شبكة المعلومات الجامعية

بسم اللّه الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

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التوثيق الإلكتروني والميكروفيلم

قسم

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شبكة المعلومات الجامعية

بالرسالة صفحات لم ترد بالأصل

APPLICATION OF THERMAL REQUIREMENTS TO PREDICT SEASONAL ACTIVITY OF THE MOST IMPORTANT COTTON INSECT PESTS

By

AHMED ADEL ALI IBRAHIM RADWAN

B. Sc. Agric. Sc. (Plant Protection), Fac. Agric. Ain Shams University, 2015

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AHMED ADEL ALI IBRAHIM RADAWN

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This thesis for M.Sc. degree has been approved by:

Dr. Mahmoud Mostafa Elbolok ……..….
Prof. Emeritus of Economic Entomology, Faculty of Agriculture, Cairo University.

Dr. Shoukry Ahmed El-Sayed El-Refai ……....……..……
Prof. Emeritus of Economic Entomology, Faculty of Agriculture, Ain Shams University.

Dr. Youssef Ezz-Eldin Youssef ……..……..……
Prof. of Economic Entomology, Faculty of Agriculture, Ain Shams University.

Dr. Mohamed Salem Abdel-Wahed ……....……
Prof. Emeritus of Economic Entomology, Faculty of Agriculture, Ain Shams University.

Date of Examination: / /2020

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AHMED ADEL ALI IBRAHIM RADAWN

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Under the supervision of:

Dr. Mohamed Salem Abdel-Wahed

Prof. Emeritus of Economic Entomology, Department of Plant Protection, Faculty of Agriculture, Ain Shams University.

Dr. Azza Kamal Abd El Rahman Emam

Prof. Emeritus of Economic Entomology, Department of Plant Protection, Faculty of Agriculture, Ain Shams University.

Dr. Youssef Ezz-Eldin Youssef Abdallah

Prof. of Economic Entomology, Department of Plant Protection, Faculty of Agriculture, Ain Shams University.

ABSTRACT

Ahmed Adel Ali Ibrahim Radwan: Application of Thermal Requirements to Predict Seasonal Activity of the Most Important Cotton Insect Pests. Unpublished M. Sc. Thesis, Department of Plant Protection, Faculty of Agriculture, Ain Shams University, 2020.

The present work is an attempt to study some biological and ecological aspects of the cotton leafworm, *Spodoptera littoralis* (Boisd.) and pink bollworm *Pectinophora gossypiella* (Saund.) and determining the thermal requirements needed for development of different stages of the two insect pests, consequently estimating seasonal activity and number of field generations based on degree days (DDs) All experiments were carried out in the Laboratory of Ecological Studies, Department of Plant Protection, and experimental stations, affiliated to Faculty of Agriculture, Ain Shams University.

Biological studies of *Spodoptera littoralis* revealed the following

The most favorable temperature for egg incubation was 35^{o}C, while 23.5^{o}C was the best for hatching. The estimated threshold of development for egg stage was 11^{o}C and the average of thermal units required for development was 48.9 degree-days. For larval stage, the shortest larval duration was 13.5 days at 35^{o}C, the estimated threshold of development was 9^{o}C and the average of thermal units required for larval development was 351.73 degree-days. Data revealed that pupal periods decreased as temperatures increased, the threshold of development was 13.1^{o}C and the average of thermal units required for development was 121.09 degree-days. The longevity of both sexes of adult moths (male and female) tends to be reduced at high temperatures. Females emerged from pupae reared at 15^{o}C were few and didn't complete its life cycle, on the other hand, females emerged at 35^{o}C were malformed and couldn't mate

with healthy males. Female oviposition periods of *S. littoralis* reached its maximum at 23.5°C; while post-oviposition periods reached its minimum at 30°C. Generally Females lived longer than males at the five tested temperatures (20, 23.5, 25, 30 and 35°C), the highest fecundity occurred at 25°C, while the highest female ratio was at 23.5°C. Regarding total generation, the shortest duration occurred at 30°C being 25.74 days. The threshold of development was 13.19ºC and the average of thermal units required for completing one generation was 444.16 degree-days. For *Pectinophora gossypiella*, the shortest egg incubation period was 4.0 days at 30°C, while the highest percent of hatchability (98%) occurred at 25°C. The estimated threshold of development for eggs, larvae, pupae and adult moths (male and female) were 12.10, 11.60, 12.93, 9.80 and 9.50°C, respectively. Generally, females lived longer than males at the four tested temperatures (18, 20, 25 and 30°C) and the highest fecundity was obtained at 25°C, while the highest ratio of females (1.44) obtained at 18°C, The threshold of development for one generation was 12.29°C and the average of thermal units required for completing one generation was 567.81 degree-days.

Ecological studies of *S. littoralis* and *P. gossypiella* were carried out at three governorates viz, Qalyubia, Sharkia and Monufia to estimate annual field generations of both insect pests, in addition to determining time of peaks occurrence. Three methods were used for this purpose, namely, fluctuation curve, accumulated heat units and regression lines (Scale Gauss). The obtained results by the three methods showed that *S. littoralis* had 7-8 annual field generations at different governorates depending on the prevailed temperature, generation peaks nearly occurred in the same dates with maximum ±2-4 days deviation. Regarding to *P. gossypiella* data revealed, the presence of 4-6 annual field generations at Sharkia Governorate, while 5-6 annual field generations were detected at Monufia Governorate, the differences between number of generation may be due to the prevailed temperature, specially early season and appearance date of infestation receptors.

Keywords: *Spodoptera littoralis*, *Pectinophora gossypiella*, threshold of development, thermal constant, annual field generations.