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COMPARATIVE TOXICITY OF FIVE INSECTICIDES TO *EARIASINSULANA* (BOISDUVAL) ADULTS (LEPIDOPTERA: NOCTUIDAE) IN ISRAEL*

MEIR KLEIN, AMOS NAVON and SARA KEREN
Division of Entomology, Agricultural Research Organization,
The Volcani Center, Bet Dagan, Israel

ABSTRACT

Five insecticides were tested against a laboratory insect colony of spiny bollworm adults, *Earias insulana* Boisd. Insecticides were applied to glass vials as acetone solutions, the acetone was evaporated and insects were exposed to the residues by the forced contact technique. The LC_{50} and LC_{90} of azinphos-methyl following exposure of 1 hr were 1.3 and 4.5 jig/cm^2, respectively. The relative activity of the four other insecticides as compared with azinphos-methyl was: profenofos —0.9 and 0.5; monocrotophos - 5.4 and 6.6; methidathion -86.7 and 15.5; and methomyl - 28.9 and 59.2. The differences in activity against males and females were not significant. The implication of these findings for field application is discussed.

INTRODUCTION

The spiny bollworm, *Earias insulana* Boisd., is one of the major pests of cotton in Israel and neighbouring countries (Avidov & Harpaz 1969; Rivnay, 1962). The damage to cotton is caused by the larvae, which penetrate leaf buds, flower buds and bolls. However, these plant parts are almost impenetrable to insecticides. Therefore, the latter have no effect on larvae but may be effective against adults, eggs and neonate larvae which are found on plant surfaces.

Toxicity of insecticides to adults of this insect was screened in the laboratory by Rivnay and Yathom in 1957 (S. Yatliom, 1980, personal comunication). However, since then new insecticides were introduced in Israel against this pest; out of these, five commercial insecticides were screened in the present work for their toxicity to *E. insulana* adults.

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MATERIALS AND METHODS

Adults of the spiny bollworm colony, bred on an artificial diet were used throughout the study. The artificial diet consisted of kidney beans (250 g) alfalfa meal (70 g), powdered milk (30 g), yeast (*Saccharomyces cervisiae*) (68 g), ascorbic acid (7 g), nipagin (11 g), chloramphenicol (3 g), and agar (30 g). The ingredients were mixed thoroughly and were homogenized in 1400 ml distilled water. Pupae were placed individually in vials and the newly emerged adults, aged 0–24 h, were sexed and used for testing.

The following insecticides were screened: profenofos (Curacron – CIBA – GEIGY), azinphos-methyl (Cotnion - MAKHTESHIM), monocrotophos (Nuvacron – CIBA – GEIGY), methidathion (Supracide – CIBA – GEIGY), and methomyl (Lannate – DUPONT). The insecticides were dissolved in acetone and 1 ml of each concentration was pipetted into a glass vial (6 cm high, 3.5 cm diam). The vials were rolled gently while held horizontally to evaporate the acetone. This manipulation produced a fine film of active material which covered the inner surface of each vial homogeneously. Each concentration was replicated twice for males and twice for females.

Ten males or ten females were placed in each vial which was covered with a piece of cheesecloth and kept at 25 ± 2°C. After a 1 hour exposure the insects were transferred to 250-ml glass containers, provided with a cotton swab presoaked in 10% sucrose solution as adult food. Mortality was recorded after 24 hrs, LC_{50} and LC_{90} and slope values of the mortality curves were calculated by a log probit analysis.

RESULTS AND DISCUSSION

Table 1 shows that profenofos and azinphos-methyl are the least effective insecticides against adults of this species. The concentrations of these two compounds producing LC_{90} in the laboratory exceed those recommended for application in the fields. Monocrotophos and methidathion, commonly used in mid season against this

TABLE 1: TOXICITY OF FIVE INSECTICIDES TO ADULTS OF *EARIAS INSULANA* IN THE LABORATORY

Insecticide	LC_{50} Dose (mg/cm^2)	LC_{50} ($g/1000\ m^2$)	Activity in relation to azinphos-methyl	LC_{90} Dose (mg/cm^2)	LC_{90} (mg/cm^2)	Activity in relation to azinphos-methyl	Slope ± S.D.
Profenofos	1.5×10^{-3}	150	0.9	8.7×10^{-3}	870	0.5	1.662±0.299
Azinphos-methyl	1.3×10^{-3}	130	1.0	4.5×10^{-3}	450	1.0	2.455±0.711
Mono-crotophos	2.4×10^{-4}	24	5.4	6.8×10^{-4}	68	6.6	2.868±0.262
Methidathion	1.5×10^{-5}	1.5	86.7	2.9×10^{-4}	29	15.5	1.000±0.308
Methomyl	4.5×10^{-5}	4.5	28.9	7.6×10^{-5}	7.6	59.2	5.034±1.413

pest proved to be more effective against adults than was azinophos-methyl. Methomyl, which is regularly used in the field against *Spodoptera littoralis,* was the most active compound.

Profenofos, which was the least active chemical, is known as an ovicide; it might therefore be used successfully against eggs and neonates. Azinphos-methyl is used in the field, especially early in the season, to reduce subsequent outbreaks of the pest; however, our laboratory results and field observations proved that this is not a promising chemical to be used. Both monocrotophos and methidathion are used regularly to control the spiny bollworm in the field from mid season, when the pest population is increasing rapidly. They usually provide good control which might result in part from their high activity against the adults. Methomyl, which had not previously been used against the spiny bollworm, showed the most promising effect on adults, and this might also be the case in the field.

In view of the high cost of chemical control, insecticides which are active against more than one pest (methidathion against *Bemisia tabaci*, and methomyl against *S. littoralis*) would be preferred for use in the field.

REFERENCES

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