

Ecological studies on boll worms and effect of some new methods in their control

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SUMMARY The present study aims to investigate the effect of ecological factors (biotic and abiotic) on the diapaused pink bollworm (PBW), *Pectinophora gossypiella* (Saunders) larvae, the biological and histological effects of the bioinsecticide (Xentari) against the spiny bollworm (SPW), *Earias insulana* (Boisd.) larvae; and evaluation of certain control programs against cotton bollworms. The obtained results revealed the following:

I. Studies on the diapaused larvae of the pink bollworm (*Pectinophora gossypiella*) seasons :

1.1- The excluded diapaused larvae from cotton seeds during the rest period (H'Jof 1994/95 and 1995/96) - The excluded *P. gossypiella* resting larvae from cotton seeds were classified to dead larvae (266 & 108) and alive larvae (140 & 169) during the rest period of both years 1994 - 95 and 1995- 96, respectively. Follow-up the excluded alive larvae obtained from the cotton seeds. during 95 & % years revealed that some of these larvae reached to the adult stage (78.57, % & 55.03 o/~respectively), while 21.43 % & 44.97 % of the", died either as larvae or pupae. However, at the end of the 1st and 2nd rest periods only 27.10 % and 33.57 % of the larvae completed their metamorphosis and reached the adult stage... It was found that the death of PBW during diapause was due to either normal or due to bacterial and/or viral infection as well as to the effect of the parasitoids *Pyemotes heFfS*; and *P. robarlltor*.

1.2- Spring emergence of *P. gossypiella* in both years of 1995 and 1996 : Emergence of PBW adults took place from March until May and the peak of emergence occurred during April.

1.3- Forecasting of timing of PBW spring emergence on the basis of degree days (dd's) or accumulated heat units (A.H.U.) during 1994-95 and 1995-96 seasons : Adult emergence started in 9th and 11th of March and nearly completed, However, in 14th and 26th of May for 1st and 2nd season. respectively. However, present study indicated that PBW spring emergence was initialized when about average of 433.5 dd's were accumulated. Also, It was found that the low rate of heat units accumulation worked as a mortality factor on the pink bollworm; so it was concluded that A.H. U. is an important factor for timing and determining size of pink bollworm spring emergence (1." generation).

II. The biological effects of the bioinsecticide (Xentari) against the spiny bollworm neonate larvae : Six concentrations of Xentari (1.25, 0.63, 0.31, 0.16, 0.08 and 0.04) g/l. at rate of 2.5 ml/50 gm of diet were tested against neonate larvae of *E. insulana*. The mortality percentages were 87.5, 80.0, 65.0, 37.5, 15.0 and 12.5%, respectively after two days of feeding on contaminated diet. The LC50 and LC90 values of Xentari against *E. insulana* neonate larvae were 0.29 g/l and 1.30 g/l, respectively with upper and lower confidence limits of (0.29 & 0.18 g/l) and (1.96 & 0.88 g/l). Xentari displayed latent effects during the subsequent stages. The... obtained effects were : 1) death", the different larval instars due to feeding the *E. insulana* neonate larvae for 2 days on contaminated artificial diet contained the LC50 of Xentari; the percentage of surviving subsequent larvae was 31. JO/~ 2) increase in larval and pupal durations and 3) decrease the longevity of the adult and the number of deposited eggs/female comparing with the untreated check.

III. Histopathological effects of Xentari on the spiny bollworm larvae: Feeding the 4th instar larvae of *E. insulana* on Xentari - neonate diet, using the highest concentration (1.25 g / l) at the rate of 5 ml / 100g liK, f{)l" 24 hrs caused many pathological effects in the mid-gut of the treated larvae. These effects, as shown in cross sections of the mid-gut, were separation of the epithelial cells from the basement membrane as well as elongation, vacuolization and breakdown of the larval epithelium mid-gut. Also,

Xentari caused disorganization and disintegration of pretrrophic membrane.

IV-Evaluation of certain control programs against cotton bollworms:

Three control programs were evaluated against the cotton bollworms (*P. gossypiella*, *E. insulana* and their complex) during 1994 cotton season. Another three control programs were tested during 1995 cotton season. During 1996 cotton season, the previous six control programs were reevaluated. The tested control programs during 1994 season were program "A", (a sequence of 4 sprays with the bio-insecticide Dipel-2X at the rate of 400 g/ml fed; program "B", a sequence of 3 sprays with the mixture of Dipel-2X at 400 g/l fed. with chemical insecticides at the half recommended rate and in the recommended sequence; and program "C", recommended sequence and rate of chemical insecticides, Dursban EC 450/0, Cutabron EC 500.4 and Bulldock EC 0.15. During 1995 cotton season, the tested control programs were: program "D", sequence sprays with the bio-insecticide Xentari at 500 g/fed; program "E", a sequence of sprays with the mixtures of Xentari (500 g/l fed.) + chemical insecticide at half of the recommended rates; and program "F" (a sequence of sprays with chemical insecticides (Cyanophos EC 500/~Cutabron EC 500.4 and Bulldock EC 150/0) at the recommended rates and sequence).

During 1996 cotton season, the efficacy of all control programs 1, 13, C, D, E and F was evaluated against the bollworms (*P. gossypiella* & *E. insulana* and their complex BWS). The cotton plants received the 1st spray in July 24th, August 2nd and 7th during 1994, 1995 and 1996 seasons, respectively. Spraying of each program was performed when the correlation between small larvae (1st instar) and all counted larvae in infested bolls was significant. The conclusions of this set of experiments were:

- 1- Program "C" (Dursban, Cutabron and Bulldock) was the most effective program against PBW, SBW and their complex BWS.
- 2- The tested control programs were more effective against PBW than SBW especially program "E" (Xentari alone).
- 3- The efficiency of program "D" (Xentari alone) against PBW larvae was higher than that of program "F" (Cyanophos, Cutabron and Bulldock), while program "F" was most effective against SBW and BWS.
- 4- Program "13" (mixture of Dipel-2X + chemical insecticides) revealed higher potential protective efficacy against bollworms than the two bio-insecticides, Dipel-2X and Xentari when used alone.