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FIELD TRIALS FOR CONTROLLING THE CITRUS LEAFMINER *Phyllocnistis citrella* (Stain.) (LEPIDOPTERA, PHYLLOCNISTIDAE) IN EGYPT

BY

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ABSTRACT

Field trials for controlling citrus leafminer (CLM) *Phyllocnistis citrella* (Stain.) on summer flushes of navel orange trees using different pesticides in two successive seasons (2006 and 2007) at Sharkia Governorate were conducted. Abamectin mixed with the mineral oil Chemi oil was the most effective tested pesticides during 2006 season. Effect of Dimectin 1.8% EC + Chemi oil extended for 4 weeks after application. In addition, Dimectin had no adverse effect on percent of parasitism among all tested pesticides. Data obtained from trials conducted in 2007 season revealed that the organophsphorus insecticide Elsan 50% EC was the most effective among the three tested insecticides. Besides, it had no adverse effect on percent of parasitism. Matador 35%EC (neonicotinoid group) was the least effective tested product. However, percent of parasitism was significantly higher than untreated control. Suntap 50%SP (thiocarbamate group) gave promising results of 4 weeks after application. However, it induced high significant adverse effect on percent of parasitism. Usage of either Dimectin 1.8% EC (abamectin) + the mineral oil Chemi oil or Elsan 50% EC (phenthoate) used alone could be recommended to control *P. citrella*, protect new flushes of navel orange trees for at least 4 weeks and less adverse effect on percent of parasitism.

INTRODUCTION

Citrus leafminer (CLM), *P. citrella* (St.) is a delicate microlepidopteran insect which cause severe damage for newly tender leaves during the different periods of flushes of citrus trees especially young trees or seedlings in Egypt and other countries (Ayoub, 1960; Badawy, 1967; Heppner, 1995; Gonzalez & Stein, 1996; Kfoury & El-Amil, 1998 and Salas & Goane, 2001). Infestation reduces rate of photosynthesis followed by retardation in growth and reduction in fruit yield.

Several trials for controlling this pest, allover the world, using different insecticides were conducted (Boulahia *et al.*, 1996; Nucifora, 1996; Rezk *et al.*, 1996; Salas *et al.*, 1997; Korashy, 1998; Mustafa & Ateyyat, 1998; Raja *et al.*, 1998a & b; Bei XuFang *et al.*, 1999; Moraes *et al.*, 1999; Vargas *et al.*, 1999; Lej BangHai & Wu QiNeng,, 2000; Villanueva- Jimenez *et al.*, 2000; Yamamoto *et al.*, 2000; Zhang QuanBing *et al.*, 2001; Pizza & Moleas, 2002 and Mosallam *et al.*, 2008).

The aim of this study is to find out appropriate control measure to suppress CLM population density on summer flushes of navel orange trees to protect autumn flushes from infestation. On the other hand, selecting a chemical control treatment which may induce least adverse effect on CLM parasites. Achieving a proper summer treatment regimes able to protect citrus orchards from expected increment of CLM population 4-5 weeks prior emergence of autumn flushes will also reduce environmental pollution, disturbance of natural balance and probable problems of high insecticide residues in winter fruits.

MATERIAL AND METHODS

Field experiments on navel orange trees (8-10 years old) severely infested with *P. citrella* were conducled. An orchard of about 25 feddans at Meniat EL-Kamh district, Sharkia Governorate was selected. Citrus trees were cultivated in clay soil. Distance between trees were 5x5 meters and irrigated using flood irrigation regime. Experiments were carried out on summer flushes for two successive years (2006 and 2007).

Used Insecticides

(A) 2006 season

1. Abamectin:
   a- Dimectin 1.8% EC
   b- Mectin 1.8% EC
2. Lufenuron (Match 5% EC)
3. Spinosad (Tracer 24% SC)
4. Thiamethoxam (Actara 25%WG)
5. Mineral oil (Chemi oil 95% EC)

(B) 2007 season

1. Cartap hydrochloride (Suntap 50%SP)
2. Phenthoate (Elsan 50%EC)
3. Imidacloprid (Matador 35%EC)

Trees in 2006 season were total coverage sprayed using ground motor sprayer (600 litre capacity). Amixture of the mineral oil (Chemi oil) at rate of 0.25% was tank mixed with Dimectin 1.8% EC, Mectin 1.8% EC, Match 5% EC, Tracer 24% SC and Actara 25% WG at concentrations of 0.025, 0.025, 0.02, 0.008 and 0.007%, respectively. In 2007 season, trees were treated with suntap 50% SP, Matador 35% EC and Elsan 50% EC at rates of 0.1, 0.005 and 0.045%, respectively. Same spraying machine and same technique applied in 2006 season was used. Area of each treatment and/or untreated control was one feddan (about 160 trees, i.e. 10 rows x 16 trees). Five replicates from tender twigs 15-20 cm in length (each contains 10 twigs) were randomly collected every week from each treatment as well as untreated control. Five leaves from each twig (i.e. 250 leaves from each treatment) were inspected using a stereoscopic microscope. Number of serpentine mines, alive and dead individuals (larvae and pupae) of *P. citrella* were counted and recorded. In addition number of parasitized individuals with both *Baryscapus* sp. and *Cirrospilus* spp. were counted. Reduction percent for either number of mines or living individuals were calculated according to Hendrson and Tilton (1955). Statistical analysis was conducted using F. test (Snedecor and Cochran, 1981).

RESULTS AND DISCUSSION

1. First Season

Reduction in mines

Data presented in Table (1) indicate that all tested insecticides mixed with Chemi oil in 2006 season were effective in reducing mean number of serpentine mines in navel orange leaves one week after application. Percentages of reduction were 97.06, 96.66, 98.35, 99.01 and 96.93% for Dimectin 1.8% EC, Mectin 1.8% EC, Match 5% EC, Tracer 24% SC and Actara 25% WG, respectively. However, efficiency of tested insecticides began to vary starting from the 2nd up the 5th week post treatment. Average reduction percent values after 5 weeks from application indicate that Mectin 1.8% EC was the most effective among all tested products. Insecticides could be arranged descendingly according to their efficacy as follows: Mectin 1.8% EC (81.63%) > Dimectin 1.8% EC (78.97%) > Match 5% EC (73.95%) > Actara 25% WG (64.73%)> Tracer 24%SC (61.94%) However, statistical analysis for average number of mines/leaf after 5 weeks of application show clearly that there were high significant differences between all tested insecticides and untreated control. Data also show that Mectin 1.8%EC and Dimectin 1.8% EC protected most new flushes from reinfestation with *P. citrella* throughout four successive weeks after application. Percent reduction in mean number of mines/leaf in new flushes for four weeks post treatment were 97.06, 96.57, 93.95 and 75.51% for Dimectin 1.8%EC, while they were 96.66, 91.88, 88.57 and 84.43% for Mectin 1.8%EC. Match 5%EC

was effective in keeping new flushes from reinfestation until the 3rd week after application. Afterward, it declined at the 4th and 5th week post application. Tracer 24%SC and Actara 25%WG were the least effective tested products. Their effect declined drastically after the 3rd week of application

These results are in agreement with those obtained by Moraes *et al.* (1999) who found that abamectin + mineral oil (25me+ 250ml) was the most effective treatment for controlling *P. citrella* in Brazil 7 and 14 days after application. In China, Lei BangHai and Wu QiNeng (2000) applied abamectin-petroleum (24.5%) at dilutions 1:500, 1:1000, 1:1500, 1:2000 to 8 years-old citrus trees heavily infested with *P. citrella*. They stated that 7 days after treatment with abamectin-petroleum, percent reduction of infestation were 95.8, 91.6, 89.2 and 83.2%, respectively. Villanueva-Jimenez *et al.* (2000) compared potentially selective and integrated pest management (IPM) compatible pesticides against *P. citrella* in Florida. They reported that petroleum oil at 3%, azadirachtin at 1x the LRFR (Least Recommended Field Rate) + 4% oil and diflubenzuron at 1x the LRFR + 4% oil were shown to be IPM-compatible pesticides, where they had fewer mines per leaf.

Reduction in alive individuals

Data illustrated in Table (2) represent the efficacy of tested pesticides mixed with Chemi oil on mean number of alive individuals (larvae & pupae) of *P. citrella* during 2006 season. All tested insecticides were highly effective within the first two weeks after application, except for Actara 25%WG which was the least effective product at end of the 2rd week (88.73%). However, no significant difference in mean number of alive individuals/leaf was recorded when compared with other insecticides. Starting from the 3rd week after application, significant differences in efficacy among tested insecticides were recorded. Dimectin 1.8%EC and Mectin 1.8% EC were significantly more effective than the other three tested insecticides. Reduction percentages in mean number of alive individuals/leaf three weeks post treatment were 99.83 and 90.68 for Dimectin and Mectin, while they were 78.45, 75.74 and 76.76% for Match, Tracer and Actara, respectively. Four weeks after application reduction percentages in mean number of alive individuals/leaf started to decline for all tested products. However, Dimectin and Mectin were still significantly more effective than other insecticides. Same trend extended the fifth week after application. In addition, there were no significant differences between untreated control and the three insecticides Match, Tracer and Actara. Average reduction percentages in mean number of alive individuals/leaf after 5 weeks of treatment, were, 85.30, 82.94, 68.89, 66.65 and 69.11 for Dimectin, Mectin, Match, Tracer and Actara, respectively. It could be concluded that mixing abamectin when tested through the two different formulations (Dimectin and Mectin 1.8%EC) with Chemi oil is considered the most effective in reducing mean number of alive individuals of *P. citrella*. Efficacy of these two mixtures extended to the fourth week after application and succeeded to protect new flushes of navel orange leaves during 2006 summer season from infestation for such period of time. These results are in harmony with those obtained by Raja *et al.* (1998b) who stated that mixtures of mineral oil with acetamiprid, fipronil or abamectin had the lowest numbers of CLM larvae up to 7 days after application. At 15 days after application with a mixture of either acetamprid or abamectin with mineral oil, less number of pupae were noticed. Tested insecticides were ineffective in reducing CLM population density 22 days after application.

Mortality and parasitism percentages

Table (3) show the efficiency of certain insecticides mixed with Chemi oil on mortality percentages of larvae and pupae of *P. citrella* as well as percent of parasitism with the two parasites *Baryscapus* sp. and *Cirrospilus* spp. at Sharkia Governorate during 2006 summer season. Data clearly indicate that Dimectin 1.8%EC was the most effective among tested insecticide, one week after application. Mortality percentages of both larvae and pupae one week post treatment were 100, 62.50, 81.25, 85.71 and 84.00 for Dimectin 1.8%EC, Mectin 1.8%EC, Match 5%EC, Tracer 24%SC and Actara

25%WG, respectively. While, it was 6.63% in untreated control. Efficacy of Dimectin 1.8% EC represented by values of mortality percentages of larvae and pupae extended up to the third week after application, while it decreased drastically in rest of pesticides starting from the second week post treatment. Dimectin 1.8%EC induced 100, 95.63 and 97.22% mortality at the first 3 weeks after application, respectively. Mean average in mortality percentages after five weeks from treatment were 71.28, 44.72, 34.19, 45.16, and 38.28 for dimectin 1.8% EC, Mectin 1.8% EC, Match 5% EC, Tracer 24%SC and Actara 25% WC, respectively. While it was 12.33 % in untreated control. Rezk *et al.* (1996) found that Vertemic (abamectin) + mineral oil was the most effective combination against *P. citrella* followed by mixture of methomyl + dimethoate when mortality was recorded 2,7 and 21 days after treatment. Mortality percent in untreated control decreased one week after application of insecticides. It was 17.91 and 6.63% before and after one week post application of insecticides, respectively. Afterward, mortality percentage in untreated control started to increase by lapse of time. This could be attributed to the adverse effect of sprayed insecticides in general on population density of parasites in whole area. Population density of parasites began to recover 2 weeks after application represented in increment of percent mortality in untreated control. Dimectin 1.8% EC which induced the highest mortality percentages on larvae and pupae had no adverse effect on the larval endoparasite *Baryscapus* sp. or prepupal ectoparasite *Cirrospilus* spp. No significant difference in average percent of parasitism in inspected navel orange leaves at the area treated with Dimectin 1.8% EC + Chemi oil and untreated contral area was recorded. Mean average percent of parasitism five weeks after application was 1.30% in area treated with Dimectin 1.8%EC, while it was 1.07% in untreated control area.

2. Second Season

Reduction in infestation

Data in Table (4) represent efficacy of three insecticides (belonging to three different chemical groups) on mean number of serpentine mines induced by *P. citrella* on new flushes of navel orange trees in 2007 summer season. All tested products showed high significant effect on mean number of mines through 6 weeks after application. Among the tested products, Elsan 50%EC was the most effective and persistent, while Matador 35%EC was the least effective. No significant differences in mean number of mines/leaf or average of mines/leaf through the first five weeks after application were recorded between Suntap 50%SP and Elsan 50%EC. However, at the sixth week after application efficiency of Elsan 50%EC was significantly higher than that of Suntap 50% SP. Average mean reduction in number of mines/leaf after six weeks of applications were 91.6, 79.0 and 73.0% for Elsan 50%EC, Suntap 50% SP and Matador 35%EC, respectively. Bei XuFang *et al.* (1999) reported that imidacloprid 10% when used at dilutions of 1:1000, 1:2000, 1:3000 and 1:4000 gave 98.9, 95.31, 93.5 and 92.6% control after 7days of application against *P. citrella*, respectively, while Marshal e.c. (carbosulfan) at 20% induced 94.1% control. Mosallam *et al.* (2008) found that acetamiprid was more effective than Dimethoate or Kz oil. It reduced percent of infestation with *P. citrella* by 60.26 and 78.33% after 1st and 2 nd applications, respectively.

Reduction in living individuals

Effect of three tested insecticides during 2007 summer season on mean number of alive individuals/leaf of *P. citrella* are presented in Table (5). Data clearly indicate that Eisan 50%EC was the most effective insecticide followed by Suntap 50% SP and Matador 35%EC. Average mean reduction percent in number of mines/leaf 6 weeks after applications were 94.80, 80.30 and 80.13% for Elsan 50%EC, Suntap 50%SP and Matador 35%EC, respectively. However, average mean number of mines/leaf in Elsan 50%EC was significantly less than in Matador 35%EC, which showed no significant difference when compared with Suntap 50%SP. In Tunisia Boulahia *et al.* (1996) reported that comfidor (imidacloprid), Evisect (thiocyelon) and the mineral oil Oleosect significantly decreased *P. citrella* population and confidor was the best

among the three tested insecticides. In Brazil Raja *et al.* (1998a) stated that 6 days post treatment, tebuferozide, cartap, fipronil, carbonyl and hexythiazox were the most effective against CLM resulting over 80% reduction in larval population in comparison with untreated control. In Egypt, Mosallam *et al.* (2008) found that acetamiprid was more effective against *P. citrella* than Dimethoate and Kz oil.

Mortality and parasitism percentages

Table (6) illustrate the effect of the three tested insecticides on percent mortality of larvae and pupae of *P. citrella* (on navel orange leaves) as well as percent of parasitism by the two parasites *Baryscapus* sp. and *Cirrospilus* spp. when applied during 2007 summer season. Effect of Suntap 50%SP was low at the first two weeks after application, (32.85 & 45.98%), respectively. Efficiency of this product increased at the 3rd and 4th week after treatment reaching 97.22 & 96.55%, then declined to 13.33 and 0.0% at 5th and 6th week, respectively Matador 35%EC showed higher efficacy than Suntap 50%SP one week after application (62.50%), then declined gradually in progressive weeks after application (47.33, 32.35, 37.55, 21.47 and 25.97%) for 2nd, 3rd, 4th, 5th and 6th, respectively. Elsan 50% EC showed high and potent efficacy with in 4 weeks after application. Percent mortality recorded were 98.36, 93.44, 79.66 and 82.35 for week 1,2,3 and 4, respectively. Afterward its efficacy declined drastically at 5th week (34.29%) reaching 0.0% at the 6th week post application. Data clearly show that Elsan 50%EC and Suntap 50%SP (irrespective to its low effect within the first two weeks post application) gave promising results extended to 4 weeks after treatment. Tested insecticides could be arranged according to their efficiency as represented in average mortality percent after 6 weeks of treatment on the following order: Elsan 50%EC (64.68%), Suntap 50% SP (47.66%) and Matador 35%EC (37.86%).

Data clearly show that the three tested insecticides had different influences on the two parasites *Baryscapus* sp. and *Cirrospilus* spp. Matador 35%EC (which had the least effect on larvae and pupae of *P. citrella*) showed the lowest adverse effect on percent of parasitism. Percentages of parasitism were significantly higher than untreated control throughout the six weeks of this study except for 2nd week after application. As shown earlier, Suntap 50% SP (which induced low effect on *P. citrella* of the first two weeks post application) had also less detrimental effect against the two parasites (parasitism percentages were 0.97 & 1.96, respectively). At the 3rd and 4th weeks, percentages of parasitism reached 0.0%, while at the same time, percentages of mortality against *P. citrella* were 97.22 and 96.55% respectively. This could be attributed to latent toxic effect of this product on either *P. citrella* or parasites. On the contrary, Elsan 50%EC induced severe adverse effect on percent of parasitism within the first two weeks after applications (0.0%), as well as it gave the highest effect on *P. citrella* during this period of time. By lapse of time percent of parasitism increased and efficacy of the product on *P. citrella* started to decrease. This could be attributed to decreement in residues of that product by lapse of time. In General, the three tested insecticides could be arranged descendingly according to their adverse effect on percent of parasitism (represented in values of mean percent of parasitism) for the two parasites *Baryscapus* sp. and *Cirrospilus* spp. as follows: Suntap 50%SP (0.50), Elsan 50%EC (2.66) and Matador 35%EC (8.37). Raja *et al.* (1998a) studied the effect of 14 different insecticides on CLM. they stated that level of parasitism by *Galeopsomya* sp. (Eulophidae) ranged between 4.1-34.7%. Mosallam *et al.* (2008) found that percent of parasitism for acetamiprid, Dimethoale and KZ oil ranged between 2.01-4.18 and 2.82-6.72 after 1st and 2nd treatments, respectively.

Table (1): Effect of certain pesticides tank mixed with Chemi oil on number of serpentine mines of *P. citrella* in navel orange leaves of summer flushes at Sharkia Governorate during 2006 season.

Pesticide + Chemi oil	Mean no. of mines / leaf											Average	
	Before treat.	1 week	% Red.	2 weeks	% Red.	3 Weeks	% Red.	4 weeks	% Red.	5 Weeks	% Red.	no. of mines	% Red.
Dimectin 1.8% EC	2.78	0.20 B	97.06	0.24 C	96.57	0.36 D	93.95	1.35 C	75.51	2.32 C	31.76	0.89 D	78.97
Mectin 1.8% EC	3.92	0.32 B	96.66	0.80 C	91.88	0.96 C	88.57	1.21 C	84.43	2.56 BC	46.60	1.17 CD	81.63
Match 5% EC	3.96	0.16 B	98.35	0.83 C	91.66	1.70 B	79.96	2.73 B	65.24	3.17 AB	34.54	1.72 BC	73.95
Tracer 24% SL	2.88	0.07 B	99.01	1.12 BC	84.53	1.86 B	69.85	2.79 B	51.15	3.34 AB	5.17	1.84 BC	61.94
Actara 25%WG	3.33	0.25 B	96.93	1.80 B	78.49	2.19 B	69.30	2.79 B	57.75	3.21 AB	21.18	2.04 B	64.73
Control	2.96	7.24 A	-	7.44 A	-	6.34 A	-	5.87 A	-	3.62 A	-	6.10 A	-
" F" test	N.S.	**	-	**	-	**	-	**	-	*	-	**	-

Table (2): Effect of certain pesticides tank mixed with Chemi oil on alive individuals of *P. citrella* in navel orange leaves of summer flushes at Sharkia Governorate during 2006 season.

Pesticide + Chemi oil	Mean no. of alive individuals / leaf											Average	
	Before treat.	1 week	% Red.	2 weeks	% Red.	3 Weeks	% Red.	4 weeks	% Red.	5 Weeks	% Red.	no. of indiv.	% Red.
Dimectin 1.8% EC	2.54	0.00 B	100	0.01B	99.86	0.01C	99.83	0.78 C	84.58	1.83 B	42.22	0.53 C	85.30
Mectin 1.8% EC	2.57	0.12 B	98.32	0.43B	93.88	0.56 C	90.68	0.71 C	86.13	1.74 B	45.70	0.71 C	82.94
Match 5% EC	2.72	0.03 B	99.60	0.45B	93.95	1.37 B	78.45	2.31 B	57.36	2.88 A	15.08	1.41 B	68.89
Tracer 24% SL	2.24	0.01 B	99.84	0.49B	91.99	1.27 B	75.74	2.08 B	53.38	2.45 A	12.28	1.36 B	66.65
Actara 25%WG	2.89	0.04B	99.50	0.89 B	88.73	1.57 B	76.76	2.29 B	60.22	2.87 A	20.36	1.53 B	69.11
Control	2.43	6.76 A	-	6.64 A	-	5.68 A	-	4.84 A	-	3.03 A	-	5.39 A	-
" F" test	N.S.	**	-	**	-	**	-	**	-	**	-	**	-

Table (3): Mortality percentages of larvae and pupae of *P.citrella* in leaves of navel orange treated with certain pesticides mixed with Chemi oil and percentages of parasitism with both *Baryscapus* sp. and *Cirrospilus* spp. at Sharkia Governorate during 2006 season.

Pesticide + Chemi oil	%Mortality (week)						Average	%Parasitism (week)						Average
	Before treat.	1	2	3	4	5		Before treat.	1	2	3	4	5	
Dimectin 1.8% EC	8.63	100.00 A	95.83A	97.22 A	42.22A	21.12BC	71.28A	1.68	0.00	0.00B	2.82	3.70A	0.00	1.30A
Mectin 1.8% EC	34.33	62.50B	46.25B	41.67B	41.32A	32.03A	44.75BC	0.68	0.00	0.00B	0.92	0.00B	0.79	0.34B
Match 5% EC	31.31	81.25AB	45.78B	19.41 D	15.38B	9.15E	34.19D	0	0.00	0.00B	0.56	0.49B	0.63	0.34B
Tracer 24% SL	22.22	85.71AB	56.25B	31.72 C	25.45B	26.65AB	45.16B	0.56	0.00	0.00B	0.89	0.48B	0.56	0.39B
Actara 25%WG	13.21	84.00AB	50.56B	28.31C	17.92B	10.59DE	38.28CD	1.60	0.00	0.00B	0.93	0.00B	0.84	0.35B
Control	17.91	6.63C	10.75C	10.41E	17.55B	16.30CD	12.33E	0	0.00	2.51A	1.93	0.00B	0.93	1.07A
" F" test	N.S.	**	**	**	**	**	**	N.S.	N.S.	**	N.S.	**	N.S.	**

Table (4): Mean of serpentine mines of *P. citrella* in leaves of navel orange trees treated with different pesticides at Sharkia Governorate during 2007 season.

Pesticide	Mean no. of mines / leaf													Average	
	Before treat.	1 week	% Red.	2 weeks	% Red.	3 weeks	% Red.	4 weeks	% Red.	5 weeks	% Red.	6 weeks	% Red.	no. of mines	% Red.
Suntap 50% SP	5.77	1.37B	82.81	0.87B	90.53	0.36C	96.53	0.29C	96.47	1.05BC	80.39	1.81B	27.33	0.96C	79.01
Matador 35% EC	5.64	0.32C	95.89	1.50B	83.29	2.38B	76.44	2.61B	67.51	1.63B	68.86	1.31B	46.19	1.63B	73.03
Elsan 50% EC	5.72	0.61BC	92.28	0.61B	93.30	0.59C	94.27	0.17C	97.91	0.35C	93.41	0.52C	78.94	0.48C	91.69
Control	5.56	7.68A	-	8.85A	-	10.01A	-	7.92A	-	5.16A	-	2.40A	-	7.00A	-
"F" test	N.S.	**	-	**	-	**	-	**	-	**	-	**	-	**	-

Table (5): Mean number of alive individuals of *P. citrella* in leaves of navel orange trees treated with different pesticides at Sharkia Governorate during 2007 seasons.

Pesticide	Mean no. of alive individuals / leaf													Average	
	Before treat.	1 week	% Red.	2 weeks	% Red.	3 weeks	% Red.	4 weeks	% Red.	5 weeks	% Red.	6 weeks	% Red.	no. of indiv.	% Red.
Suntap 50% SP	5.28	0.92B	87.41	0.47B	94.55	0.01C	99.90	0.01C	99.86	0.91BC	80.93	1.81A	19.15	0.69BC	80.30
Matador 35% EC	5.03	0.12BC	98.28	0.79B	90.38	1.61B	82.97	1.63B	76.69	1.28B	71.85	0.84B	60.61	1.05B	80.13
Elsan 50% EC	5.12	0.01C	99.86	0.04B	99.52	0.12C	98.75	0.03C	99.58	0.23C	95.03	0.52B	76.05	0.16C	94.80
Control	5.00	6.92A	-	8.16A	-	9.40A	-	6.95A	-	4.52A	-	2.12A	-	6.35A	-
"F" test	N.S.	**	-	**	-	**	-	**	-	**	-	**	-	**	-

Table (6): Mortality percentages of larvae and pupae of *P. citrella* in leaves of navel orange trees treated with different pesticides and percentages of parasitism with both *Baryscapus* sp. and *Cirrospilus* spp. at Sharkia Governorate during 2007 season.

Pesticide	% Mortality (week)							Average	% Parasitism (week)							Average
	Before treat.	1	2	3	4	5	6		Before treat.	1	2	3	4	5	6	
Suntap 50% SP	8.49	32.85C	45.98B	97.22A	96.55A	13.33C	0.00C	47.66B	0.46C	0.97C	1.96B	0.00B	0.00D	0.09D	0.00B	0.50C
Matador 35% EC	10.82	62.50B	47.33B	32.35C	37.55C	21.47B	25.97A	37.86C	3.55A	15.63A	0.00C	17.23A	5.75B	5.52A	6.11A	8.37A
Elsan 50% EC	10.49	98.36A	93.44A	79.66B	82.35B	34.29A	0.00C	64.68A	2.33B	0.00C	0.00C	4.52B	7.84A	3.61B	0.00B	2.66B
Control	10.07	9.90D	7.80C	6.09D	12.25D	12.40C	11.67B	10.02D	2.70B	5.21B	3.42A	2.66B	1.85C	2.06C	0.00B	2.53B
"F" test	N.S.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**

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تجارب حقلية لمكافحة حشرة صانعة أنفاق أوراق الموالح فى مصر

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أجريت تجارب حقلية لمكافحة حشرة صانعة أنفاق أوراق الموالح على النموات الصيفية لأشجار البرتقال أبو سرة باستخدام مبيدات متعددة خلال موسمين متتاليين (٢٠٠٦، ٢٠٠٧) بمحافظة الشرقية. ولقد أثبتت النتائج أن مركب أبامكتين عندما استخدم بمستحضرين مختلفين (مكتين ١,٨% مستحلب مركز، ديمكتين ١,٨% مستحلب مركز) وعند خلطهما مع الزيت المعدنى كيمى أويل أنهما الأكثر فعالية من بين جميع المبيدات المستخدمة خلال موسم ٢٠٠٦. وقد امتدت فعالية مركب ديمكتين ١,٨% مستحلب مركز + زيت كيمى أويل إلى ٤ أسابيع بعد المعاملة بالإضافة إلى ذلك لم يحدث هذا المركب أى تأثير ضار على النسبة المئوية للتطفل بالنوعين *Cirrospilus* spp., *Baryscapus* sp. بمقارنته بباقى المبيدات. كما أظهرت نتائج التجارب التى أجريت فى موسم ٢٠٠٧ أن المركب الفوسفورى العضوى السان ٥٠% مستحلب مركز كان الأكثر فاعلية من بين الثلاث مبيدات التى تم اختبارها. كما أن هذا المركب لم يظهر أى تأثير معاكس على النسبة المئوية للتطفل مع نهاية التجربة. أما مركب ماتادور ٣٥% مستحلب مركز (وهو يتبع مجموعة النيونيكوتينويد) فقد كان المركب الأقل فاعلية. ومع ذلك فقد كانت النسبة المئوية للتطفل مرتفعة معنوياً عنها فى غير المعامل. ولقد أعطى مركب صن تاب ٥٠% مسحوق قابل للذوبان (وهو يتبع مجموعة الثيوكرباميت) نتائج مشجعه حتى الأسبوع الرابع بعد المعاملة. ومع ذلك فلقد أدى لحدوث تأثيرا معاكسا بدرجة معنوية على النسبة المئوية للتطفل. لذا يمكن أن نوصى باستخدام أى من المركبين ديمكتين ١,٨% مستحلب مركز (مادته الفعالة أبا مكتين) مخلوطاً مع الزيت المعدنى كيمى أويل أو مركب السان ٥٠% مستحلب مركز (مادته الفعالة Phenthoate) منفرداً فى مكافحة صانعة أنفاق الموالح على نموات الصيف لتوفير حماية لا تقل عن أربعة أسابيع وبأقل ضرر على النسبة المئوية للتطفل.