Influence of variety, organic and mineral fertilization on the qualitative and quantitative characteristics of cucumbers crop (*Cucumis sativus* L.)

[1]Athari J. Mohammed, [2]Razzaq A. Saqar, [3]Muaid S. Ali

[1,2,3] *University of Thi-Qar, College of Agriculture and Marshlands, Department of Horticulture and Landscape*

[1]Email: muaid-ali@utq.edu.iq

[2]Email:razak-abd@utq.edu.iq

[3]Email:kkosaa12.post.am@utq.edu.iq

Abstract:

The experiment was carried out at the Agricultural Research Station of the College of Agriculture and the Marshlands / University of Thi-Qar, located in Al- Mustufawia for the agricultural season (2019-2020). The study was the effect of cultivar and organic and mineral fertilization on the qualitative and quantitative characteristics of cucumber crops grown in greenhouses, and applied according to the factorial experiments inside the split plots, using the complete randomized sectors with three replications. The factors of research were: two cultivars (Datis and Sakata) occupied the main plots, three levels of organic fertilization occupied the secondary plots which included control treatment O_1, cow manure O_2(2.457 tons of greenhouse^{-1}) and poultry manure O_3(3.713 tons of greenhouse^{-1}) and the third factor was four levels of mineral fertilization (NPK) including control treatment M_1, M_2 (2.250 kg. dunam^{-1}), M_3 (3.350 kg. dunam^{-1}), and M_4 (4.450 kg. dunam^{-1}) which occupied the sub-plots. The results showed that Datis cultivar significantly outperformed Sakata cultivar in yield per plant, total yield, leaf content of nitrogen and phosphorus, and fruit content of carbohydrates, reaching (1.402 kg. plant^{-1}, 24.24 tons .greenhoues^{-1}, 2.2517%, 0.4069%, 1.2876%) respectively. On the other hand, the treatment of organic fertilizer O_3 recorded a significant effect in the following crop traits such as leaf area, total yield, leaf content of nitrogen and phosphorus, and fruit content of carbohydrate, reaching (178.0 cm^2, 24.36 tons. greenhouse^{-1}, 2.5017%, 0.4608%, 1.3561%). Respectively compared to other treatments, total yield, leaf content of nitrogen and phosphorus, reaching (180.1 cm^2, 25.88 t. greenhoues^{-1}, and 2.3478%, and 0.4561%) to other treatments. The treatment M_2 significantly outperformed in yield per plant (1.682) kg. plant^{-1} and treatment M_3 significantly exceeded the fruit's carbohydrate content, reaching (1.2930%). All the combinations among this study's treatments were compared to meet their significant effecting on all traits.

Keyword: **Organic fertilization, Mineral fertilization, cucumber, *Cucumis sativus* L.**

I.   INTRODUCTION

Cucumber (*Cucumis sativus* L.) is one of the major vegetable crops in the world and Iraq. It belongs to the Cucurbitaceae family, which is a monoculture plant that is characterized by being climbing or creeping. Cucumber is one of the main vegetable crops in the hot region's market. However, its fruits are of less nutritional importance compared to other

vegetable fruits. It is still a good source of vitamins B5, B6, K and C. and A also elements such as potassium, magnesium, phosphorous, copper and manganese; also it contains dietary fiber(Vimala et al., 1999). Its fruits also contain ascorbic acid and caffeic acid, both of which help relieve irritation and skin health. Fruits of Cucumber have an important role in relieving nervous disorders, purifying the body from toxins, headache reliever, a thirst remover, and a diuretic(Duke, 1997). Cucumber is one of crops that need high nutritional requirements. Its field performance is poor in the event of a lack of nutrients in the soil, which leads to low yield, deformation of fruits and bitterness of its taste, for maintaining an acceptable level of its production, should be raised soil's nutritional status by preserving its fertility to meet need for crop. One of its methods is use of organic or inorganic fertilizers, as their application intends to increase agricultural production by not less than 50% provided that other growth factors are ideally available(Ali, 2007). This led to using of chemical fertilization to solve this problem. However, most fertilizers added to the soil, especially nitrogenous ones, are exposed to many factors that lead to poor performance and lack of efficiency, such as volatilization, stabilization, and washing below the root zone, which pollute the groundwater. These fertilizers contain nitrogen, phosphorous, potassium and micro-nutrients for healthy growth of plants.

Organic matter positively affects the physical and chemical properties of soil and fertility, such as soil acidity, reducing calcium carbonate, supplying plants with the necessary nutrients, including nitrogen, potassium and phosphorous, in addition to its role in holding water much more significant than its weight due to its high surface area, improving soil composition and increasing capillary pores, which helps soils increasing its ability to hold water. It is necessary to devise more productive varieties while supplying the plant with its nutrients, whether by adding mineral fertilizers and organic extracts that have a fundamental role in increasing production. Mineral fertilizers provide the major and main elements of N, P, and K necessary for growth and production, which is reflected in this Increase yield and improve its quality.

The study aimed to determine the appropriate variety for Thi-Qar governorate conditions when protected cultivation inside greenhouses. Also, producing high yield of cucumber crop was studied the possibility of producing the cucumber crop within the use of organic and mineral fertilizers and determining the quantity and quality of the appropriate organic and mineral fertilizers to achieve the best yield in quantity and quality.

II. MATERIALS AND METHODS

A. Field of study

The study was conducted in Thi-Qar Governorate - Nasiriya city Al Mustufawia region, for the 2019-2020 agricultural seasons in an unheated greenhouse of the college of agriculture and marshlands / University of Thi-Qar in sandy mix soil for studying the effect of the cultivar and organic and mineral fertilization on the physical and chemical properties of cucumbers.

B. Experimental design and treatments

The experiment was carried out using a factorial experiment within the split-plot design using a randomized complete block design (RCBD) with three replicates. The experiment included 72 treatments, so the first factor was two Cucumber varieties (Datis and Sakata), a symbol of V_1 and V_2, where it occupied the main plots. The second factor included three

organic fertiliser levels (comparison, beef manure, poultry manure) with the levels (0, 3.713, 2.457) tons-greenhouse $^{-1}$, which is symbolized as (O_1, O_2, O_3) respectively. The third one has four mineral fertiliser levels (NPK) by average (0, 2.250, 3.350, 4.450) kg. du^{-1} which are denoted by the symbols (M_1, M_2, M_3, M_4) respectively. Both the second and third factors were occupied in sub-plot as factorial factors. Data were analyzed according to GenStat (2011), and the means of treatments were compared using the least significant difference test (L. S. D) under a probability level ($p \geq 0.05$) (Sahuki and Waheeb, 1990).

III. RESULTS

A. Leaf area (cm2)

The results in a table (1) showed that the treatment of organic fertilizer O3 was significantly superior in giving the highest rate of (178.0 cm2) in Leaf area compared with other treatments O1 and O2, which gave the lowest rate of leaf area (158.0 and 159.1 cm2) respectively. Treatment M4 showed significant superiority in providing the highest average of leaf area (180.1 cm2), which did not differ significantly with M2 which reached (177.3 cm2) of leaf area, while treatment M1 and M3 gave the lowest average of this trait, was (160.2 and 142.6) cm2, respectively. The interaction between the two types of fertilizers had a significant effect on this characteristic, as the combination of (O3 × M2) gave the highest average was 203.3 cm2compared to the combination (O1 × M1) and (O2 × M2), which gave lowest average 140.0 cm2 and 135.1 cm2 respectively.

TABLE (1): EFFECT OF CULTIVARS, ORGANIC AND MINERAL FERTILIZATION AND THEIR INTERACTIONS ON LEAF AREA OF CUCUMBERS (CM^2)

Variety (V)	Organic fertilization (O)	Mineral fertilization (M)				V*O
		M_1	M_2	M_3	M_4	
	O_1	151.3	205.7	153.2	177.3	171.9
	O_2	185.5	139.4	166.5	192.3	170.9
V_1	O_3	187.1	220.3	142.4	199.9	187.4
	O_1	128.7	181.4	137.0	129.7	144.2
	O_2	134.7	130.8	134.4	189.4	147.2
V_2	O_3	173.9	186.4	122.5	191.8	168.7
L.S.D $_{0.05}$	V×O×M = N.S					V*O= N.S
						Mean (V)
	V_1	174.6	188.5	154.0	189.8	176.7
V×M	V_2	145.8	166.2	131.2	170.3	153.4
L.S.D $_{0.05}$	V×M = N.S					V = N.S
						Mean (O)
O×M	O_1	140.0	193.6	145.1	153.5	158.0

O_2	160.1	135.1	150.3	190.8	159.1
O_3	180.5	203.3	132.5	195.9	178.0
Mean (M)	160.2	177.3	142.6	180.1	
L.S.D $_{0.05}$ **O×M = 20.97**	**M = 12.11**				**O = 10.48**

Varieties (V_1= Datis, V_2= Sakata); **Organic fertilizer** (O_1= comparison, O_2= beef manure, O_3= poultry manure); **Mineral fertilizer (NPK)** (M_1=0, M_2= 2.250, M_3 = 3.350, M_4 = 4.450) kg. dunam^{-1}.

B. Total yield (kg. greenhouse $^{-1}$)

The results of Table (2) showed that cultivar V_1 was significantly superior compared to variety V_2 and recorded the highest average of total yield (24.24) kg. greenhouse^{-1} compare to 19.84) kg of the second cultivar, respectively. The results indicated that organic fertilizer O_3 was significantly superior by giving the highest average of total yield (24.36 kg) kg. greenhouse^{-1}, which did not differ significantly from treatment O_2, showed an average of (22.77) kg. greenhouse^{-1} compared with treatment O_1, which gave the lowest average of (18.99) kg. greenhouse-1. Treatments M_2 and M_4 significantly affected the total yield and recorded the highest average of total yield (25.88 kg), while the treatments M1 and M_3 gave the lowest average (17.48 and 18.92 kg) respectively.

The combination of ($V_1 \times O_3$) recorded the highest average for this trait 27.72 kg, while the combination ($V_2 \times O_1$) gave the lowest rate of 18.36 kg. The combination ($V_1 \times M_4$) achieved the highest average 30.16 kg, while treatment ($V_2 \times M_1$) showed the lowest yield of 17.20 kg. Also, the interaction between two types of fertilizers had a significant effect on this aspect. A combination ($O_3 \times M_2$) gave the highest average 38.40 kg compared to ($O_1 \times M_1$), giving the lowest average of total yield 14.41 kg. The triple among the factors achieved a significant effect in this trait the combination ($V_1 \times O_3 \times M_2$) gave the highest average 46.08 kg, while the combination ($V_2 \times O_1 \times M_1$) gave the lowest 16.08 kg. This may be interpreted based on the influence of individual factors.

TABLE(2): EFFECT OF CULTIVAR, ORGANIC AND MINERAL FERTILIZATION AND THEIR INTERACTIONS ON TOTAL YIELD (KG. GREENHOUSE^{-1})

Variety (V)	Organic fertilization (O)	Mineral fertilization (M)				V*O
		M_1	M_2	M_3	M_4	
	O_1	12.75	25.92	17.76	22.08	19.63
V_1	O_2	22.56	15.36	25.20	38.40	25.38
	O_3	18.00	46.08	16.80	30.00	27.72
	O_1	16.08	21.12	16.80	19.44	18.36
V_2	O_2	18.72	16.08	21.36	24.48	20.16
	O_3	16.80	30.72	15.60	20.88	21.00
L.S.D $_{0.05}$	**V×O×M = 6.748**					**V*O = 3.345**
V×M						**Mean (V)**
	V_1	17.77	29.12	19.92	30.16	24.24

	V_2	17.20	22.64	17.92	21.60	19.84
L.S.D $_{0.05}$	**V×M** = 3.849					**V** = 3.536
						Mean (O)
O×M	O_1	14.41	23.52	17.28	20.76	18.99

	O_2	20.64	15.72	23.28	31.44	22.77
	O_3	17.40	38.40	16.20	25.44	24.36
Mean (M)		17.48	25.88	18.92	25.88	
L.S.D $_{0.05}$	**O×M** = 4.837	**M** = 2.793				**O** = 2.419

Varieties (V_1= Datis, V_2= Sakata); **Organic fertilizer** (O_1= comparison, O_2= beef manure, O_3= poultry manure); **Mineral fertilizer (NPK)** (M_1=0, M_2= 2.250, M_3 = 3.350, M_4 = 4.450) kg. dunam^{-1}.

C.   The percentage of nitrogen in the leaves (%)

The results (Table. 3) showed that cultivar V_1 was significantly superior compared to cultivar V_2 in the percentage of leaves' nitrogen content (2.2517 and 2.1150) % for each, respectively. The results also indicated that treatment of organic fertilizer O_3 was significantly superior in giving the highest average of this trait (2.5017%) but did not differ significantly with O2 treatment that recorded (2.2696%). The treatment O1 recorded the lowest average (1.7787%).

The effect of mineral fertilizer appeared the significant impact on this trait; thus the treatments M_4, M_3, and M_2 recorded the highest average percentage of nitrogen (2.348, 2.220, and 2.140 %) respectively compared to control treatment that recorded the lowest average (2.025%).

The binary interaction between cultivars and the organic fertilization showed a significant effect, the combination (V_1 × O_3) gave the highest average of this trait, which reached 2.5383%. In comparison, the combination (V_2 × O_1) showed the lowest was 1.6592%. The combination (V_1 × M_4) and (V_2 × M_4) significantly exceeded the other combination and recorded the highest average for this trait, reaching 2.3878% and 2.3078%, respectively, while the combination (V_2 × M_1) gave the lowest was 1.9367%. The combination (O_3 × M_2) also gave the highest average, reaching 2.6383%, compared to (O_1 × M_1) which gave the lowest 1.6167%. The triple interaction treatment among varieties, organic and mineral fertilization achieved a significant effect in this trait. Thus, combination (V_1 × O_3 × M_2) gave the highest average at 2.6600%, while the combination (V_2 × O_1 × M_1) gave the lowest one was 1.6167 %.

TABLE(3): EFFECT OF CULTIVAR, ORGANIC AND MINERAL FERTILIZATION AND THEIR INTERACTIONS ON THE PERCENTAGE OF NITROGEN IN THE LEAVES (%)

Variety (V)	Organic fertilization (O)	Mineral fertilization (M)				V*O
		M_1	M_2	M_3	M_4	
V_1	O_1	1.7967	1.8467	1.9000	2.0500	1.8983

	O_2	2.1467	2.3133	2.3600	2.4533	2.3183
	O_3	2.3967	2.5267	2.5700	2.6600	2.5383
V_2	O_1	1.4367	1.5200	1.7300	1.9500	1.6592
	O_2	2.0933	2.2000	2.2333	2.3567	2.2208

	O_3	2.2800	2.4367	2.5267	2.6167	2.4650
L.S.D $_{0.05}$	**V×O×M = 0.07305**					**V*O = 0.03172**
						Mean (V)
V×M	V_1	2.1133	2.2289	2.2767	2.3878	2.2517
	V_2	1.9367	2.0522	2.1633	2.3078	2.1150
L.S.D $_{0.05}$	**V×M = 0.03856**					**V = 0.01449**
						Mean (O)
O×M	O_1	1.6167	1.6833	1.8150	2.000	1.7787
	O_2	2.1200	2.2967	2.2967	2.4050	2.2696
	O_3	2.3383	2.4817	2.2967	2.6383	2.5017
Mean (M)		2.0250	2.1406	2.2200	2.3478	
L.S.D $_{0.05}$	**O×M = 0.05374**	**M = 0.03103**				**O = 0.02687**

Varieties (V_1= Datis, V_2= Sakata); **Organic fertilizer** (O_1= comparison, O_2= beef manure, O_3= poultry manure); **Mineral fertilizer (NPK)** (M_1=0, M_2= 2.250, M_3 = 3.350, M_4 = 4.450) kg. dunam^{-1}.

D. Percentage of phosphorous in leaves (%)

The results indicated that cultivar V_1 was significantly superior to cultivar V_2 at average of (0.4069 and 0.3536) % respectively (Table, 4). The treatments of organic fertilizer O_3 and O_2 were significantly exceeding in giving the highest average (0.4408 %) respectively, compared to other treatments and O1 recorded the lowest average (0.2392 %). The treatment M4 also Recorded a significant in giving the highest average of this trait (0.4561 %) compared to other treatments, especially M_2 and M_3, where they gave (0.3706 and 0.3922) % respectively. While the treatment M_1 gave the lowest (0.3022%).

The binary interaction showed a significant effect, the combination ($V_1 \times O_3$) gave the highest average for this characteristic 0.5000%, while the combination ($V_2 \times O_1$) gave the lowest one 0.2200%. Also, combination of ($V_1 \times M_4$) gave the highest average 0.4733%, while the combination ($V_2 \times M_1$) gave the lowest average 0.2733%. The interaction between two types of fertilizer had a significant effect, as the combination ($O_3 \times M_2$) gave a highest average 0.5367% compared to combination of ($O_1 \times M_1$) which gave the lowest rate 0.1550% (Table 4).

The triple interaction treatment among cultivars, organic and mineral fertilization achieved the highest rate in this trait. Thus, combination ($V_1 \times O_3 \times M_2$) gave the highest average 0.5467%, while combination ($V_2 \times O_1 \times M_1$) gave the lowest mean of this trait 0.1300%.

TABLE(4): EFFECT OF CULTIVAR, ORGANIC AND MINERAL FERTILIZATION AND THEIR INTERACTIONS ON THE PERCENTAGE OF PHOSPHOROUS IN THE LEAVES (%)

Variety (V)	Organic fertilization (O)	Mineral fertilization (M)				V*O
		M_1	M_2	M_3	M_4	
V_1	O_1	0.1800	0.2533	0.2600	0.3400	0.2583
	O_2	0.3933	0.4800	0.4433	0.5333	0.4625
	O_3	0.4200	0.4867	0.5467	0.5467	0.5000
V_2	O_1	0.1300	0.2133	0.2200	0.3167	0.2200
	O_2	0.3333	0.4200	0.4500	0.4733	0.4192
	O_3	0.3567	0.3700	0.4333	0.5267	0.4217
L.S.D $_{0.05}$	$V×O×M = 0.02925$					$V*O = 0.01486$
						Mean (V)
V×M	V_1	0.3311	0.4067	0.4167	0.4733	0.4069
	V_2	0.2733	0.3344	0.3678	0.4389	0.3536
L.S.D $_{0.05}$	$V×M = 0.01694$					$V = 0.01643$
						Mean (O)
O×M	O_1	0.1550	0.2333	0.2400	0.3283	0.2392
	O_2	0.3633	0.4500	0.4467	0.5033	0.4408
	O_3	0.3883	0.4283	0.4900	0.5367	0.4608
Mean (M)		0.3022	0.3706	0.3922	0.4561	
L.S.D $_{0.05}$	$O×M = 0.02086$	$M = 0.01204$				$O = 0.01043$

Varieties (V_1= Datis, V_2= Sakata); **Organic fertilizer** (O_1= comparison, O_2= beef manure, O_3= poultry manure); **Mineral fertilizer (NPK)** (M_1=0, M_2= 2.250, M_3 = 3.350, M_4 = 4.450) kg. dunam^{-1}.

E. The percentage of total carbohydrates in the fruits

The results showed a significant variance of V_1 cultivar than V_2 cultivar, and their averages were (1.2876 and 1.2555) % respectively. The results indicated that treatment of organic fertilizer O_3 was significantly superior in giving the highest average of (1.3561%) in this characteristic compared to other treatments. And the treatment O_2 significantly reached (1.2292 %) compared to the control treatment (O_1) that recorded the lowest average (1.166) The reason for this may be due to the role of organic matter, especially poultry waste, in increasing ability of the root to grow and absorb ready-made elements, especially the potassium element, which has an important role in stimulating the process of photosynthesis and transfer of its products by stimulating the formation of ATP, which is needed to fill (phloem tissue). On the other hand, the effect of mineral fertilizer significantly affected this trait; thus, the treatment M_3 recorded the highest mean of carbohydrate in fruits (1.293 %), which significantly differed compared to other treatment. The treatment M_1 gave the lowest average, reaching (1.2343%).

The results showed a significant effect of bilateral interaction, the combination ($V_1 × M_2$) gave the highest average for this characteristic 1.3091%, while combination ($V_2× M_1$) gave the lowest 1.2042%. The combination ($O_3 × M_3$) gave a highest

average 1.3795% compared to ($O_1 \times M_1$), which gave the lowest 1.1085%. The triple interaction treatment among study factors achieved the highest average in this trait; thus, combination ($V_1 \times O_3 \times M_3$) gave the highest average of 1.4047%, whereas the combination ($V_2 \times O_1 \times M_1$) gave the lowest 1.0427%.

TABLE(5) : EFFECT OF CULTIVAR, ORGANIC AND MINERAL FERTILIZATION AND THEIR INTERACTIONS ON THE PERCENTAGE OF TOTAL CARBOHYDRATES IN THE FRUITS (%)

Variety (V)	Organic fertilization (O)	Mineral fertilization (M)				V*O
		M_1	M_2	M_3	M_4	
V_1	O_1	1.1743	1.1763	1.1957	1.1957	1.1855
	O_2	1.2883	1.3017	1.3270	1.3043	1.3053
	O_3	1.3307	1.3580	1.4047	1.3940	1.3718
V_2	O_1	1.0427	1.1783	1.1830	1.1817	1.1464
	O_2	1.2533	1.2823	1.2933	1.2900	1.2798
	O_3	1.3167	1.3283	1.3543	1.3620	1.3403
L.S.D $_{0.05}$	V×O×M = 0.02885					V*O = N.S
V×M						Mean (V)
	V_1	1.2644	1.2787	1.3091	1.2980	1.2876
	V_2	1.2042	1.2630	1.2769	1.2770	1.2555
L.S.D $_{0.05}$	V×M = 0.01637					V = 0.01469
						Mean (O)
O×M	O_1	1.1085	1.773	1.1893	1.1887	1.1660
	O_2	1.2708	1.2920	1.3102	1.2972	1.2925
	O_3	1.3237	1.3432	1.3795	1.3780	1.3561
Mean (M)		1.2343	1.2708	1.2930	1.2879	
L.S.D $_{0.05}$	O×M = 0.02072	M = 0.1196				O = 0.01036

Varieties (V_1= Datis, V_2= Sakata); **Organic fertilizer** (O_1= comparison, O_2= beef manure, O_3= poultry manure); **Mineral fertilizer (NPK)** (M_1=0, M_2= 2.250, M_3 = 3.350, M_4 = 4.450) kg. dunam^{-1}.

F. Yield per plant (kg. plant $^{-1}$)

From the results (Table. 6), the significant effect among the experiment factors was recorded in this trait; thus cultivar V_1 appeared high effect on the yield compared to other cultivar and achieved a 1.402 kg plant-1 of fruit yield to 1.145 kg plant^{-1} that achieved by cultivar V_2. On the other hand, the same effect was recorded for the mineral fertilizer treatments in the yield; thus, both treatments M_2 and M_4 recorded the highest yield (1.682 and 1.420 kg plant^{-1}) respectively, which they were significantly exceeded both other treatments M_3 and M1 that they reached (1.080 and 0.913 kg plant^{-1}) respectively. The interaction between two types of fertilizers had a significant effect in yield per plant thus, combinations ($O_1 \times M_2$), ($O_3 \times M_2$) and ($O_2 \times M_4$) gave the highest average in this trait (2.337, 1.842 and 1.911 kg. plant-1) respectively, compared with a combination ($O_1 \times M_1$), which gave the lowest at 0.792 kg. plant^{-1}.

TABLE(6): EFFECT OF CULTIVAR, ORGANIC AND MINERAL FERTILIZATION AND THEIR INTERACTIONS ON YIELD PER PLANT (KG. PLANT^{-1})

Variety (V)	Organic fertilization (O)	Mineral fertilization (M)				V*O
		M_1	M_2	M_3	M_4	
	O_1	0.798	2.976	1.204	1.278	1.564
V_1	O_2	1.158	0.768	1.140	1.860	1.231
	O_3	0.936	2.280	0.882	1.548	1.411
	O_1	0.786	1.699	0.804	0.918	1.052
V_2	O_2	0.895	0.828	1.620	1.824	1.292
	O_3	0.905	1.542	0.829	1.092	1.092
L.S.D $_{0.05}$	V×O×M = N.S					V*O = N.S
						Mean (V)
V×M	V_1	0.964	2.008	1.075	1.562	1.402
	V_2	0.862	1.356	1.084	1.278	1.145
L.S.D $_{0.05}$	V×M = N.S					V= 0.1437
						Mean (O)
	O_1	0.792	2..337	1.004	1.089	1.308
O×M	O_2	1.026	0.798	1.380	1.842	1.262
	O_3	0.920	1.911	0.855	1.320	1.252
Mean (M)		0.913	1.682	1.080	1.420	
L.S.D $_{0.05}$	O×M = 0.8165	M = 0.4714				O = N.S

Varieties (V_1= Datis, V_2= Sakata); **Organic fertilizer** (O_1= comparison, O_2= beef manure, O_3= poultry manure); **Mineral fertilizer (NPK)** (M_1=0, M_2= 2.250, M_3 = 3.350, M_4 = 4.450) kg. dunam^{-1}.

IV. DISCUSSION

The results showed the significant effect of the experimental factors and their interactions on the traits under this study described in the results section. To understand these significant influences among the study factors, we looked to the reasons for the behavior of these factors; thus, the cultivars Datis and Sakata showed differences response on the traits, and this might be due to the nature of genetic factors (Sudre Et al., 2010) specific to variety Datis (V_1) in which determine the degree of its growth and development, which is represented by the increase in plant height and number of leaves (data is not available) compared to Sakata cultivar (V_2). The cultivar V_1 significantly responded to the experiment environment compared to the cultivar V_1, which was cleared on the fruits yield, percentage of nitrogen and phosphorous in leaves, and

carbohydrates(Mahdi, 2016). This result was consistent with what found by by (Mahmoud and Al-Rawi, 2015; Al-Jubouri et al, 2017).

On the other hand, the results appeared the significant effect to the treatments of organic fertilizer 3.713 tons (O_3) compared to other treatments on all the trails except the yield of plant and the reasons might be due to an increase in the role of Organic matter which used as improves soil properties by improving ability of soil to hold water. Also, its important role in increasing nutrients, especially nitrogen, has a major role in increasing the effectiveness of carbon representation and building carbohydrates. The addition of organic fertilizers (animal waste), especially poultry manure, leads to a decrease (pH) in the soil and increases the readiness of nutrients and to the production of hormones, including auxins and gibberellins, which work to encourage vegetative growth and this is reflected in outcome(Al-Sahhaf, 1994) .

As well as, the importance of adding poultry waste, it contains almost twice amount of nitrogen present in beef waste, in addition to containing large quantities of potassium and phosphorous. This leads to poultry manure's superiority in increasing percentage of nitrogen in plant leaves due increase in soil content of organic matter, ammonium and nitrates. and the increase in release nitrogen from them due to the mineralization process compared to manure from cattle manure. Al-Zobaie, (2000) and Al-Zahawi (2007)concluded that organic fertilizers led to secure nutrients in the soil and increase average of nitrogen and organic matter. Also, the role of organic matter, especially poultry waste, in increasing ability of the root to grow and absorb ready-made elements, especially the potassium element, which has an important role in stimulating the process of photosynthesis and transfer of its products by stimulating the formation of ATP, which is needed to fill phloem tissue(Viro, 1974).

The treatment 4.450 kg (M_4) of mineral fertilizer showed the highest effect on most of this study's traits. The reasons for this may be is that addition of chemical fertilizer to the soil increased readiness of these nutrients in soil solution, which may lead to an increase in their absorption from the plant and a reflection of this information of an efficient root group in the absorption of nutrients from the soil (Tisdale et al. 1997). Also, raising yield is increase in concentration of these elements, which led to encouragement of the photosynthesis process and then manufactured of carbohydrates in leaves, their transfer and storage in fruits, which contributed to increase weight of fruit, which was positively reflected in the increase in total productivity of greenhouse, these results are in line with(Abd al-Rahman, 2013).The variation in percentage of nitrogen in the plant may be due to difference in content of added fertilizer (chemical and organic) of major and minor elements.

 The high content of leaves in these elements may be attributed to potassium inactivation of many enzymes within the plant, which has an important role in the construction processes. As well as, the role of potassium in the transfer of carbohydrates manufactured in the plant from places of their manufacture to places of growth, which is reflected in the increase in growth of root hairs and thus increase efficiency of plants to absorb phosphorous and trace elements, transfer to leaves and increase their concentration in them. So, the role of Phosphorous in cell division and participation in plant life processes, including photosynthesis, increases the synthesis of carbohydrates resulting from photosynthesis . The effect of organic and chemical fertilizers added and its positive role in improving the physical and chemical properties of soil and equipping plant with necessary elements, especially nitrogen and potassium, which lead to an increase in the

strength of vegetative growth and its activity, which is positively reflected in the increase Quotient and productivity. Also, it works to raise temperature of soil (Al-Ajeel, 1998). Therefore, this leads to provision of ideal conditions of growth of roots and an increase in activity of microorganisms and their preparation, which increased the readiness of nutrients and increased their absorption by plant, especially the elements necessary for plant growth. This affects strength of vegetative growth and then increases yield.

V. Conclusion

- Datis cultivar significantly outperformed in yield per plant, total yield, leaf content of nitrogen and phosphorus, and carbohydrates' fruit content.

- On the other hand, the treatment of organic fertilizer O_3 recorded a significant effect in leaf area, total yield, leaf content of nitrogen and phosphorus, and fruit content of carbohydrate.

- The treatment M_2 significantly outperformed in yield per plant, treatment M_3 significantly exceeded the fruit's carbohydrate content, and M_4 outperformed in leaf area, percentage of Nitrogen and Phosphorous in the leaves, and percentage of total carbohydrates in the fruits.

VI. References

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