

SOIL TREATMENT WITH PYRETHROIDS, ORGANOPHOSPHATE AND
BENZOYLPHENYLUREA AS A METHOD FOR CONTROLLING
TROPINOTA SQUALIDA (SCOP.) BEETLE

By

A.E.A. EL-SHEIKH

Plant Protection Dept. , Faculty of Agric. ,
Minufiya Univ. , Shebin El-Kom , Egypt .

A B S T R A C T

The effectiveness of 16 compounds representing organophosphates, pyrethroids and insect growth regulators (IGRs) against the eggs and adults of Tropineta squalida (Scop) were studied as a soil treatments at various concentrations .

The results showed that the activity of both pyrethroid Biphenthrin and IGR Diflubenzuron against T. squalida adults were superior in comparison with the other compounds tested . The ovicidal effect of organophosphate Isoxathion was shown clearly especially at the higher concent. of 1000 p.p.m. . Also Diflubenzuron had good effect especially at the two higher concentrations of 10 and 50 P.P.m. .

I N T R O D U C T I O N

In the recent years the Tropineta squalida (Scop) beetle has been becoming a serious pest to several plant species, in Egypt, especially for those grown in the calcareous sandy soil . A list of the plant species attacked by this beetle, including apple, pear, almond, apricot, peach, strewberry, cherry and plum was reported by Martinovich (1962) . This beetle seemed to be polyphagous, it caused considerable damage to the blossoms of fruit trees (Shakooch et al., 1967) .

Bebic (1954) reported that T. squalida had become wide in serbia caused considerable damage to the blossoms of fruit trees . The beetles seemed to be had one generation a year, active on warm days and sought flowers turned towards the sun, but hid in the soil at other times (Shakooch et al., 1967 and Giray, 1969).

Our present work aims to study the effectiveness of several insecticides, including insect growth regulators (IGRs) for controlling eggs and adult of T. squalida in calcareous sandy soil.

MATERIALS AND METHODS

INSECTICIDES USED :

I- Insect growth regulators (IGRs) :

Six compounds of benzoylphenylurea (BPU) were used in this study :-

- Diflubenzuron : 1- (3, 5 -dichlorophenyl) -3- (2, 6 -difluorobenzoyl) - urea) as Dimilin 5 % E.C. .
- Dowco-439 : (2-chloro) N (4- (((2, 2 -dichloro -1, 1 -difluoroethoxy) phenyl) amino) carbonyl benzamide 5 % E.C.) .
- IKI-7899 : (N- 3, 5 dichloro -4- (3-chloro-5-trifluoromethyl -2-pyridyloxy) phenyl carbamoyl) -2, 6 -difluorobenzamide 5% E.C.).
- SIR-8514 : (2-chloro-N-(((4 (trifluoromethoxy) phenyl) amino) carbonyl) benzamide 6.5 % E.C.) .
- XRD-473 : (N-(((3, 5, dichloro-4-(1,1,2,2-tetrafluoroethoxy) phenyl amino) carbonyl)-2, 6-difluorobenzamide 5 % E.C.) .
- Flufenoxuron : N-(((4- (2-chloro-4-(tri-fluoromethyl) phenoxy) -2 fluorophenyl) amino) carbonyl)- 2, 6-difluorobenzamide ; as Cascade (SH-777 5 % E.C.) .

II- Synthetic pyrethroids :

Nine compounds of the synthetic pyrethroids insecticides were used in this study . These chemicals are as follows :-

- Biphenthrin : 2-methyl-biphenyl-3- yl methyl (Z)-(1Rs, 3rs) - 3-(2-chloro-3-(2-chloro-3,3,3-trifluoro-propenyl)) 2, 2 -dimethyl cyclopropane-carboxylate ; as Talstar 10 E.C.
- Deltamethrin : α -cyano-3-phenoxybenzyl (+) Cis 2, 2-dimethyl, 1-3-(2, 2-dibromovinyl) cyclopropane carboxylate ; as Decis 2.5 E.C.
- Lambda-cyhalothrin : a 1:1 mixture of (s)- α -cyano-3-phenoxybenzyl (Z)-(1R)-Cis-3-(2-chloro-3,3,3-trifluoropropenyl)-2, 2-dimethyl-cyclopropanecarboxylate and (R)-cyano-3-phenoxybenzyl (Z)-(1s)-Cis-3-(2-chloro-3,3,3-trifluoropropenyl)-2, 2-dimethylcyclopropane carboxylate ; as Kendo 5 E.C.

- Ciscyfluthrin : α -cyano-4-fluoro-3-phenoxybenzyl (iRs)-Cis-3-(2, 2-dichlorovinyl)-2, 2-dimethylcyclopropanecarboxylate ; as Poldoc 2.5 E.C. .
- Hi-Cis cypermethrin : (s) cyano-3-phenoxy-benzyl (IR)-Cis-3-(2, 2-dichloro-vinyl) 2, 2-dimethylcyclopropanecarboxylate ; as Fenom 20 E.C. .
- Cypermethrin : α -cyano-m-phenoxybenzyl-3-(2, 2-dichlorovinyl) 2, 2-dimethyl-cyclopropane-carboxylate ; as Ripcord 30 E.
- Fenvalerate : α -cyano-m-phenoxybenzyl α -isopropyl-p-chlorophenylacetate ; as Sumicidin 20 E.C.
- Fenpropathrin : (Rs)- α -cyano-3-phenoxybenzyl-2,2,3,3-tetramethyl-cyclopropane-carboxylate ; as Meothrin 20 E.C.
- Alphamethrin : a 1:1 mixture of two stereoisomers of cypermethrin (R)- α -cyano-3-phenoxybenzyl (ls)-Cis-3-(2, 2-dichlorovinyl) 2, 2-dimethylcyclopropane carboxylate and (s)-cyano-3-phenoxybenzyl (lR)-Cis-3 (2, 2-dichlorovinyl)-2, 2-dimethylcyclopropane-carboxylate ; as Fastac 25 S.C.

III- Organophosphorates :

- Isoxathion : O, O-diethyl O-5-phenylisoxazol-3-yl phosphorothioate ; as Karphos 50 % E.C.

SOIL TREATMENTS :

Soil samples were given from Sadat district, Minufiya province, Egypt . The physical and chemical properties were carried out as described by Richards (1954) and Jackson (1958) and given in Table (1) . A four soil samples of 100 gm each are put in a plastic cups irrigated with 20 cm³ of water or insecticides concentration .

INSECT REARING :

The stock culture of the insects were collected from farmers at Minufiya & Sadat districts and kept with flowers of common mustard weed for eating in glass jars which covered with muslim .

Table (1) :

Physical and chemical properties of the Sadat & Minufiya soil .

O.M. %	CaCO ₃ %	F.C. %	Particle size Distribution (%)				Texture grade	C.E.C.	pH
			C.S.	F.S.	Silt	Clay			
0.39	13.98	16.78	35.20	44.50	5.08	15.22	Sandy loam	7.20	8.30 ^{**}
1.35	2.21	33.20	1.95	12.50	38.80	46.75	Clay	50.00	7.90 ^{**}

F.C. : field capacity ; C.E.C. : cation exchange capacity ;

O.M. : organic matter ; C.S. : coarse sand ;

F.S. : fine sand ; * Sadat soil ; ** Minufiya soil .

INSECT TREATMENT :

a) Adult treatment :

Ten insect adults were put on surface of the soil at plastic cup and fed with fresh untreated common mustard weed flower . The number of dead adult individuals was recorded and corrected according to natural mortality in check by Abbott's formula (Abbott, 1925) . The median lethal concentrations (LC₅₀) of tested compounds were estimated according to the method of Litchfield and Wilcoxon (1949) .

b) Egg treatment :

The eggs of T. squalida used in this test was obtained from susceptible strain reared in the laboratory at 27 ± 1 C° and 75 ± 5 RH . Fifteen eggs were added in each plastic cup at which four replicates were used for each insecticide-treatment . The number of emerged larvae was recorded at 3,10,17 and 24 days after treatment .

RESULTS AND DISCUSSION

The potency of 16 compounds included 9 synthetic pyrethroids , 1 organophosphates and 6 insect growth regulators against Tropinota squalida are shown in Tables (2, 3 and 4) .

Data presented in Table (2) revealed that most of the tested pyrethroid compounds caused a remarkable toxicity against T. squalida adults . As the toxicity index based on both LC₅₀ and LC₉₀ values, the potency of these compounds can be arranged in descending order as follows :

talstar (100), decis (75.8), kindo (72.7), fastac (51.5), poldoc (28.6), fenom (27), ripcord (5.5), sumicidin (5.2) and meothrin (5.1) .

Ripcord at the LC_{90} level seemed to be the least insecticide due to its flat LD_p line (slope = 2.38), while sumicidin and meothrin were lower toxic than ripcord, based on LC_{50} . These results confirmed well with those obtained by Abdel-Aal et al., (1979) with Spodoptera Sp. and Coccinella Sp. and Hussein et al., (1981) with Callosobruchus maculatus .

The presented results showed apparently that, of all synthetic pyrethroids used, Biphenthrin had the most toxicity effect against T. squalida with no big difference with Deltamethrin and Lamdacyhalothrin . The relative potency of Biphenthrin , Deltamethrin and Lamdacyhalothrin were 19.37, 14.7 and 14.1 times more toxic than Fenpropathrin based on LC_{50} , respectively .

Data in Table (3) demonstrated clearly that IGR diflubenzuron considered to be one of the most toxic IGRs tested against T. squalida . The results showed the IGRs tested caused a considerable mortality, in which the LC_{50} values were arranged to the following pattern of effectiveness : (I) highly effective compounds, included diflubenzuron ; dowco 439 and cascade and its LC_{50} values were 2.4, 3.1, 4.0 P.P.m. , respectively ; (II) moderate effective compounds included chlorfluazuron and triflurumuron and its LC_{50} values were 5.2 and 10.4 P.P.m., respectively ; (III) the least effective compound was XRD-473 with LC_{50} values equal 25.1 P.P.m. due to its flat LD_p line (slope = 1.55) .

The relative potency of the most toxic IGR (diflubenzuron) was 10.45 times more than the least one XRD-473 based on LC_{50} values to T. squalida .

The heavy sclerotized cuticle of coleopterous adults may explain the noticeable low susceptibility of this insect to insecticides . This concides with the results of El-Sebae (1963) , El-Sebae et al., (1973) and Hussein et al., (1981) .

Data in Table (4) showed the response of T. squalida egg treatment with 4 compounds . Karphos showed 100 % reduction at high concentration of 1000 p.p.m. at which no larvea obtained .

Table (2) :

Toxicity of synthetic pyrethroids against T. squalida adults 48 h after soil treatment .

Insecticides	LC ₅₀ P.P.m.	LC ₉₀ P.P.m.	Slope	Toxicity index (a)	Relative potency (b)
Biphenethrin	19.8	63.6	3.21	100	19.37
Deltamethrin	26.1	67.1	4.00	75.8	14.70
Lamdacyhalothrin	27.2	94.4	3.04	72.7	14.10
Alphamethrin	38.4	98.8	4.00	51.5	9.99
Ciscyfluthrin	69.1	143.2	5.20	28.6	5.55
Hi-Cis Cypermethrin	73.1	169.0	4.50	27.0	5.24
Cypermethrin	359.7	1758.0	2.38	5.5	1.06
Fenvalerate	372.4	1019.0	3.39	5.2	1.03
Fenpropathrin	383.7	1047.0	3.76	5.1	1.00

Based on LC₅₀ values of pyrethroids biphenethrin (a) ,
and fenpropathrin (b) .

Table (3) :

Toxicity effect of benzoylphenylurea (BPUs) compounds
against T. squalida adults 48 h after soil treatment .

BPU	LC ₅₀ P.P.m.	LC ₉₀ P.P.m.	Slope	Toxicity index (a)	Relative potency (b)
Diflubenzuron	2.4	130.6	0.94	100	10.45
Dowco 439	3.1	246.6	0.90	77.4	8.09
Cascade	4.0	471.0	0.79	60.0	6.27
IKI-7899	5.2	125.0	1.19	46.1	4.82
SIR-8514	10.4	176.6	1.34	23.0	2.41
XRD-473	25.1	39.6	1.55	0.09	1.00

Based on LC₅₀ values of BPU diflubenzuron (a) ,
and XRD-473 (b) .

Diflubenzuron also had good effect, especially at the two higher concentration of 10 and 50 P.P.m. which caused 75 and 76.9 % inhibition, respectively. Main and Mulla (1982) and also Carter (1975) showed that diflubenzuron caused highly mortality of the eggs in Tribolium castanum. The pyrethroid compound Deltamethrin was the least effective compound in this respect especially at the low concentration which caused only 20 % inhibition.

The above results indicated that both organophosphate Karphos and IGR Diflubenzuron had a satisfactory activity against the eggs of T. squalida and these results may be useful to clear the one of the important methods to control T. squalida in soil.

Table (4) :

Toxicity of certain insecticides on T. squalida when applied as egg treatment.

Insecticides concentrations (P.P.m.)	Mean number of emerged larvea days post-treatment				Emerged larvea %	Reduction %
	3	10	17	24		
Isoxathion						
1000	0	0	0	0	0	100
500	2.3	0	0	0	17.60	82.40
100	2.0	1.0	0	0	23.00	77.00
Deltamethrin						
50	0	2.0	1.3	0	25.38	74.62
10	4.0	3.25	2.0	0	71.15	28.85
5	5.0	4.0	3.0	0	92.30	7.70
SH - 777						
50	2.0	1.3	0	0	25.38	74.62
10	1.0	3.0	1.0	0	38.46	61.54
5	3.0	5.0	3.0	0	84.60	15.40
Diflubenzuron						
50	2.00	1.0	0	0	23.10	76.90
10	3.25	0	0	0	25.00	75.00
5	2.00	4.0	1.3	0	56.15	43.85
Control	5.0	5.0	3.0	0	100	0

REFERENCES

- Abdel-Aal, Y.A.I. ; El-Sayed, A.M.K. ; Negm, A.A. ; Hussein, M.H. and El-Sebae, A.H. (1979) . The relative toxicity of certain insecticides to *Spodoptera littoralis* (Boisd.) and *Coccinella undecimpunctata* L. . International Pest Control , Vol. 21, No. 4 .
- Abbott, W.S. (1925) . A method for computing the effectiveness of an insecticides . J. Eco. Entomol., 18(2) : 265-267 .
- Babic, N. (1954) . A contribution to knowledge of *Epicometis hirta* . Plant Prot., 28 : 63-71 .
- Cartter, S.W. (1975) . Laboratory evaluation of three novel insecticides inhibiting cuticle formation against some susceptible and resistant stored product beetles . J. Stored Prod. Res., 11 : 187-193 .
- El-Sebae, A.H. (1953) . Insecticidal properties of sevin against some stored grain insects . J. Econ. Ent., 56: 420-421 .
- El-Sebae, A.H. ; Shaker, N. ; Tantawy, G.A. and Marei, A.S.M. (1973) . Selectivity of carbaryl oximes insecticides . J. Egt. Pest. Cont. Cong. Assiut, 469-483 .
- Garay, H. (1969) . Preliminary investigations on the important species of apple pests . Ege. Univ. Zir. Fak. Yayin. Izmir., No. 160 : 49 .
- Hussein, M.H. and Abdel-Aal, Y.A.I. (1981) . Toxicity of some compounds against the cowpea seed beetle . Assiut Jr. of Agric. Sci., Vol. 12, No. 1 .
- Jackson, M.L. (1958) . Soil chemical analysis constable Co., Ltd., London .
- Litchfield, J.T. and Wilcoxon, F. (1949) . Simplified method of evaluation dose-effect experiments . J. Pharmacol. and Exp. Therap., 96 : 99-113 .
- Martinovich, V. (1962) . The injuriousness and distribution of *E. hirta* in Hungary and observations on its time of flight . Fol. Ent. Hung., 15 (20) : 347-354 .
- Main, L.S. and Mulla, M.S. (1982) . Biological activity of IGRs against four stored-product coleopterous . J. Econ. Ent., 75 : 80-85 .
- Richards, L.A. , Ed. (1954) . Diagnosis and improvement of saline and alkali soils . U. S. Salinity Lab. Dept. Agr. Handbook 60 .
- Shakooch, A. ; Akrami, F. and Nazmi-Afshar (1967) . Studies on the biology and control methods of flower feeder beetles . Entomologie Phytopath. Appl. no. 25 : 1-20 .

معاملة التربة لمبيدات البيرثرويد والبنزويل فينبيل يوريا
كطريقة لمكافحة حشرة جعل الورد الزففسى

د. أنور السيد النيسنج

جامعة السويبة - كلية الزراعة - قسم زراعة الجسبات

تمت دراسة كفاءة ١٦ مركب من مبيدات البيرثرويد ، الفوسفورينيسيد
ومضادات النمو الحشرية على سيمر وحشرة من الورد الزففسى في التربة .

وقد أوضحت النتائج أن مركب البيرثرويد المبيدشترين ومنظم النمو الحشوي
دايفلوسينزورون كانا أفضل المركبات المختبرة عند التطور الكامل لحشرة حشيرة
الورد الزففسى .

بالنسبة لكفاءة التأثير على طور البيضة فقد أوضحت النتائج أن المبيد
الفوسفوري أيزوكسانثيون أعطى أفضل نتيجة خاصة عند التركيز ألف جزء في المليون
كذلك فإن المركب دايفلوسينزورون له تأثير جيد على اليمر خاصة عند التركيزات
١٠ ، ٥٠ ، جزء في المليون .