J.Pest Cont. & Environ. Sci. 8 (1): 1 – 14 (2000)

TOXICITY OF THE GRAMINICIDES TO SPIDER MITES AND THEIR IMPACT ON BIOMETRICS OF *T. urtica.*

By

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Recived 14/5/1999 , Accepted 28/11/1999.

ABSTRACT

Laboratory studies were conducted to evaluate the toxicity of seven systemic graminicides in addition to kelthane as a reference acaricide on the *Tetranychus urtica* and *T. cinnabarinus* and their effects on the biometrics of *T. urtica*. All the tested graminicides were toxic to *T. cinnabarinus* than to *T. urtica*. Both LC_{50} and LC_{95} values were lower on *T. cinnabarinus* than on *T. urtica*. The most toxic compound was Propequizafop (T7).

Biological aspects of *T.urtica* such as the adult female longevity, oviposition period, number of deposited eggs and egg hatchability were significantly reduced by Propequizafop (T7) followed by Fluazifop-butyl.

INTRODUCTION

The spider mites are serious pests of many vegetables, fruits-trees and field crops. *Tetranychus urtica* and *T. cinnabarinus* are the most economically important mite species of a wide spread nature in Egypt, (Hoda, 1990). The infested plants in about 55 dicotyledon and 2

monoctyledon families as well as the cupressaceae weeds which are present as groundcover (Gerson, 1992).

This groundcover weeds under grape-vine, citrus, pear, and many fruit trees, are considered the alternative hosts for mites and when controlled by contact herbicides such as gramoxon, reglon glyphosate, etc., caused migration of spider mites from the killed weeds to the crops. To prevent this migration , the suitable acaricide can be mixed with the herbicides (Boller et al., 1985; Pfeiffer, 1986; Meagher and Meyer, 1990; Sarospataky and Szendry, 1990; Sarospataky et al.,1991; and Flexner et al., 1991. On the other hand, certain herbicides were harmless to nearly all species of predatory mites (Gerson, 1992).

The aryloxy phenoxy propionate and cyclohexane derivatives which are used as postemergence systemic herbicides for grassy weeds [Graminicides] such as fluazifop-butyl, and sethoxydim had no effect on larval survival, pupal weight or developmental time to pupation, but larvae reared on the herbicide-treated plants had significantly reduced the lifespan compared with those reared on untreated plants (Agnello et al., 1986). The biological aspects of spider mites were studied by many workers by using the insecticides and acaricides (Hoda, 1990; and Gaaboub et al., 1982). However these herbicides were not studied before.

The theme of this work is designed to figure out the most effective graminicides against the spider mite so it can be recommend in the field against grassy weeds for dual purpose to prevent the migration of mite infestation .

MATERIALS AND METHODS

Laboratory studies were carried out to study the effect of the selected seven herbicides and kelthane as acaricides on two spider mites, *Tetranychus urtica* and *T. cinnabarimus*, and their effect on

Table (A): Trade, common, chemical names, and formulation of the tested herbicides.

Tr No	Trade name	Common name	Chemical name	Formula
T1	Fusilade	Fluazifop-butyl	Butyl 2-[4-(5-trifluromethyl-2-pyridyloxy) phenoxy] propionate.	12.5%EC
T2	Nabu	Sethoxydim	2-[1-(ethoxyimino)butyl] -5-[2-ethylthio) propyl]-3-hydroxy-2-cyclohexen-1-one.	20%EC
T3	Targa	Quizalofop-ethyl	Ethyl 2-[4-[(6-chloro-2-quinoxalinyl) oxy] phenoxy] propionate.	10%EC
T4	Grasp	Traloxydim	2-[1-(Ethoxyimino)propyl]-3-hydroxy-5-(2,4,6 -trimethyl phenyl)cyclohex-2-enone.	10%EC
T5	Focus	Cycloxydim	2-[1-(Ethoxyimino)butyl]-3-hydroxy-5-(2H-tetrahydrothio pyran-3-yl)-2-cyclohexen-1-one.	10%EC
T6	Gallant	Haloxyfop-methyl	Ethoxyethyl-2-[(4-(3-chloro)-5-(trifluro methyl)2-pyridinyl) oxy) phenoxy]propionate.	12.5%EC
T7	Agil	Propequizafop	[(Isopropylideneamino)oxy]ethyl-D-(+)-2[p-(6-chloro-2-quin oxalinyl]phenoxy]propionate	10%EC
T8	Kalthen	Dicofol	1,1-Bi (chlorophenyl) 2,2,2-trichloroethanol.	18.5%EC

biomtrics of *T. urtica*. Colonies of the spider mites were reared in the laboratory on sweet potato at constant temperature (25±2^{0}C and relative humidity 65±5%). The first experiment was conducted according to the method of Fisher and Wernsch , 1986. The leaf-disc spray method was used to determine the effects of herbicides listed in table A on the adult females of the two spider mites.

Analysis of data by probit regression are estimated for mortality percentages and using (Finney, 1971) for calculating the LC_{50}, LC_{95}, chi-square (X^2), and probability were carried out to represent significant confidence limits at 0.05%. Changes in the biology of mites were determined from the 2nd experiment after treating the adult females of *T. urtica* with the same herbicides at the LC_{50} level. Number of adult females were confined on a single leaf of sweet potato, placed on moistened cotton wool in petri-dishes. After egg deposition, adult females of the same age were sprayed by glass atomizer, then individually placed in petri-dish. Twenty-five replicates of adult females were used for each treatment (five per disc). Leaves were changed when they wilted. The biological criteria, female longevity, pre-oviposition, oviposition period, incubation period, number of eggs, and percentages of egg hatchability were determined (Gaaboub et al., 1982).

RESULTS AND DISCUSSION

The results obtained from this work were recorded in Tables 1, 2, 3, and for the mortality and confidence limits of the herbicidal treatments, while table 5 contains the biological aspects of *Tetranychus urtica* and their affection by tested herbicides.

1-**Mortality rates of herbicides on *T.urtica* :**

a : **Mortality percentages of tested herbicides after 24h.**

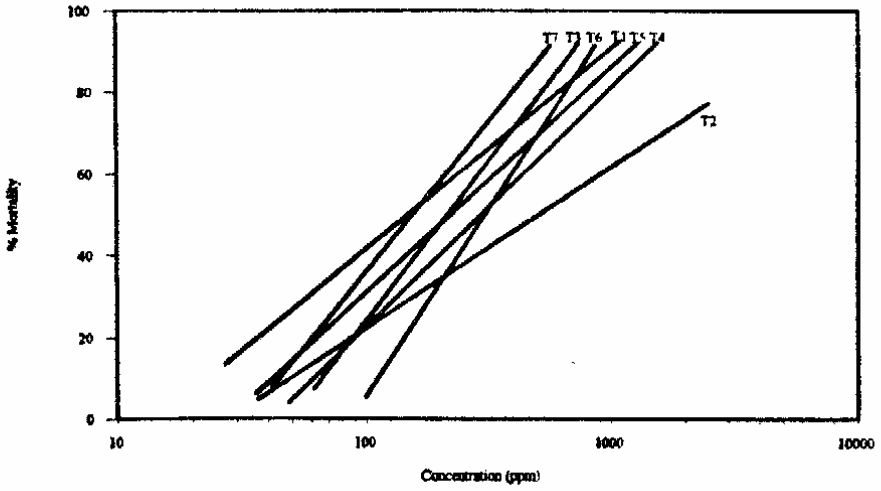
The data recorded in table one revealed that:

1- The LC_{50} and LC_{95} for the standard acaricide (Kelthane) were 19.59 and 87.21 ppm respectively.

2- According to the LC_{50} values, the herbicides can be classified into four groups according to toxicity level (highly toxic, toxic, moderately toxic, poorly toxic).

Table (1): Mortality Percentages and the confidence limits at 95% of herbicidal treatments on *Tetranychus urtica* after 24 hours.

Tr.No.	LC_{50}	LC_{95} ppm	Slope	x^2	P.
T1	163.29	2436.8	0.06	1.29	0.72
T2	528.29	11937.1	0.06	0.65	0.85
T3	187.81	1096.51	0.09	3.37	0.29
T4	547.62	14954.19	0.06	3.13	0.20
T5	214.90	1340.16	0.08	5.39	0.58
T6	301.47	2262.21	0.08	1.64	0.58
T7	153.38	707.26	0.11	1.44	0.69
T8	19.59	87.21	0.14	2.12	0.58



3- Propequuizafop was toxic to *T. urtica*, the LC_{50} and LC_{95} values were 153 and 707.21 respectively, this result agree with the results of Daubaras, 1990, who found that some aryloxy phenoxy propionate and glyphosate herbicides with and without surfactant were toxic to adult female of gorse spider mites. Also, fluazifop-butyl and quizalofop-ethyl behave the same trend. While cycloxydim and haloxyfop-methyl were moderately toxic, on the other hand, sethoxydim and traloxydim were poorly toxic, LC_{50} values were 528.29 and 547.62 ppm respectively.

b-Mortality rates of tested herbicides after 48h.

Table (2), revealed that:-

1-The LC_{50} values of the tested herbicides were decreased by about 65% than at 24h (speed index) except the traloxydim was decreased by 36%.

2-The behavior of tested herbicides were the same categories which described under 24h. But , all the tested compounds showed, high mortality at 48 hrs, and some compounds gave 100% mortality at 500 ppm (propequizafop).

2: Mortality rates of tested herbicides on *T. cinnabaricus*.

a :Effect of tested compounds after 24 hours.

1- In general, all the tested compounds were more toxic on *T. cinnabaricus* than on *T. urtica*. Also propequizafop was a highly toxic compound against *T. cinnabaricus* (LC_{50} was 95.07 ppm).
2- Sethoxydim herbicide was still poorly toxic against *T. cinnabaricus* like on *T. urtica*.

b :Effect of tested compounds after 48 hours.

1-The average speed index for tested compound was 63%.
3- The hundred mortality percentages was observed for propequizafop at 500ppm and for fluazifop-butyl, quizalofop-ethyl and cycloxydim at 1000 ppm.

In general, the statistical analysis of the data confirmed the fitness of all lines of the tested compounds at 0.05%, this was observed from the X^2 values, slope, and values of the confidence limits and probabilities.

Table (2): Mortality Percentages and the confidence limits at 95% of herbicidal treatments on *Tetranychus urtica* after 48 hours.

Tr.No.	LC_{50}	LC_{95} ppm	Slope	x^2	P.
T1	106.23	916.92	0.08	2.76	0.45
T2	397.13	10694.94	0.06	0.23	0.97
T3	116.47	658.53	0.10	2.24	0.54
T4	195.86	2627.96	0.06	0.35	0.95
T5	160.59	1126.80	0.08	4.36	0.20
T6	205.49	1834.74	0.07	1.44	0.67
T7	108.52	519.42	0.13	5.12	0.20
T8	11.20	62.09	0.16	4.78	0.29

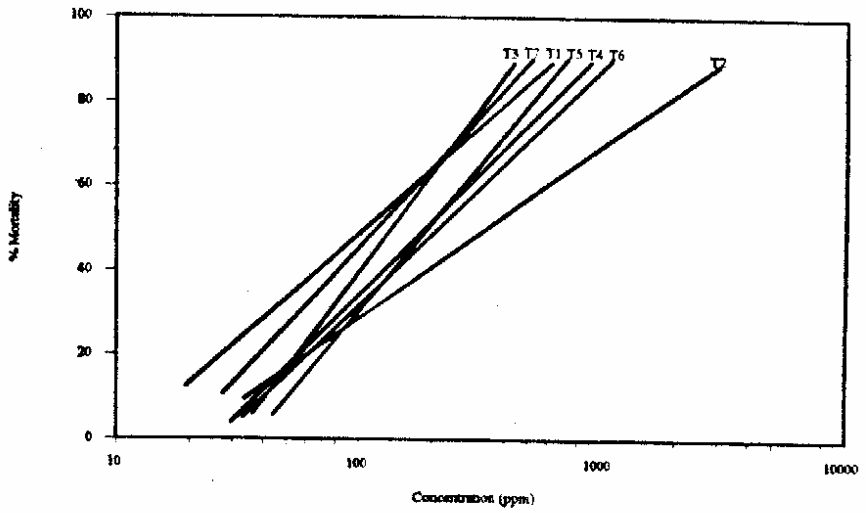


Table (3): Mortality Percentages and the confidence limits at 95% of herbicidal treatments on *Tetranychus cinnabarinus* after 24 hours.

Tr.No.	LC_{50}	LC_{95} ppm	Slope	x^2	P.
T1	135.75	1212.05	0.07	4.54	0.21
T2	501.42	10326.98	0.06	1.63	0.54
T3	165.60	801.40	0.10	1.79	0.60
T4	261.21	2867.98	0.07	0.79	0.83
T5	149.09	997.14	0.08	2.61	0.45
T6	254.39	2183.93	0.08	2.43	0.41
T7	95.07	435.87	0.14	3.13	0.41
T8	60.81	411.33	0.18	0.51	0.64

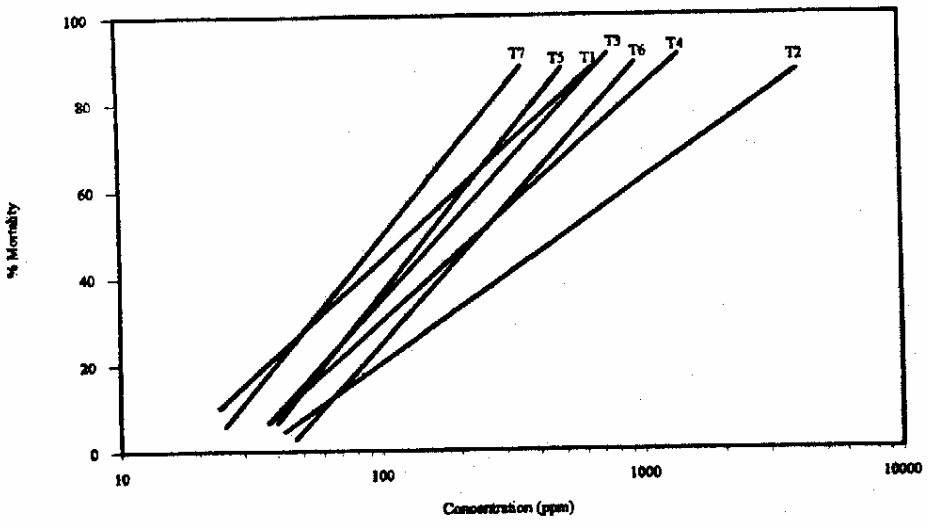


Table (4): Mortality Percentages and the confidence limits at 95% of herbicidal treatments on *Tetranychus cinnabarinus* after 48 hours.

Tr.No.	LC_{50}	LC_{95} ppm	Slope	x^2	P.
T1	105.69	788.15	0.09	2.61	0.47
T2	354.94	16973.11	0.06	0.22	0.99
T3	84.83	447.78	0.13	3.63	0.36
T4	138.41	2835.74	0.06	0.47	0.92
T5	91.39	746.12	0.09	1.86	0.62
T6	118.37	1728.74	0.06	0.37	0.95
T7	66.16	383.73	0.15	2.41	0.54
T8	42.50	277.36	0.18	2.28	0.52

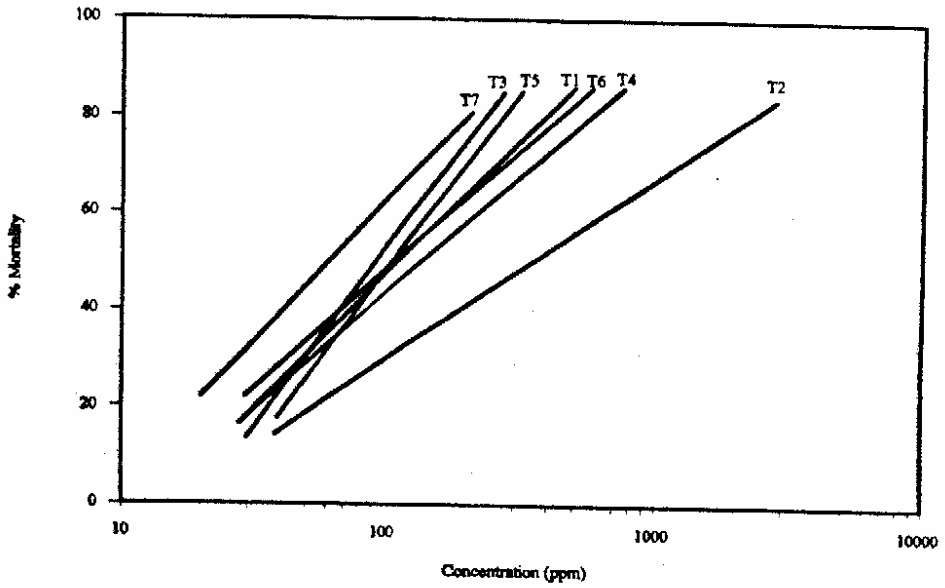


Table (5): Effect of Herbicidal treatments on the Biometrics of *Tetranychus urtica.*

Tr. No.	Dose LC_{50}	Female longevity (days)	pre-ovipos ition period (days)	Ovipo sition period (days)	Incub ation period (days)	No. of Eggs	Hatch-Ability %
T0	0.00	11.66	2.43	8.73	5.31	87.65	99.01
T1	163.29	6.01	1.95	4.03	5.98	53.11	55.63
T2	528.29	10.31	3.96	6.84	4.34	79.80	80.37
T3	187.81	6.93	2.02	4.33	5.38	55.93	59.93
T4	547.62	10.98	4.10	7.11	4.95	80.14	81.20
T5	214.90	9.21	4.30	5.08	3.87	60.10	63.13
T6	301.47	10.03	1.21	6.24	4.10	69.83	73.19
T7	153.38	5.30	1.73	2.00	5.52	20.83	50.30
T8	19.59	3.50	3.42	1.33	6.25	10.42	71.31

3- Effect of the tested compounds on the biological aspects of *T. urtica*.

The data in Table (5) showed that: Herbicidal treatments reduced adult female longevity and oviposition period. In the case of untreated adult, these periods were 11.66 and 8.73 days respectively, while the corresponding values decreased to 3.5 and 1.33 with kelthane, 5.3 and 2 days with propequizafop followed by 6.01 and 4.03 for fluazifop-butyl, and 6.93 and 4.33 for quizalofop-ethyl, but other compounds did not affect these periods.

On the other hand, no differences were observed between the tested compounds and untreated on the pre-oviposition and incubation periods. But, the No. of deposited eggs and egg hatchability were apparently affected by the treatment with propequizafop, 20.83 and 50.3

(untreated, 87.65 and 99.01), followed by fluazifop-butyl 53.11 and 55.63, and the least one was traloxydim 80.14 and 81.2, respectively. This result was confirmed by Sarospataky and Szendrey, 1990. Who found that, as a result of gramoxon treatment, spider mite larvae emerging from eggs die of before they have time to migrate on the grape-vines. Also, amitrol herbicide was found to inhibit the egg deposition of *T. urtica* and decreased the reproduction rate (Mothes et al., 1990).

This it can be concluded that some herbicides can be useful at dual purpose treatment the spider mite population which emerge after weed killing.

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الملخص العربى

سمية المبيدات النجيلية على الأكاروسات وحيوية الأكاروس الأخضر

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تم أجراء دراسات معملية لتقييم سمية سبعة من مبيدات النجيليات (المتخصصة ضدالحشائش النجيلية) بالأضافة الى مبيد الكالثين كمبيد أكاروسى قياسى على كل من الأكاروس الأحمر والأكاروس الأخضر وتأثير ذلك على دورة حياة الأكاروس الأخضر. كل مبيدات الحشائش المتخصصة للحشائش النجيلية أوضحت تأثيرا ساما على نوعى الأكاروس وكان التأثير على الأكاروس الأحمر أعلى منه فى الأكاروس الأخضر. حيث كانت قيم التركيز اللازم لقتل ٥٠%، ٩٥% من عشيرة الأكاروس الأحمر أقل بكثير من القيم الخاصة ضد الاكاروس الأخضر، وكان أعلى المبيدات تأثيرا هو مبيد البروبيكوزافوب (معاملة رقم٧).

كذلك قدرت الثوابت الحيوية للأكاروس الأخضر عن طريق تقدير عمر الأناث، فترة وضع البيض، عدد البيض، النسبة المئوية للفقس. فقد قلت هذه الصفات معنويا بأستخدام مبيد البروبيكوزافوب ويتبعه مبيد الفلازيفوب –بيوتيل عن بقية المبيدات المختبره الآخرى.