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FIELD EFFICACY OF SOME TYPES OF INSECTICIDES FOR CONTROLLING WHITE FLIES ON THE JUJUBE PLANT

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ABSTRACT

This experiment was conducted in the Nineveh Forest Nursery in the autumn season of 2019. The study aims to examine the efficacy of three kinds of pesticides which are different with respect to their effect in killing the whitefly nymphs that exist on the saplings of jujube plants with an apple variety; these pesticides are : Evisect, Sivanto, and Matrixine plus, that are normally recommended. The initial survey done on the samples of jujube leaves has revealed that they were infected with the three kinds of the whitefly insect, *Acaudalerodes rachipora* (Singh) and *Aleurolobus marlatti* (Quaintance). *Aleuroclava jasmin*) Takahashii (The infection was concentrated on the upper surface of the leaves. The percentage of leaves infection before the treatment with the pesticides was 80.3%. The results showed that the pesticides differed in their activity for killing whitefly nymphs according to the type of pesticide and the surface of leaves. In this respect, the insect pesticide Evisect was more effective than Sivanto and Matrixine Plus, in reducing the number of nymphs found on the surface of the jujube leaf. The average of reduction, in this regard, reached 51.76, 41.30, and 50.78 % respectively. Ten days of treatment were the best period in reducing the number of nymphs, with an average of 5.3 nymphs/leaf, compared to the initial number 20.3 nymphs/leaf before the treatment

Keywords **:** *Jujube whitefly, Evisect Pesticide, Sivanto, Matrixine*

Introduction

Jujube trees are spread in the tropical and subtropical regions of the hemisphere, especially in the Indian subcontinent and China, and are considered to be small-core fruit trees (Abdel-Aal, 1967). Jujube, *Zizyphus spina* Christi, belongs to the Rhamnacae family and the Rhamnales rank, which includes about 58 genera with 600 Spescis distributed as trees, shrubs, climbers and, rarely, herbs (Al-Obaidi, 2001). Jujube has many medical and general benefits, for instance, the bark of the jujube trees is one of the important treatments for severe diarrhea cases. As for the leaves, they are considered an essential material for the best plant antiseptics and are used in the manufacture of the finest types of washing and disinfection materials, because they contain saponins (Rouiha, 1978; Wills, 1981, and others). Jujube trees in Iraq are exposed to infection by many pests that vary in importance according to regions, such as crusty insects, mite species, and micro-bugs, such as *Icerya aegyptiaca* (Al-Durki, 2002), the worm of jujub flour, the jujub leaf digger (Arhem, 2002), the fruit fly, *Ceratitus capetata* and the jujub fruits fly (Jabbar, 1996). They are also affected by white flies which are small insects belonging to the rank Homoptera and under the rank Sternorrhyncha and to the Aleyrodidae family which includes 1556 species belonging to 161 genera in the world (Martin, 2007). Black flies have characteristics and capabilities that made them dangerous pests, their nymphs and adults feed directly on the plant sap, causing great damage by inserting their sucking perforated mouth parts into the phloem of the leaves and depleting its contents of sugars and amino acids (Baufeld and Unger, 1994). They also cause indirect damage through the secretion of the honeydew that covers the leaves, fruits and twigs, which hinders the process of photosynthesis. In addition to their negative impact on the process of transpiration, due to the gathering and adhesion of dust that prevents sunlight from reaching the surface cells, which leads to their yellowing and death, they also prepares a suitable environment for the growth of black mold fungi (Osborn, 1990 and Al-Alaf, 2012). The most serious harm of black flies is represented by the transmission of viral diseases. In this respect, Mau and Martin (1992) mentioned that black flies transmit more than 40 viral diseases to vegetables and fiber crops, while Nour and Ahmed (1987) mentioned that more than 77 viral diseases are transmitted to plants by species of whiteflies. The jujube white fly is characterized by its rapid formation of insecticide-resistant strains, due to its short life and multiple generations, which made it a stubborn pest that requires constant monitoring and the use of various methods in controlling it, including the diversification of pesticides used to combat it. In this study, some pesticides that differ in their effect in controlling the jujube white fly were field evaluated.

Materials and Methods

The experiment was conducted on seedlings of jujube apple variety infected with white flies (*A. rachipora* and *A.*

marlatti A. jasmini) and planted in the canopy of the Nineveh forest nursery located in the Mohandessin district on 10/5/2019, where the canopy was divided into four parts, three of which were sprayed with pesticides, **Evisect**, Sivanto and Matrixine Plus, and one part sprayed with water only as a control experiment.

Table 1 : Types of pesticides tested in an experiment to measure their effectiveness on the jujube white fly

The Name of the Commercial Pesticide	The Manufacture Company	Usage Percentage Recommendation	Impact Method	Effective Material	Chemical Group
Matrixine Plus	Russel IPM	50 ml / 100L	Blocker feed	Abamectin 5% Oxymatrin 2.4%	Natural Extracts
Sivanto	Bayer	50-60 ml /100L	Acetylcholine Inhibitor	Flopiradforon	Biotinolides
Evisect	King Quenson	100 ml /100L	Acetylcholine Receptor Inhibitor	Thiocyclam Hydrogen Oxalate 50%	Diverse Miscellzneous

The infection rate was estimated first before spraying, by taking five random branches for each treatment, the total number of infected leaves and the number of live and dead nymphs on both leaf surfaces are calculated. The recommended concentrations of pesticides were used with a 20 liter back spray, taking into account the creation of a barrier between one sector and another to avoid the occurrence of spray interference.

The first reading was taken after three days, the second reading after six days and the third reading after ten days from the date of spraying, and it consisted of five random branches from each treatment brought to the laboratory and calculated the numbers of total and infected papers and the numbers of live and dead nymphs on the two surfaces of the paper using a binocular device. The percentage of infestation and the relative effectiveness of pesticides according to the following equations:

Leaves infection percentage = the number of infected papers in the sample / the total number of papers in the sample * 100%

$$\% \text{ Relative efficiency} = \left(1 - \frac{\text{Number of pest individuals after treatment x}}{\text{number of pest individuals in comparison before treatment}} \times \frac{\text{Number of pest individuals before treatment x}}{\text{number of pest individuals in comparison after treatment}} \right) \times 100$$

According to the Henderson and Tilton equation mentioned in Shaban and AL-Mallah (1993).

The results were analyzed statistically using a CRD design, and the results were compared through Duncan's multi-range analysis (Antar, Salem Hammadi, 2010)

Results and Discussion

The effect of the type of pesticide and the time of treatment on the percentage of jujube leaves infestation with the jujube white fly

The results of the research shown in Table No. (2) indicates that the rates of leaf infection with the whitefly before treatment were high at a total rate of 83.4%. The percentage of leaf infestation was varied among the three pesticides, as it was the highest possible with Civanto pesticide, at a rate of 25.5%, while the lowest percentage of leaf infection was with the pesticide Evisect and reached 11%. The average leaf injury rate varied between transactions as noted in the table, but no significant differences were recorded between them. The lowest value of leaf injury percentage was recorded after ten days of treating seedlings with Matrixen Plus pesticide, reaching 57.3%.

It is noticeable that the infection rates of leaves, despite the use of pesticides, remained relatively high, and the reason may be that seeing one nymph on the plant leaf means an infected leaf, and thus the high values of infection rates of leaves.

The effect of the type of pesticide and the time of treatment on the numbers of live whitefly nymphs on the upper surface of the jujube leaves

The initial survey showed that the number of nymphs on the upper surface is much more than on the lower surface. The rate of retention was the lowest possible with Civanto pesticide at a rate of 32.4%. The average number of live nymphs on the upper surface after ten days of treatment was 3.0, 2.22, 2.20 nymphs / leaf for Matrixine Plus, Evisect and Sivanto, respectively, while their numbers before treatment were 12.16. 10.5, 14.7 nymph / paper, Table No. (3). Also, the values of the bilateral interference between the type of pesticide and the timing of the reading showed significant differences between their averages, and the lowest value for the number of live nymphs on the upper surface when treated with Matrixen Plus after ten days, where the average was 2.2 nymphs/leaf.

The effect of the pesticide type and the time of treatment on the numbers of live whitefly nymphs on the lower surface of the jujube leaves:

Sivanto pesticide surpassed the rest of the pesticides in preserving the number of nymphs of the jujube fly on the underside of the leaves, as its effectiveness reached 61.65%, while Matrixine Plus showed weakness in reducing the number of nymphs on the lower surface of the leaves and its relative effectiveness reached 47.79%. The bottom surface as a result of using Matrixine Plus, Sivanto and Evisect pesticides were 54.68, 55.55 and 39.50% respectively. Table No. (4), the lowest value of the number of live nymphs was recorded on the bottom surface of the leaf when plants were treated with Matrixen Plus after six days of treatment, and it was 2.18 nymphs/leaf. Tark and Muhammad (2011) indicated that the mortality rate of nymphs of the white jasmine fly treated with Oxymatrin was relatively low at 64.5% compared to other pesticides tested (Desis, Beamont, Grafiti) and the adult mortality rate of the white jasmine fly after three days of treatment was 47.5%.

The effect of the pesticide type and the time of treatment on the numbers of live whitefly nymphs on the jujube leaf surfaces

The results of the experiment shown in Table No. (5) state that the variation of the pesticides in their effect on nymphs on both surfaces of the paper, where the pesticide Evisect was superior to Matrixine Plus and Sivanto in preserving the number of live nymphs and the ratios reached 51.76, 50.78 and 41.30% respectively. A period of ten days from the date of the treatment recorded a greater effect on reducing the number of nymphs, as the average number of live nymphs was 5.3 nymphs per leaf, while the average number of nymphs before the treatment was 20.3 nymphs / leaf. The coefficients of the bilateral interference were varied and observed significant differences between them at a probability level of 0.05. Evisect recorded the highest effective rate of 52.25%, and the reason may be due to the fact that Evisect has an effect on contact and through the stomach, as it is absorbed by the leaves and applied into the sap stream, and it is an important factor in affecting the pests protected from direct spraying. Farghly, (2010) indicated in her study that the whitefly, Bemisia tabaci (Genn) resisting to pesticides effect, was unable to exhibit cross-resistance with different insecticides, such as thiocyclam, buprofgen, acetamiprid, pimetrosine, pyrimifos-methyl, methomyl, carbosulfan. The proposed sequences of insecticide applications as a resistance management strategy showed that the program containing the sequences of thiocyclam-buprofen, acetamiprid and pimetrosine was the best program. Another study showed that the pesticides Evisect, Abloud and Admiral proved to be effective against the whitefly in all its nymph stages (Al-Qasim 1998)

Table 2 : The effect of the pesticide type and the time of treatment on the percentage of jujube leaves infestation with the jujube whitefly

Pesticide	Leaves Infection Rate%				Rate of Infection Rate after Treatment	Percentage of Infection Reduction%
	Before the Treatment	Three Days after the Treatment	Six Days after the Treatment	Ten Days after the Treatment		
Evisect	90 a	79.5 ac	80.06 ac	81.0 ab	80.1	11
Sivanto	89.7 a	71.9 ac	60.68 bc	68.2 ac	66.9	25.5
Matrixine	70.6 ac	66.06 bc	61.7 bc	57.3 c	61.6	12.8
Comparison	79.5 ac	71.1 ac	82.6 ab	81.9 ab	78.5	
Time Effect Rate	83.4	72.4	67.4	68.8		

The different letters indicate the presence of significant differences between the factors at a probability level of 0.05

Table 3 : The effect of the pesticide type and the time of treatment on the numbers of live whitefly nymphs on the upper surface of the jujube leaves

Pesticide	Number of nymphs nymph / leaf				Average number of nymphs after the Factor Nymph / Leaf	The percentage of reduced number of nymphs%	The relative effectiveness of the pesticide%
	before Treatment	Three Days after Treatment	Six Days after Treatment	Ten Days after Treatment			
Eivsect	12.16 ab	9.6 a-c	5.7 cd	3.0 d	6.1	50.66	47.10
Sivanto	10.5 a-c	13.5 ab	5.8 cd	2.22 d	7.1	32.4	28.71
Matrixine	14.7 A	13.3 ab	2.66 d	2.20 d	6	59.18	56.96
Comparison	10.86 ab	11.5 ab	10.0 a-c	9.5 bc	10.3		
Time Effect Rate after treatment	12.4	12.1	4.7	2.4			

The different letters indicate the presence of significant differences between the factors at a probability level of 0.05

Table 4 : The effect of the pesticide type and the time of treatment on the numbers of live whitefly nymphs on the lower surface of the jujube leaves

Pesticide	Number of nymphs nymph / leaf				Average number of nymphs after treatment	Percentage reduction in number of nymphs%	The relative effectiveness of the pesticide%
	before Treatment	Three Days after Treatment	Six Days after Treatment	Ten Days after Treatment			
Evisect	10.46 a	4.22 c-f	7.58 b	2.44 ef	4.74 a	54.68	60.89
Sivanto	7.2 bc	5.3 b-e	2.66 d-f	1.64 f	3.2 b	55.55	61.65
Matrixine	5.62 b-d	3.42 d-f	2.18 ef	4.62 b-f	3.40 b	39.50	47.79
Comparison	4.04 d-f	5.22 b-e	4.44 c-f	4.54 c-f	4.68 b		
Time Effect Rate after treatment	6.83 a	4.54 b	4.21 b	3.31 b			

The different letters indicate the presence of significant differences between the factors at a probability level of 0.05.

Table 5 : The effect of the pesticide type and the time of treatment on the number of live nymphs for total white flies on both sides of the jujube leaves.

Pesticide	Number of nymphs nymph / leaf				Average number of nymphs after treatment	Percentage reduction in number of nymphs%	The relative effectiveness of the pesticide%
	before Treatment	Three Days after Treatment	Six Days after Treatment	Ten Days after Treatment			
Evisect	22.6 A	13.8 bc	13.46 bc	5.46 D	10.90 b	51.76	52.25
Sivanto	17.72 Ab	18.84 ab	8.5 cd	3.86 D	10.40 b	41.30	41.89
Matrixine	20.3 Ab	16.72 ab	6.44 d	6.82 D	9.99 b	50.78	51.27
Comparison	14.9 Bc	16.78 ab	14.46 bc	14.06 Bc	15.05 a		
Time Effect Rate after treatment	20 .3	16 .4	9 .4	5 .3			

The different letters indicate the presence of significant differences between the factors at a probability level of 0.05.

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