BIOLOGICAL STUDIES AND COLD STORAGE OF EGG PARASITOIDS *Trichogramma evanescens WESTWOOD* AND *Trichogramma euproctidis* GIRAULT (HYMENOPTERA: TRICHOGRAMMATIDAE)

By

HANAN HASSAN RAMADAN KASSEM GALAL
B.Sc. (Home Economics), Fac. Agric., Cairo Univ., Egypt, 1994
M.Sc. (Economic Entomology), Fac. Agric., Cairo Univ., Egypt, 2008

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

DOCTOR OF PHILOSOPHY

In

Agricultural Sciences
(Economic Entomology)

Department of Economic Entomology and Pesticides
Faculty of Agriculture
Cairo University
EGYPT

2017

SUPERVISION SHEET

BIOLOGICAL STUDIES AND COLD STORAGE OF EGG PARASITOIDS *Trichogramma evanescens WESTWOOD* AND *Trichogramma euproctidis* GIRAULT (HYMENOPTERA: TRICHOGRAMMATIDAE)

Ph.D. Thesis
In
Agricultural Sci. (Entomology)

By

HANAN HASSAN RAMADAN KASSEM GALAL
B.Sc. (Home Economics), Fac. Agric., Cairo Univ., Egypt, 1994.
M.Sc. (Economic Entomology), Fac. Agric., Cairo Univ., Egypt, 2008

SUPERVISION COMMITTEE

Dr. SAYED ASHRAF ELARNAOUTY
Professor of Biological Control, Fac. Agric., Cairo University

Dr. AMAL IBRAHIM AFIFI
Professor of Biological Control, Fac. Agric., Cairo University

APPROVAL SHEET

BIOLOGICAL STUDIES AND COLD STORAGE OF EGG PARASITOIDS *Trichogramma evanescens WESTWOOD* AND *Trichogramma euproctidis* GIRAULT (HYMENOPTERA: TRICHOGRAMMATIDAE)

Ph.D. Thesis
In
Agricultural Sci. (Entomology)

By

HANAN HASSAN RAMADAN KASSEM GALAL
B.Sc. (Home Economics), Fac. Agric., Cairo Univ., Egypt, 1994
M.Sc. (Economic Entomology), Fac. Agric., Cairo Univ., Egypt, 2008

APPROVAL COMMITTEE

Dr. SAYED ASHRAF ELARNAOUTY.....
Professor of Biological Control, Fac. Agric., Cairo University

Dr. AMAL IBRAHIM AFIFI.....
Professor of Biological Control, Fac. Agric., Cairo University

Dr. HAMDYABD ELSAMAD ELSHABRAWY.....
Professor of Economic Entomology, Fac. Agric., Cairo University

Dr. AMAL AHMED AHMED EL-ZOGHBY.....
Head Research of Biological Control, Agriculture Research Center-Giza

Date:24 /5 /2017

ACKNOWLEDGEMENT

Firstly an ultimate thanks to Allah

I wish to express my sincere thanks to ***Dr. Sayed A. El-Arnaouty****, Professor of Biological Control, Faculty of Agriculture, Cairo University for his supervision, review of this manuscript constructive criticism, continuous efforts and guidance.*

Sincere thanks and grateful appreciation are due to ***Dr. Amal Ibrahim Afifi****, Professor of Biological Control, Department of Economic Entomology and Pesticides, Faculty of Agriculture, Cairo University for her valuable guidance in supervising this study and kind assistance in the review of this manuscript.*

My appreciation and deepest thanks to ***Dr. Valérie Beyssat-Arnaouty*** *for continuous help to complete this work. Many thanks to* ***Mrs. Pizzol*** *(INRA Sophia-Antipolis) for her efforts in data analysis and* ***Eng. Mohamed Kamal,*** *who offered me the opportunity to implement Biological Control in greenhouses.*

Thanks for all the staff members of the Chrysopa Mass Production laboratory at Faculty of Agriculture, Cairo University.

Deep Thanks to my family for their encouragement and great helpful.

Also deepest thanks to my beloved son ***Fares A. Hany*** *and mother-in-low for their concern and continuous encouragement.*

And thanks all the thanks, sincere gratitude and appreciation to the greatest human being stood by my side for the circumstances of my work and my scientific studies, devoted efforts, continuous encouragement and great helpful to my beloved husband ***Dent. Tech. Ayman M. M. HANY****.*

Name of Candidate: Hanan Hassan Ramadan Kassem GALAL **Degree:** Ph.D.Thesis
Title of Thesis: Biological Studies and Cold Storage of Two Egg Parasitoids *Trichogramma evanescens* Westwood and *Trichogramma euproctidis* Girault (Hymenoptera: Trichogrammatidae)
Supervisors: Dr. Sayed Ashraf ElArnaouty.
Dr. Amal Ibrahim Afifi.
Department: Economic Entomology and Pesticides
Branch: Economic Entomology
Approval: 24/5/2017

ABSTRACT

A biological study was conducted to determine optimal temperature for mass rearing of two species of *Trichogramma*; *Trichogramma euproctidis* and *T. evanescens*. Three temperatures (20, 25 and 30 °C) were tested. Obtained results showed that 30 °C was the most favorable temperature to give highest parasitism for *T. euproctidis* (250.6 eggs) and *T. evanescens* (124.5 eggs) followed by 25 °C then 20 °C. The impact of the inoculation dosages (1 Inoculum/3, 4, 6, 8 and 10 Host surfaces *Ephestia kuehniella* on their rate of parasitism was studied. results showed that mass rearing of *Trichogramma* can be done on *E. kuehniella* eggs up to the dosages of 1/10 (1/HS), also at all treatment the parasitism rate was higher for *T. evanescens* than for *T. euproctidis*.

A study was carried out to assess the suitable storage temperature and duration for *T. euproctidis* and *T. evanescens*. The effect of storage of the two parasitoids on intermediate degrees (4, 8, 12 and 15 days) then stored at 3 °C for different periods was studied. Highest mean number of parasitism (113.9 and 86.5 egg) for *T. euproctidis and T. evanescens* recorded at 3 °C for 60 days storage after keeping for 15 days at 15 °C as intermediate temperature. Results obtained from this study indicated that 12° C and 15 °C was the most effective temperature for storage of *T. euproctidis* and *T. evanescens* For both long and short term storage.

Finally, Assessment of *T. euprocitidis,* for the control of *Tuta absoluta* in tomato greenhouses, three release doses (25, 50 and 75 parasitoids/m) were tested during two year experiment 2011/12 and 2012/13 at Berkash(Giza). The results show that *T. euproctidis* was significantly efficient, especially at a higher dose, in keeping down *T. absoluta* mines during both experimentation years.

Keywords: *Trichogramma euproctidis*; *Trichogramma evanescens*; mass rearing; inoculation dosage; Cold Storage; Biological control; *Tuta absoluta*; greenhouse.

CONTENTS