading and correcting the manuscript.

Thanks are also due to **Dr. Zahia Moustafa**, Lecturer of Entomology in the same department for her advice in writing the manuscript and various helps.

The author appreciates the kind encouragement and sincere consideration and patience of her husband and daughters.

To the head and staff members of the Department of Entomology, Faculty of Science, Ain Shams University, the author offers her respect for their friendly cooperation and general help and assistance during the period of this work.

ep.c.	epithelial cells
C.t.	Connective tissue
t.	trachea
g.c.	gastric caecum
gob.c.	goblet cell
m.s.v.	merocrine secretory vesciles
per.m.	peritrophic membrance
cyto.p.	cytoplasmic projection
b.s.	brush border
reg. c	regenerative cell
M.t.	Malpighian tubules
F.t.	Fat tissues
m.	muscles
p.	dark pigments
S.L	Sarcolemma
s.g.	silk gland
L.g.	Lyonnet's gland
us.g.	unstained silk gland
N.m.	Neuropile mass
c.b	cell body region
g.sh	ganglion sheath
g.cl	glandular cell
g.t.	glandular tissues
g.	granules
v.	vacuoles
cyto.g.	cytoplasmic globules
B.st	bladder structure
B.w	body wall
D.D.V.P	Dichlorovos
Paraoxon	O,O-diethyl-o-p-nitrophenyl phosphate
Azodrine	monocrotophos
a.a.	acetic acid

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Abstract

The present study investigated the toxicological, histopathological and biochemical changes during the treatment of the greater wax moth, ***Galleria mellonella*** larvae with toxic extracts of both determined procaryotic and eucaryotic plants.

Laboratory culture of the bacterium ***Bacillus thuringiensis*** Berliner, used as procaryotic cell type was bioassyed against ***G. mellonella*** larvae, the calculated LC_{50} value was 0.15×10^{-3} mg/ml. Garlic extract, used as eucaryotic cell type, proved toxicity against ***G. mellonella*** larvae, LC_{50} value was 0.59×10^{-3} gm/ml. ***B. thuringiensis*** showed a great pathological signs on different insect tissues. Mid gut epithelia, known as the target of the bacterial endotoxin, δ-ENDT, showed severe damage, detached from each other and from basement membrane, vacuolation of the cytoplasmic was detected during examination of the prepared treated sections. Muscles, fat tissues, tracheae and nervous tissues showed variable pathological effects after the bacterial treatment.

Histopathological changes were also observed on prepared insect tissues after treatment with garlic extract. Fat and muscular tissues showed great damage from vacuolation and pigmentation to complete reduction or dislocation. Treated mid gut epithelia showed a very

characteristic bladder like structure of the columnar cells. Cell cytoplasm appeared hyaline after treatment with garlic extract. The tracheal system, silk glands and nervous tissues showed variable pathological signs.

Biochemical changes, due to treatment of ***G. mellonella*** larvae with both toxins, were determined by measuring changes in protein content, lipoprotein, glycoprotein and enzyme patterns in insects haemolymph and fat body. The present study gave an evidence that: Garlic extract caused a depletion in the haemolymph and fat body protein contents of the greater wax moth, more than the bacteria.

Garlic extract caused a severe decrease in the number of protein bands in the haemolymph, while larvae treated with bacteria showed a slight decrease in the number of protein bands. The protein patterns of fat body was slightly affected by bacterial or garlic treatment. The number of arylesterases increased in the haemolymph (H_b) and fat body (FB_b), while they decreased in treated larvae (H_g and FB_g), when compared to those of untreated larvae. The number of cholinesterases decreased in the haemolymph of H_b larvae, while it increased in H_g larvae when compared to H_c. In case of the fat body, both bacterial and garlic extract treatment caused an increase in the number of cholinesterases. The carboxyesterase patterns did not show any changes in either the haemolymph or the fat body in response to treatments with bacteria or garlic extract.

Key words: ***Galleria mellonella***, greater wax moth, protein, lipoprotein, glycoprotein, esterases, histopathology of body tissues.