J. Pest Control & Environ. Sci. Vol 3 No. 1 : 34 - 49 (1991)

STUDIES ON SYNTHETIC PYRETHROIDS 17-TOXICITY, JOINT TOXIC EFFECT AND SYNERGISM OF SYNTHETIC PYRETHROIDS AGAINST THE EGYPTIAN COTTON LEAFWORM, SPODOPTERA LITTORALIS

BY

ABD EL-SALAM MAREI, MEDY YOUSSEF, MAGDY SHEKEBAN AND MAHMOUD ZEID

Pesticide Division, Faculty of Agriculture, University of Alexandria
Agricultural Research Center, Pesticide Central Lab., Sabbahia, Alexandria

ABSTRACT
****

The toxicity , joint toxic effect and synergism of different pyrethroid pairs against the Egyptian cotton leafworm , S. Littoralis were studied . The dihalopyrethroid , deltamethrin and tetrahalopyrethroid , tralomethrin showed the same toxicity . The cyanopyrethroid , cypermethrin was more toxic than the noncyanc pyrethroid permethrin by 11.6 fold , the toxicity index was 44 and 3.8 respectively . The cis isomer of permethrin or cypermethrin gave higher toxicity than the corresponding trans isomer. LD50 values of cis permethrin , trans permethrin , cis cypermethrin, and trans cypermethrin were 0.023, 0.034, 0.0025 and 0.0076 Ug/larvae respectively . Fenvalerate representing the p-chlorophenyl pyrethroid derivative was higher as toxic as flucythrinate which represent the p-difluoromethoxy pyrethroids by 2.1 folds , the toxicity index was 60 and 28.9 respectively . Mixing profenofos or propoxur insecticide with the tested pyrethroids as esterase inhibitors resulted in an increase in the toxicity of the pyrethroids by 1.4-12.9 or 1.1-5.0 fold respectively. Piperonyl butoxide synergized the tested pyrethroids by 1.3-15.2 fold .

INTRODUCTION

Tralomethrin which is concidered as a brominated deltamethrin is a potent insecticide and the optimal insecticidal activity is associated with the 1R cis, &S configuration (Ackerman et al 1980) . The substitution of the cyano group at the & - carbon of 3-phenoxybenzyl ester increases the toxicity of pyrethroids (Burt and Goodchild 1977) . The geometric isomers produced rapid kill and the changes in the geometrical isomerism of the acid moiety result in modification of penetration and detoxication rates (Ford et al 1977) . The important current acid moieties of pyrethroids includes isopropyl-4-chlorophenylacetic acid (Casida 1979) and 2-p-difluoromethoxy phenyl-3-methylbutyrate.Fenvalerate and flucythrinate represent those two acid moieties containing pyrethroids. The joint toxic effect of synthetic pyrethroids with different chemicals was evaluated by different investigators (e.g. El-Sebae et al 1978,1985) . The present investigation compares the toxicity, joint toxic effect and synergism of each pair of dihalo and tetrahalo ; cyano-and noncyano ; cis and trans isomer ; and p-chlorophenyl and difluoromethoxyphenyl methylbutyrate pyrethroids against the Egyptian cotton leafworm, S. littoralis .

MATERIALS AND METHODS

1 - Tested Pesticides and Synergists :

Synthetic pyrethroids including deltamethrin, tralomethrin, permethrin, cypermethrin, fenvalerate and flucythrinate were involved in this study . The organophosphorus compound chlorpyriphos was involved as standard insecticide while profenofos and propoxur were used as esterase inhibitors . Piperonyl butoxide was used as a synergist . These chemicals were in pure form,and obtained from Dr. J.Casida, California Univ. USA .

2 - Tested Organism :

The original stock culture of susceptible strain of cotton leafworm, Spodoptera littoralis (Boisd) was obtained

from The Plant Protection Department,Faculty of Agriculture University of Alexandria . The culture was reared in this laboratory on castor oil leaves under the temperature of 24-26°C and relative humidity of 62-70 % . The 4th instar larvae were used for bioassay tests .

3 - Bioassay of tested chemicals :

The 4th instar larvae were topically treated using microapplicator . One micro liter of redistilled acetone solution of the tested insecticides for each concentration was applied to the thoracic terga of the insect . Three replicates , each of ten fourth-instar larvae , were treated for each concentration of the toxicant.Three control replicates were considered . Following the treatment , the larvae were placed in glass beakers provided with a fresh food of castor bean leaves and covered with muslin textile and kept for 24 hours at room temperature of 24 - 26°C and relative humidity of 62 - 70 % . The percentage mortalities were recorded 24 hours after application. The average of percent mortality was plotted against the dosage on logarethmic probit paper , the regression lines were fitted by eye; and then LD50 and LD95 values were obtained (Litchfield and Wilcoxon, 1949) .

4 - Joint Toxic Effect and Synergism of Pyrethroid Insecticides against the Egyptian Cotton Leafworm,S. littoralis

Joint toxic effect was studied using different combinations of each tested pyrethroid and the organophosphorus insecticide, profenofos or carbamate insecticide, propoxur. Piperonyl Butoxide(P.B) was mixed with each of the examined pyrethroid to study the synergistic effect . Profenofos, propoxur or(P.B)mixtures with pyrethroids were used at the ratio of 1:5 of pyrethroid to other chemicals respectively.

5 - Statistical Analysis :

Slope values of LdP lines, confidence limits of LD50,s, relative toxicity of toxicants (R.T.),toxicity index (T.I) of tested compounds, and synergism expressed as synergistic ratio (S.R.) were obtained using convenient methods reviewed by several authors (e.g. Metcalf 1967) .

RESULTS AND DISCUSSION

1 - Toxicity , Joint Toxic Effect and Synergism of Dihalo (Deltamethrin) and Tetrahalopyrethroid (Tralomethrin) against the 4th Instar Larvae of the Egyptian Cotton Leafworm, S. littoralis.

Table 1 : Toxicity, Joint Toxic Effect and Synergism of Dihalo (Deltamethrin) and Tetrahalopyrethroid(Tralomethrin) against the 4th Instar Larvae of the Egyptian Cotton Leafworm, S.Littoralis .

Treatment	LD50Ug/ larvae	LD95Ug/ larvae	Slope	LD50 Confidence Limits		Toxicity Index	Relative Toxicity (Fold)	synergistic Ratio (Fold)
Deltamethrin (Dihalo)	0.00325	0.0094	3.6	0.0041	-0.0026	50.8	—	—
Tralomethrin (Tetrahalo)	0.00315	0.011	3.05	0.00413	-0.0024	52.4	—	—
Deltamethrin+ Profenofos	0.0017	0.0051	3.54	0.0014	-0.0021	97.1	1.9	—
Tralomethrin+ Profenofos	0.0019	0.0064	3.24	0.0023	-0.0015	86.8	1.7	—
Deltamethrin+ Propoxur	0.00185	0.0062	2.90	0.0023	-0.0015	89.2	1.8	—
Tralomethrin+ Propoxur	0.0017	0.005	3.54	0.0021	-0.0014	79.1	1.5	—
Deltamethrin+ P.B.	0.00165	0.0053	3.31	0.002	-0.0014	100	—	1.97
Tralomethrin+ P.B.	0.0024	0.008	3.23	0.003	-0.002	68.8	—	1.3
Profenofos	0.36	1.70	2.65	0.4911	-0.2638	0.46	—	—
Propoxur *	11.50	26.0	4.74	13.25	-9.98	0.014	—	—
Piperonyl Butoxide (P.B.)	———	———	—	———	———	———	—	—
Chlorpyriphos	0.24	0.93	2.77	0.323	-0.178	0.69	—	—

* No mortality was observed when dosage up to 20Ug/larvae was applied .

LD50 values , LD95 values , confidence limits , slope values and toxicity index of deltamethrin, tralomethrin and the mixtures were presented in Table 1 . The toxicity of tralomethrin in treatments could be arranged in the following descending order : tralomethrin + propoxur,tralomethrin + profenofos,tralomethrin +P.B and then tralomethrin alone. The toxicity of deltamethrin treatments indicated that deltamethrin + P.B. was the most toxic treatment followed by deltamethrin + profenofos, deltamethrin + propoxur and then deltamethrin alone .

The contact toxicity of deltamethrin to the larvae of the Egyptian cotton leafworm S. littoralis was studied by several investigators and the results indicated the superiority of the compound in toxicity when compared with the conventional insecticides , i.e. , organophosphorus and carbamate insecticides (El-Gengy et al 1987 and Gergy et al 1986). The similarity in the toxicity of deltamethrin and tralomethrin can be supported with those stated that tralomethrin (Akermann et al 1980) in some cases is similar in insecticidal activity to deltamethrin. It was reported that insecticidal activity of permethrin against housefly and cabbage looper may be due in part to the liberation of deltamethrin in insect (Ruzo and Casida 1981)

Profenofos , propoxur and piperonyl butoxide showed a remarkable influence in the insecticidal toxicity when mixed with the dihalopyrethroid (deltamethrin) or tetrahalopyrethroid (tralomethrin). However deltamethrin was mixed with other chemicals in order to increase the toxicity against insect pests by several investigators . These attempts may support the present results (Gergy et al 1985 ; and Bengston et al 1983) .

1 Toxicity, Joint Toxic Effect and Synergism of Cyano (Cypermethrin) and Noncyanopyrethroid (Permethrin) against the 4th Instar larvae of the Egyptian Cotton leafworm S . littoralis

Table 2 shows the LD50 ,LD95, toxicity index , relative toxicity and synergistic ratio for cypermethrin and permethrin .

The toxicity of different tested mixtures for cypermethrin could be arranged in the following descending order : profenofos mixtures, piperonyl butoxide mixtures , propoxur mixtures and then the single pyrethroid treatments . while the toxicity of permethrin mixtures could be arranged in

the following descending order:piperonyl butoxide mixtures, profenofos mixtures, propoxur mixtures and then single pyrethroid treatment .

The insecticidal activity of formulated or isomer mixture of the cyano-or noncyanopyrethroid, was assesed against the Egyptian cotton leafworm S. littoralis(Boisd)by several investigators (Ford et al (1977) ; Breeze (1977) ; and Lhoste and Piedallu (1977)) .

Table 2 : Toxicity, Joint Toxic Effect and Synergism of Cyano(Cypermethrin) and Noncyanopyrethroid(Permethrin) against the 4th Instar Larvae of the Egyptian Cotton Leafworm, S. littoralis .

Treatment	LD50Ug/ larvae	LD95Ug/ larvae	Slope	LD50 Confidence Limits	Toxicity Index	Relative Toxicity (Fold)	Synergistic Ratio (Fold)
Permethrin	0.058	0.175	3.54	0.07011-0.04798	3.8	—	—
Cypermethrin	0.005	0.019	2.82	0.00635-0.00394	44.0	—	—
Permethrin+ Profenofos	0.0045	0.0096	5.23	0.0051 -0040	48.9	12.9	—
Cypermethrin+ Profenofos	0.0022	0.015	1.98	0.0031 -0.0016	100	2.3	—
Permethrin+ Propoxur	0.058	0.175	3.54	0.0701 -0.0480	3.8	1.0	—
Cypermethrin+ Propoxur	0.0044	0.011	4.22	0.0052 -0.0038	50	1.1	—
Permethrin+ P.B.	0.0038	0.021	2.29	0.0051 -0.0028	57.9	—	15.2
Cypermethrin+ P.B.	0.0031	0.02	2.08	0.0043 -0.0022	71	—	1.6
Profenofos	0.36	1.7	2.65	0.4911 -0.2638	0.6	—	—
Propoxur	11.50	26.0	4.74	13.25 -9.98	0.02	—	—
Piperonyl Butoxide	—	—	—	— —	—	—	—
Chlorpyriphos	0.24	0.93	2.77	0.323 -0.178	0.92	—	—

* No mortality was observed when dosage up to 20Ug/larvae was used .

Table 3 : Toxicity , Joint Toxic Effect and Synergism of cis and trans isomers of Permethrin against the 4th Instar larvae of the Egyptian Cotton Leafworm S. littoralis

Treatment	LD50ug/larvae	LD95ug/larvae	Slope	LD50 Confidence Limits	Relative Toxicity Index *	Synergistic Toxicity (Fold)	Ratio (Fold)
Trans Permethrin	0.0034	0.135	2.79	0.00396-0.00292	20.6	—	—
Cis Permethrin	0.023	0.08	2.99	0.0265 -0.0199	30.4	—	—
Trans Permethrin+ Profenofos	0.0074	0.035	2.4	0.0098 -0.0056	94.6	4.6	—
Cis Permethrin+ Profenofos	0.0084	0.03	2.96	0.0105 -0.0067	83.3	2.7	—
Trans Permethrin+ Propoxur	0.034	0.135	2.79	0.0396 -0.0292	20.6	1.0	—
Cis Permethrin+ Propoxur	0.007	0.047	1.96	0.0099 -0.0050	100	3.3	—
Trans Permethrin+ P.B.	0.016	0.10	2.09	0.0221 -0.0116	43.8	—	2.1
Cis Permethrin+ P.B.	0.0094	0.025	3.99	0.0111 -0.0079	74.5	—	2.5
Profenofos	0.36	1.70	2.65	0.4911 -0.2638	1.9	—	—
Propoxur	11.50	26.00	4.74	13.25-9.98	0.06	—	—
Piperonyl Butoxide (P.B.)	—	—	—	— —	—	—	—
Chlorpyriphos	0.24	0.93	2.77	0.323 -0.178	2.9	—	—

* Relative to the value of individual pyrethroid .

The present results report that the cyanopyrethroid, cypermethrin , was more toxic than the noncyanopyrethroid , permethrin , this finding may be supported with those reported by Burt and Goodchild (1977); and Mc Donald (1981) .

The mixing of permethrin or cypermethrin with profenofos propoxur or piperonyl butoxide has led to an increase in toxicity against the Egyptian cotton leafworm S.littoralis. However, mixing cypermethrin and permethrin with other pesticides was attempted (Sherby et al (1986),and Omer (1986). The role of piperonyl butoxide in synergising the toxicity of cypermethrin and permethrin can be supported by the results of Bengston et al (1983) .

3 - Toxicity , Joint Toxic Effect and Synergism of cis and trans Pyrethroids against the Egyptian Cotton Leafworm, S. Littoralis (Boisd) .

Tables 3 & 4 show LD50 , LD95, toxicity index, relative toxicity and synergistic ratio of cis-cypermethrin , trans-cypermethrin, cis-permethrin and trans-permethrin .

The toxicity of these mixtures could be arranged in the following descending order when the tested pyrethroid was cis cypermethrin , or cis permethrin : propoxur-pyrethroid mixture, profenofos+pyrethroid mixture, and(P.B)+pyrethroid mixtures . Trans-cypermethrin mixtures showed a different trend. However;(P.B.)+trans-cypermethrin showed the highest toxicity against such insect pest , this followed by propoxur+trans-cypermethrin, profenofos+trans-cypermethrin. Trans-permethrin treatments showed that profenofos was more toxic than P.B. and then propoxur mixtures .

The present results indicate that cis isomer of either permethrin or cypermethrin was more toxic to the Egyptian cotton leafworm larvae than the corresponding trans-isomer. These results may be supported with those obtained by (Ackermann et al (1980) ; Ford et al (1977) ; and Anderson et al (1985)) . The difference in the toxicity of cis and trans isomers of either permethrin or cypermethrin can be explained on a base of difference in the enzyme hydrolysis of cis and trans pyrethroids (Holden 1979) . The influence of profenofos or propoxur on the toxicity of pyrethroids can be explained on the bases of its effect on microsomal esterase . The magnitude of synergism appears to depend on insect species , esterase inhibitor and pyrethroid involved (Gaughan et al 1980) .

Table 4 : Toxicity , Joint Toxic Effect and Synergism of cis and trans isomers of Cypermethrin against the 4th Instar larvae of the Egyptian Cotton Leafworm , S. littoralis .

Treatment	LD50Ug/ larvae	LD95Ug/ larvae	Slope	LD50 Confidence Limits	Relative Toxicity Index	Synergistic Toxicity (Fold)	Ratio (Fold)
Trans Cypermethrin	0.0076	0.0175	4.61	0.00833-0.00693	6.6	—	—
Cis Cypermethrin	0.0025	0.014	2.21	0.00303-0.0021	20	—	—
Trans Cypermethrin+ Profenofos	0.004	0.022	2.23	0.0054 -0.0030	12.5	1.9	—
Cis Cypermethrin+ Profenofos	0.00075	0.004	2.30	0.001 -0.0056	66.7	2.3	—
Trans Cypermethrin+ Propoxur	0.0028	0.013	2.49	0.0037 -0.0021	17.9	2.7	—
Cis Cypermethrin+ Propoxur	0.0005	0.002	2:75	0.00074-0.00045	100	5.0	4.5
Trans Cypermethrin+ P.B.	0.0017	0.02	1.54	0.0026 -0.0011	29.4	—	4.47
Cis Cypermethrin+ P.B.	0.00094	0.0041	2.52	0.0012 -0.00072	53.2	—	2.7
Profenofos	0.63	1.70	2.65	0.4911 -0.2638	0.14	—	—
Propoxur	11.50	26.00	4.74	13.25-9.98	4.34	—	—
Piperonyl Butoxide (P.B.)	—	—	—	— —	—	—	—
Chlorpyriphos	0.24	0.93	2.77	0.323 -0.178	0.21	—	—

4 - Toxicity , Joint Toxic Effect and Synergism of p-Chlorophenyl and p-Difluoromethoxyphenyl Methylbutyrate against the Egyptian Cotton Leafworm, S.littoralis .

The comparative toxicity of p-chlorophenyl(Fenvalerate) and p-difluoromethoxyphenyl (Flucythrinate) methylbutyrate was evaluated . The values of LD50 , LD95 , toxity index , relative toxicity and synergistic ratio of these compounds and their mixtures were obtained and presented in Table 5 . The toxicity of these treatments could be arranged in the following descending order: fenvalerate+(P.B.), fenvalerate +propoxur, fenvalerate+profenofos , flucythrinate+(P.B.), flucythrinate+profenofos, flucythrinate+propoxur, fenvalerate, flucythrinate, chlorpyriphos, profenofos and propoxur.

Table 5 : Toxicity, Joint Toxic Effect and Synergism of p-Chlorophenyl Methylbutyrate Fenvalerate and p-Difluoromethoxyphenyl Methylbutyrate Flucythrinate Pyrethroid Derivatives against the Egyptian Cotton Leafworm, S.littoralis .

Treatment	LD50Ug/ larvae	LD95Ug/ larvae	Slope	LD50 Confidence Limits	Toxicity Index	Relative Toxicity (Fold)	Synergistic Ratio (Fold)
Fenvalerate	0.025	0.082	3.91	0.02969–0.02105	60	—	—
Flucythrinate	0.052	0.16	3.39	0.06341–0.04264	28.9	—	—
fenvalerate+ Profenofos	0.018	0.062	2.95	0.0226 –0.0143	83.3	1.4	—
Flucythrinate+ Profenofos	0.022	0.058	3.91	0.0272 –0.0178	68.2	2.4	—
Fenvalerate+ Propoxur	0.017	0.064	2.82	0.0216 –0.0134	88.2	1.5	—
Flucythrinate+ Propoxur	0.023	0.105	2.44	0.0303 –0.0175	65.2	2.3	—
Fenvalerate+ P.B.	0.015	0.052	3.03	0.0182 –0.0124	100	—	1.7
Flucythrinate+ P.B.	0.018	0.084	2.44	0.0237 –0.0137	83.3	—	2.9
Profenofos	0.36	1.70	2.65	0.4911 –0.2638	4.2	—	—
Propoxur	11.50	26.0	4.74	13.25–9.98	0.13	—	—
P.B.	—	—	—	— —	—	—	—
Chlorpyriphos	0.24	0.93	2.77	0.323 –0.178	6.3	—	—

1

The current acid moieties of interest include &-isopropyl-4-chlorophenyl acetic acid and 2-para-difluoromethoxyphenyl-3-methyl butyrate . Fenvalerate and flucythrinate represent these two acid moieties containing pyrethroids respectively.These compounds were applied to evaluate their toxicity against the Egyptian cotton leafworm S. littoralis by El-Dahan and El-Sebae (1983) . The present data indicate that fenvalerate(p-chlorophenyl methyl butyrate derivative) was more toxic than flucythrinate (p-difluoromethoxyphenyl methyl butyrate derivative) against the Egyptian cotton leafworm S. littoralis . This is an agreement with other authors who reported that fenvalerate was more toxic to the 5th stage larvae of Agrotis orthogonia (Morrison) than flucythrinate (Mc Donald 1981). Fenvalerate and flucythrinate were synergized by piperonyl butoxide at the ratio of 1 : 1 while increasing the ratio of insecticide synergist up to 1 : 10 revealed an antagonistic effect against the Egyptian cotton leafworm S. littoralis (El-Dahan and El-Sebae 1983) .

It can be concluded that tetrahalo pyrethroid cyano. 6S isomer and then p-chlorophenyl methyl butyrate derivative were more toxic than the corresponding dihalo,noncyano. 1R isomer and those pyrethroid containing p-difluoromethoxy, ethyl methyl butyrate derivative against the Egyptian cotton leafworm S. littoralis . Also the mixing of profenofos, propoxur or piperonyl butoxide with tested pyrethroids resulted in potentiation or synergism of toxicity for this examined insect .

REFERENCES

Ackermann, P.; F. Bourgeois, and J. Drabeck (1980). The optical isomers of -cyano-3-phenoxybenzyl 3-(1, 2-dibromo-2,2 dichloroethyl)-2,2-dimethylcyclopropanecarboxylate and their insecticidal activities . Pestic. Sci. 11: 169-79 .

Burt, P.E. ; and R.E. Goodchild (1977) . The action of pyrethroids in the insect control nervous system I . Features of molecular structure associated with toxicity to cockroaches and their giant fiber axons . Pestic. Sci. 8: 681-91 .

Bengston, M. ; R.A.Davies ; J.M. Desmarchelier; R. Henning; W. Murray; B.W. Simpson; J.T. Snelson; R.Sticka and B.E. Wallbank (1983). Organophosphorothioates and synergised synthetic pyrethroids as grain protectants on Bulk Wheat . Pestic. Sci. 14: 373-84 .

Breese, M.H. (1977) . The potential of pyrethroids as agricultural veterinary and industrial insecticides . Pestic. Sci. 8: 254-9 .

Choste, J. ; and C. Piedallu (1977). Control of insects in cotton crops in Africa with some pyrethroids Pestic. Sci. 8: 254-7 .

Litchfield, J.T.; and Wilcoxon (1949). A simplified method of evaluating dose-effect experiments. J. Pharmcol. Exp. Therp. 96: 113-99 .

Mc Donald, S. (1981). Evaluation of organophosphorus and pyrethroid insecticides for control of pale Western cutworm. J. Econ. Entomol. 74: 45-8 .

Metcalf, R.L. (1967) . Mode of action of insecticide synergists . Ann. Rev. Entomol. 12: 229-36 .

Omer, A.E.; M.B. Ashour ; W.S. Saleh ; and H.K. Bekit (1986) . Susceptibility of American bollworm, Heliothis zea(Boisd),and the level of esterases activity to certain pyrethroids. J. Agric. Res. Tanta Univ. 12: 519-28 .

Anderson, R.J. ; K.G. Adams ; and C.A. Henrick (1985) . Synthesis and insecticidal activity of the stereo isomers of &-cyano-3-phenoxybenzyl . J. Agric. Food Chem . 33: 508-14

Ford, A.G. ; R.C.Reay ; D.Fert ; P.E.Ellis , and L. J. Mc Veigh(1977). Toxicity of pyrethroids to larvae of the Egyptian cotton leafworm Spodoptera littoralis (Boisd). Relative toxicities and knockdown activities of benzyl, and 5-benzyl-3-furylmethyl, cyclopropanecarboxy ; ate. Pestic Sci. 8: 203-10 .

Casida J E . (1979) Pesticide research to maintain and improve plant protection-Adv. Pestic.Sci. Part1, Wld Food Prod : 45-53

El-Gendy, K. A, El-bakary N.S Ahmed, F.I. Moustafa, and A.E. El-sebae (1985). Interaction between toxicity and some insecticides against Spodoptera littoralis larvae Alex Sci. Exch 6: 33-9

El-Sebae, A.H., A.E. Dawoud, and S.A Soliman, (1978). New synergists for pyrethetic pyrethroids and organophosphorus insecticides against cotton leafworm , Spodoptera littoralis . The Proc of Int. Sym. Crop Prot. Med Fac. Landbouww. Rijksuniv. Gent. 43/2: 713-16 .

El-Sebae, A.H., S.E. Shaer, A.F. Daoud, and M.I. Zeid(1988). Selectivity toxicity of synthetic pyrethroids and some synergists to mice and cotton leafworm larvae (Spodoptera littoralis) and some biochemical enzymes activities. The proc of Int. Sym. Crop. Med. Fac. Landbouww Rijksuniv Gent. 50/3a: 939-50

Sherby, S.M., S.M Kesseem , M.I. Zeid , and N. Sakry (1986) Relative potency of certain pyrethroid insecticide and their mixtures with other insecticides against the Egyptian cotton leafworm and bollworm . Alex. Agric Res. 31: 323-31 .

Ruzo, L.O. , and J.E. Casida (1981) . Pyrethroid photochemistry : (5) &-cyano-3-phenoxybenzylcyclopropane carboxylates.J.Agric.Food Chem.29: 702-6.

Holden, J.S. (1979). Absorption and Metabolism of pyremethrin and cypermethrin in the cockroach and the cotton leafworm larvae. Pestic. Sci. 10: 295-307.

Gaughan, L ; J.L. Engle, and J.E. Casida (1980). Pesticide interaction Effect of organophosphorus pesticides on the metabolism , toxicity and persistence of selected pyrethroid insecticides. Pestic. Biochem and Physiol. 14: 81-5 .

El-Defrawi, A.A.; and A.A. El-Gebae (1983). Joint effect of organophosphorus and carbamate insecticides with synthetic pyrethroids against susceptible and laboratory resistant strains of cotton leafworm Spodoptera littoralis (boisd). Proc. Int. Conf. Env. Haz. Agrochem. 981-90 .

ACKNOWLEDGEMENT

The authors wish to thank

" Dr. Awatef E. Khamis "

for her advice and assistance

during the course of this study

دراسات على المبيدات البيرثرويديه

السميه ، التاثير السام المشترك والتنشيط

للمبيدات البيرثرويديه ضد

دودة ورق القطن المصريه

عبد السلام محمد مرعي - ميدى محمد يوسف

مجدى محمد فكيبان - محمود ابراهيم زيد

ملخص عربي

تم دراسة السميه والتاثير السام المشترك ، الفعل التنشيطى لازواج مختلفه يشمل كل منها احد المبيدات البيرثرويديه وذلك ضد دودة ورق القطن المصريه . اوضحت النتائج ان سمية البيرثرويدات رباعية الهالوجين"تر الومثرين" لم تختلف عن سمية البيرثرويدات ثنائية الهالوجين"دلتامثرين". اعطت معاملات البيرثرويدات المحتوية على مجموعة سيانو "سيبرمثرين" سمية اعلا من نظيرتها الغير محتويه على مجموعة سيانو "برمثرين" بمقدار ٦ر١١ ضعف حيث كان معامل السميه لكليهما هو ٤٤ ، ٨ر٣ على التوالى . اعطى مقابه "سيز" لكل من البرمثرين او سيبرمثرين سميه اعلا من نظيره مقابه "ترانس" حيث كانت الجرعة القاتلة لـ ٥٠% من الحفرات المختبره (ج ق ٥٠) للبيرثرويدات سيز برمثرين ،ترانس برمثرين ،سيز سيبرمثرين ، ترانس سيبرمثرين هى ٠ر٠٢٣ ، ٠ر٠٣٤ ، ٠ر٠٠٢٥ ، ٠ر٠٠٧٦ ميكروجرام / يرقه على التوالى . كانت سمية فينفاليرات وهو

يمثل البيرثرويدات المحتويه على بار اكلوروفينايل اعلا من سمية فلوسيثرينات المحتوى على بار اثاني فلوروميثوكسي في الجزء الحامضي من المركب بمعدل ١ر٢ ضعف حيث كان معامل السميه هو ٦٠ ، ٩ر٢٨ على التوالي . ١دى خلط البيرثرويدات المختبره بواسطة المبيد الحشري الفوسفوري بروفينفوس و المبيد الحشري الكربماتي بروبوكسر كمثبطات لانزيمات الاستريزيس الى زياده في السميه بمعدل ٤ر١ - ٩ر١٢ ضعف ، ١ر١ - ٥ر٥ ضعف على التوالي . نفط ببروشيل بيوتوكسيد سمية البيرثرويدات المختبره بمعدل ٣ر١ - ٢ر١٥ ضعف .