VI. SUMMARY

The present investigation was carried out to estimate the mortalities amongst the pink bollworm, Pectinophora gossypiella (Saund.) larvae at different districts of four Egyptian governorates, and the role played by bacteria, virus, other mortality factors and natural mortality in causing mortalities amongst dead larvae, and to study the effect of the bacterium, Bacillus thuringiensis Ber. (in commercial preparations) on larvae of E. insulana and P. gossypiella; the effect of field application of Bactospeine (a commercial preparation of B. thuringiensis) on the larval population of P. gossypiella and the fecundity of resultant adults. The obtained data can be summarized as follows:

A. Natural infection of P. gossypiella larvae with diseases and other mortality factors :

Larvae of P. gossypiella that were counted in fortnightly samples, of 100 cotton bolls each, collected during September and October, 1980 and 1981, at different districts of four Egyptian governorates (Fayoum, Qalubia, Sharkyia and Gharbyia). Collected larvae were reared in the laboratory until pupation

and adults emergence, where mortalities amongst larvae and subsequent pupae and the percentages of adults emergence were recorded. Dead larvae were thoroughly inspected to determine the cause of death. The highest percentages of total mortality was recorded at Sharkyia governorate (30.62 %, average of two seasons) and that was correlated with the lowest larval population that was counted at the same governorate (68 larvae/100 cotton bolls; average of two seasons). The lowest total mortality percentage (27.14%) was on, the other hand, recorded at Fayoum governorate, and that was correlated with the highest rate of infestation that was recorded at this governorate (100.2 larvae/100 bolls). That gave an indication that the natural mortality factors may play a role in suppressing the rate of infestation with P. gossypiella in cotton fields.

Studies on the percentages kill by different causes, amongst dead larvae, indicated that the majority of dead larvae were killed by bacteria (53.57 - 80.28 % of dead larvae). Virus ranked the second after bacteria at Fayoum governorate (19.41 % of dead larvae).

Estimation of the rate of natural infection of P. gossypiella larvae, in the field, with diseases and other mortality factors before planning for any program of the pest management is recommended.

B. Laboratory infectivity tests with B. thuringiensis :

a. On the first instar larvae of E. insulana and P. gossypiella :

Four concentrations in water of each of the two commercial preparations (Dipel and Bactospeine) were used in this experiment; 0.05 % (8×10^3 I.U./ml. suspension), 0.1 % (16×10^3 I.U./ml.), 0.2 % (32×10^3 I.U./ml.) and 0.4 % (64×10^3 I.U./ml.), using the dipping technique of okra disks or green cotton bolls. The obtained data indicated that Dipel was, generally, more efficient on E. insulana 1st instar larvae than Bactospeine, where the averages of values in percentage mortality after 7 days of treatment, % of malformed pupae, LC_{50} and LT_{50} were 55.4 %, 12.2 %, 0.0675 % (10.8×10^3 I.U./ml.) and 5.9 days in case of Dipel treatment and 53.6 %, 9.03 %, 0.1 % (16.5×10^3 I.U./ml.) and 7.03 days in case of Bactospeine treatment, respectively. On P. gossypiella 1st instar larvae, Bactospeine treatment showed that E. insulana 1st instar larvae were more susceptible, where the LC_{50} in case of the former insect was 0.15 % (24×10^3 I.U./ml. suspension).

b. On the 2nd and 4th instar larvae of P.gossypiella:

Five concentrations of Bactospeine were incorporated with the larval artificial medium (80, 160, 240, 320 and 400 I.U./7 gm. diet) and tested against 2nd and 4th instar larvae of P. gossypiella. The illustrated concentration-mortality lines indicated that the effect increased with the increase in the bioinsecticide concentration and the decrease in larval age. The LC_{50} values were 154.7 and 429.8 I.U./7 gm. diet for treatment of the 2nd and 4th instars, respectively. The LT_{50} values averaged 3.15 and 11.15 days, respectively, indicating higher susceptibility of the former instar. A latent effect could be, also, detected amongst the resulting pupae and adults emergence, but the effect was generally low.

c. On resting larvae of P. gossypiella :

Intrahemocoele injection of five doses of Bactospeine (8, 16, 24, 32,and 40 I.U./larva)was carried out in healthy diapaused larvae of P. gossypiella. Mortalities amongst treated larvae increased, successively during the first 3 days after treatment, though the highest mortality rates occurred after 24 - 48 hours

of treatment. After the 3rd day of treatment; mortalities amongst treated larvae were very low. As the applied dose increased; the effect on larval mortality increased, however the LT_{50} value decreased. The LT_{50} after 72 hours of treatment was 11.29 I.U./larva.

C. Effect of field application of Bactospeine on P. gossypiella :

Bactospeine suspensions were applied on cotton plants (sown at two planting dates; March, 7th and 28th) at two rates; 2.5 Kg. (40×10^9 I.U.)/200 litres of water/feddan and 4 Kg. (64×10^9 I.U.)/feddan. Bioinsecticidal application took place on August, 10th on the two plantations. Data indicated that treatments caused a significant reduction in larval population of P. gossypiella than control. The percentages of reduction in larval population averaged 47.11 and 35.16 %, respectively for the first plantation and 31.15 and 33.84 %, respectively for the second plantation. Thus the low rate of Bactospeine (40×10^9 I.U./feddan) was recommended.

The oviposition rates amongst adults that developed from larvae of treated and untreated areas were,

also, estimated. Data indicated that treatments, markedly, reduced the females oviposition rate. However, a slight effect on the percentages of eggs hatching was detected.