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EFFICIENCY OF CERTAIN MINERAL OILS AGAINST THE COMMON ABUNDANT TOMATO INSECT PESTS AT ALEXANDRIA, EGYPT

Aziza A. S. Fata
Inst. Plant Prot.,Agric. Res. Center, El-Sabaheia, Alexandria, Egypt.

ABSTRACT

Efficacy of three mineral oils, KZ 95% EC, Super Masrona 94% EC and Super Royal 95% EC against immature stages of white fly, *Bemisia tabaci, Thrips tabaci, Aphis* spp. and *Liriomyza bryoniae* were investigated on two tomato cultivars (Super strain-B & Uc-97) at Sabaheia Experimental region during summer season of 2002. The obtained results revealed that *Liriomyza bryoniae* was the most dominant insect-pest on tomato plants of both tested cultivars.

Concerning the effect of tomato cultivars on the rate of infestation, UC-97 cultivar was more susceptible to infestation by the white fly, the aphid, and leaf miner than Super strain-B cultivar. The tolerant super strain-B cultivar showed the least infestation rates with all studied insects, except for thrips infestation. There were significant differences between both cultivars.

Also,data also showed that mineral oil-KZ was the highest effect against white fly, leaf-miners and aphids on Super strain-B cultivar,while the mineral oil-Super royal was the highest effect against white fly and liriomyzid on UC-97 cultivar. On the contrary, the mineral oil-Super Royal gave the highest effect against the onion thrips on tomato cultivar-Super strain-B.Both mineral oils Super Royal & KZ gave closely highest effect against onion thrips on tomato cultivar UC-97.

Also, it found that there was a strong positive and/or negative correlation relationship between the estimated levels of white fly and leaf miner infestations (+ 0.6298 and – 0.6999) after the 1st and 2nd sprays of KZ mineral oil, respectively on tomato cultivar Super Strain-B. While, there was strong positive correlation relationship (+ 0.5892 and + 0.8956) was detected between the measured rates of white fly and leaf miner infestation after the 1st and 2nd sprays of Super Masrona oil as well as the correlated rates of leaf miner and thrips infestations (+ 0.8215 and + 0.9998) after the 1st and 2nd sprays of KZ oil on tomato cultivar UC-97.

INTRODUCTION

Vegetables are considered among the most important cultivated crops in Egypt. Amongst these vegetables, tomato plants are most abundant and widely spread allover Egypt.

As reported by the Ministry of Agriculture, vegetable crops are usually infested by plenty species of different pests, which cause a great rate of loss amounting to more than 30% of the total annual production (proximately comprise 13 million tons). Therefore, an efficient pest control program must be adopted to minimize the expected loss in production. Integrated pest management (IPM) is the most optimum approach to reduce the population level of an economic injurious pest.

The white fly, *B. tabaci* is one of the utmost harmful insect pests of vegetable crops especially tomato plants. It causes direct damage by sucking juice of plants and transmits viral diseases (Bird and Maramorsch, 1978). Chemical control is still considered as the lone important measure for

controlling white fly (Hamid, 1999). Despite, many problems arose, following the use of chemical insecticides, such as the different aspects of environmental pollution, particularly, the hazardous effects on domestic animals and various natural enemies of parasitic or/and predatory species of economic pests.

Also, *Thrips tabaci* is one of the important economic insect pests, once plants are seriously infested with thrips, they soon change in colour, turn yellow and start to deteriorate (Lall and Singh, 1968). The thrips have been proved to be a vector of the spotted wilt of tomato (Samuel *et al.*, 1930).

For aphids, the worst injury is caused by transmitting different viral diseases to their hosts (Neilson and Harold, 1974 and Mesbah *et al* ., 1977 and 1983). Generally, aphids injure host plants by sucking the sap, excretion of the honey dew and depreciating their marketing value on render them completely unmarketable.

Leaf-mining flies of the genus *Liriomyza* Mink are among the most injurious dipterous insects attacking vegetable and horticultural crops (Jones *et al.*, 1986 and Parrella *et al,* 1987). These insects are considered secondary pests on tomatoes (Johnson *et al.,* 1980), however up to 90% of the foliage may be lost if the population increased (Schuster, 1978). In particular, several reports of insecticidal resistance in this respect were published and documented (Alverson and Gorsuch, 1982).

Petroleum oils were recommended as insecticides as early as 1763 but probably very little was used until the nineteenth century (Metcalf *et al.* 1962). Sprays of local oils are used for many years against scale insects, mealy bugs, thrips, aphids and mites on different crops and fruit trees. Oil sprays are used commonly in horticulture to control scale insects and mites. El-Sebae *et al.* (1976) stated that resistance was not recorded for mineral oils, which still have the advantage of being effective to resistant strains. The other factor, which may put into consideration in the integrated pest management program, is the selection of plant cultivars possessing the characteristics that may influence their tolerance or\and resistance against the key pests.

Therefore, the purposeof this research is to study the efficacy of three mineral oils; KZ 95% EC,Super Masrona 94% EC, Super Royal 95% EC against the occurring immature stages of the white fly, thrips, leaf miners and aphids on tomato plants compared with the untreated plants.Also, studying the susceptibility of two tomato cultivars to the infestation with there associated injurious insect-pests with tomato plants.

MATERIALS AND METHODS

The present study was carried at the experimental farm of El-Sabaheia Research Station during the summer season of 2002.Seedlings of both tested tomato cultivars (Super strain-B and UC-97) were transplanted on the first week of May. Inspection and records of occurring pests was performed during the elapsing period from May till July. The conducted

treatment of each cultivar was replicated three times in a Split Split Block Design. Dimensions of each block were 17 X 7 m. The normal agricultural practices were carried out.

1. Survey and population density of pests :

The population densities of immature stages of white fly, thrips, aphids and the leaf-minerswere determined by selected five plants randomizely from each plot and one leaf was picked up from the upper, medium and lower part of each plant(immature stages/5 plants).Collected leaves were kept in cloth bags till examination in the laboratory using stereoscopic binocular microscope. Statistical analysis of the data was carried out using Cohort Software, Inc. (1986), and the means of performed treatments were compared using the least significant differences.

2. Tested mineral oils and their rates:

Each of the evaluated mineral oils, i.e. KZ 95% EC, Masrona 94% EC and Super Royal 95% EC was applied at 1.5L/100L water.

To study the efficiency of these mineral oils, the time and number of applications on the occurring populations of *B. tabaci, Aphis* spp.; *T. tabaci* and *L. bryoniae* on both tested cultivars. An area of 1/12 feddan for each one was divided into plots (1/400 feddan each). Five plants from each plot were randomly chosen and three leaves from each plant were picked up and taken to the laboratory for microscopic examination and counting the numbers of alive individuals of inspected pests. Each treatment was replicated 3 times and performed in 2 sprays program (May,26 + June,24). Full coverage of tomato plants was secured by the use of knapsack sprayer fitted with one nozzle.

Numbers of inspected alive immatures were used as a criterion to the effectiveness of each evaluated mineral oil.Post-treatment counts were made after one, two and three weeks from the date of application (1^{st} or 2^{nd} spray) within the program and represent the initial and actual effects of the tested mineral oils upon tomato insect-pests. The percentages of reduction of each pest as a result of the run treatments were calculated according to Handerson and Telton (1955). Data of the tested mineral oils upon the populations of tomato insect pests were also analyzed and compared according to L.S.D. test.

RESULTS AND DISCUSSION

1. Survey and population densities of inspected insect pests on tomato plants :

Several pests have been reported to infest tomato plants (*Solanum Lycopersicum*, fam.: Solanaceae). The recorded insect pests during the period from May up to July included the white fly *B. tabaci*, the onion thrips *T. tabaci*, the aphids *Aphis* spp. and the leaf miner *L. bryoniae*. These insects were mostly associated with both tested cultivars of tomato plant (Super Strain-B & UC-97). These insect pests cause extensive damage to tomato plants as well as other field crops, such as cotton, soybean, ornamental

plants and other numerous vegetables. The resulted damage by these pests generally reflects in the reduced plant growth due to feeding on the plant phloem sap (Byrne and Bellow, 1991). Some of these pests, particularly the white fly and the aphids secrete the honeydew, which reduces harvest quality and promotes sooty mold (Cohen *et al.*, 1992 and Hendrix and Wei, 1992).

The measured levels of infestation and population density of each insect-pest are included in Table 1. From the table, it is obvious that *L. bryoniae* was the most dominant insect-pest on tomato plants of both tested cultivars. The highest level of *B. tabaci* infestation on tomato cultivar Super Strain-B occurred during the second half of May, the first week of June, first and third weeks of July. While, the highest rates of *B. tabaci* infestation on UC-97 tomato cultivar occurred during the second half of May, first and fourth weeks of June, and the first half of July. The higher infestation of thrips appeared on tomato cultivar Super Strain-B during the whole month of June, while for the other tested cultivar-UC-97 that higher level was observed in the first half of June. The aphid density on cultivar Super Strain-B reached the peak in the first week of June, versus the UC-97 cultivar, for which this peak occurred in the second half of May as well as the first and third weeks of June.

The formerly carried out studies showed that many factors influence the population density of the associated pests to the crop. Among these factors are the location where the plant is grown, the prevailing environmental and weather factors in the location, the relationship between pests and the genotype of the cultivars and their characteristics.

2. The susceptibility of both tested tomato cultivars to some pests:

The results in Table(1) & fig.(1) ,indicated that both cultivars differed in their susceptibility to infestation with the prevailing insect-pests in Sabaheia location. UC-97 cultivar was highly susceptible to infestation by the white fly, aphid and leaf miner than Super Strain-B cultivar (that may be due to the presence of densed smooth hairs on the leaflets of UC-97 cultivar). The tolerant Super Strain-B cultivar showed the least infestation rates with all studied insects except for thrips infestation. There was significant difference between the two evaluated varieties. The lack of attractiveness of a plant to the infestation with various pests appears to be associated with several factors. The differences in pest population on growing cultivars indicate their attractiveness difference to the pests (Lambert *et al.*, 1997 and Scheafsma *et al.*, 1998). Several different mechanisms of resistance have been suggested by many authors (Kornegay *et al.*, 1986). Among these are the structure of the leaf surface, hairs presence or absence and some chemical properties of the plant, which may control the feeding behavior of the pest.

Table 1: Rate of pest infestation due to time inspection in Sabaheia region.

Cultivar	Pests	Date of inspection and mean numbers of pests *								Mean
		26/5	3/6	10/6	17/6	24/6	1/7	8/7	15/7	
Super Strain-B	*B. tabaci*	12.33 a	9.16 c	4.50 g	3.66 h	6.33 e	8.80 d	6.00f	10.00 b	7.59
	T. tabaci	4.00 f	9.00 c	16.3 a	8.16 d	11 16 b	7.30 e	3.80 f	3.80 f	7.94
	Aphis spp.	4.66 c	13 33 a	6.00 b	4.66 c	8.00 b	7.33 b	6.66 b	4.66 c	6 91
	L. bryonii	6 50 d	7 00 d	6.00 d	6.3 d	8.80 c	5.16 d	11 66 b	14 33 a	8 21
	Mean	6.87	9 62	8.20	5.69	8.57	7.14	7.03	8.19	
UC-97	*B tabaci*	18.33 a	11.50 c	5.16 f	3.16 g	9 66 d	14 00 b	8.66 e	11.00 c	10.18
	T. tabaci	5.30 b	7.50 a	7.00 a	3.30 c	3.10 c	3.66 c	2 66 c	2.66 c	4 39
	Aphis spp	8.66 c	16 00 a	2.66 d	11.33 b	5.33 cd	7.33 c	2.00 d	0.66 d	7.82
	L. bryonii	10.17 b	13.83 a	13.17 a	9.83 b	13 33 a	6.50 d	10 66 b	7.83 c	10.66
	Mean	10.61	12.20	6.99	6.90	7.85	7.87	5.99	5.53	

*** Average number of pests per 5 plants or 15 composed leaves.**
L.S.D. at 0.05 B. tabaci both cultivars = 0.79 & 0.72
L.S.D. at 0.05 T. tabaci = 0.75 & 0.85
L.S.D. at 0.05 L. bryoniae = 1.72 & 0.77
L.S.D. at 0.05 B. tabaci both cultivars = 2.09 & 1.57

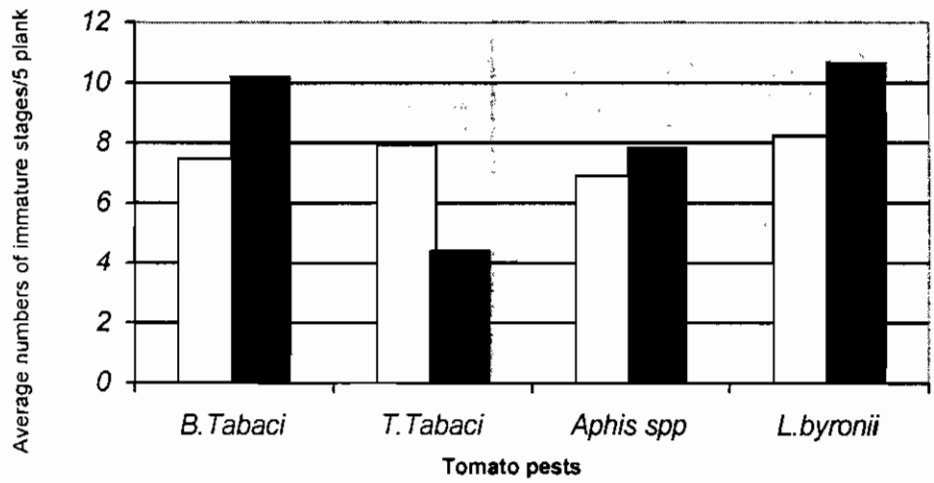

Fig. (1): Number of immature stages of tomato pests associated with Super strain –B & Uc-97 cultivars.

Generally, it could be mentioned that the obtained results of this experiment proved the existence of a somewhat high level of tolerance of the tested tomato cultivars especially when the population density of each of the studied pests is high.

3. Effect of three mineral oils on the infestation of tested insect-pests:

In this study, the efficiency of mineral oils, timeand number of adopted sprays against the sucking insect-pests of *B. tabaci, T. tabaci, Aphis* spp. and the leaf miner, *L. bryoniae* were investigated. Treatments were performed during the summer season of 2002 to determine the efficient mineral oil, the optimal time and number of required applications against these insect-pests. The obtained results for each insect-pest could be illustrated as follow.

3.1. *Bemisia tabaci*

Table (2) show, the calculated reduction percentages of *B. tabaci* numbers after 1, 2 and 3 weeks from the date of 1st and 2nd sprays. For the tomato cultivar Super Strain-B, regardless the time and number of sprays, data indicated that KZ mineral oil was the highest efficient one against the white fly after 3 weeks from 1st spray (93.39%), followed by S. Royal oil (52.77%). On the contrary, S. Royal oil recorded the highest reduction of white fly after 3 weeks from the 2nd spray (72.25%) followed by Super Masrona oil (65.43%) and KZ oil which was the least effective against the white fly (57.14%).

Table 2: Reduction percentages of *Bemisia tabaci* as affected different mineral oils on two tomato cultivars

Cultivar	Mineral oil and spray *		% Reduction after				General mean
			1 week	2 weeks	3 weeks	Mean	
Super Strain-B	Super Masrona	a	25.60	25.32	53.53	34.81	39.01
		b	1.75	62.50	65.43	43.22	
	KZ	a	25.61	83.47	93.39	67.49	66.86
		b	63.80	77.77	57.14	66.23	
	Super Royal	a	11.72	71.11	52.77	45.20	53.73
		b	53.11	58.44	72.25	62.27	
UC-79	Super Masrona	a	19.57	45.68	91.11	52.12	34.03
		b	10.84	4.48	32.46	15.92	
	KZ	a	37.66	75.75	89.09	67.50	55.93
		b	71.42	25.17	36.50	44.36	
	Super Royal	a	33.15	74.84	95.47	67.82	63.10
		b	67.74	40.74	66.66	58.38	

* a = 1st spray and b = 2nd spray.

For the other tested tomato cultivar UC-97, it could be noticed that after 3 weeks from the 1st spray, S. Royal oil recorded the highest toxic effect against the white fly (95.47%) followed by Super Masrona oil (91.11%) and KZ oil (89.09%). Similarly, S. Royal gave the highest toxic effect upon white fly after the same period from 2nd spray (66.66%), followed by the least efficient KZ and Super Masrona oils (36.5% and 32.46%, respectively).

Concerning the deduced means of reduction, for 1st and 2nd sprays, the three evaluated mineral oils were more or less moderately efficient against the white fly on both tested tomato cultivars. Where, the calculated reduction percentages of white fly infestation on the tomato cultivar S. Strain-B ranged from 67.49 and 66.23% for KZ oil to 37.81 & 43.22% for the least efficient Super Masrona oil after the 1st and 2nd sprays, respectively. Also, on UC-97 cultivar, the calculated mean reduction after

Also, the deduced general mean of reduction percentages of white fly after the 1st and 2nd sprays, KZ oil gave the highest rate of reduction followed by S. Royal oil and Super Masrona oil (66.86%, 53.73% and 39.01%, respectively) on the tomato cultivar S. Strain-B. But, on UC-97 cultivar, S.

Royal oil exhibited the highest rate of reduction followed by KZ oil and Super Masrona oil (63.1%, 55.93% and 34.03%, respectively). the 1st and 2nd sprays ranged from 67.82% & 58.38% for S. Royal oil to 52.12% and 15.92% for Super Masrona oil (Table 2).

3.2. *Thrips tabaci*

The included results in Table (3) demonstrate the calculated readuction percentages of *T. tabaci* numbers after one, two and three weeks from performed applications on tomato cultivar Super-Strain-B. It was revealed that Super Masrona oil was the least effective one and gave reduction values of 13.19% and 30.36% after 3 weeks from application of each of 1st and 2nd sprays respectively. Super Royal oil recorded the highest toxic effect against *T. tabaci* after 2 weeks from application of 1st spray (91.42%) followed by KZ oil (90.59%). Also, on Super-Strain-B cultivar, that mineral oil Super Royal recorded the highest effective toxic action against onion thrips (88.60 and 88.03%) after 2 and 3 weeks from the 2nd spray.

On contrary, for the tomato cultivar UC-97, Super Masrona oil recorded the highest effect against the onion thrips (81.48%) followed by Super Royal oil (75.30%) after 3 weeks from the 1st spray. Both of tested KZ and Super Royal mineral oils were less effective, recording reduction percent of about 62.95% & 62.5% after 1 week from the application of 1st spray. Also, Super Masrona and Super Royal mineral oils exhibited least toxic efficacy against onion thrips (11.11%) after 3 weeks from application of the 2nd spray.

Generally, for the treated tomato cultivar Super Strain-B, Super Royal oil gave the highest of reduction mean post the 1st spray (85.06%) followed by KZ oil (79.19%) and Super Masrona oil which gave the least mean of reduction (34.05%). Viceversa, KZ oil recorded the highest mean of reduction post the 2nd spray (75.81%) followed by Super Royal oil (72.93%) and Super Masrona oil (41.32%).

Table 3: Reduction percentages of Thrips tabaci as affected different mineral oils on two tomato cultivars

Cultivar	Mineral oil and spray *		% Reduction after				General mean
			1 week	2 weeks	3 weeks	Mean	
Super Strain-B	Super Masrona	a	62.50	62.47	13.19	34.05	37.68
		b	55.17	38.46	30.36	41.32	
	KZ	a	58.97	90.59	88.00	79.19	77.50
		b	57.50	85.34	84.61	75.81	
	Super Royal	a	77.77	91.42	86.00	85.06	78.99
		b	42.16	88.60	88.03	72.93	
UC-79	Super Masrona	a	30.55	48.57	81.48	53.53	40.19
		b	25.00	44.44	11.11	26.85	
	KZ	a	62.96	58.33	44.4	55.24	52.96
		b	43.75	58.33	50.00	50.69	
	Super Royal	a	62.50	25.0	75.30	54.27	40.56
		b	25.00	44.44	11.11	26.85	

* a = 1st spray and b = 2nd spray.

For tomato cultivar UC-97, according to the mean reduction post 3 weeks of 1st spray, all the calculated means for the tested oils were merely the same (about 53 – 55%). While, after the same intervals of the 2nd spray, KZ oil recorded the highest mean (50.19%) followed by Super Royal and Super Masrona mineral oils which gave a same lower rate of reduction comprised 26.85%.

The excluded general mean of reduction for both sprays, KZ oil gave the highest mean of reduction (52.96%) followed by the tested mineral oils-Super Masrona and Super Royal which gave a similar means amounting to 40.19 and 40.56%.

In conclusion, the three evaluated mineral oils were some what more efficient upon the treated individuals of *thrips tabaci* infesting the tomato cultivar Super Strain-B compared to the tested cultivar UC-97.

3.3. *Aphis* spp.

Table (4) shows the calculated reduction percentages of occurring aphids numbers on tomato cultivar Super Strain-B after one, two and three weeks from the date of 1st and 2nd sprays. Regardless the time and number of applied sprays, data indicated that Super Masrona oil gave the highest effect against aphids after 3weeks from 1st spray (91.66%) followed by KZ and Super Masrona oils which gave the same rate of aphids reduction (75%). While, KZ oil recorded the highest reduction of aphids after the same period from 2nd spray (87.5%) followed by Super Royal oil (75.0%) and Super Masrona oil (50.0%).

Table 4:Reduction Percentages of *Aphis* spp. as affected different mineral oils on two tomato cultivars

Cultivar	Mineral oil and spray *		% Reduction after 1 week	2 weeks	3 weeks	Mean	General mean
Super Strain-B	Super Masrona	a	10.00	62.50	91.66	54.72	65.67
		b	89.28	90.62	50.00	76.63	
	KZ	a	72.22	83.33	75.00	76.85	75.92
		b	70.80	66.66	87.50	74.99	
	Super Royal	a	55.55	25.00	75.00	51.85	52.77
		b	61.11	25.00	75.00	53.70	
UC-97	Super Masrona	a	52.0	20.00	93.84	55.28	54.02
		b	58.3	50.00	50.00	52.77	
	KZ	a	60.00	33.33	89.74	61.02	69.61
		b	80.77	69.23	84.61	78.20	
	Super Royal	a	50.00	87.50	38.46	58.65	51.12
		b	23.08	38.46	69.23	43.59	

* a = 1st spray and b = 2nd spray.

For the tomato cultivar UC-97,Super Masrona oil gave the highest effect against aphids (93.84%) after 3 weeks from 1st spray, followed by KZ oil (89.74%) and Super Royal (38.46%). While, KZ oil recorded the highest reduction of aphids after the same period from 2nd spray (84.61%) followed

by super Royal oil (69.23%) and Super Masrona oil (50.0%).

Concerning the deduced means of reduction after each of 1st and 2nd spray on tomato cultivar-Super Strain-B, KZ gave the highest mean of reduction of aphids (76.85% and 74.99%) followed by Super Masrona oil (54.72% and 76.63% respectively). Also, KZ gave the highest mean reduction of aphids on UC-97 cultivar (61.02% and 78.20%) followed by Super Masrona oil (55.28% and 52.77%). The three evaluated mineral oils gave more efficient control of aphids on Super Strain-B cultivar compared with the UC-97 cultivar.

In regard to the extracted general mean of aphids reduction on each tested cultivar, KZ oil gave the highest mean of reduction followed by Super Masrona and Super Royal oils, which were less effective control against aphids. Lamont *et al.* (1990) showed that mineral oil sprays reduced the number of aphids with 17 and 33% using 2 and 4% oil emulsions.

3.4. *Liromyza bryoniae*

Table (5) show the calculated reduction percentages of *L. bryoniae* after one, two and three weeks from the date of 1st and 2nd sprays. The observed reduction in the 1st and 2nd weeks may represent the initial and actual effects of the tested mineral oils upon this pest.

Regardless the time and number of sprays, data indicated that Super Royal mineral oil gave the highest effect against the liriomyzid (81.1 and 84%) on Super Strain-B cultivar after one and two weeks from 1st spray followed by KZ oil (78.7 and 89.74%) and Super Masrona oil which was the least effective against the liriomyzid (58.97 and 61.48%).

On the contrary, after the 2nd spray, Super Masrona oil recorded the highest effect against the leaf miners (98.69) along 3 weeks after the second spray followed by Super Royal oil and KZ oil which gave the highest reduction of the liriomyzid along the same period from 2nd spray ranged from 91.66 to 96.39% and 90.59 to 95.49%, respectively.

Table 5:Reduction Percentages of *L. bryoniae* as affected different mineral oils on two tomato cultivars

Cultivar	Mineral oil and spray *		% Reduction after				General mean
			1 week	2 weeks	3 weeks	Mean	
Super Strain-B	Super Masrona	a	58.97	61.48	57.14	59.19	76.49
		b	95.76	87.00	98.64	93.80	
	KZ	a	78.70	89.74	61.53	76.65	82.67
		b	90.59	80.00	95.49	88.69	
	Super Royal	a	81.10	93.84	38.46	71.13	77.69
		b	94.70	91.66	96.39	84.25	
UC-97	Super Masrona	a	82.95	70.31	92.50	81.92	71.42
		b	79.58	65.00	38.22	60.93	
	KZ	a	90.51	73.91	95.65	86.69	77.60
		b	73.08	53.84	78.68	68.52	
	Super Royal	a	84.41	92.68	88.57	88.55	84.76
		b	90.38	68.75	83.78	80.97	

* a = 1st spray and b = 2nd spray.

For the other tested UC-97 cultivar, it could be noticed from Table 5 that KZ oil recorded the highest reduction in leaf miners infestation after 3 weeks from 1st application (95.65%) followed by Super Masrona oil (92.5%) and Super Royal (88.57%). But, after the 2nd spray, Super Royal oil showed the highest effect against liriomyzids after the same period of 3 weeks from application (83.78%) followed by KZ oil (78.65%) and Super Masrona oil (38.22%).

Generally, after the 2nd spray S. Royal gave the highest reduction of liriomyzids along the 1st, 2nd and 3rd from application (90.38%, 68.75 & 83.78%, respectively).

Concerning the deduced means of reduction for 1st and 2nd spray,the three evaluated mineral oils gave more efficient control of leaf miners on UC-97 cultivar compared with the super strain-B one. Where, the calculated reduction percentage of UC-97, ranged from 60.93 and 81.9% for Super Masrona oil to, 80.97% % 88.55% for S. Royal oil, and from 59.19 and 93.8% for SUPER Masrona oil to 76.85 & 88.69% for KZ oil of Super Strain-B after the 1st and 2nd sprays (Table 5).

That result was ascertained by the deduced general mean of recorded reduction rates during the period of inspections after the 1st and 2nd sprays, whereas KZ oil gave the highest rate of reduced number (82.67%) on Super Strain-B cultivar. Also, S. Royal oil was the highest efficient on the treated plants of UC-97 cultivar and reduced the number of leaf miners up to 84.76% (Table, 5). There were high significant differences between the three tested oils on both evaluated cultivars.

The correlated values of estimated infestational rates of prevailing insect pests on both tomato cultivars after the 1st and 2nd sprays of each of evaluated mineral oils are included in Table 6. From the table, for the tomato cultivar Super Strain-B it could be revealed the strong positive and/or negative relation ship (+ 0.6298 and - 0.6999) between the estimated level of white fly and leaf miner infestations after the 1st and 2nd sprays of KZ oil, respectively. While, for the other correlated values of measured rates of each of white fly and/or leaf miner with thrips and aphids, the deduced values to a more or less extent varied and calibrated between the positive or negative weak and/or strong relationships according to the correlated values of insect-pests infestational rates (Table 6). Similarly, for the tomato cultivar UC-97, the strong positive relationship (+ 0.5892 and + 0.8956) was detected between the measured rates of white fly and leaf miner infestation after the 1st and 2nd sprays of Masrona oil, as well as the correlated rates of leaf miner and thrips infestations (+ 0.845 and + 9998, respectively) after the 1st and 2nd sprays of KZ oil (Table 6).

Table 6: Correlation coefficient values between two tomato cultivars and three mineral oils on three tomato pests

Cultivar	Mineral oil	Control		S. Royal oil		KZ oil		Masrona oil	
	Spray No.	1st	2nd	1st	2nd	1st	2nd	1st	2nd
	Variable	(rv.)	(rv.)	(rv.)	(rv.)	(rv.)	(rv.)	(rv.)	(rv.)
Super Strain-B	White fly and Leaf miner	-0.1308 ns	+ 0.9146 **	+ 0.6602 *	- 0.0251 ns	+ 0.6298 *	- 0.6999 *	-0.5331ns	-0.1640ns
	White fly and Thrips	-0.7982 ***	- 0.1467 ns	- 0.0441 ns	+0.3683 ns	+0.4694 ns	- 0.4892 ns	-0.8836 **	-0.2125ns
	White fly and Aphid	- 0.8748 **	- 0.4183 ns	- 0.0212 ns	- 0.3683 ns	+0.1800 ns	+0.0504 ns	-0.3414ns	-0.3146ns
	Leaf miner and Thrips	+ 0.6474 *	- 0.6436 *	- 0.4962 ns	- 0.2028 ns	- 0.1308 ns	+ 0.6999 *	+0.2378ns	+0.946 ***
	Leaf miner and Aphid	+0.4090 ns	- 0.3515 ns	- 0.0239 ns	- 0.2589 ns	+0.1714 ns	+0.1486 ns	-0.0331ns	+0.5604ns
	Thrips and Aphid	+ 0.4090 *	- 0.0534 ns	+0.3321 ns	- 0.1729 ns	-0.3255 ns	+0.0658 ns	+0.3515ns	+0.5525ns
UC-97	White fly and Leaf miner	+0.0185 ns	- 0.1253 ns	- 0.6481 *	- 0.3276 *	+0.4322 ns	- 0.5344 ns	+ 0.5892 *	+0.8956 **
	White fly and Thrips	+0.2284 ns	+ 0.9417 **	- 0.6796 *	+ 0.3026 *	+0.4892 ns	+ 0.9998 **	+0.4326ns	+0.0000ns
	White fly and Aphid	+0.0881 ns	+ 0.5430 ns	- 0.2115 ns	-0.3655 ns	+0.5171 ns	- 0.3078 ns	+0.3496ns	+ 0.7029 *
	Leaf miner and Thrips	+ 0.7250 **	+ 0.0460 ns	- 0.0188 ns	+0.1010 ns	+ 0.8215 **	+ 0.9989 **	+ 0.8076**	+0.1740ns
	Leaf miner and Aphid	+0.3812 ns	- 0.1360 ns	+0.2213 ns	+0.0949 ns	- 0.0137 ns	- 0.0825 ns	+0.0986 s	+ 0.6625 *
	Thrips and Aphid	+0.4090 ns	+ 0.5410 ns	+0.4322 ns	-0.1879 ns	+0.0718 ns	+ 0.9998 **	+0.2003ns	-0.0975ns

* = Significant at 0.05 level, ** = Significant at 0.01 level and ns = Not significant

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فاعلية بعض الزيوت المعدنية على أهم الآفات الحشرية التى تصيب الطماطم فى الإسكندرية (مصر)

عزيزة أحمد سليمان فتى

معهد بحوث وقاية النبات ، مركز البحوث الزراعية ، الصبحية بالإسكندرية

الهدف من هذا البحث هو استخدام بعض الزيوت المعدنية(Super Masrona, kz and Super Royal) لمكافحة أهم الآفات الحشرية التى تصيب الطماطم خلال الموسم الصيفى لعام 2002 بهدف تقليل استخدام المبيدات والمحافظة على البيئة فى إطار البرنامج القومى للمكافحة المتكاملة مع التحكم فى تعداد الآفات تحت الحد الاقتصادى الحرج للإصابة .

وكذلك تم دراسة وفرة وتذبذب تعداد أهم الآفات الحشرية التى تصيب صنفين من الطماطم وهما Super Strain-B وصنف UC-97 فى منطقة الصبحية بالاسكندريه .

وقد أظهرت النتائج أن أهم الآفات الحشرية التى تصيب الطماطم هى الذبابة البيضاء ونافقات الأوراق والتربس والمن،حيث كانت نافقات الأوراق أكثر الآفات الحشرية تواجدا على كل من صنفى الطماطم . وبالنسبة لتأثير الأصناف على معدلات الإصابة بالحشرات فقد كان صنف الطماطم UC-97 أكثر حساسية للإصابة أى أكثر تعدادا بالذبابة البيضاء والمن ونافقات الأوراق ، بينما صنف Super Strain-B كان أقل إصابة بهذه الحشرات ولكن كان أكثر حساسية بالإصابة بالتربس حيث كان هناك فروق معنوية بين الصنفين.

أظهرت النتائج أيضا أن المعاملة بالزيت المعدنى kz كان أعلى الزيوت المختبرة تأثيرا على الذبابة البيضاء ونافقات الأوراق والمن فى صنف الطماطم Super Strain-B وأيضا كان أعلى تأثيرا على المن فى صنف UC-97. بينما الزيت المعدنى Super Royal كان أعلى تأثيرا على الذبابة البيضاء ونافقات الاوراق فى صنف UC-97. بينما الزيت المعدنى Super Royal كان أعلى تأثيرا على الذبابة البيضاء ونافقات الأوراق فى صنف UC-97 وعلى التربس فى صنف Super Strain-B.

ارتباط معنوى موجب وسالب بين نافقات الأوراق والذبابة البيضاء بعد معاملة كل من الرشة الأولى والثانية لزيت KZ على التوالى . أرتباط سالب عالى المعنوية بين الذبابة البيضاء والتربس ونافقات الأوراق بعد الرشة الأولى لزيت Super Masronaعلى صنف Super Strain-B.

بالنسبة لصنف UC-97 ؛ هناك علاقة ارتباط سالب المعنوية بين الذبابة البيضاء وكل من نافقات الأوراق والتربس بعد الرشة الأولى لزيت Super Royal . وجد أن هناك ارتباط عالى المعنوية موجب بين نافقات الأوراق والتربس بعد كل من الرشة الأولى والثانية لزيتkz وكذلك بعد الرشة الأولى لزيت Super Masrona وجد علاقة ارتباط موجبة معنوية بين نافقات الأوراق والمن بعد الرشة الثانية لزيت Super Masrona وعلاقة ارتباط موجبة عالية المعنوية بين المن والتربس بعد الرشة الثانية بالزيت المعدنى kz