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Some Ecological Aspects of some Piercing-Sucking Pests Infestation on Four Vegetable Marrow Varieties in Relation to their Histological Features and their Control and Evaluation of Yield

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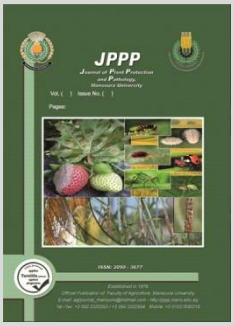

ABSTRACT

Two field experiments were conducted during 2020 at the Plant Protection Research Station at Qaha, Qalubiya Governorate. Those included fluctuation in population growth rate of *Bemisia tabaci, Aphis gossypii, Thrips tabaci* and *Tetranychus urticae* in addition to evaluation of the susceptibility degree of 4vegetable marrow varieties (hybrid Aziad, hybrid Marseille, Askandrany and Amna)to infestation by previously mentioned pests. The study also included the application of lemon oil, ginger oil, fenugreek oil, green tea oil and egyxide plus(water soluble natural oil)for control of these each of pests. The 5oils (at 500 and 1000ml.)were mixed with 250gm hivit 80%WDG. Also, 5insecticides; Vapcomic 1.8%EC, Mobet, Trivap 75%WP, Oecos 3.2%EC and Hivit 80%were assayed at the recommended concentrations.Aziad variety could be fairly categorized as the highest susceptible(S)to infestation with the above mentioned pests of vegetable marrow plants, with means 31.61, 19.45, 1.76 and 2.31/leaf to *B. tabaci, A. gossypii, T. tabaci* and *T. urticae*, respectively/leaf.Obtained data indicated that *A. gossypii* recorded the highest growth rate 6.77, taking time difference 7days at Marseille variety. As for the anatomical measurements, those were the highest in case of Amna variety and the lowest in Aziad variety. Also, highest fruit yield was that of Amna variety and lowest in Aziad variety.The obtained records exhibited, that vapcomic and fenugreek oil+Hivit(1000ml+250gm)caused the significantly highest reduction against *B. tabaci* and *A. gossypii* counts on Aziad variety, as the recorded average of their reductions after 14days of first and second spray were(88.8 and 88.1%),(93.2 and 91.3%)and(96.2 and 95.2%), respectively.

Keywords: Aphid**,** Whitefly**,** Thrips, Spider-mite, Pesticides, Biopesticides.

INTRODUCTION

The vegetable plants comprise a primarily main component of human daily meals. These plants are used, either fresh or after being cooked. Cucurbitaceous vegetable plants are considered of the most important vegetable crops, which are consumed in different ways as food in Egypt.

Vegetable marrow is one of the most important cucurbitaceous vegetable crops cultivated in Egypt. The total area cultivated was increased during the last few years especially in new reclaimed lands for local consumption and exportation. Cucurbitaceous vegetable plants are subjected to attack by numerous pest species throughout the growing season (El- Maghraby, *et al.* 1989 and El-Lakwah *et al.* 2011). Homopterous insects i.e., aphids, whitefly and thrips. The red- spider-mite is also of the major pests of cucurbitaceae. These pests cause extensive damage not only by sucking plant juice but also by transmission of phytopathogenic agents causing reduction in the final yield (Fereres and Moreno , 2009; Gameel ,2013; Abd-El-Kariem *et al.*, 2015 ;Al- Saleh *et al.*, 2015 and Garzon *et al.*,2016). Cucurbit plants are preferable for these pests which decreased its yield. Therefore, the present study was designed to assess the relationships between plant varieties, their chemical constituents and the rates of infestation with the aforementioned homopterous insects. The presented study aimed, also, to shed light on the following:

1- Surveying certain piercing-sucking pests infesting vegetable marrow during 2020.
2- Evaluating susceptibility degree of the four vegetable marrow varieties to infestation by pests, the correlation between the levels of infestation and plant leaves anatomy.
3- Determining the efficacy of five oil preparation against some pests on susceptible vegetable marrow variety in the open field.
4- Evaluating the efficacy of the tested oils mixed with Hivit 80% WDG against some pests on susceptible vegetable marrow variety in open field.
5- As sayin the efficacy of Vapcomic 1.8% EC, Mobet, Trivap 75% WP, Hivit 80% WDG and Oecos 3.2%EC against the cotton aphid and the cotton & tomato whitefly on a susceptible vegetable marrow variety in open field.

MATERIALS AND METHODS

Two field experiments were conducted at the Plant Protection Research Station at Qaha, Qalubiya Governorate.

The first was conducted to study the population fluctuation, susceptibility degree and also the population growth rate to *B. tabaci, A. gossypii, T. tabaci* and *T. urticae* infestations on four vegetable marrow varieties. At second experiment the susceptible variety were used in evaluation the efficiency of some tested materials, against *B. tabaci* and *A. gossypii*.

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First experiment:

The first experiment was conducted in 2020 season. An area of about 150m^2 was cultivated by seeds with the four vegetable marrow varieties (hybrid aziad, hybrid marseille, askandrany and amna) in March, 30th. The whole area was divided to 12 replicates, (of 11 m^2 each). 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 (of 10 randomly picked leaves/ replicate) continual for 11 weeks, Each sample was kept in a tightly closed paper bag and brought to the laboratory in the same day for inspection under a stereomicroscope for counting the numbers of *B. tabaci* (immature stages); *A. gossypii* (nymphs and adults); *Tetranychus urticae* (moving immature and adult stages) and *T. tabaci* (nymphs and adults).

Classification of the susceptibility degree of each variety to infestation by the previously mentioned pests was dependent on the general mean number ($\bar{X}$) of each pest's count and the standard deviation (SD) as reported by Chiang and Talekar (1980) Susceptibility rate was categorized as follows:

a- Highly susceptible (HS): average number more than $\bar{X}$ +2SD
b- Susceptible (S): average number between $\bar{X}$ and $\bar{X}$ +2SD
c- Low resistant (LR): average number between $\bar{X}$ and $\bar{X}$ -1SD
d- Moderately resistant (MR): average number between $\bar{X}$ -1SD and $\bar{X}$-2SD
e- Highly resistant (HR): average number less than $\bar{X}$ -2SD.

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

$$GR = (N_t - N_o)/\Delta t$$

Where:

N_t = number of each pest recorded at the maximum count of the population on a leaf
N_o= initial number of each pest counted on each leaf
Δt= difference in time between N_t and N_o

Anatomical studies:-

In laboratory, leaves samples were cleaned with tap water, cut into suitable parts, fixed in formalin, acetic acid and alcohol (F.A.A) solution for at least 36 hours, dehydrated with n-butyl alcohol, infiltrated and embedded in pure paraffin wax (M.P. 56-58ºC) (Johansen 1940). Sectioning was performed at thickness of 14 micron by using a rotary microtome. Paraffin ribbons were mounted on thin slides and stained with safranin and light green. (Corgan and Widmoyer,1971). Sections were mounted in Canada balsam then examined microscopically. The epidermal cell thickness was measured by planimeter (Saeed, 1992).

Second experiment:

The second experiment was conducted during nili plantation of 2020 season to evaluate the efficiency of sixteen treatments, those were:

- Lemon oil (*Citrus limon* L.; Fam. Rutaceae), ginger oil (*Zingiber officinale* Roscoe; Fam. Zingiberaceae), fenugreek oil (*Trigonella foenum-graecum* L.; Fam. Fabaceae) and green tea oil (*Camellia sinensis* L.; Fam. Theaceae) were bought from El Captain Company ″CAP PHARM″.
- Egyxide plus (water soluble natural oil) was bought from the Egyptian United Company.

The concentrations of oils used in this investigation were 500 and 1000ml /100L water.

- Each of these oils was mixed with 250gm Hivit 80% WDG.

Also, five different pesticides were assayed against the mentioned pest species, those were;

- Vapcomic (abamectin) (1.8% EC) was used at 40cm/100 L water, bought from Fabco Company.
- Mobet (Water-soluble potassium oxide (K2O) 7,5% and Chloride content <0,05%) was used at500ml/100 L water, bought from to Fert Land company (Under experimentation).
- Trivap (cyromazine) 75% WP was used at17.5gm/100 L water, bought from Fabco Company.
- Oecos (azadirachtin) 3.2%EC was used at 100cm/100 L water, bought from Lotus Agricultural Development
- Hivit (sulfur) 80% WDG with rates of 250gm /100 L water, bought from Al-Munir Company for Agriculture and Livestock.
- Control.

An area of about 550 m^2 was cultivated by seeds with vegetable marrow variety (hybrid aziad) on September, 12th 2020 summer season. The whole area was divided into 48 replicates (11m^2 for each replicates). Each treatment was represented by 3 replicates and control. All the normal agricultural practices were followed except for the absence of pesticidal treatment. Treatments were sprayed on October, 3rd and 17th by using a 20 L. knapsack sprayer with one nozzle.

The efficacies of treatments were determined by inspecting 10 randomly picked leaves from each replicate then every 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* (immature stages) and *A. gossypii* (nymphs and adults).

Inspections of plants were carried out before spraying and after 1, 3, 5, 7 and 14 days from application to evaluate the efficacies of treatments on the reduction rates of the pest populations.

The reduction percentage of population (% mortality) has been calculated according the equation of Henderson and Tilton (1955) formula as follow:

$$\% \text{ Reduction of counts} = 100\,[1-(Cb / Ca \times Ta / Tb)]$$

Where:

Cb = count of insects in control before application
Ca = count of insects in control after application
Ta = counts of insects in treatment before application
Tb = counts of insects in treatment after application

Statistical analysis:

Statistical analysis was performed using SAS computer program and LSD (Least significant difference) was calculated to find out the significance in difference between mean counts of three pest species on the three studied tomato varieties (SAS Institute, 2003).

RESULTS AND DISCUSSION

Population fluctuation of the piercing-sucking pests on the four vegetable marrow varieties during 2020 summer season plantation in Qalubiya Governorate:

B. tabaci

The results shown in Table (1a) and Figure (1) indicate two peaks of *B. tabaci* abundance on Aziad variety on April, 21th and May, 25th with 48.7 and 75.5 immature stage individual/ leaf, respectively. On Marseille variety, three peaks were recorded for the population abundance of *B. tabaci* on April, 21st; May, 11th and June, 2nd with 53, 68 and 36 immature stage individual/ leaf, respectively. Askandrany variety recorded three peaks also on April, 28th; May, 11th and June, 2nd with 37.5, 30 and 33.4 immature stage individual/ leaf, respectively. Under the same field conditions, Amna variety recorded two peaks of the population abundance of *B. tabaci* on May, 4th and May, 25th with 78 and 26.5 immature stage individuals/ leaf, respectively.

A. gossypii

Data in Table (1a) and Fig (1) showed the population abundance of *A.gossypii* on Aziad, Marseille, Askandrany and Amna varieties. A single peak of abundance was recorded on April, 7th with 122.2, 81.4, 52 and 15.9/ leaf of the four vegetable marrow varieties, respectively.

T. tabaci

Data in Table (1b) and Fig (1) indicated two peaks of *T. tabaci* abundance on Aziad variety, the first was 7.5 individuals/ leaf on April, 21st and the second of 3.4 individuals on May, 11th. On Marseille variety two small peaks were recorded on April, 14th and May, 18th (2.3 and 2.5 individuals/ leaf, respectively), Askandrany variety recorded also two peaks of the population abundance of *T. tabaci* on April, 21st and June, 2nd (3 and 3.5 / leaf, respectively). Under the same conditions, Amna variety recorded a single peak of 12.5 individuals/ leaf on April, 21st.

T. urticae

Data in Table (1b) and Fig (1) indicated that the population abundance of *T. urticae* on Aziad recorded single peak on April, 7th with 16.7/ leaf. Marseille and Askandrany varieties recorded, also, a single peak on April, 21st with 16.7, 2.5 and 12.5/ leaf, respectively. At the same time Amna variety didn't record any peak of *T. urticae.*

Table 1a. Counts and population growth rate of some pests on four vegetable marrow varieties during of 2020 season.

Date of inspection	Plant age	Mean count of pests / Leaf																							
		B. tabaci												*A. gossypii*											
		Aziad			Marseille			Askandrany			Amna			Aziad			Marseille			Askandrany			Amna		
		Eggs	Nymphs	Total	Eggs	Nymphs	Total	Eggs	Nymphs	Total	Eggs	Nymphs	Total	Nymphs +Adult stages	Winged	Total	Nymphs +Adult stages	Winged	Total	Nymphs +Adult stages	Winged	Total	Nymphs +Adult stages	Winged	Total
30/3	15	18	0	18	3	0	3	0	0	0	0	0	0	7.9	3.4	8.24	3.2	2	3.4	2.8	1	2.9	8	1	9
7/4	22	28	0	28	11.2	0	11.2	1	0	1	0	0	0	113.6	8.6	122.2	75.4	6	81.4	48.3	3.7	52	13.6	2.3	15.9
14/4	29	20	13.7	33.7	4.5	6	10.5	3.5	1	4.5	2	0	2	7.3	2	9.3	5	1	6	2.5	1	3.5	1	1	2
21/4	36	19.7	29	48.7	17	36	53	20	12.5	32.5	3	2	5	0	0	0	0	0	0	4	0	4	0	0	0
28/4	43	2.5	1	3.5	12.3	2.5	14.8	25	12.5	37.5	6	8	14	0	0	0	0	0	0	1.5	0	1.5	0	0	0
4/5	50	7	6	13	35	25	60	14	2	16	23	5.5	78	0	0	0	0	0	0	0	0	0	0	0	0
11/5	57	37	1	38	32	36	68	9	21	30	8	20	28	0	0	0	0	0	0	0	0	0	0	0	0
18/5	64	15.5	31.5	47	22.5	32	54.5	5.5	17	22.5	5	6.5	11.5	0	0	0	0	0	0	0	0	0	0	0	0
25/5	70	25	50.5	75.5	11	24.7	35.7	7.5	8.5	16	16.5	10	26.5	0	0	0	0	0	0	0	0	0	0	0	0
2/6	77	6	28.3	34.3	15	21	36	20.7	12.7	33.4	11	6	17	0	0	0	0	0	0	0	0	0	0	0	0
9/6	84	0	8	8	5	10	15	10	3	13	4	2	6	0	0	0	0	0	0	0	0	0	0	0	0
Mean ± SE		16.3 ± 3.46	15.4 ± 5.12	31.61 ± 6.33	15.3 ± 3.22	17.6 ± 4.31	32.88 ± 6.99	10.6 ± 2.53	8.2 ± 2.24	18.76 ± 4.06	7.1 ± 2.17	5.5 ± 1.79	17.09 ± 6.77	18.2 ± 11.9	1.3 ± 0.81	19.45 ± 12.67	10.2 ± 7.13	0.8 ± 0.55	11.04 ± 7.67	7.7 ± 4.76	0.5 ± 0.34	8.18 ± 5.08	2.1 ± 1.36	0.4 ± 0.23	2.45 ± 1.57

Table 1b. Counts and population growth rate of some pests on four vegetable marrow varieties during of 2020 season.

Date of inspection	Plant age	Mean count of pests / Leaf																
		T. tabaci (Nymphs +Adult)				*T. urticae*												
						Aziad			Marseille			Askandrany			Amna			
		Aziad	Marseille	Askandrany	Amna	Eggs	Individuals *	Total	Eggs	indivedual *	Total	Eggs	indivedual *	Total	Eggs	indivedual *	Total	
30/3	15	0	0	0	1	8	0	8	0	0	0	1	0	1	0	0	0	
7/4	22	0	0.7	0.8	2	15	1.7	16.7	1	0.2	1.2	1.5	0.3	1.8	0	0	0	
14/4	29	2	2.3	2	6	0.7	0	0.7	1	1	2	4	1	5	0	0	0	
21/4	36	7.5	0.3	3	12.5	0	0	0	1	1.5	2.5	12.5	0	12.5	0	0	0	
28/4	43	0.5	0.5	2.5	1.5	0	0	0	0	0	0	0	0	0	0	0	0	
4/5	50	1.5	0.5	1	0.5	0	0	0	0	0	0	0	0	0	0	0	0	
11/5	57	3.4	0.5	1	0.5	0	0	0	0	0	0	0	0	0	0	0	0	
18/5	64	1.5	2.5	1.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	
25/5	70	1.5	1	2	0.5	0	0	0	0	0	0	0	0	0	0	0	0	
2/6	77	1.5	1.7	3.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	
9/6	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Mean ± SE		1.76±0.65	0.91±0.26	1.57±0.35	2.32±1.13	2.2±1.47	0.2±0.15	2.31±1.61	0.3±0.14	0.2±0.15	0.52±0.28	1.7±1.14	0.1±0.09	1.85±1.16	0.0±0.0	0.0±0.0	0.00	

*** Indivedual= nymphs +adult of *T. urticae***

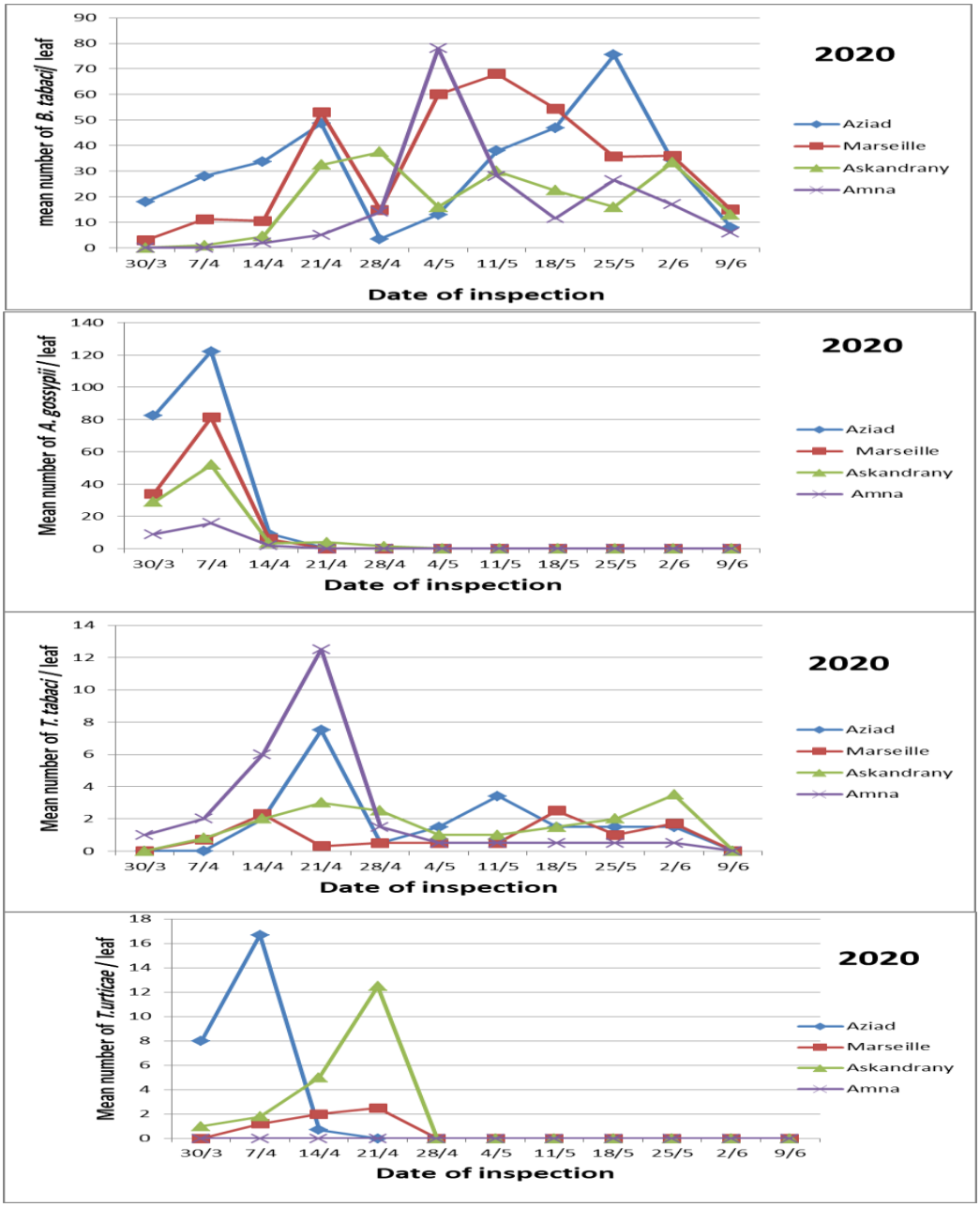

Fig. 1. Counts and population growth rate of the studied pest species on four vegetable marrow varieties during 2020 summer season plantation.

Evaluation of relative susceptibility of four vegetable marrow varieties to infestation by four different piercing-sucking pest:

According to data presented in Table (2), Aziad variety proved as susceptible to *B. tabaci, A. gossypii, T. tabaci* and *T. urticae* infestations. The recorded susceptibility rates were 31.61, 19.45, 1.76 and 2.31/ leaf respectively.

Table 2. The susceptibility of vegetable marrow varieties to infestation by 4 the piercing-sucking pests during 2020 summer season plantation:

Pests / Varieties	*B. tabaci*		*A. gossypii*		*T. tabaci*		*T. urticae*	
	Total	Susceptibility degree	Total	Susceptibility degree	Total	Susceptibility degree	Total	Susceptibility degree
Aziad	31.61	S	19.45	S	1.76	S	2.31	S
Marseille	32.88	S	11.04	S	0.91	MR	0.52	LR
Askandrany	18.76	LR	8.18	LR	1.57	LR	1.85	S
Amna	17.09	MR	2.45	LR	2.32	S	0.00	MR
Mean ± SD	25.09±8.31		10.28±7.08		1.64±0.58		1.17±1.09	

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

As for, Marseille variety, it was susceptible (S) (32.88 and 11.04/ leaf) to *B. tabaci* and *A. gossypii*, respectively. It recorded moderate resistance (MR) (0.91/ leaf) to *T. tabaci* and low resistance (LR) (0.52/ leaf) to *T. urticae.*

Susceptibility degree of Askandrany variety recorded low resistance (LR) with means of 18.76, 8.18 and 1.57 / leaf to *B. tabaci*, *A. gossypii* and *T. tabaci*, respectively (Table, 2). The same variety proved as susceptible with mean 1.85 / leaf to *T. urticae*.

In case of, Amna variety, it showed moderate resistance (MR) (17.09 and 0.00 / leaf) to *B. tabaci* and *T. urticae*, respectively, while it recorded low resistance (LR) (2.45/ leaf) to *A. gossypii* and susceptible (S) 2.32/ leaf to *T. tabaci.*

Population growth rate:

Data in Table (3) 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 between these two factors (Δt) of 4 serious pest species attacking 4 vegetable marrow varieties.

In respect to *B. tabaci*; Amna variety recorded the highest growth rate (3.62), taking time difference of 21 days between initial *B. tabaci* number (2) and maximum count (78).

In relation to *A. gossypii*, Marseille variety recorded the highest growth rate (6.77), taking time difference of 7 days between initial *A. gossypii* number (34) and maximum count (81.4).

As for *T. urticae;* Aziad variety recorded the highest growth rate (1.24), taking time difference of 7 days between initial *T. urticae* number (8) and maximum count (16.7).

In relation to *T. tabaci;* Amna variety recorded the highest growth rate(1.64), taking time difference of 7days between initial *T. tabaci* number(1) and maximum count(12.5).

Table 3. Population growth rate for the piercing-sucking pests on the vegetable marrow varieties during 2020 summer plantation season:

pests	variety	Population growth rate parameters			GR
		N_o	N_t	Δt	
B. tabaci	Aziad	18	75.5	56	1.03
A. gossypii		82.4	122.2	7	5.69
T. tabaci		2	7.5	7	0.79
T. urticae		8	16.7	7	1.24
B. tabaci	Marseille	3	68	42	1.55
A. gossypii		34	81.4	7	6.77
T. tabaci		0.7	2.5	42	0.04
T. urticae		1.2	2.5	14	0.09
B. tabaci	Askandrany	1	37.5	21	1.74
A. gossypii		29	52	7	3.29
T. tabaci		0.8	3.5	56	0.05
T. urticae		1	12.5	21	0.55
B. tabaci	Amna	2	78	21	3.62
A. gossypii		9	15.9	7	0.99
T. tabaci		1	12.5	7	1.64
T. urticae		0	0	0	0

GR= population growth rate,
Nt = maximum count of the population on leaf
No = initial pests count on leaf,
Δt = time difference between No and Nt

Anatomical studies:

Data in Table (4) and Fig (2) clarify the anatomy measurements of vegetable marrow leaf in different varieties. Amna variety had the thickest Upper and lower epidermis of cuticle, palisade tissue, spongy tissue, collenchyma layers below and above the upper epidermis at midrib, outer phloem in large vascular bundle and widest xylem vessel in large vascular bundle. The same variety had, also, the highest number of trichomes on upper and lower epidermis. On contrary, Aziad variety manifested the lowest values of all of the above mentioned measurements. The two remaining varieties had intermediate values.

Table 4. The anatomy measurements of different parts of vegetable marrow leaf of different varieties:

Varieties / Characters	Aziad	Marseille	Askandrany	Amna	Key
Upper epidermal cuticle thickness.	5.40	5.40	5.40	7.20	1
Lower epidermal cuticle thickness.	4.50	4.50	4.50	5.40	2
Upper epidermal thickness.	8.10	9.00	9.00	10.80	3
Lower epidermal thickness.	7.20	8.10	7.20	9.00	4
Palisade tissue thickness.	108.00	117.00	135.00	144.00	5
Spongy tissue thickness.	76.50	76.50	112.50	148.50	6
Mean thickness of collenchyma layers below the upper epidermis at midrib.	15.00	15.75	19.69	21.00	7
Mean thickness of collenchyma layers above the upper epidermis at midrib.	18.00	21.60	22.25	29.50	8
Thickness of outer phloem in large vascular bundle.	135.00	143.00	155.80	180.00	9
Thickness of widest xylem vessel in large vascular bundle.	63.00	72.00	72.00	76.50	10
No. of trichomes in upper epidermis	6	6	6	22	11
No. of trichomes in lower epidermis	2	2	18	28	12

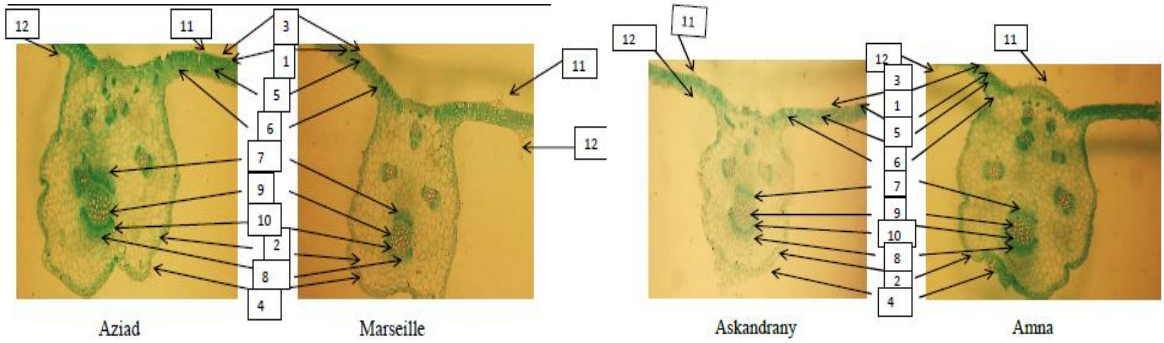

Fig. 2. Histological features of leaf-blade of different vegetable marrow varieties (T.S.) during 2020 summer season plantation.

Obtained yield from different vegetable marrow varieties:

Results given in Table (5) indicated that, Amna variety produced the highest fruits' yield by 3877 (kg/fed.), while Aziad variety manifested the lowest yield (994 kg/fed.). Askandrany and Marseille varieties resulted intermediate weights of yield (1668 and 1394 kg/fed., respectively).

Table 5. Resultant fruits' yield from different vegetable marrow varieties:

Varieties	Yield (kg/fed.)
Aziad	994
Marseille	1394
Askandrany	1668
Amna	3877

In similar field studies Saleh *et al.* (2017) and Hegab (2018) studied the seasonal fluctuations of *B. tabaci* and *A. gossypii* on vegetable marrow plant.

In recent years, studies certified that the use of resistant varieties for insects control did help, significantly, to increase food production in major agricultural areas. In most studies of pests management programs, the study of plant resistance to insects (Smith *et al.*, 1994; Yasaikinici and Hincal 1996), and the study of the host preference of pests (Jounior *et al.* 2003) were found as very much important. From data presented in the present study, it is clear that Aziad variety was the highest susceptible to infestation by the four tested pest species and subsequently resulted the lowest yield. So, some have been tested by pesticides and biopesticides against some pests in Aziad variety.

Pesticides and Biopesticides:

Reduction percentages of *B. tabaci* and *A. gossypii* caused by different treatments were investigated and results are shown in Table (6). All treatments caused significant ($P < 0.05$) reductions in insect counts compared to the untreated control. Data indicated reduction percentages of infestation after the first and second sprays on different treatments against the mentioned pests where Vapcomic proved as the highest effective treatment in reducing the densities of *B. tabaci* (88.8%) and *A. gossypii* population (93.2 and 96.2%, respectively).

Because of the disadvantages of pesticides' application including environmental pollution and disturbance of the natural ecological balance (Abd El-Hakeem *et al.*, 2019), other treatments were used in the present study. The insects population reductions by fenugreek oil+ Hivit (1000ml+250gm) of *B. tabaci* (90.2%) and *A. gossypii* (91.3 and 95.2%, respectively). That was followed by mobet , being on *B. tabaci* (87.2%) and *A. gossypii* (84.9 and 88.8%, respectively). Results from fenugreek oil+ Hivit (1000ml+250gm) and Mobet did not significantly differ than Vapcomic (Table, 6).

The present results agree with the findings of Abdallah *et al*. (2012) and Saleh *et al*. (2017) who found that some biochemical control products against certain vegetable marrow pests (*Thrips tabaci*, *A. gossypii* and *B. tabaci*) caused reduction of the insect species under chemical control.

Table 6. Efficacies of different compounds in reducing the population density of *B. tabaci* and *A. gossypii* during 2020 nili season plantation on Aziad variety vegetable marrow:

Treatments		first spray								second spray			
		B. tabaci				*A. gossypii*				*B. tabaci*			
Tested compounds	Rat. / 100Lwater	Days after spray			Mean Red.	Days after spray			Mean Red.	Days after spray			Mean Red.
		3	7	14		3	7	14		3	7	14	
lemon oil	500ml	59.1	75	76.9	70.3^{kl}	70	65.4	55.3	63.6^{no}	36.2	70.2	72.6	59.7^{o}
	1000ml	75.5	86.2	89.1	83.6^{d}	72.7	84.2	68.7	75.2^{ghij}	54	92.6	83.3	76.6^{i}
	500ml+250gm (hivit)	65.7	76.7	79.2	73.9^{j}	66.7	73.5	63.5	67.9^{lm}	52.7	85.7	91.2	76.5^{i}
	1000ml+250gm (hivit)	76.8	89.3	90.8	85.6^{bc}	71.5	95.2	83.5	83.4^{cd}	58.8	94.8	98.8	84.1^{ef}
ginger oil	500ml	79.5	80.1	90.8	83.5^{d}	54.7	65.2	56.9	59^{p}	47.8	87.4	77.6	70.9^{k}
	1000ml	66.6	81	88.9	78.8^{g}	71.7	83.2	79.2	78^{fgh}	59.2	85.4	98.5	81.0^{h}
	500ml+250gm (hivit)	53.4	70.2	81.4	68.3^{m}	55.3	63.9	67.5	62.2^{op}	45.3	70.7	84.4	66.8^{n}
	1000ml+250gm (hivit)	68.9	87.8	92.2	83^{ed}	72.9	81.5	85.4	80^{def}	59.4	88.6	97.6	81.9^{gh}
fenugreek oil	500ml	61.2	77.2	92.9	77.1^{ghi}	42.2	53.3	62.5	52.7^{q}	49.7	78.5	35.1	54.4^{p}
	1000ml	75.2	85.5	95.6	85.4^{c}	72.9	80.3	85.1	79.4^{ef}	85.1	93	72.3	83.5^{efg}
	500ml+250gm (hivit)	67.3	78.4	87.6	77.8^{gf}	66.2	73.4	81.6	73.7^{ij}	66.5	80.1	78.2	74.9^{ij}
	1000ml+250gm (hivit)	74.8	91.9	97.6	88.1^{a}	87.9	90.2	95.8	91.3^{a}	91.1	95.8	98.8	95.2^{a}
green tea oil	500ml	47.7	76.6	89	71.1^{k}	54.4	68.4	72.5	65.1^{mno}	66.6	74.3	85.9	75.6^{ij}
	1000ml	68.5	85.9	95.8	83.4^{de}	76.2	81.8	78.9	79^{efg}	61.6	91.5	94.2	82.4^{fgh}
	500ml+250gm (hivit)	50.2	72.5	95.8	72.8^{j}	64	78.9	65.5	69.5^{kl}	35.2	63	53.9	50.7^{q}
	1000ml+250gm (hivit)	78.3	81.6	98.3	86.1^{bc}	78.8	83.2	85.3	82.4^{cde}	42.6	76.3	87.5	68.8^{lm}
egyxide plus water soluble natural oil	500ml	59.6	68.7	79.6	69.3^{lm}	58.8	67.8	75.6	67.4^{lmn}	40.3	82.4	86.4	69.7^{kl}
	1000ml	61.6	75.7	92.3	76.5^{hi}	64.8	74.2	84.2	74.4^{hij}	77.3	84.2	96.1	85.9^{d}
	500ml+250gm (hivit)	62.2	76.8	88.5	75.8^{i}	62.5	71.6	82.5	72.2^{jk}	66.8	72.8	82.6	74.1^{j}
	1000ml+250gm (hivit)	66.2	83.6	95.3	81.7^{ef}	68.4	77.3	85.7	77.1^{fghi}	79.4	88.9	85.3	84.5^{de}
Hivit	250gm	66.6	75.2	87.3	76.4^{hi}	73.8	75	67.8	72.2^{jk}	43.7	77.5	92.9	71.4^{k}
Vapcomic	40cm	74.1	94.2	98.2	88.8^{a}	98.8	92.1	88.6	93.2^{a}	97.4	92.8	98.5	96.2^{a}
Mobet	500ml	75.6	88.3	97.8	87.2^{b}	92.9	85.2	76.6	84.9^{b}	83.3	90.8	92.3	88.8^{b}
Trivap	17.5gm	76.6	77.7	88.1	80.8^{f}	72.7	87.3	73.7	77.9^{fgh}	49.2	90.9	88.4	76.2^{i}
Oecos	100cm	66.6	71.4	83.5	73.8^{j}	89.4	84.1	55.8	76.4^{fghi}	38.6	79.8	83.5	67.3^{mn}
MSE	-	-	-	-	0.57				1.28				0.57

Means having similar letters in each column are not significantly different (P<0.05).

Results given in Table (6&7) indicated that, the tested treatments by pesticides and biopesticides had significant effects in reducing pest counts on Aziad variety and the resultant yield. The highest yield was obtained after treatment by fenugreek oil+ hivit (1000ml+250gm) (5900 kg/fed.) indicating 83.2% increase than control. While Vapcomic treatment resulted a significantly, lower yield (1324 kg/fed.) showing, in the same time, only 24.9%increase than control which gave (994 kg/fed.).

From the overall obtained data, the use of biopesticides in order to control sap-sucking insects infesting vegetable marrow plants could be recommended for the safety of these biopesticides on the environment, on one hand, and assuming, significantly, higher yield production, on the other hand.

Table 7. Effect of different treatments on the yield (kg/fed.) of Aziad variety:

Treatments		The yield	Rate of increase
Tested compounds	Rate/ 100Lwater	(Kg/fed.)	(%)
lemon oil	500ml	2570^{i}	61.3
	1000ml	2780^{h}	64.2
	500ml+250gm(hivit)	3990^{d}	75.1
	1000ml+250gm(hivit)	5335^{b}	81.4
ginger oil	500ml	1290 ^{u}	22.9
	1000ml	2086^{k}	52.3
	500ml+250gm (hivit)	2436^{j}	59.2
	1000ml+250gm(hivit)	2874^{g}	65.4
fenugreek oil	500ml	1765^{p}	43.7
	1000ml	1866^{o}	46.7
	500ml+250gm (hivit)	4552^{c}	78.2
	1000ml+250gm(hivit)	5900^{a}	83.2
green tea oil	500ml	1628^{q}	38.9
	1000ml	1973^{l}	49.6
	500ml+250gm (hivit)	1262^{v}	21.2
	1000ml+250gm(hivit)	1390^{s}	28.5
egyxide plus water soluble natural oil	500ml	2436^{j}	59.2
	1000ml	2874^{g}	65.4
	500ml+250gm (hivit)	1113^{w}	10.7
	1000ml+250gm(hivit)	1871^{n}	46.9
Hivit	250gm	3578^{f}	72.2
Vapcomic	40cm	1324^{t}	24.9
Mobet	500ml	3606^{e}	72.4
Trivap	17.5gm	1547^{r}	35.7
Oecos	100cm	1944^{m}	48.9
Control		994	0.0
LSD		1.618	

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بعض الجوانب البيئية على الإصابة ببعض الآفات الثاقبة الماصة على أربعة أصناف من الكوسة ، وعلاقتها بخصائصها النسيجية ، ومكافحتها وتقييم المحصول

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تم إجراء تجربتين حقليتين فى محطة بحوث وقاية النبات بقها (مركز البحوث الزراعية)- محافظة القليوبية خلال عام ٢٠٢٠. أجريت التجربه الأولى لدراسة الكثافة العددية ، ومعدل النمو العددى لأربعة أنواع من الآفات الثاقبة الماصة هى: ذبابة القطن والطماطم البيضاء ،من القطن ،تربس القطن والعنكبوت الاحمر وتقييم درجة حساسية أربعة أصناف من الكوسة (أسكندرانى ،أمنه ،الهجين مارسيليا والهجين أزياد) للإصابة بالآفات المذكورة سابقا. أما التجربة الثانية فقد أجريت بهدف إختيار عدة مركبات لمكافحة تلك الآفات محل الدراسة على الصنف الهجين أزياد التى تعرضت لأعلى إصابة وذلك بإستخدام (زيت ليمون ،زيت الزنجبيل ،زيت الحلبة ،زيت الشاى والزيت المعدنى والخلط بين الزيوت والكبريت بمعدل ٥٠٠ و١٠٠٠ مل من كل زيت مع ٢٥٠ جرام من الكبريت لكل ١٠٠ لتر ماء، هذا إلى جانب المبيدات فابكوميك ،موبيت ،تريفاب ،أويكوس والكبريت). وقد أظهرت نتائج الدراسة الأولى أن صنف الكوسة أزياد كان الأكثر حساسية للإصابة بالذبابة البيضاء ،من القطن ،تربس القطن والعنكبوت الاحمر خلال موسم الدراسة بمتوسط ٣١,٦١ ، ١٩,٤٥ ، ١,٧٦ ، ٢,٣١ فردا / الورقة على التوالى. وتشير البيانات التى تم الحصول عليها إلى أن من القطن سجل أعلى معدل نمو ٦,٧٧ والوقت المستغرق بين الإصابة وأعلى تعداد للإصابة سجل ٧ أيام لصنف الكوسة أزياد. كما سجل الصنف أمنة أقل معدل نمو للعنكبوت الأحمر. أشارت النتائج إلى أن القياسات التشريحية لصنف أمنة كانت الأعلى في القياسات المدروسة ، بينما أعطى الصنف أزياد الأقل في جميع القياسات المدروسة. وكان المحصول الأعلى فى الصنف أمنه والأقل فى الصنف أزياد. أظهرت البيانات المتحصل عليها أن المبيد فابكومك وزيت الحلبة مع الكبريت بمعدل (١٠٠٠ملى + ٢٥٠ جم) أعطيا أعلى معدل إنخفاض معنوى لتعداد حشرات تربس القطن ومن القطن على الصنف أزياد حيث كان متوسط الإنخفاض بعد ١٤ يوم من الرشة الأولى والثانية (٨٨,٨ و ٨٨,١%) و (٩٣,٢ و ٩١,٣%) و (٩٦,٢ و ٩٥,٢ %) على الترتيب.