

**TOXICITY INDICES OF INSECTICIDES TESTED AGAINST
FIELD STRAINS OF THE PINK BOLLWORM,
PECTINOPHORA GOSSYPIELLA SAUND.
DURING 1990 COTTON SEASON**

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Abstract

Field strains of the pink bollworm *Pectinophora gossypiella* Saund. were tested to 13 insecticides during 1990.

The results obtained showed that pyrethroids were far more toxic to the pest than were organophosphates and carbamates.

The descending order of toxicity at the LD50 level was cyfluthrin, fenpropathrin, alphamethrin, deltamethrin, fenvalerate, cypermethrin, S.fenvalerate, cyanophos, methomyl, profenofos, methamidophos, chlorpyrifos then thiodicarb.

INTRODUCTION

The pink bollworm *Pectinophora gossypiella* (Saund.) has firmly established itself in all the Egyptian Governorates cultivated with cotton. Several insecticides that belong to pyrethroids, organophosphates and carbamates, have to be recommended for its control each year.

Ayad *et al.* (1989) demonstrated that pyrethroids were the most potent in insecticides tested against *Pectinophora gossypiella* during the years 1985-1989.

This paper reports the categorization of insecticides according to their toxicity index on *Pectinophora gossypiella* during 1990 cotton season.

MATERIALS AND METHODS

Test insects

Infested cotton seeds were collected from ginneries of seven Governorates representing upper and lower Egypt during January 1990 before the heating process was directed to kill the pink bollworm larvae inside the seeds. Fourth instar larvae were released by carefully detaching the double seeds.

Insecticides

The pyrethroids deltamethrin ((S)-a-cyano-3-phenoxybenzyl-(1R,3R)-3-(2,2-dibromovinyl)-2,2-dimethyl-cyclopropane carboxylate), cypermethrin ((RS)-a-cyano-3-phenoxybenzyl-(1RS)-cis,trans-3-(2,2-dichlorovinyl)-2,2 dimethylcyclopropane carboxylate), cyfluthrin (cyano-(4-fluoro-3-phenoxybenzyl)-methyl-3-(2,2-dichloroethenyl)-2,2-dimethyl-cyclopropane carboxylate), fenvalerate ((RS)-a-cyano-3-phenoxybenzyl-(RS)-2-(4-chlorophenyl)-3-methylbutyrate), fenpropathrin ((RS)-a-cyano-3-phenoxybenzyl-2,2,3,3-tetramethyl cyclopropane carboxylate), alphas-methrin((1R cis) S and (1S cis) R enantiomer - isomer pair of alpha - cyano-3-phenoxy-benzyl-3-(2,2dichlorovinyl)-2,2-dimethyl cyclopropane carboxylate) and S. fenvalerate ((S)-a-cyano-3-phenoxybenzyl-(S)-2-(4-chlorophenyl)-3- methyl butyrate); the organophosphates cyanophos(0-4-cyanophenyl-0,0 dimethyl-phosphorothioate), profenofos (0 - 4 - bromo - 2 - chlorophenyl - 0 - ethyl-S-propyl-phosphorothioate), chlorpyrifos (0,0 - diethyl - 0 - 3,5,6 - trichloro - 2 - pyridyl- phosphorothioate) and methamidophos (0,S-dimethyl amidophosphate; the carbamates methomyl (S-methyl-N-((methyl carbamoyl)oxy)-thioacetimidate and thiodicarb(dimethyl-N,N-(thiobis-((methylimino)-carbonyl-oxy)-bis-(ethanimidothioate)) were tested.

Testing procedure

The insecticides were dissolved in acetone except thiodicarb which was dissolved in dichloromethane. Each technical grade insecticide was tested at several dosages against the last instar larvae released from the double seeds. The bioassay tests were carried out by depositing 0.5ul of each insecticide dissolved in acetone on the dorsal surface of the thorax. Several concentrations were prepared and each concentration was replicated three times. Ten larvae were used in each replicate and mortality count was recorded 24 hours after treatment.

Mortality data were subjected to probit analysis by the method of Finney (1952). The toxicity indices of the insecticides were determined as indicated by Sun(1950).

$$\text{Toxicity Index (T.I.)} = \frac{\text{LD}_{50} \text{ of the most toxic insecticide}}{\text{LD}_{50} \text{ of the least toxic insecticide}} \times 100$$

Mean toxicity indices were used to express the potency of each chemical on field strains of *P. gossypiella*.

RESULTS AND DISCUSSION

The toxicity indices of several pyrethroids on *Pectiniphora gossypiella* are shown in Table 1. The results clearly revealed that cyfluthrin was the most effective in Menufia, Kafr El-Sheikh and Dakahlia while alphamethrin was the most potent in Gharbia and Sharkia. In Behera Cypermethrin was quite effective compared to the other chemicals. Fenvalerate also produced high toxicity in Menia Governorate.

Table 1. Toxicity indices of pesticides tested against *P. gossypiella* collected from different Governorates during 1990 cotton season.

INSECTICIDES	TOXICITY INDEX							AVERAGE T.I.
	Menufia	Gharbia	Kafr elsheikh	Sharkia	Dakahlia	Behera	Menia	
Cyfluthrin	100	67	100	9.37	100	76	43	71
Deltamethrin	67	65	39	11	29	3.9	43	37
Alphamethrin	59	100	35	100	25	37	27	55
Fenpropathrin	53	76	78	20	17	55	33	47
Fenvalerate	48	44	37	10	12	37	100	41
Cypermethrin	37	13	58	30	13	100	10	37
S. Fenvalerate	11	19	7.2	5.26	12	6.4	11	10
Cyanophos	42	14	3.7	0.98	0.54	2.6	0.9	3.8
Profenofos	1.7	3.1	0.56	0.25	0.12	1.1	0.19	1
Chlorpyrifos	0.38	0.54	0.53	0.1	0.004	0.025	0.27	0.26
Methamidophos	0.23	2.2	0.34	0.93	0.03	0.18	1	0.7
Methomyl	0.96	14	2.1	1.06	0.32	3.6	0.55	3.2
Thiodicarb	0.07	0.31	0.13	—	0.03	0.1	0.19	0.14

The order of toxicity of pyrethroids differed from one Governorate to another, a matter that necessitates the pooling of toxicity indices in means. The means express satisfactorily the potency of each individual chemical in all seven Governorates. Following the means of the toxicity indices (Fig.1), it is evident that cyfluthrin was the most effective followed by deltamethrin, alpermethrin, fenpropathrin, fenvalerate, cypermethrin then S.fenvalerate.

As shown in Table 1 and Fig. 1, organophosphates and carbamates were far less toxic compared to pyrethroids. This is clear from the values of the toxicity indices that ranged from 0.004 -14 compared to 4-100 for pyrethroids.

Within organophosphate and carbamate insecticides, cyanophos and methomyl were the most potent followed by profenofos. On the other hand, chlorpyrifos, methamidophos and thiodicarb were less effective in all Governorates except for Menia where methamidophos was more potent (Table 1).

At the LD₅₀ level, the descending order of toxicity of organophosphate and carbamate insecticides was cyanophos, methomyl, profenofos, methamidophos, chlorpyrifos and thiodicarb.

In general, pyrethroids are highly toxic compounds against *Pectinophora gossypiella* than organophosphates and carbamates.

Insecticides	Toxicity Index						Average
	Menia	Matruh	Shubra	Shubra	Shubra	Shubra	
Cyfluthrin	100	87	100	8.37	100	100	77
Deltamethrin	87	82	39	17	59	43	57
Alpermethrin	59	100	32	100	52	37	52
Fenpropathrin	83	76	78	50	17	33	47
Fenvalerate	48	44	37	10	17	37	41
Cypermethrin	37	73	38	30	13	10	37
S.fenvalerate	17	19	7.5	2.58	15	6.4	16
Cyanophos	45	14	3.7	0.88	0.24	0.9	3.8
Profenofos	7.7	1.8	0.28	0.15	0.17	0.09	1
Chlorpyrifos	0.88	0.24	0.23	0.1	0.004	0.052	0.28
Methamidophos	0.53	5.5	0.34	0.93	0.03	0.18	0.7
Methomyl	0.88	74	2.1	1.06	0.32	0.22	2.2
Thiodicarb	0.97	15.0	0.13	—	0.03	0.19	0.14

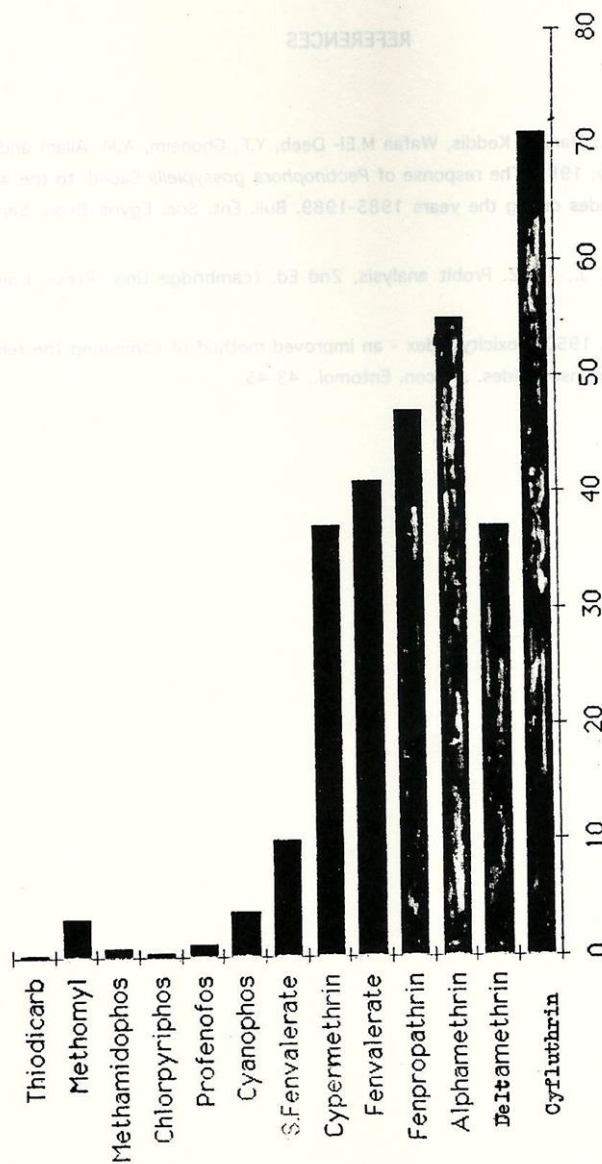


Fig 1. Average toxicity indices of pesticides tested against *P. gossypiella* collected from different governorates during 1990.

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معاملات السمية لبعض المبيدات المختبره علي السلالات الحقلية لديدان
اللولز القرنفلية خلال موسم القطن ١٩٩٠

فريدة أحمد عياد ، يحيى فتحي غنيم ، ماري ايليا قديس
عبد الحميد مصطفى علام ، السيد ابراهيم مراد ، محسن عبد الحليم الجندي .

المعمل المركزي للمبيدات - مركز البحوث الزراعية - الدقي.

إختبرت سلالات حقلية من ديدان اللوز *Pectinophora gossypiella saunders*
معملياً ضد ١٣ مبيد خلال عام ١٩٩٠.

وقد اوضحت النتائج المتحصل عليها أن مبيدات البيرثرويدز كانت سامه للآفه إلي
حد بعيد بمقارنتها بالمبيدات الفورسفرويه والكريماتيه.

وقد كان ترتيب معاملات السمية تنازلياً علي اساس الجرعة السامه النصفيه
كالتالي :

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