J. Plant Prot. and Path., Mansoura Univ., Vol.8 (8): 415 - 423, 2017

Impact of Some Ecological Aspects on Some Pests Infestation on Certain Tomato Varieties and Their Control

Horia A. Abd-El Wahab ; Maha S. El-Ghanam and Hosnea A. Afifi
Plant Protection Research Institute, Dokki,Giza, Egypt.

ABSTRACT

Two Field experiments were conducted during winter successive seasons of 2013/2014 and 2014 /2015 at Gizera Bele, banha, Qalybia Governorate. The study included population fluctuation, the population growth rate of *B. tabaci, A. gossypii* and *T. urticae* & evaluation the susceptibility degree of three varieties of tomato (omnia, arika and safira) to infestation by previously mentioned pests. The study, also included the control of these pests by sesame oil; *Beauveria bassiana* , abamactin and malathion . The obtained results revealed that the highest mean population fluctuation (for 15 weeks) of *B. tabaci* (22.1, 61.2, 88.6) & (10, 17.7, 28.9) nymph and adult stages/ 5 leaves, followed by mean population of *T.urticae* (14.9, 5.3, 26.3) & (10.7, 9.0, 14.9) individuals/ 5 leaves of the three tomato varieties omnia, arika and safira during the two seasons, respectively, while population of *A. gossypii* was lowest mean population. Also the results revealed clearly susceptibility degree of Safira variety was susceptible (S) to infestation with the above mentioned pests of tomato plants during the two seasons, with mean 58.73 , 10.6 and 20.6 (individual) / 5 leaves , respectively . Present data indicated that *B. tabaci* recorded the highest growth rate (23.64 &4.57), taking time difference 14 days at Safira variety in the first and second season, respectively. Our data exhibited, sesame oil and abamactin gave the significant highest reduction against *B. tabaci, A. gossypii* and *T. urticae* on tomato plants, as the average of their reductions after 14 days of spraying were (80.9% , 78.1% , 69.8%) and (77.6, 86.3, 71.4%), respectively .

INTRODUCTION

Tomato, *Lycopersicon esculentum* (Solanacea), is economically one of the most important and widely grown vegetables in the world vegetables (Polston & Anderson, 1999 and Peralta and Spooner, 2007), ranking second in importance next to potato (FAO STAT, 2005). Tomato is a good source of all nutrients especially vitamin C, B and K.

Tomato plants are subject to infestation by the piercing-sucking pests, such as the tomato whitefly, *Bemisia tabaci* (Genn.) (Aleyrodidae); *Aphis gossypii* (Glover.) (Aphididae) and the red- spider-mite, *Tetranychus urticae* (Koch.) (Tetranychidae) ,(Ahmed, 2000). *B. tabaci* is one of the most important pests of tomato, it sucks the plant sap (Schuster *et al.* 1996) reducing the quality and quantity of the sap (Mound 1965). This insect exists as an economic pest in most places of the world Martin 1987; Byrne and Houk 1990; Gerling 1990). This pest also transmits various viral diseases (Bedford *et al.* 1994 and Jones, 2003).

Aphids (Hemiptera: Aphididae) feed through phloem tissue. Those are important pests on agricultural crops (Blackman and Eastop, 2000). Aphids cause many losses on numerous crops, and about of 13% agricultural outputs were recorded to be lost by insect pests (Van Emden and Harrington, 2007; Faria *et al*., 2007). Economic agricultural losses resulted from aphid feeding, which returned to deficiency of essential plant nutrients through the plant development. Rapid reproduction of aphids is due to parthenogenetic reproductions which produce high population densities. While, winged aphids infest new host plants (Powell *et al*., 2006). In addition, aphids feeding, also, allow transition of more than 275 viruses; aphids cause also insufficiency of photosynthesis by producing honeydew on the leaf surface (Miles, 1989; Sylvester, 1989).

The tetranychid mite species feed on the plant sap injuring the epidermis resulting in blotching, stippling or bronzing causing serious damage (Park and Lee 2002). The mites consumed nearly all the chlorophyll causing decrease in leaves vitality and lead to a reduction or damage the crop. *Tetranychus urticae* causes much indirect damage by transmitting viral and fungal pathogens (Park and Lee 2007).

The cultivation of pest-resistant plants is one way to counter pests. Resistant genotype can affect the morphology, biology, and physiology of pests and can play a part in reducing the population of pests (Toscano *et al.* 2002; Fancelli *et al*. 2003; Cunha *et al*. 2005; Bogorni and Vendramim 2005; Baldin *et al*. 2007).

Pesticides produced from natural products have been recently attracting the attention of many scientists to avoid the problems caused by synthetic compounds they are deeply interested in their chemical constituents and biological properties (Abou-Yousef *et al.,* 2010).The significance of botanical pesticides/plant extracts is highly recognized in the field of agriculture as botanical pesticides are cheap, safe and sound, hazardless, non-residual, and highly effective.

The objectives of this research were to:-

1- Study the population fluctuation and the population growth rate of *B. tabaci, A.gossypii* and *T. urticae* on three varieties tomato
2- Evaluate susceptibility degree of three varieties of tomato to infestation by *B. tabaci, A.gossypii* and *T. urticae.*
3- Evaluate the efficacy of sesame oil; biofly (*Beauveria bassiana*) and Cormat 1.8% E.C (Abamactin) in comparison to malathion 57% E.C (Coromandel)) against some pests on susceptible tomato variety in open field.

MATERIALS AND METHODS

Two field experiments were conducted at Gizera Bele, banha, Qalyoubia Governorate. The first one conducted to study the population fluctuation, susceptibility degree & the population growth rate to *B. tabaci* , *A. gossypii* and *T. urticae* infestation on three tomato varieties. At second experiment the susceptible variety were used in evaluation the efficiency of some tested materials, against the three previous pests.

The first experiment was conducted for two successive winter seasons throughout 2013/ 2014 and

2014/2015 season. An area of about 525 m^2 was cultivated with the three tomato varieties (omnia, arika and safira) in 26 th and 30th of October during 2013/2014 and 2014/2015 seasons; respectively. The whole area was divided in 9 replicates, (each replicate of 58 m^2). Each variety was represented by 3 replicates. All the experimental area received the recommended and standard cultivation practices. The total area was kept free from any pesticides application. Weekly randomized samples continue for 15 weeks, sampling of 5 leaves were randomly taken from each replicate then each sample was kept in a tightly closed paper bag and transferred to the laboratory in the same day for inspection under stereomicroscope to count the numbers of *B. tabaci* (nymphs); *A. gossypii* (nymphs and adults) and *Tetranychus urticae* (individuals) and direct count of the whitefly adults numbers was done in the field on random samples of 5 leaves.

For parameters, maximum population size and growth rate for *B. tabaci, A.gossypii* and *T. urticae* were recorded for three varieties tomato , and the time taken to reach the maximum count (N_t) were used for comparing between varieties tomato. Population growth rate (GR) was calculated by using Odum's equation (Odum, 1971) as follow;

$$\mathbf{GR= (N_t – N_0)/ \Delta t}$$

Where N_t = the number of each pest recorded at the maximum count of the population on a plant.

N_0= the initial number of each pest released on each plant.

Δt= the difference in time between N_t and N_0.

The classification the susceptibility degree of each variety to infestation with the previously mentioned pests was dependent on the general mean number ($\bar{X}$) of each pest and the standard deviation (SD) as reported by Chiang and Talekar (1980) The varieties that:-

Highly susceptible (HS) : had an average numbers of pest more than $\bar{X}$ +2SD

Susceptible (S): had an average numbers of pest between $\bar{X}$ and $\bar{X}$ +2S

Low resistant (LR): had an average numbers of pest between $\bar{X}$ and $\bar{X}$ -1SD

Moderately resistant (MR): had an average numbers of pest between $\bar{X}$ -1SD and $\bar{X}$-2SD

Highly resistant (HR): had an average numbers of pest less than $\bar{X}$ -2SD.

The second experiment was conducted during the second season 2014/2015 to evaluate the efficiency of four treatments, sesame oil (*Sesamum indicum* L.) Fam. Pedaliaceae was purchased from El-Captain Company (CAP PHARM) for extracting oils, Natural plants& COSMECICS. Egypt; malathion 57% E.C (Coromandel); biofly (*Beauveria bassiana*) and Cormat 1.8% E.C (Abamactin), with rate of 500 ml, 500 ml, 425 ml and 40 ml /100 L water ,respectively. Sesame oil was formulated by addition of Pril detergent at 1% in water. Water was used as controls (or untreated plants) Safira variety which infested by the highest numbers of these pests used in this experiment.

An area of about 1125 m^2 was cultivated with the tomato variety (Safira) in 30 th and 25th of October during 2013/2014 and 2014/2015 seasons; respectively. The whole area was divided into 15 replicates (75 m^2 for each replicates). Each treatment was represented by three replicates and control. All the normal of agricultural practices for tomato variety (safira) cultivation were followed except pesticidal treatment. The chosen treatments were sprayed in 1st of December during 2014/2015 by using a 20 L. knapsack sprayer with one nozzle.

The efficiency of treatments was determined by inspecting 5 randomly leaves from each replicate then each sample was kept in a tightly closed paper bag and transferred to the laboratory in the same day for inspection under stereomicroscope to count the numbers of *B. tabaci* (nymphs); *A. gossypii* (nymphs and adults) and *Tetranychus urticae* (individuals). In respect to *B. tabaci* adult, the direct count done in the early morning on random samples of 5 leaves.

Inspection of plants was carried out before spraying and after 3, 7 and 14 days from application to evaluate the efficiency of sesame oil; biofly and Abamactin, while Malathion after 1, 7 and 14 days on the reduction rates of the pest populations.

The reduction percentage of population (% mortality) was calculated according the equation of Henderson and Tilton (1955).

Statistical tests were performed using SAS program computer and calculated LSD (Least significant difference) to find differences between mean numbers of three pests on the three tomato varieties studied (SAS Institute, 2003).

RESULTS AND DISCUSSION

Population fluctuation of *B. tabaci, A.gossypii* and *T.urticae* on three tomato varieties during two successive seasons at Qalyoubia Governorate.

First season 2013/ 2014:

A- *B. tabaci*

Data in table (1) and fig (1) indicated that the population fluctuation of *B. tabaci* in Omnia variety had three peaks in dates 26 November & 24 December 2013 and 21 January 2014 with 87.0, 29.0 and 6.0 (nymph and adult stages) / 5 leaves.

On the other hand Arika and Safira varieties recorded single peak at the date of 26 November 2013 as 353.0 and 3 December 2013 with 298.0 (nymph and adult stages) / 5 leaves, respectively.

B- *A .gossypii*

Data in table (1) and fig (1) was showed the population fluctuation of *A.gossypii in* Omnia variety recorded three peaks at the dates 26 November, 17 December 2013 and 28 January 2014 with 6.0, 16.0 and 5.0 (nymph and adult stages) / 5 leaves, respectively.

In the first season, Arika variety recorded single peak at the date of 17 December 2013. While Safira variety had two *A. gossypii* peaks at the dates of 26 November 2013 and 21 January 2014 with 10.0 and 29.0 (nymph and adult stages) / 5 leaves, respectively..

C- *T.urticae*

Data of Omnia variety in table (1) and fig (1) illustrated that *T.urticae* population recorded two peaks at dates 26 November and 31 December 2013 with 67.0 and 25.0 individuals/ 5 leaves.

Data of Arika variety showed that single peak of *T. urticae* at date of 31/12/2013 with 55.0 individuals. Mean while Safira variety showed gradually increasing in *T. urticae* tell recorded single peak at the end of season at date 11 February 2014 with 70.0 individuals/ 5 leaves.

Table 1. Counts and population growth rate of some pests on three tomato varieties during of 2013 / 2014 season.

Dat of inspection	Plant Age	Number of pests /5 Leaves								
		Omnia			Arika			Safira		
		B.tabaci	*A. gossypii*	*T.urticae*	*B.tabaci*	*A. gossypii*	*T.urticae*	*B.tabaci*	*A. gossypii*	*T.urticae*
		Nymph+ Adult stages	Nymph+ Adult stages	Individuals	Nymph+ Adult stages	Nymph+ Adult stages	Individuals	Nymph+ Adult stages	Nymph+ Adult stages	Individuals
12/11/2013	17	15	2	7	22	2	3	25	2	0
19/11/2013	24	36	2	8	56	1	10	40	5	1
26/11/2013	31	87	6	67	353	5	15	137	10	3
3/12/2013	38	54	5	48	205	8	23	298	5	12
10/12/2013	45	38	8	10	107	8	29	248	9	15
17/12/2013	52	28	16	10	70	15	32	153	10	17
24/12/2013	59	29	10	15	46	10	35	130	5	22
31/12/2013	66	17	9	25	24	9	55	94	9	25
7/1/2014	73	15	7	15	12	6	22	89	10	32
14/1/2014	80	5	7	10	10	5	10	66	18	36
21/1/2014	87	6	4	5	5	3	9	42	29	40
28/1/2014	94	1	5	2	4	2	5	4	26	42
4/2/2014	101	0	3	1	1	2	3	2	12	58
11/2/2014	108	0	1	1	0	2	0	1	9	70
18/2/2014	115	0	0	0	0	2	0	0	5	22
Mean ± SE		22.07±6.31	5.67±1.1	14.93±4.86	61±24.38	5.33±1.03	16.73±4.07	88.6±23.58	10.93±2.0	26.33±5.26

Second season 2014/ 2015:

A- *B. tabaci*

Data of omnia variety in table (2) and fig (1) illustrated that *B. tabaci* population recorded single peak at date of 1 December 2014 with 50.0 (nymph and adult stages) / 5 leaves. It is notice that the weekly inspections from date 12 January 2015 tell the end of season at 23 February 2015 recording Zero. Arika variety recorded single peak of *B. tabaci* population at the date 8 December 2014 with 62.0 (nymph and adult stages) / 5 leaves.

Table 2. Counts and population growth rate of some pests on three tomato varieties during of 2014/ 2015 season.

Dat of inspection	Plant Age	Omnia			Arika			Safira		
		B.tabaci	*A. gossypii*	*T.urticae*	*B.tabaci*	*A. gossypii*	*T.urticae*	*B.tabaci*	*A. gossypii*	*T.urticae*
		Nymph+ Adult stages	Nymph+ Adult stages	Individuals	Nymph+ Adult stages	Nymph+ Adult stages	Individuals	Nymph+ Adult stages	Nymph+ Adult stages	Individuals
17/11/2014	18	6	13	2	10	10	6	24	8	7
24/11/2014	25	18	17	6	25	19	14	49	13	14
1/12/2014	32	50	29	14	61	27	15	88	20	20
8/12/2014	39	35	20	20	62	15	30	62	19	22
15/12/2014	46	23	15	10	31	20	19	38	18	12
22/12/2014	53	10	12	12	28	18	13	37	25	17
29/12/2014	60	5	10	33	16	9	10	33	20	49
5/1/2015	67	3	12	22	10	7	10	20	29	34
12/1/2015	74	0	7	15	6	12	8	22	15	12
19/1/2015	81	0	6	8	5	8	4	20	8	9
26/1/2015	88	0	9	6	3	4	3	17	1	7
2/2/2015	95	0	2	5	4	3	2	10	0	5
9/2/2015	102	0	4	4	2	1	1	8	0	3
16/2/2015	109	0	8	2	2	0	0	4	0	8
23/2/2015	116	0	4	2	1	0	0	1	0	4
Mean ± SE		10.0±3.8	11.2±1.82	10.73±2.29	17.73±5.24	10.2±2.12	9.0±2.15	28.87±6.07	11.73±2.59	14.87±3.23

Meanwhile, Safira variety had two peaks of *B. tabaci* population at Dates of 1 December 2014 and 12 January 2015 with 88.0 & 22.0 (nymph and adult stages) / 5 leaves, respectively.

B- *A.gossypii*

Data in table (2) and fig (1) showed that, Omnia variety had four peaks in the second season. The peak dates of Omnia variety were 1 December 2014 and 5, 26 January and 16 February 2015 with 29.0, 12.0, 9.0 and 8.0 (nymph and adult stages) / 5 leaves, respectively. Also Arika variety recorded three peaks were in 1, 15 December 2014 and in 12 January 2015 with 27.0, 20.0 and 12.0 (nymph and adult stages) / 5 leaves, respectively. The three peaks of Safira variety were in 1, 22 December 2014 and in 5 January 2015 with 20.0, 25.0 and 29.0 (nymph and adult stages) / 5 leaves, respectively.

C- *T. urticae*

Table (2) and fig (1) illustrated that *T. urticae* population of Omnia and Safira varieties had two peaks at dates of 8 and 29 December 2014. The two peaks of Omnia variety recorded 20.0 and 33.0 individual / 5 leaves, while Safira showed 22.0 and 49.0 individual / 5 leaves, respectively. On the other hand Arika variety had single peak at date of 8 December 2014 with 30.0 individual / 5 leaves.

In general, the three weeks from 1 December tell 22 December 2014 had the distinct peaks of three tomato varieties for *B. tabaci* and *A. gossypii*. On the other hand *T. urticae* peaks recorded in 8 and 29 December 2014.

Evaluation of relative susceptibility degree of some tomato varieties to *B. tabaci* ; *A. gossypii* and *TC- urticae* infestation, during growing season 2013/2014.

Data in table 3 included the susceptibility degree of two growing seasons 2013/ 2014& 2014/2015.

A- *B. tabaci*

Omnia variety was showed moderate resistance (MR) 22.07 (nymph and adult stages) / 5 leaves in the first season meanwhile recorded a low resistance (LR) 10.0 nymphs and adults / 5 leaves in the second season, respectively. The mean susceptibility degree of the two seasons recorded moderate resistance (MR) with 16.03 (nymph and adult stages) / 5 leaves.

In respect to, Arika variety had susceptible (S) in the first season and low resistance in the second season with 61.0 and 17.73 (nymph and adult stages) / 5 leaves, respectively. The mean susceptibility degree of the two tested seasons showed low resistance (LR) with 39.37 (nymphs and adults) / 5 leaves.

Susceptibility degree of Safira variety was susceptible (S) in the two seasons with mean 58.73 (nymph and adult stages) / 5 leaves.

B- *A. gossypii*

Susceptibility degree of both Omnia and Arika varieties was recorded low resistance in both tested seasons, with mean 7.43 and 6.80 nymph and adult stages. While Safira variety was susceptible in the two seasons with mean 10.63 nymph and adult stages.

C- *T. urticae* in respect to *T. urticae* both Omnia and Arika varieties had a low resistance (LR) in both seasons, with mean 12.83 and 12.87 individual/ 5 leaves, respectively. Meanwhile Safira variety recoded susceptible (S) in the two tested season, with mean 20.60 individual/ 5 leaves.

Evaluation of relative susceptibility degree of some tomato varieties to *B. tabaci* ; *A. gossypii* and *T. urticae* infestation during growing season 2014/2015.

Data in table 3 included the susceptibility degree of two growing seasons 2013/ 2014 & 2014/2015.

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Omnia variety was showed moderate resistance (MR) 22.07 (nymph and adult stages) / 5 leaves in the first season meanwhile recorded a low resistance (LR) 10.0 nymphs and adults / 5 leaves in the second season, respectively. The mean susceptibility degree of the two seasons recorded moderate resistance (MR) with 16.03 (nymph and adult stages) / 5 leaves.

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Susceptibility degree of Safira variety was susceptible (S) in the two seasons with mean 58.73 (nymph and adult stages) / 5 leaves.

B- *A. gossypii*

Susceptibility degree of both Omnia and Arika varieties was recorded low resistance in both tested seasons, with mean 7.43 and 6.80 nymph and adult stages. While Safira variety was susceptible in the two seasons with mean 10.63 nymph and adult stages.

T. urticae In respect to *T. urticae* both Omnia and Arika varieties had a low resistance (LR) in both seasons, with mean 12.83 and 12.87 individual/ 5 leaves, respectively. Meanwhile Safira variety recoded susceptible (S) in the two tested season, with mean 20.60 individual/ 5 leaves.

Population growth

Data in table (4) is an attempt to study the population growth rate in length of recording the initial pests numbers (N_o) , Maximum count of the pests populations (N_t) and the time difference them (Δt) of some serious pests that attacking some tomato varieties.

Firstly, in respect to *B. tabaci*, data in table (4) was showed that, Arika variety recorded the highest growth rate (23.64), taking time difference 14 days between initial *B. tabaci* number 22 and maximum count 353 in the first season. Data of the second season was showed the Arika variety recorded the lowest growth rate 2.48 taking 21 day between the initial pest number N_o (10 nymph and adult stages) / 5 leaves) and maximum count N_t (62 nymph and adult stages) / 5 leaves).

Secondly, in respect to *A. gossypii*, the three variety (Omnia, Arika and Safira) had the lowest growth rate in the first season were 0.40, 0.37 and 0.39, respectively. Meanwhile, the Safira variety recorded the lowest growth rate (0.43), where Omnia and Arika varieties had 1.14 and 1.21 in the second season.

Thirdly, Data of *T. urticae* was showed fluctuated growth rate in the two tested seasons.

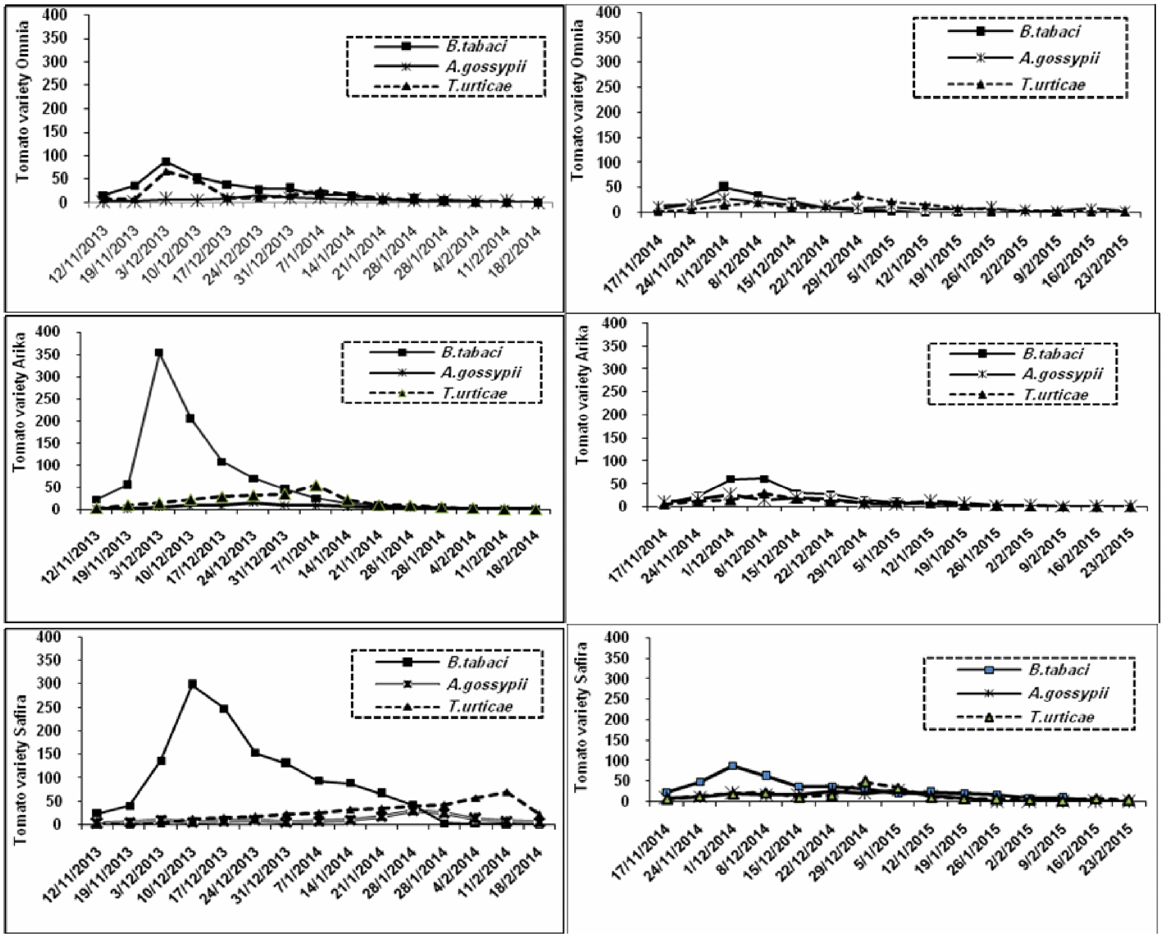

Fig. 1. Counts and population growth rate of some pests on three tomato varieties during two seasons.

Table 3. The susceptibility degrees of three tomato varieties for *B.tabaci ,A.gossypii and T. urticae* during winter plantation of 2013/2014 &2014/2015 seasons at Qalyubia Governorate.

Pests Varieties	*Bemisia tabaci*						*Aphis gossypii*						*Tetranychus urticae*					
	1st season	Susceptibility degree	2nd season	Susceptibility degree	Mean	Susceptibility degree	1st season	Susceptibility degree	2nd season	Susceptibility degree	Mean	Susceptibility degree	1st season	Susceptibility degree	2nd season	Susceptibility degree	Mean	Susceptibility degree
Omnia	22.07	MR	10.00	LR	16.03	MR	5.67	LR	9.20	LR	7.43	LR	14.93	LR	10.73	LR	12.83	LR
Arika	61.00	S	17.73	LR	39.37	LR	5.33	LR	8.27	LR	6.80	LR	16.73	LR	9.00	LR	12.87	LR
Safira	88.60	S	28.87	S	58.73	S	10.93	S	10.33	S	10.63	S	26.33	S	14.87	S	20.60	S
Mean ± SD	57.22 ± 33.43		18.87 ± 9.48		38.04 ± 21.38		7.31 ± 3.14		9.27 ± 1.03		8.29 ± 2.05		19.33 ±6.13		11.53 ±3.04		15.43 ± 4.47	

Susceptible (S) = between $\bar{X}$ and $\bar{X}$ +2SD **Low resistant (LR) = between $\bar{X}$ and $\bar{X}$ -1SD**

Moderately resistant (MR) = between $\bar{X}$ -1SD and $\bar{X}$-2SD

Table 4. **Population growth rate of of some pests on three tomato varieties during 2013 / 2014& 2014/2015 seasons.**

Pests		First season				Second season			
		Population growth rate parameters			GR	Population growth rate parameters			GR
	variety	N_0	N_t	Δt		N_0	N_t	Δt	
B. tabaci		15	87	14	5.14	6	50	14	3.14
A. gossypii	Omnia	2	16	35	0.40	13	29	14	1.14
T.urticae		7	67	14	4.29	2	33	42	0.74
B.tabaci		22	353	14	23.64	10	62	21	2.48
A.gossypii	Arika	2	15	35	0.37	10	27	14	1.21
T.urticae		3	55	49	1.06	6	30	21	1.14
B.tabaci		25	298	21	13.00	24	88	14	4.57
A.gossypii	Safira	2	29	70	0.39	8	29	49	0.43
T.urticae		1	70	84	0.82	7	49	42	1.00

GR= the population growth rate, **N_t = the pest numbers at the maximum count of the population on a plant**
N_0 = the initial pest numbers on a plant, **Δt = the time difference between N_0 and N_t**

Efficiency of different compounds for reducing the population density of *B. tabaci* , *A. gossypii* and *T. urticae* during 2014/2015 season:

A- **Initiale effect**

1 ***B. tabaci***

In respect to initial effect of the tested materials against *B. tabaci* nymph and adult, the abamactin categorized in first rank, followed by sesame oil and malathion in the second rank, while biofly occupied the third category, with % reduction were 85.7, 78.5, 78.5 and 61.9, respectively.

2 *A. gossypii*

Dunkan analysis ranked the tested materials into three groups against *A. gossypii* . Malathion, (sesame oil &abamactin) and biofly, where the initial reduction % recorded 100, (92.0, 90.5) and 73.3, respectively.

3 *T. urticae*

Statistical analysis categorized the tested materials into four groups. The descending arrangements were sesame oil > abamactin > biofly > malathion, where the initial redction % showed 85.2, 79.0, 73.3 and 54.6, respectively.

B- Residual toxicity

1 *B. tabaci*

It is worth to mention that sesame oil ranked in the first category after 7 and 14 days after application. The mean of residual toxicity of sesame oil recorded 82.1.

2 *A. gossypii*

Abamactin occupied the highest reduction % after 7 and 14 days after application against *A. gossypii* , where recorded 100 and 68.3, respectively. In respect to the mean of residual toxicity of abamactin was 84.2

3 *T. urticae*

Sesame oil came in the first category after 7 days with reduction % was 79.8, while abamactin occupied the first category after 14 day with reduction % was 58.8. The mean of residual toxicity of abamactin was 76.7

Table 5. Effect of various treatments against *B. tabaci* , *A. gossypii* and *T. urticae* infesting tomato variety (Safira) during winter plantation at Qalyubia Governorate.

		Mean number /5 Leaves and percent reduction at indicated periods (days)																	
Treatments	Rat/ 100L Water	No. of insects Pre-Sprav	*B. tabaci*					No. of insects Pre-Spray	*A. gossypii*					No. of insects Pre-Spray	*T. urticae*				
			3	7	14	Residual toxicity	Mean		3	7	14	Residual toxicity	Mean		3	7	14	Residual toxicity	Mean
Sesame oil		65	14	5	7	6	8.7		1	3	6	4.5	3.3		2	2	3	3	2.3
(*Sesamum*	500 ml		78.5	89.1	75.1	82.1	80.9	17	92.2	81.4	60.8	71.1	78.1a	9	85.2	79.8	44.4	62.1	69.8
indicum)			b	a	a	a	a		b	b	b	b	b		a	a	c	ab	a
Bio fly		92	35	16	13	14.5	21.3		2	3	4	3.5	3.0		4	4	3	3.5	3.7
(*Beauveria*	425 gm		61.9	75.3	67.3	71.3	68.2	10	73.3	68.4	55.6	62.0	65.8	10	73.3	63.6	50.0	56.8	62.3
bassiana)			c	b	bc	b	c		c	d	c	b	b		c	c	b	ab	ab
Cormat 1.8% E.C		84	12	15	10	12.5	12.3		1	0	4	2.0	1.7		28	23	22	22.5	24.3
	40 ml		85.7	74.7	72.4	73.6	77.6	14	90.5	100	68.3	84.2	86.3	89	79.0	76.5	58.8	67.7	71.4
(Abamactin)			a	b	ab	b	ab		b	a	a	a	a		b	b	a	a	a
Control		88	88	62	38	50	62.7	20	15	19	18	18.5	17.3	20	30	22	12	17	21.3
Treatments	**Rat/100L Water**	**No. of insects Pre-Spray**	**1**	**7**	**14**	**Residual toxicity**	**Mean**	**No. of insects Pre-Spray**	**1**	**7**	**14**	**Residual toxicity**	**Mean**	**No. of insects Pre-Spray**	**1**	**7**	**14**	**Residual toxicity**	**Mean**
Malathion 57% E.C	500 ml	79	17	14	12	13	14.3	18	0	4	6	5	3.3	15	10	7	5	6	7.3
			78.5	74.9	64.8	69.9	72.7		100	76.6	63.0	69.8	79.9		54.6	57.6	44.4	51.0	52.2
(Coromandel)			b	b	c	b	bc		a	c	b	b	a		d	c	c	b	b
Control		88	88	62	38	50	62.7	20	23	19	18	18.5	20.0	20	15	22	12	17	16.3
LSD			3.261	4.738	6.679	6.771	6.464		5.069	2.977	3.882	12.62	12.82		5.242	3.919	1.883	14.12	12.22

C-General mean of reduction %

1 *B. tabaci*

The highest reduction % recorded by sesame oil and followed by abamactin with 80.9 and 77.6, respectively.

2 *A. gossypii*

Abamactin and malathion showed the highest mean reduction % (86.3 and 79.9) with non significant differences.

3 *T. urticae*

The best mean reduction % recorded by abamactin and sesame oil with 71.4 and 69.8, respectively with non significant differences.

DISCUSSION

In general the three tested tomato varieties, showed maximum population fluctuation of *B. tabaci* at the first fifth weeks from transplantation in the two growing tomato season. In the same field Metwally (1976) studied the seasonal fluctuation of *B. tabaci*, he found that the population peak took place by mid September on tomato.

In recent years, studies conducted in the field of production and use of crop varieties resistance to insects, has helped to significantly increase food production in major agricultural area. In most pests management programs the subject of plant resistance to insects (Smith *et al*., 1994; Yasaikinici and Hincal 1996), and the subject of the host preference of pests (Jounior *et al*. 2003) are important.

If pest resistant varieties are used with chemical control methods, the costs of chemical control and problems related to insecticides which remain in the environment will be reduced. In particular, using substances of natural origin (as sesame oil in this study) in the chemical method will be very useful, because there are numerous known harmful effects of these substances on human health and animals. Consequently, the application of resistant plant varieties plays an important role in reducing environment pollution.

Susceptibility degree studies of our varieties of three tomato varieties indicated that, the safira variety was susceptible for the three tested pests in both seasons. While Arika variety had low resistance along the two study seasons. On the other hand Omnia recoded low resistance for *A.gossypii* and *T. urticae* , while showed moderate resistance against *B. tabaci*.

Arika variety had fluctuated growth rate in the two test seasons in respect to *B. tabaci*. Safira variety recorded the lowest growth rate of *A. gossypii* during the two seasons.

Lamiri *et al*., 2001 demonstrated that the insecticidal activity of an essential oil could be attributed either to the major compound present in the oil or to the synergistic and / or antagonistic effects of all the compounds of oil.

The chemical analysis of sesame oil (untabulated data) showed the components balance of sesame oil, were the Fatty acid 16.73 ug/ triolein/ ml, Triglycerides vales (212.3 mg%), total phenols values 372.3ug/ ml and Tannis values (130.3 ug tannic acid/ ml) exhibited a promise toxic effect against *B. tabaci* nymphs and adults and considerable results against *A. gossypii* and *T. urticae*. In the same field Homam and Maha 2017 investigated the ovicidal effect of six plant oils, they concluded that Marjoram oil revealed the highest mortality % 89.1 against *Phthorimaea operculella* (Zeller) eggs and the predation efficiency of *Chrysoperla carnea* was 96.4 % with Marjoram oil that treated *P. operculella* eggs and the predator lived for 15.3 days out of 16 days. Also, the results showed that, the abamactin recoded reduction % were 77.6, 86.3 & 71.4 for *B. tabaci, A. gossypii* and *T. urticae*, respectively. Some author as; Mahmoud and Eustachio (2009) in Egypt stated that abamectin (Vertemic 1.8% EC) reduced significantly whitefly and aphid populations on cucumber and tomato plants, in field experiments. Sayed (2013) found that the bioinsecticides, Mycotal (*Verticillium lecanii*), Biosect (*Beauveria bassiana*) and their mixture against whitefly *B. tabaci* on cucumber significantly reduced the population density as compared with the untreated control. The results indicated a high and rapid reduction in insect density 3-15 days after spraying. Siti Hajar *et al.* (2016) found that effect of malathion at 50µg/ml concentration on reproduction and feeding activity of aphids. The total number of new born nymphs produced and the relative development stage of nymphs were significantly reduced compared to untreated leaves.

This is primary study for sesame oil against some piercing sucking pests need more efforts and to apply in suitable method and tactics in the field to study its effect on predators and parasite to be become item in integrated pest management.

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أثير بعض الجوانب البيئية على بعض الآفات التي تصيب بعض أصناف الطماطم ومكافحتها

حورية علي عبد الوهاب ، مها صبري الغنام و حسنية عبد الفتاح عفيفي
معهد بحوث وقاية النباتات ـ مركز البحوث الزراعية ـ الجيزة ـ مصر

تم إجراء تجربتين حقليتين فى جزيرة بلي ببنها – بمحافظة القليوبية خلال موسمين شتاء متتاليين 2014/2013 و 2015/2014. التجربه الأولى فقد انجزت فى موسمين متتالين وهم 2014/2013 و 2015/2014 لدراسة الكثافة العددية ، ومعدل النمو السكاني للذبابة البيضاء ومن القطن والعنكبوت الاحمر وتقييم درجة حساسية ثلاثة أصناف من الطماطم وهم (أمنيا، أريكا وسفيرة) بالإصابة بالآفات المذكورة سابقا. أما التجربه الثانيه فقد أجريت في الموسم الثاني 2014/ 2015 بهدف مكافحة تلك الافات محل الدراسه على صنف الطماطم سفيرة التى تعرضت لأعلى إصابه وذلك بإستخدام اربع مركبات (زيت السمسم والملاثيون والبيوفلاي والابامكتين). وقد أظهرت نتائج الدراسه للتجربه الأولى ان أعلى معدل للكثافة العددية لمتوسط 15 اسبوعا كان للذبابة البيضاء وقد سجل (22.1 و 61.2 و 88.6) & (10.0 و 17.7 و 28.9) حورية وحشرة كاملة / 5 اوراق طماطم ويلية العنكبوت الاحمر بمتوسط كثافة سكانية (14.9 و5.3 و 26.3) & (10.7 و 9.0 و 14.9) فرد / 5 اوراق للثلاثة اصناف من الطماطم وهم (أمنيا، أريكا وسفيرة) خلال الموسمين على التوالي. في حين كان من القطن اقل معدل للكثافة العددية. كما أظهرت النتائج أن صنف الطماطم سفيرة كان أكثر حساسيه للإصابه بالذبابة البيضاء ومن القطن والعنكبوت الاحمر خلال موسمي الدراسة بمتوسط (58.7 و10.6 و20.6) فرد /5 اوراق طماطم علي التوالي . وتشير البيانات الحالية إلى أن الذبابة البيضاء سجلت أعلى معدل نموكان (23.64 و 4.57)، والوقت المستغرق بين الاصابة واعلي تعداد للاصابة سجل 14 يوما للصنف الطماطم سفيرة في الموسم الأول والثاني، على التوالي. بينت نتائج التجربه الثانيه والخاصه بمكافحة الذبابة البيضاء ومن القطن والعنكبوت الاحمر على نباتات الطماطم بان زيت السمسم والابامكتين أعطتا أعلى نسبة خفض معنويه لأعداد الافات حيث كان متوسط نسبة الخفض بعد 14 يوم كانت (80.9 ٪، 78.1٪، 69.8٪) & (77.6، 86.3، 71.4٪) للمركبين على التوالي.