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Effect of Plantation Date, Plant Cultivars and Plant Density on Insects' Populations and Yield of Sunflower Crop

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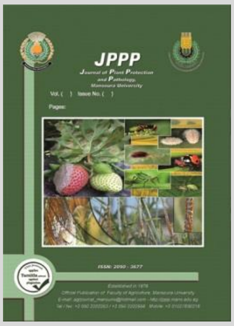

ABSTRACT

The effect of plantation date, plant density, and plant varieties on the population of insects that attack sunflower plants and their predators were examined. Two plantation dates, two sunflower varieties (Giza102 and Sahka53), and two distances between the planting pits were taken in account. Numbers of *Aphis gossypii* showed significant differences between the two plantation dates of Sakha53 and Giza102 varieties, whereas those of *Empoasca lybica* only showed significant differences between the two plantation dates of Giza 102 variety. Only numbers of the green lacewing, *Chrysoperla carnea* exhibited significant differences between both dates of cultivation. In respect to March plantation, the distance of 25 cm had significantly higher numbers of *Bemisia tabaci*, *Thrips tabaci*, and *E. lybica* than 15cm for cultivation of Sakha 53 variety, whereas the distance did not affect the insects that harbored Giza 102 variety. In respect to June plantation, the distance of 15cm had significantly higher numbers of *E. lybica* than 25 cm for cultivation of Sakha 53 variety, whereas 25cm had higher numbers of *A. gossypii* and *Icerya secyllarum* than 15cm in Giza102 variety. In March plantation, Sakha53 variety harbored significant numbers of *A. gossypii* and *T. tabaci* compared with Giza 102, whereas in June plantation, it harbored significant numbers of *E. lybica* and *I. secyllarum*. In general, Sakha 53 variety seems to be a more sensitives sunflower host for insect infestation than Giza102, resulting in lower quantity of sunflower heads yielded by this variety. Chemical and morphological analyses support this finding.

Keywords: *Chrysoperla carnea*, chemical analysis, plant morphology, Sakha 53, Giza 102

INTRODUCTION

Sunflower (*Helianthus annuus* L.) is one of the most important oil crops all over the world. The crop is planted in Egypt for oil, which is cholesterol free, and seeds, but it is attacked by a number of sucking insect pests in Egypt such as *Aphis gossypii* Glover, *Thrips tabaci*, and *Spodoptera littoralis* (Boisd.) (Ahmed, 2002). It is cultivated for oil and edible seed (Khan, 2007), great emphasis must be given towards this crop to decrease the gab in oil. Production of sunflower was about 1627 tons in the year 2005 (Aboshosha *et al*. 2007). Insects are one of the major factors that led to losses in production and yield of sunflower crop (Mukhtar, 2009). (Sattar *et al.* 1984 and Kakakhel *et al*. 2000) found that the most important insect pests that attack sunflower were *Bemisia tabaci* (Gennadius), *A. gossypii*, *Empoasca* spp., and *Heliothis armigera*. (Aslam *et al.* 2000) mentioned that the cotton aphid, *A. gossypii*, potato aphid (*lacrosiphum euphorbiae* Thos.) are serious pests that infest sunflower plants. (Ashfaq and Aslam 2001) studied different sunflower genotypes against some sucking insect pests, (Lanjar *et al*. 2014), studied the correlation between plant physiochemical characteristics and insect pest population. (Aslam *et al.* 2000) evaluated the susceptibility of six genotype of sunflower to infestation by *A. gossypii*; *B. tabaci*; the leafminer, *Phytomyza atricornis* Meigen; green leafhopper, *Empoasca* spp.; painted bug, *Bagrada* spp.; and seed weevil, *Smicronyx* spp. They found that SMH-9707 was partially resistant against aphids, whereas SF-187 was found less susceptible. (Sethi *et al.* 1978) found that *B. tabaci* and *Amrasca bigutella* (Ishida) were major pests of five sunflower cultivars during the winter season. Although, several studies have been done on insect pests that infest sunflower plants, few have been dealt with some agricultural practices, that perhaps reduce the infestation of sunflower with some insect pests. Therefore, the current work aims to examine the effect of plantation dates, plant density per unit area, and sunflower cultivars on insect infestation and crop yield.

MATERIALS AND METHODS

1. Experimental design and sampling

The trials were carried out at the farm of the Faculty of Agriculture, Mansoura University. The experimental area was about half Feddan. In the first trial, two plantation dates for sunflower: the first one was on 21st March and the second one was on 4th June 2020 were applied to examine the effect of plantation dates on population density of insect pests and their predators. In the second trial, for each sunflower plantation date, two sunflower cultivars namely, Giza 102 and Sahka 53 were sown to examine the effect of sunflower varieties on population density of insect pests and their associated predators. In the third trial, the effect of sunflower density, i.e., the distance between the planting pits, on the

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population abundance of insect pests and their predators were investigated. Two distances of 15 and 25 cm were considered for each sunflower variety and plantation date.

The leaf sample method was used to estimate the population abundance of insect pests and their associated predators. After two weeks from cultivation, twenty-five sunflower leaves were taken randomly. Samples were collected from the five directions of the field (i.e., North, south, west, east and center). Samples were collected weekly in paper bags for inspection in the laboratory using a binocular microscope. In all trials, the normal agricultural practices of land preparation, irrigation, and mechanical weed control were applied, whereas pesticide applications were neglected.

2. Chemical and morphological features

To explain the difference in susceptibility of both sunflower cultivars to infestation by insect pests, some plant materials were chosen to analyze certain chemical and morphological features.

A. Chemical properties

- The total chlorophyll: chlorophyll a and b were colorimetrically determined (mg/g F.W.) using a spectrophotometer according to the method described by (Sadasivam and Manickam 1996). The chlorophyll a and b determinations were conducted using methanol solvent (pure) as a blank at wavelengths of 666 and 653 nm, respectively. Then, the total chlorophyll was calculated as follows:

•Chl. a = 15.65 A666 - 7.34 A653 (X1).

•Chl. b = 27.05 A653 - 11.21 A666 (X2).

•Total chlorophyll content (mg/g F. W.) = Chl.a content + Chl.b content.

- The total nitrogen (N) and phosphorus (P): Leave and stem of samples of both sunflower cultivars were oven dried at 70 °C to constant weight then were ground to a fine powder and then 0.2 g was taken to wet digestion using a mixture of sulphuric and perchloric acids according to method of (Gotteni *et al.* 1982) to determine the following nutrients:

•Total N (%) was determined using Micro kjeldahl apparatus as described by (Jones *et al*. 1991).

•Total phosphorus (%) was determined spectrophotometrically by Milten Roy spectronic 120 at wavelength 725 nm using stannous chloride reduced molybdosulphoric blue colour method in sulphoric system as described by (Peters *et al.* 2003). Total potassium (%) was determined in the digested plant materials using a flame photometer according to method of (Peters *et al.* 2003).

B. Morphological features

Specimens were prepared for scanning electron microscopy. The method described here is an example for fixation and contrastation. Very small piece of sunflower leaf tissue (1cm^2) should be fixed from each cultivar. The preparation should be quick enough, i.e., 5 minutes after tissue does no longer receive oxygen, it begins to show first signs of degeneration of ultrastructure. The fixation of the tissue was done using a modified method of (Karnovsky 1965) solution as follows: 1) 2.5 % buffered glutaraldehyde + 2 % paraformaldehyde in 0.1 M sodium phosphate buffer pH 7.4, 2) leaving tissue overnight at 4° C, 3) washing 3 x 15 minutes (min.) in 0.1 M sodium phosphate buffer + 0.1 M Sucrose, 4) postfixing 90 min. in 2 % sodium phosphate buffered osmium tetroxide pH 7.4, 5) washing 3 x 15 min in 0.1 M sodium phosphate buffer pH 7.4, 6) Gradual dehydration 2 x 15 min: 50 % ethanol (in distilled water); 2 x 15 min. 80 % ethanol; 2 x 15 min. 90 % ethanol; 2 x 15 min. 96 % ethanol; and 3 x 20 min. 100 % ethanol, 7) Coating the specimens with gold-palladium membranes and observing in a Jeol JSM-6510 L.V SEM. The microscope was operated at 30 KV at EM Unit, Mansoura University, Egypt.

3. Statistical analysis

The *t* test was used to analyze the differences in the average numbers of each insect species between the two plantation dates, the two sunflower varieties, or the two plant distances. Sigma plot program (version 14.5) was used in all analyses.

RESULTS AND DISCUSSION

1. Effect of plantation dates

Table (1) shows the effect of plantation dates on the average number of insect species that attack sunflower varieties and their insect predators that occur in the field during the tested period. In respect to Sakha 53 variety, only the numbers of the cotton aphid, *A. gossypii* showed significant difference between the two plantation dates (t = 3.39, P = 0.003). The results showed that only *I. seycllarum* did not record in March plantation, whereas *B. tabaci* and *T. tabaci* did not observe in June plantation. All numbers of both predator species did not significantly differ between both dates of plantation.

Table 1. Effect of plantation dates (March and June) on population density (±SE) of insect pests that attack sunflower varieties (Sakha 53 and Giza102) and their predators.

Insect species	Sakha 53		*t*	*P*	Giza 102		*t*	*P*
	March	June			March	June		
A. gossypii	42.3±6.70	17.5±3.0	3.393	0.003	21.3±2.90	10.7±1.7	3.130	0.006
E. lybica	48.5±6.70	54.0±6.5	0.582	0.570	34.2±8.50	14.5±1.1	2.290	0.040
B. tabaci	58.8±7.40	NF	-	-	44.1±6.10	NF	-	-
T. tabaci	24.1±4.20	NF	-	-	13.1±1.60	NF	-	-
I. seycllarum	NF	33.5±4.7	-	-	NF	14.5±2.0	-	-
F. occidentalis	2.3±0.21	2.8±0.6	0.001	0.990	2.5±0.22	3.4±0.8	0.386	0.710
C. carnea	8.0±.0.80	6.7±0.5	1.361	0.680	8.4±0.90	6.2±0.3	2.200	0.040
O. insidiosus	3.8±0.60	3.0±0.3	1.620	0.140	3.8±0.60	3.8±0.7	0.773	0.460

NF: means that the insect species did not record during this plantation date

In respect to Giza 102 variety, the numbers of the cotton aphid, *A. gossypii* and the cotton leafhopper, *E. lybica* showed significant difference between the two plantation dates (t = 3.13, P = 0.006 and t = 2.29, P = 0.04, respectively). The results showed also, only *I. seycllarum* did not occur in the March plantation, whereas *B. tabaci* and *T. tabaci* did not note in June plantation. Only numbers of the green lacewing, *C. carnea* exhibited significant differences between both dates of cultivation (t = 2.20, P = 0.04).

2. Effect of plant distance (density) on insect populations and sunflower yield

March plantation

Table (2) shows the effect of plant distance (i.e., plant density per unit) on the average number of insect species that attack sunflower varieties and their insect predators that occur in the field during March plantation. In respect to Sakha 53 variety, the numbers of the cotton whitefly, *B. tabaci*, the onion thrips, *T. tabaci*, and the cotton leafhopper, *E. lybica* showed significant difference between the two plant distances (t = 3.39, P = 0.003; t = 2.71, P = 0.010; and t = 1.99, P = 0.050, respectively). The numbers of predator species did not significantly differ between both distances. In respect to the Giza 102 variety, there were no significant differences in the numbers of the insect species or the predator species between both plant distances.

Table 2. Effect of plant distance (i.e., plant density) between pits on population density (±SE) of insect pests that attack sunflower varieties (Sakha 53 and Giza102) and their predators during March plantation.

Insect species	Sakha 53		*t*	*P*	Giza 102		*t*	*P*
	15 cm	25 cm			15 cm	25 cm		
A. gossypii	17.73±2.50	24.55±4.7	1.29	0.210	12.1±2.1	9.2±1.30	1.17	0.260
B. tabaci	15.8±3.80	43.0±7.0	3.39	0.003	18.6±3.2	25.5±3.30	1.49	0.150
T. tabaci	6.4±1.20	17.7±4.0	2.71	0.010	6.5±1.0	6.5±9.00	0.01	0.99 0
E. lybica	31. 1±5.50	17.5±4.0	1.99	0.050	17.9±5.50	16.3±3.30	0.26	0.800
F. occidentalis	1.2±0.20	1.2±0.2	0.00	1.0 00	1.3±0.20	1.2±0.20	0.62	0.550
C. carnea	4.1±0.55	3.9±0.4	0.26	0.790	4.3±0.60	4.1±0.60	0.22	0.830
O. insidiosus	1.5±0.34	2.3±0.42	1.54	0.16	2.3±0.42	1.5±0.20	1.75	0.110

June plantation

Table (3) shows the effect of plant distance (i.e., plant density per unit) on the average number of insect species that attack sunflower varieties and their insect predators that occur in the field during June plantation. In respect to Sakha 53 variety, only the numbers of the cotton leafhopper, *E. lybica* exhibited a significant difference between the two plant distances (t = 2.57, P = 0.02).

In respect to Giza 102 variety, the numbers of the cotton aphid, *A. gossypii* and the common white mealybug, *I. secyllarum* exhibited significant difference between the two plant distances (t = 2.20, P = 0.04 and t = 4.60, P = 0.0002, respectively). On both varieties, the numbers of predator species did not significantly differ between both plant distances.

Table 3. Effect of plant distance (i.e., plant density) between pits on population density (±SE) of insect pests that attack sunflower varieties (Sakha 53 and Giza102) and their predators during June plantation.

Insect species	Sakha 53		*t*	*P*	Giza 102		*t*	*P*
	15 cm	25 cm			15 cm	25 cm		
A. gossypii	7.6±1.1	9.8±2.0	0.970	0.34	3.5±0.4	7.2±1.6	2.20	0.0400
E. lybica	35.9±6.3	18.1±2.9	2.574	0.02	7.1±0.8	7.5±1.0	0.28	0.7800
I. seycllarum	15.9±2.5	17.6±3.3	0.397	0.69	2.5±0.4	11.9±1.9	4.60	0.0002
F. occidentalis	1.2±0.2	1.6±0.4	0.894	0.39	1.8±0.4	1.6±0.4	0.37	0.7200
C. carnea	3.4±0.3	3.4±0.3	0.009	1.00	3.1±0.3	3.1±0.3	0.01	1.0000
O. insidiosus	1.6±0.3	1.4±0.3	0.577	0.58	2.0±0.3	1.8±0.4	0.41	0.6900

Sunflower yield

The final production of both varieties of sunflower are presented in Table (4). Considering both plantation dates and both plant distances, Sakha 53 variety yielded higher quantity of sunflower heads that weighted in kilograms than that of Giza 102.

Table 4. Yield of sunflower heads that weighted in kilograms

Varieties	March		June	
	15 cm	25 cm	15 cm	25 cm
Sakha 53	42.900	42.300	58.400	42.200
Giza 102	41.200	34.400	66.10	53.200

Effect of plant varieties

Table (5) shows the effect of sunflower varieties (Sakha 53 and Giza 102) on the average number of insect species and their insect predators that occur in the field during the tested period. In respect to March plantation, the numbers of cotton aphid, *A. gossypii* and cotton thrips showed significant difference between the two sunflower varieties (t = 2.88, P = 0.01 and t = 2.45, P = 0.03). The results showed that only *I. seycllarum* did not record on both sunflower varieties in March plantation. In respect to June plantation, the numbers of the cotton leafhopper, *E. lybica* and the common white mealybug, *I. seycllarum* showed significant difference between the two sunflower varieties (t = 5.79, P = 0.001 and t = 3.74, P = 0.002, respectively). The results showed that the cotton whitefly, *B. tabaci* and the cotton thrips, *T. tabaci* did not occur in June plantation. In both plantation dates, the numbers of predator species did not significantly differ between both sunflower varieties.

In the current study, numbers of *A. gossypii* showed significant differences between the two plantation dates of Sakha 53 and Giza 102 varieties, whereas those of *E. lybica* only showed significant differences between the two plantation dates of Giza 102 variety. Only numbers of the green lacewing, *C. carnea* exhibited significant differences between both dates of cultivation. In respect to March plantation, the distance of 25 cm had significantly higher numbers of *B. tabaci*, *T. tabaci*, and *E. lybica* than 15 cm for cultivation of Sakha 53 variety, whereas the distance did not affect the insects that harbored Giza 102 variety. In respect to June plantation, the distance of 15 cm had significantly higher numbers of *E. lybica* than 25 cm for cultivation of Sakha 53 variety, whereas 25 cm had higher numbers of *A. gossypii* and *I. seycllarum* than 15 cm in Giza 102 variety. In March plantation, Sakha 53 variety harbored significant numbers of *A. gossypii* and *T. tabaci* compared with Giza 102, whereas in June plantation, it harbored significant numbers of *E. lybica* and *I. seycllarum*. These results are consistent with those of (Ashoub,1985; Abdel-Gawad, *et al*.,1987; El-Shehaby, *et al*.,1992., Ekvised *et al*., 2006., El-Maksoud, 2008, and fargalla *et al*.,2019).

Table 5. Effect of sunflower varieties on population density (±SE) of insect pests and their predators during March and June plantations.

Insect species	March		*t*	*P*	June		*t*	*P*
	Sakha 53	Giza 102			Sakha 53	Giza 102		
A. gossypii	42.3±6.70	21.3±2.90	2.880	0.01	17.5±3.0	10.7±1.7	1.96	0.070
E. lybica	48.5±6.70	34.2±8.50	1.330	0.20	54.0±6.5	14.5±1.1	5.97	0.001
B. tabaci	58.8±7.40	44.1±6.10	1.530	0.14	NF	NF	-	-
T. tabaci	24.1±4.2	13.1±1.60	2.450	0.02	NF	NF	-	-
I. seycllarum	NF	NF	-	-	33.5±4.7	14.5±2.0	3.74	0.001
F. occidentalis	2.3±0.21	2.5±0.22	0.542	0.59	2.8±0.6	3.4±0.8	0.63	0.550
C. carnea	8.0±.0.80	8.4±0.90	0.290	0.77	6.7±0.5	6.2±0.3	0.93	0.360
O. insidiosus	3.8±0.60	3.8±0.60	0.000	1.00	3.0±0.3	3.8±0.7	1.09	0.310

NF: implies that the insect species did not record on sunflower variety during this plantation date

Chemical analysis of sunflower varieties

The chemical constituents of plant leaves and stems of both sunflower varieties are shown in Table (6). The analysis revealed that the sunflower variety of Sakha 53 possessed more in N and P nutrients than Giza 102 cultivar in both leaf and stem materials, whereas it possessed lower K than Giza 102. These analyses support our field results that most insect species were relatively higher on Sakha 53 than Giza 102 (see Tables 1 and 5).

Table 6. Chemical analysis of leaves and stems of two varieties of sunflower plants.

Chemical elements		Sunflower varieties			
		Sakha 53		Giza102	
		Leaves	Stem	Leaves	Stem
N		3.440	2.500	3.090	2.130
P		0.625	0.754	0.590	0.678
K		1.890	1.160	1.990	1.550
Chlorophyll	*Chl. A*	0.601	……	0.531	……
content	*Chl. B*	0.428	……	0.385	……
(mg/g F.W)	*T. chl.*	1.029	……	0.916	……

(Bayoumy *et al*. 2017) found that the numbers of *B. tabaci* were positively correlated with the higher ratios of P and K in eggplant leaves. Further they found that the higher numbers of *Aphis* spp. were higher in squash plants because the higher ratios of total protein, total carbohydrates, and N, and the lower ratio of K. in the current study, the lowest population of insect plant feeders on Giza 102 can be due to the highest K levels that can minimize the magnitude of cumulated amino acids, which in turn can decline the piercing-sucking insect densities (Jansson and Ekbom, 2002; Leite *et al*., 2011). Potassium enters in the synthesis of RNA polymerase and reduces free amino acid levels in the juice of the plant (Marschner, 1995). Thus, Sakha 53 variety of sunflower seems to be a more suitable variety for aphids, whitefly, thrips, leafhoppers, and mealybugs than Giza 102.

Morphological features of sunflower varieties

Micromorphological features of abaxial and adaxial leaf epidermis of sunflower varieties studied have been measured using Plates (1-3) and summarized in Table (7). The leaf surface is composed of many cell types and appendages, like, epidermal cells, stomata, and macro hairs. The entire leaf surface had a dense cover of epicuticular wax. Macro-hairs were common within the adaxial surface together with different types of hairs. Macro-hairs were characteristically non-glandular, multicellular with pointed tips and were seen with a hand lens. They are tough, short pointed structures with swollen bases and short, sharp pointed spines or barbs that arise from.

Table 7. Morphological features of the both sunflower cultivar leaves

Features	Giza 102	Sakha 53	Plate
Trichomes length	72.5 µ	40 µ	Plate 1
Number of trichomes (1Cm^2)	40.0	31	Plate2
Number of stomata	70.0	49	Plate 3

Two types of trichomes were observed on the two cultivars of sunflower leaves (Plate 1). Triangular glandular trichomes (a) with three-four tier of cells and globular glandular trichomes (b) with seven tiers of globular cells. Plate (1) and Table (7) show that Giza 102 had the maximum trichome length (72.5 µ), whereas Sakha 53 had minimum trichome length (40 µ). Plate (2) and Table (7) show that the highest trichome density on leaf lamina (40) was recorded in Giza 102 cultivar, whereas the lowest density on leaf lamina (31) was recorded in Sakha 53 cultivar. Plate (3) and Table (7) show that the number of stomata in Giza 102 variety is higher than Sakha 53. However, the stoma's diameter of Giza 102 variety was smaller than that of Sakha 53 (plate 1).

Regarding the cuticle texture, the plate (3) indicates that the cuticle is a multifunctional structure that covers the epidermal cells. The epicuticular waxes are also formed as a thin film over the epidermis or could be seen as microscopic aggregates (epicuticular wax crystals) protrusive from thin film. The shape and density of wax crystal differ upon the two genotypes. Sakha 53 having a smooth epidermis, due to low precipitation of epicuticule waxes crystals on the lower or upper epidermis. On the other hand, Giza 102 having a continuous rough cuticle with plate cuticle and variable precipitation of cuticle wax crystal.

In general, the morphological features of both sunflower cultivars may explain the highest number of insects that recorded infesting Sakha 53 in both plantation dates (see Tables 1 and 5). In the current study, the number and length of trichomes per unit area were higher in Giza 102 than Sakha 53 (Table 6), resulting in lower pest populations on the former variety than the latter one which might act as a defensive barrier against insect attack. It is well documented that pest population is correlated negatively with hair density and length on leaf lamina (Zia *et al*., 2011; Khalil *et al*., 2017). Plant trichomes play a prominent role as the basis of resistance against a number of small insects and mites (Norris and Kogan, 1980). In many cases, the nature and distribution of epidermal trichomes and glandular trichomes protect crop plants from the attack of insect pests (Stipanovic, 1983). The hairy varieties of crops are more resistant to aphid than those of smooth cultivars (Irfan *et al*., 2008). Phloem feeders, like our recorded insects, must insert their stylets deeper into the plant tissue, and trichomes may impeded his insertion. Hence, the sucking insects face strong interference in utilizing the plant sap because of the presence of trichomes (Panda and Khush, 1995). Hair-like physical structures on plant surface (Plant's trichomes) may help plants to defend themselves against herbivores (Moles and Westoby, 2000; Kennedy, 2003) by impeding insect walking, feeding, and oviposition (Levin, 1973). Thus, the defensive role of hair and resistance to insects is well documented in several crops (Horn, 1988; Goertzen and Small, 1993). For example, the hairy-leaf cotton cultivars have been colonized with lower *Bemisia* aggregations (Flint and Parks, 1990; Butler *et al*., 1991; Leite *et al*., 2011) and aphid populations than those of smooth leaf (Amine *et al*., 2017). Similarity, (Bhat *et al*. 1984) reported that cotton varieties with higher densities of leaf trichomes exhibited higher resistance to insects than those with lower densities.

The high trichome density appears to be the most important factor determining the low number of infesting insects and vice versa. The strong negative relationship between trichome density and the number of insects probably reflects interference by trichomes on insect movement, stylet penetration and colony formation. The reason for the observed variation in the number of trichomes/1cm^{2}area per different leaf categories for various genotypes is probably genetic (Mollah, 1996). The growing terminal leaf possesses a smaller surface area with denser trichomes.

As shown in Pate (3) Sakha 53 having a smoother epidermis with lower epicuticule wax crystals than Giza 102. This may explain the higher densities of most insect plant feeders on Sakha 53 variety of sunflower than on Giza 102. The epicuticular waxes on plant surfaces can mechanically function against some herbivores by reducing their ability to touch the plants; however, the plant waxes can impede the efficacy of herbivore predators by similar mechanism as well (Eigenbrode, 2004).

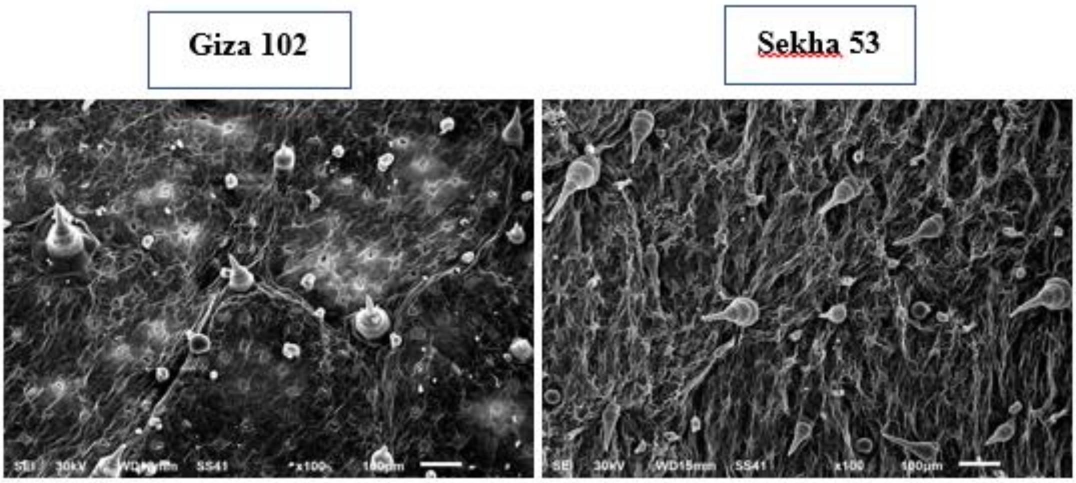

Plate 1. Number of trichomes in both sunflower cultivars

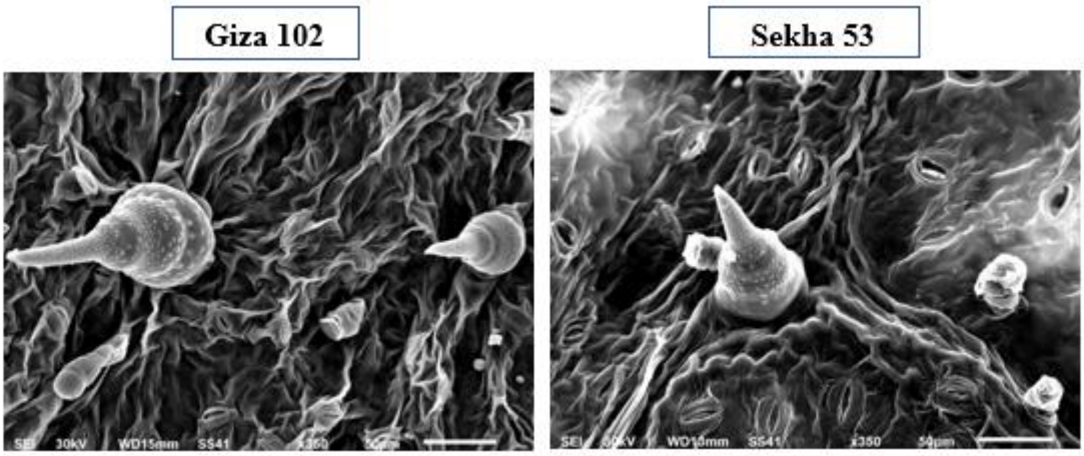

Plate 2. Number of stomata in both sunflower cultivars.

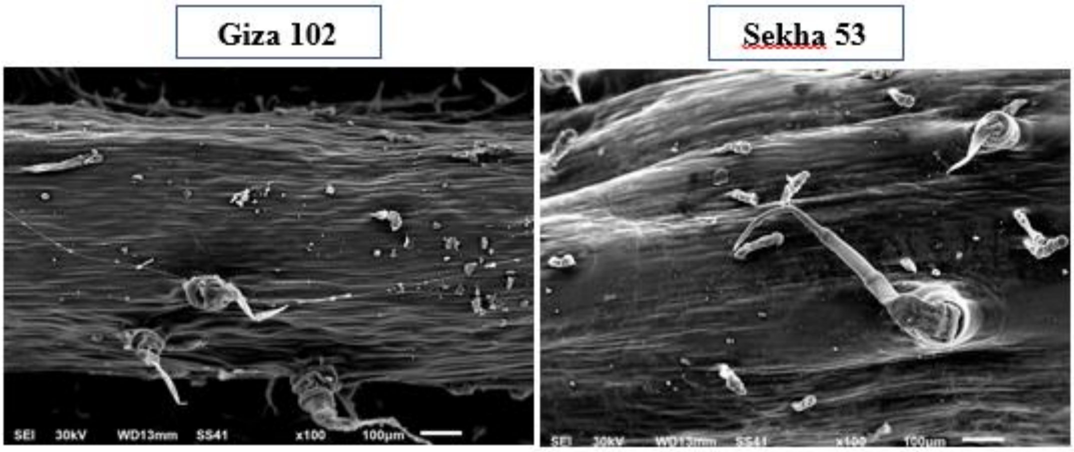

Plate 3. Cuticle in both sunflower cultivars

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تأثير مواعيد الزرعة ، الأصناف النباتية ، الكثافة النباتية على تعداد الحشرات وإنتاجية محصول عباد الشمس

مروة محمود رمضان[1] ،أمنية فيصل ابراهيم[2] و أميرة على على عبدالهادى[1]
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تم دراسة أثير ميعاد الزراعة وكثافة النبات والأصناف النباتية على تعداد الحشرات التى تهاجم نباتات عباد الشمس ومفترساتها الحشرية فى مزرعة كلية الزراعة جامعة المنصورة . تم الأخذ فى الإعتبار ميعادين للزراعة (٢١ مارس – ٤ يونيو ٢٠٢٠) ، وصنفين من عباد الشمس جيزة ١٠٢ وسخا ٥٣ ومسافتين بين الجورة النباتية (١٥ – ٢٥ سم). تم إجراء التحليلات الكيماوية والمورفولوجية لأوراق كلا صنفى عباد الشمس لإختبار ما اذا كان هذه التحليلات يمكن ان تساعد فى تفسير التغيرات فى تعداد لحشرات فى كلا الصنفين أم لا ؟. أوضحت النتائج إختلافات معنوية فى تعداد من القطن بين كلا ميعادى الزراعة للصنفين جيزة ١٠٢ وسخا ٥٣، بينما أظهر ان نطاط اوراق القطن أظهر إختلافات معنوية بين ميعادى الزراعة لجيزة ١٠٢ وكذلك أظهرت أعداد اسد المن الأخضر فقط اختلافات معنوية فى تعدادها بين كلا ميعادى الزراعة . بالنسبة لميعاد الزراعة فى شهر مارس ظهرت أعداد معنوية لكل من الذبابة البيضاء وتربس القطن ونطاط أوراق القطن عندما زرعت النباتات على مسافة ٢٥ سم وذلك بمقارنتها بالنباتات التى زرعت على ١٥ سم وذلك لصنف سخا ٥٣ ،فى حين لم يكن لمسافات الزراعة اى تأثير معنوى على أعداد الحشرات وذلك للصنف جيزة ١٠٢ .اما بالنسبة لميعاد الزراعة فى شهر يونيو فقد ظهرت أعداد معنوية من نطاط أوراق القطن على النباتات التى زرعت على مسافة ١٥ سم وذلك بمقارنتها بالنبتات التى زرعت على ٢٥سم لصنف سخا ٥٣ .كما أوضحت النتائج ظهور أعداد عالية وبصورة معنوية لكلا من القطن وبق السيشلارم على النباتات الى زرعت على مسافة ٢٥سم و بمقارنتها بالنباتات التى زرعت على مسافة ١٥سم وذلك لصنف ١٠٢. وبالنسبة للنباتات التى زرعت فى شهر مارس وذلك فقد اصيب الصنف سخا ٥٣ بأعداد معنوية عالية لكلا من القطن وتربس القطن مقارنتا بالصنف جيزة ١٠٢. بينما النباتات التى زرعت فى شهر يونيو اصيبت النباتات بأعداد عالية من نطاط اوراق القطن وبق السيشلارم الدقيقى . بصفة عامة فان عباد الشمس صنف سخا ٥٣ يبدو انه العائل النباتى الأكثر حساسية للاصابة الحشرية من صنف جيزة ١٠٢ وهذا ادى الى كميات أقل من رووس عباد الشمس المنتجة من صنف سخا ٥٣. كما ان التحليلات الكيميائية والمورفولوجية تدعم هذه الخلاصة .