European Scholar Journal (ESJ)
Available Online at: https://www.scholarzest.com
Vol. 4 No.08, August 2023
ISSN: 2660-5562

THE EFFECT OF COBALT ADDITION ON THE CHEMICAL PROPERTIES, YIELD CHARACTERISTICS, QUANTITY AND QUALITY OF ZUCCHINI SQUASH PLANTS GROWN UNDER PROTECTED CONDITIONS

Jamal kamil Kassar[1], Abdulla A.Abdulla[2], Aqeel H. Abdulwahid[3]
University of Basra - College of Agriculture - Department of Horticulture and Landscape Engineering / The research is extracted from a PhD thesis of the first researcher.
Jamal.Kasser84@gmali.com

Article history:

Received: 20th June 2023
Accepted: 20th July 2023
Published: 25th August 2023

Abstract:

The experiment was conducted during the two agricultural seasons 2021-2022 and 2022-2023 in one of the greenhouses affiliated to the Agricultural Research Station, College of Agriculture, Basra University, in Karma Ali, with the aim of studying the effect of Cobalt addition on the growth and yield of some Zucchini cultivars, as it included 18 factorial treatments that are the combinations of Six varieties are AL nahrain, Alexandria F1, Seminis, Eskandrany2, Khatoon F1 and Mullah Ahmed, and three concentrations of Cobalt in the form of CoSo4 are 0, 0.75 and 1.5 mg. L^{-1} was carried out as a one-time split factorial experiment, according to the randomized complete block design and with three replications. The results showed that the AL nahrain hybrid was significantly superior in the leaves content of carbohydrates, nitrogen in the second season, phosphorus, potassium, early and total yield, while the local cultivar Mullah Ahmed excelled in the leaves content of cobalt and excelled Hybrid Alexandria F1 in the percentage of nitrogen in the first season, while the hybrids did not differ significantly in the content of leaves of chlorophyll for both seasons.

The plants were treated with cobalt at a concentration of 0.75 mg. L^{-1} had a significant superiority in the leaf content of carbohydrates, nitrogen in the second season, phosphorus, potassium, TSS, early yield and total yield, while the concentration was higher than 1.5 mg. L^{-1} in percentage of cobalt.. The interaction between the study factors showed a significant effect on most of the traits under study. The AL nahrain hybrid plants treated with cobalt at a concentration of 0.75 mg gave. $Liter^{-1}$ has the highest early production and total production for both seasons of the experiment.

Keywords: zucchini squash plant, hybrid, cobalt element, greenhouses, chemical, yield.

INTRODUCTION

The Zucchini squash plant (Cucurbita pepo L.) is one of the important summer vegetable crops in Iraq. Its juicy fruits are eaten cooked at the stage of horticultural maturity. They are easy to digest and have low thermal energy. The dry matter percentage is 5-8% in the form of sugars with about 3-5 %, proteins 1%, and vitamin C from 20-30 mg. 100 gm $^{-1}$ fresh weight and vitamin E from 30-40 mg. 100 gm $^{-1}$ (6) , it has medical uses in the treatment of the stomach as a laxative, its seeds are rich in oils 46%, proteins 34%, carbohydrates 15%, and fiber 2.8% (16).

It is grown in Iraq in the spring and autumn seasons openly, and in the winter season it is protected inside greenhouses (8) , the plant is monoecious, monoecious, male flowers appear first, and with the continuation of growth, an exchange occurs in the production of male and female flowers, then only female flowers are formed (9) , The ratio between the number of female flowers to the number of male flowers is called the sex ratio (8) , and whenever this ratio is high, it indicates an increase in the number of female flowers and the increase in the number of knotty flowers, and then the increase in yield, and this ratio is affected by many factors, including genetics, hormonal, environmental and nutritional It differs from one variety to another due to genetic factors related to the same variety (5).

As he noticed (1) the differences between the varieties of zucchini Mulla Ahmed Al-Mahalli, Al-Mustaqbal Al-Suri, Tala, Eibethor, and Bather genetically in the sexual ratio, and showed (3) the difference between the hybrids Amjad and Jamila, who were grown in the plastic house, significantly between them in the sexual ratio, with the superiority of the hybrid Jamila compared to the hybrid Amjad, There was (7) a significant difference between the two hybrids of squash

Carisma and Alexandria in the ratio of the number of male flowers to the number of female flowers, as it increased in the Alexandria hybrid.

Cobalt is an essential element for the synthesis of vitamin B12 required for human and animal nutrition (10 and 11), unlike other heavy metals, cobalt is considered safer for human consumption and up to 8 mg can be consumed on a daily basis without the occurrence of any health hazards, and (15) concluded that cobalt One of the secondary components in the soil, which ranges from 10.54 - 5.59%, and the cobalt element is considered essential in the plants of the legume family because of its use by microorganisms in fixing the nitrogen element from the atmosphere (10).

It was found that the use of cobalt in low concentrations less than 0.5 mg. L^{-1} significantly increased the production of ethylene, which plays an important role in increasing the sexual ratio of the Cucurbitaceae family (12) , and it was noted (2) when soaking the seeds of squash squash with three concentrations of cobalt (0.25, 0.50, and 1.00) ppm added to distilled water. And the AOA solution for 48 hours exceeded the concentration of 1.00 ppm in the percentage of the number of female flowers compared to the number of male flowers, with a significant difference from all concentrations and treatments used in the experiment.

MATERIALS AND METHODS

The experiment was conducted in one of the greenhouses affiliated to the Agricultural Experiment Station at the College of Agriculture - University of Basra for the fall season 2021/2022 and 2022/2023 under the greenhouses. The land was plowed three times orthogonally, smoothed and leveled, then random samples were taken from the field soil at a depth of 0-30 cm to analyze the physical and chemical characteristics of the soil and irrigation water before starting the study (Table 1). They are AL nahrain, Alexandria F1, Seminis, Eskandrany2, Khatoon F1 and Mullah Ahmed, and three concentrations of cobalt element were watered at the stage of 3-4 true leaves and once in the form of cobalt sulfate CoSo4 is 0, 0.75 and 1.5 mg. L^{-1} .

Table (1) Some physical and chemical properties of the soil and water of the experimental field

Adjective tissue	**the value**
pH	**7.45**
E.C Desi Siemens M^{-1}	**2.75**
Total nitrogen. kg^{-1}	**0.24**
Ready phosphorus amalgam. kg^{-1}	**40.5**
Ready potassium mg/kg	**2.6**
The organic matter is cloudy. kg^{-1}	**2.8**
Soil articulations	
The sand is cloudy. kg^{-1}	**112**
silt cloud kg^{-1}	**400**
Mud cloud. kg^{-1}	**488**
the texture	**Silty Clay**

Then, on 25/9/2021, the beginning of the experiment was divided into six lines with a length of 48 m and an interval of 35 cm between the experimental units and between each concentration of the cobalt element and the varieties. The distance between the passerby is 1.30 m. At a depth of 30 cm, in the direction of the winds from north to south to avoid damage caused by the plastic sheeting from the wind. It was fertilized with decomposed animal manure (cow waste) at a rate of 15 tons. h^{-1} (8) .

Divide the single line into nine experimental units, the length of each experimental unit is 5 m, leaving a separator between the experimental units to prevent overlap between transactions. All the agricultural service operations used to produce the crop were carried out inside the plastic houses, including hoeing, weeding, irrigation, fertilization, control, and manual pollination in the early morning, and covering the house with a transparent polyethylene cover with a thickness of 150 microns on 10/12/2021. It was implemented as a one-time split plot design, according to the design of the sectors. Complete randomization with three replications counted camels as a main factor, and cobalt concentrations as a secondary factor. The readings were taken at the end of the season, including measurement of vegetative growth indicators based on a random sample of 5 plants. The total chlorophyll pigment in the leaves was estimated by the extraction method described by (6) , and the total soluble carbohydrate content of the leaves was estimated using the phenol method with sulfuric acid. Modification of Phenol - Suipnuric Acid Colorimetric Method described by (4).

The percentage of total proteins was calculated through the formula nitrogen percentage 6.25^{*} , the potassium element was estimated in the digestion solution after dilution with distilled water using the Flame Photometer according to the method (13) , the cobalt element was estimated by the atomic absorption spectrophotometer. The percentage of dissolved solids was calculated according to the method described in (14), the early yield 2m was calculated on the basis of the yield of the first three harvests (8). Total productivity = yield of one plant * plant density (kg m^{-2}) . The

results were analyzed statistically using the GenStat statistical program, and the arithmetic means of the coefficients were compared according to the Least Significant Difference L.S.D test at a probability level of 0.05.

RESULTS AND DISCUSSION

The data of Table (2) indicate that the hybrids used in the study did not have a significant effect on the amount of total chlorophyll in the leaves for both seasons. As for the effect of cobalt, the concentration was superior to 0.75 mg L^{-1}, with a significant difference from the comparison treatment, with an increase rate of 29.66 and 31.44% for the first and second seasons, and it did not differ significantly with the concentration of 1.5 mg L^{-1} for both seasons. As for the interaction between the two factors, it showed a significant effect on this trait and for both seasons, as the Al-Nahrain hybrid plants, at a concentration of 0.75 mg L^{-1}, recorded the highest amount of chlorophyll amounting to 51.67 mg. 100 g^{-1} for the first season and 49.56 for the second season. While the plants of the hybrid Eskandrany2 gave the lowest amount of chlorophyll when compared to 38.55 for the first season, and the plants of the local cultivar Mullah Ahmed the lowest amount of chlorophyll amounted to 36.40 mg.100gm^{-1}. The data of Table (2) indicate that the hybrids had a significant effect on the total soluble carbohydrate content of the leaves, as the AL nahrain hybrid was significantly superior, with an increase rate of 11.28, 19.38, 21.49, and 18.80 compared to the hybrids used in the study, with the exception of the Seminis hybrid, which did not differ significantly with it in the first season and 10.62, 13.36, 29.00 and 17.89 compared to all hybrids except for the Alexandria F1 hybrid, which did not differ significantly with it in the second season.

As for the effect of the cobalt element, it had a significant effect on the carbohydrate content of the leaves, as the concentration was significantly higher than 0.75 mg L^{-1} for both seasons, with an increase rate of 8.78% compared to the comparison treatment, and it did not differ significantly with the concentration of 1.5 mg L^{-1} in the first season, with an increase of 17.33%. 8.64 for both concentrations in the second season. It appears from the same table that the interaction between the study factors had a significant effect on this trait for both seasons, as the Seminis hybrid plants, at a concentration of 1.5 mg L^{-1}, recorded the highest content of carbohydrates in the leaves, amounting to 48.97, while the Iskandrany2 hybrid plants, when compared with the comparison treatment, recorded the lowest amount of carbohydrates. It reached 32.08 in the first season, while in the second season the Alexandria F1 hybrid plants at a concentration of 0.75 mg L^{-1} recorded the highest carbohydrate content amounting to 50.50, while the Khatoon F1 hybrid plants recorded the lowest content of leaves amounting to 32.40 (mg.gm^{-1} dry weight) during the comparison treatment . The data of Table 2 indicate that the hybrids differed significantly in the percentage of protein in the leaves, as the Alexandria F1 hybrid outperformed the hybrids used in the study with a significant difference of 21.06, 31.01, 8.34, and 29.95 in the first season, with an increase of 24.07, 35.93, 9.40, and 34.67 in the second season compared to the rest of the hybrids, while it did not differ significantly with the hybrid AL Nahrain in both seasons. As for the addition of the cobalt element, it had a significant effect on this characteristic, as the concentration exceeded 0.75 mg L^{-1}, with a significant difference, with an increase rate of 46.04 and 54.26% , for both seasons compared to the comparison treatment, and it did not differ significantly with the concentration of 1.5 mg L^{-1}. As for the interaction between the two factors, it showed a significant effect on this trait, as the AL Nahrain hybrid plants at a concentration of 0.75 mg L^{-1} and the Alexandria F1 hybrid plants at a concentration of 1.5 mg L^{-1} recorded the highest percentage of protein in the leaves, amounting to 3.667% , while the hybrid plants recorded Eskandrany2 and the local cultivar Mullah Ahmed, when compared with the lowest percentage of protein, amounted to 1.913 in the first season, while in the second season, the plants of the hybrid AL Nahrain at a concentration of 0.75 mg L^{-1} recorded the highest percentage of protein in the leaves amounted to 3.333% , while plants of the cultivar recorded Local Mullah Ahmed when the comparison treatment lowest percentage of protein in the leaves reached 1.500%.

Through the data of Table 3, it is clear that the hybrids differed significantly in the percentage of phosphorus in the leaves, where the hybrid Alexandria F1 excelled with a significant difference compared to the hybrids Seminis, Eskandrany2 and Mullah Ahmed, with an increase of 24.13, 35.84 and 34.57, while it did not differ significantly with the hybrids AL Nahrain and Khatoon F1 in the first season , while in the second season the AL Nahrain hybrid was significantly superior compared to all camels with an increase of 18.20 , 15.70 , 21.58 , 34.38 , and 15.36 . As for the addition of the cobalt element, it had a significant effect on the percentage of phosphorus in the leaves, where the concentration of 0.75 mg L^{-1} was significantly higher than the comparison treatment for the two seasons, respectively, with an increase of 60.98 and 13.48%, while it did not differ significantly with the concentration of 1.5 mg L^{-1}.

As for the interaction between the two factors, it showed a significant effect on this trait, as the AL Nahrain hybrid plants recorded at a concentration of 0.75 mg L^{-1} the highest percentage of phosphorous in the leaves amounting to 0.377, while the plants of the local cultivar Mullah Ahmed recorded the lowest percentage amounting to 0.158 in the first season. In the second season, AL Nahrain hybrid plants also recorded, at a concentration of 0.75 mg L^{-1}, the highest percentage of phosphorus in the leaves, amounting to 0.436, while the Eskandrany2 and Khatoon F1 hybrid plants recorded the lowest percentage of phosphorus in the leaves, amounting to 0.283.

Table (2) the effect of cobalt and cultivars and the interaction between them on some chemical components of the leaves.

transactions			chlorophyll		carbohydrate		protein	
			first season	second season	first season	second season	first season	second season
average effect of the class	V_1		44.45	42.35	46.68	46.65	19.11	17.03
	V_2		43.44	41.33	45.74	42.17	16.61	14.53
	V_3		44.68	42.57	41.96	45.83	20.11	18.03
	V_4		45.33	43.22	39.10	41.15	15.35	13.26
	V_5		43.08	40.97	38.42	36.16	18.56	16.48
	V_6		44.70	42.59	39.29	39.57	16.10	13.39
L.S.D$_{0.05}$			N.S	N.S	4.194	2.333	0.508	0.515
Cobalt medium effect	0		37.38	35.27	39.84	38.66	13.65	11.57
	1		48.47	46.36	43.34	45.36	19.94	17.85
	2		46.99	44.88	42.41	41.75	19.02	16.94
L.S.D$_{0.05}$			3.154	3.415	2.966	1.649	0.359	0.364
Overlap between camel and cobalt	V_1	0	30.37	28.26	49.57	43.85	11.54	9.45
		1	51.67	49.56	46.36	49.98	22.91	20.83
		2	51.33	49.22	44.11	46.12	22.87	20.79
	V_2	0	33.18	31.07	42.06	38.53	11.54	9.45
		1	47.09	44.98	46.19	47.71	17.23	15.14
		2	50.04	47.93	48.97	40.27	21.08	19.01
	V_3	0	39.58	37.47	38.11	38.88	15.95	13.87
		1	48.94	46.83	46.92	50.50	21.48	19.39
		2	45.51	43.40	40.84	48.10	22.91	19.89
	V_4	0	38.55	36.44	32.08	39.20	11.95	9.87
		1	49.10	46.99	41.60	41.26	18.39	16.31
		2	48.33	46.22	43.63	43.00	15.70	13.62
	V_5	0	43.04	40.93	36.29	32.40	18.98	16.89
		1	45.04	42.93	40.83	42.35	21.08	19
		2	41.17	39.06	38.13	33.74	15.64	13.56
	V_6	0	39.58	36.40	40.92	39.10	11.95	9.37
		1	48.97	46.86	38.16	40.34	18.54	16.45
		2	45.55	43.44	38.97	39.27	15.93	13.85
L.S.D$_{0.05}$			7.725	8.365	7.265	4.040	0.880	0.893

Through the data of Table 3, it is clear that the hybrids differed significantly in the percentage of potassium in the leaves, as the data indicates that the AL Nahrain hybrid was significantly superior compared to the hybrids Eskandrany2 and Mullah Ahmed, with an increase of 16.74 and 16.40% in the first season, with an increase of 23.39, 53.01, and 28.52 and 44.73% compared to the rest of the hybrids, with the exception of the hybrid Alexandria F1, which did not differ significantly with it in the second season.

As for the addition of the cobalt element, it had a significant effect on the percentage of potassium in the leaves, where the concentration of 0.75 mg L^{-1} was significantly higher than the comparison treatment for the two seasons, respectively, with an increase rate of 16.49 and 52.58% , while it did not differ significantly with the concentration of 1.5 mg L^{-1}. As for the interaction between the study factors, there was no significant effect on the potassium content of the leaves for both seasons. The data of Table 3 indicate that the hybrids differed significantly in the percentage of cobalt in the leaves, as the local cultivar Mullah Ahmed excelled by a significant difference compared to the AL Nahrain and Alexandria F1 hybrids, with an increase of 71.71 and 73.46%, while it did not differ significantly with the rest of the hybrids in the first season. In the second season, the Khatoon F1 hybrid plants excelled significantly compared to AL Nahrain and Alexandria F1 hybrids, with an increase of 31.92 and 32.07%, and it did not differ significantly with the rest of the hybrids. As for the effect of adding the cobalt element, the concentration of 1.5 mg L^{-1} was significantly superior, with an increase rate of 121.98% compared to the comparison treatment, and it did not differ significantly with the concentration of 0.75 mg L^{-1} in the first season. concentration, with an increase of 153.33 and 28.57%.

As for the interaction between the factors of the study, it recorded a significant effect, as the plants of the local cultivar Mullah Ahmed, at a concentration of 0.75 mg L^{-1}, recorded the highest percentage of cobalt in the leaves amounting to 0.387, while the hybrid plants AL Nahrain recorded in the comparison treatment the lowest percentage of cobalt amounted to 0.109% in the first season. In the second season, the plants of the hybrid Eskandrany2, at a concentration of 1.5 mg L^{-1}, recorded the highest percentage of cobalt, which amounted to 0.414, while the local cultivar, Mullah Ahmed, recorded the lowest concentration of cobalt, when compared to 0.114%.

Table (3) Effect of cobalt and cultivars and the interaction between them on some components of metallic elements in leaves.

transactions			%P		% K		$C0^{+2}$ %	
			first season	second season	first season	second season	first season	second season
average effect of the class	V_1		0.282	0.383	3.619	3.397	0.198	0.213
	V_2		0.232	0.324	3.467	2.753	0.233	0.251
	V_3		0.288	0.331	3.541	3.001	0.196	0.212
	V_4		0.212	0.315	3.100	2.220	0.282	0.281
	V_5		0.263	0.285	3.304	2.643	0.237	0.281
	V_6		0.214	0.332	2.968	2.347	0.284	0.250
L.S.D$_{0.05}$			0.052	0.031	0.332	0.577	0.038	0.066
Cobalt medium effect	0		0.182	0.304	3.044	2.109	0.141	0.135
	1		0.293	0.345	3.546	3.218	0.264	0.266
	2		0.271	0.336	3.409	2.853	0.313	0.342
L.S.D$_{0.05}$			0.036	0.022	0.235	0.408	0.026	0.027
Overlap between camel and cobalt	V_1	0	0.137	0.303	3.137	2.770	0.109	0.123
		1	0.377	0.436	3.960	3.830	0.221	0.255
		2	0.332	0.410	3.760	3.590	0.264	0.260
	V_2	0	0.151	0.296	3.263	1.997	0.151	0.118
		1	0.242	0.360	3.483	3.470	0.242	0.260
		2	0.304	0.316	3.653	2.793	0.304	0.374
	V_3	0	0.222	0.320	3.057	2.093	0.110	0.126
		1	0.310	0.340	3.830	3.410	0.222	0.248
		2	0.333	0.333	3.737	3.500	0.257	0.262
	V_4	0	0.158	0.283	2.903	2.173	0.222	0.163
		1	0.261	0.360	3.260	2.373	0.272	0.265
		2	0.218	0.303	3.137	2.113	0.372	0.414
	V_5	0	0.270	0.283	2.937	1.493	0.126	0.168
		1	0.304	0.280	3.747	3.457	0.242	0.276
		2	0.217	0.293	3.230	2.980	0.342	0.400
	V_6	0	0.158	0.340	2.967	2.130	0.125	0.114
		1	0.263	0.296	2.997	2.770	0.387	0.292
		2	0.221	0.360	2.940	2.140	0.340	0.345
L.S.D$_{0.05}$			0.090	0.054	N.S	N.S	0.065	0.038

It is clear from the data of Table (4) that the hybrids differed significantly in the percentage of total dissolved solids and for the two seasons, respectively, as the Alexandria F1 hybrid excelled significantly compared to the hybrids Seminis , Eskandrany2, and the local variety Mullah Ahmed, with an increase rate of 10.51, 14.89, and 14.44%, and it did not differ significantly. With the hybrid AL nahrain and Khatoon F1 in the first season. The hybrid AL Nahrain was significantly superior compared to the hybrids Seminis, Khatoon F, and the local cultivar Mullah Ahmed, with an increase rate of 14.51, 9.08, and 15.19%, and it did not differ significantly with the hybrid Eskandrany2 and Alexandria F1 in the second season.

The data of the same table indicate that the addition of the cobalt element had a significant effect on the percentage of total dissolved solids in the fruits, as the concentration of 0.75 mg L^{-1} was significantly higher than the comparison treatment for the two seasons, respectively, with an increase of 20.71 and 8.24%, while it did not differ significantly with The concentration is 1.5 mg L^{-1}.

As for the interaction between the study factors, the interaction between the study factors showed that the first season did not show any significant effect on this trait, while in the second season it showed a significant effect, as AL Nahrain plants recorded at the concentration 0.75 mg L^{-1} the highest percentage of dissolved solids The total amounted to 7.100%, while the plants of the local cultivar Mullah Ahmed and the hybrid Khatoon F recorded the lowest percentage of total dissolved solids, which amounted to 5.700.

The data of Table 4 indicate that the crosses differed significantly in the characteristics of the early plant yield, as the hybrid AL Nahrain excelled with a significant difference compared to the rest of the hybrids, with an increase rate of 78.31, 28.41, 73.09, and 128.13, with the exception of the Alexandria F1 hybrid, which did not differ significantly with it in the first season, with an increase rate of 41.14 and 73.48 and 69.6 with the exception of the hybrid Alexandria F1 and Seminis did not differ significantly in the second season.

As for the addition of the cobalt element, it had a significant effect on the weight of the fruit, as the concentration exceeded 0.75 mg L^{-1} significantly compared to the comparison treatment in the first season, with an increase rate of 68.76%, and an increase rate of 71.42 and 28.35% compared to both concentrations in the second season.

As for the interaction between the study factors, the interaction in the first season showed a significant effect, as AL nahrain plants recorded at a concentration of 0.75 mg L^{-1} the highest early yield of the plant amounted to 1.710 kg. $Plant^{-1}$, while the plants of the local cultivar, Mullah Ahmed, recorded the lowest weight of the fruit, which amounted to 0.470 kg. $Plant^{-1}$, and the interaction between the factors in the second season did not have a significant effect on this trait.

Table (4) The effect of cobalt and cultivars and the interaction between them on the quantitative and qualitative characteristics of the yield.

transactions			TSS		early attainment		Total yield kg.m^{-2}	
			first season	second season	first season	second season	first season	second season
average effect of the class	V_1		5.725	6.533	1.184	1.060	3.553	3.180
	V_2		5.326	5.589	0.664	0.826	2.000	2.480
	V_3		5.886	5.944	0.994	1.003	2.994	3.010
	V_4		5.123	5.810	0.922	0.751	2.766	2.250
	V_5		5.638	5.867	0.684	0.611	2.052	1.830
	V_6		5.143	5.556	0.519	0.625	1.556	1.880
L.S.D$_{0.05}$			0.515	0.501	0.232	0.294	0.698	0.884
Cobalt medium effect	0		4.852	5.661	0.605	0.602	1.815	1.810
	1		5.857	6.128	1.021	1.032	3.062	3.100
	2		5.711	5.861	0.861	0.804	2.584	2.410
L.S.D$_{0.05}$			0.364	0.354	0.164	0.208	0.494	0.625
Overlap between camel and cobalt	V_1	0	4.513	5.567	0.695	0.688	2.084	2.070
		1	6.33	7.100	1.710	1.573	5.130	4.720
		2	6.327	6.533	1.149	0.918	3.446	2.750
	V_2	0	4.513	5.767	0.696	0.558	2.088	1.670
		1	5.423	5.600	0.718	1.020	2.154	3.060
		2	6.040	5.400	0.586	0.901	1.758	2.700
	V_3	0	5.220	5.500	0.594	0.584	1.781	1.750
		1	6.103	6.233	1.341	1.443	4.024	4.330
		2	6.333	6.100	1.059	0.982	3.178	2.950
	V_4	0	4.580	5.730	0.701	0.693	2.104	2.080
		1	5.610	6.200	0.838	0.846	2.514	2.540
		2	5.180	5.500	1.227	0.714	3.681	2.140
	V_5	0	5.703	5.700	0.475	0.539	1.424	1.620
		1	6.040	5.833	0.819	0.716	2.458	2.150
		2	5.170	6.067	0.758	0.580	2.275	1.740
	V_6	0	4.580	5.700	0.470	0.553	1.409	1.660
		1	5.633	5.600	0.698	0.593	2.094	1.780
		2	5.217	5.367	0.388	0.730	1.165	2.190
L.S.D$_{0.05}$			0.893	N.S	0.403	N.S	1.210	1.531

It is noted from Table 4 that all the factors of the study had a significant effect on the characteristic of the total production per square meter kg. plant 2, as the plants of the AL Nahrain hybrid were significant and for both seasons had a significant effect compared to all except for the Alexandria F1 hybrid. 28.45, 73.14, and 128.34% in the first season, while in the second season, the percentage increase was as follows: 28.22, 41.33, 73.77, and 69.14%.

The data of the same table indicate that the addition of the element cobalt had a significant effect on the characteristic of the total yield, as the concentration of 0.75 mg L^{-1} was significantly higher than the comparison treatment for the two seasons, respectively, with an increase rate of 68.70 and 71.27%, while it did not differ significantly with the concentration of 1.5 mg L^{-1}. As for the interaction between the study factors, the interaction between the study factors showed a significant effect in the first season, as AL Nahrain plants at a concentration of 0.75 mg L^{-1} recorded the highest rate of total production amounting to 5.130 kg. $Plant^{-2}$, while the plants of the local cultivar Mullah Ahmed recorded, in the comparison treatment, the lowest rate of total production amounting to 1.409 kg. $Plant^{-2}$. In the second season, the AL Nahrain hybrid plants, at a concentration of 0.75 mg L^{-1}, recorded the highest rate of total production amounting to 4.720 kg. . $Plant^{-2}$, while Khatoon F1 plants, when compared, recorded the lowest rate of total production, amounting to 1.620 kg. $Plant^{-2}$.

The results of the effect of cultivars and the addition of the cobalt element at different concentrations and the interaction between the two factors showed a significant effect on some of the chemical content of the leaves, as the cultivars differed among themselves in carbohydrates, protein, phosphorus, potassium and cobalt (Tables 2, 3, 4) that the discrepancy between cultivars may be attributed to special genetic factors cultivar, and the extent of its adaptation

to environmental factors, and this is consistent with what he found (3). The data of Table (2-3-4) indicate that the addition of cobalt at a concentration of 0.75 mg L^{-1} has a significant effect. The content of the leaves of total chlorophyll and of the major nutrients Table (2,3) and the role of this in the course of the physiological processes of the plant, especially the process of photosynthesis and the formation of proteins and sugars, which is directly reflected in the quantity and quality of the crop. These results are consistent with the findings of (2).

REFERENCES

1. Al-Hamdani, ShamilYounes Hassan and WaleedBadr Al-Din Mahmoud Al-Laila (2011) Analysis of the combining ability of yield and its components in squash Cucurbitapepo L. Al-Rafidain Journal of Agriculture 39 (1): 40- 48.
2. Atta-Aly, M. A. (1998). Soaking summer squash seeds in low concentrations of cobalt solution before sowing increased plant growth, femaleness, and fruit yield via increasing plant ethylene level. *Journal of Plant Growth Regulation*, *17*, 25-32.
3. Abdullah, Abdullah Abdul-Aziz and Abdul-Hussein Qassem Al-Maliki (2016) The effect of nitrogen fertilization on the growth and yield of hybrid summer , Cucurbitapepo L. Amjad and Jamila, grown in a plastic house, Basrah Journal of Agricultural Sciences 29 (2): 62-73.
4. Dubois,M.; K.M.Grilles; J.K.Hamiltor; D.A.Rebers and; F. Smith (1956).Colorimetric method for determination of sugurs and related Substances .Anal.chem.28:350-356.
5. Currence, T. M. (1925). *Nodal sequence of flower type in the cucumber* (Master's thesis, West Virginia University) .
6. Goodwin,T.W.(1976).Chemistry and Biochemistry of plant pigment .2nded. Academic Press , London , New York ., San Francisco , pp. 373.
7. Hussein, Ahlam Ahmed (2018) The effect of foliar spraying with ascorbic acid on the flowering growth and productive characteristics of two hybrids of summer squash grown in greenhouses. Journal of Agricultural, Environmental and Veterinary Sciences 4(2):12-19 .
8. Matlob, Adnan Nasser, Izz al-Din Sultan and KarimSalihAbdoul (1989) Vegetable Production, Part Two, Higher Education Press, University of Mosul, Iraq, 337 p . .
9. Nitsch, J. P., Kurtz Jr, E. B., Liverman, J. L., & Went, F. W. (1952). The development of sex expression in cucurbit flowers. *American Journal of Botany*, 32-43 Postharvest Biology and Technology. 4: 13-21.
10. Smith RM (1991) Trace elements in human and animal nutrition. Micronut News Info 119 16
11. Young RS (1983) Recent advances on cobalt in human nutrition. Micronut News Info 3:
12. Yu, Y. B., & Yang, S. F. (1979). Auxin-induced ethylene production and its inhibition by aminoethyoxyvinylglycine and cobalt ion. *Plant physiology*, *64*(6), 1074-1077.
13. Page,A.L; R.H.Miller and D.R.Keeney(1982). Methods of soil analysis . part (2)2nd . (ed). Madison . Wisconsin ,U.S.A.
14. Howrtiz,W.W.(1975). Official methods of analysis association of official analytical chemists , wa hington ,D.C.U.S.A.
15. Salisu, A., Aimrun, W., Abdullah, A. F., & Kamal, R. M. (2021). Characterization of Clay Soil and Zolite Powder as Materials for the Production of Irrigation Porous Pipes. *Basrah Journal of Agricultural Sciences*, *34*, 100-107.
16. Whitaker, T. W., & Davis, G. N. (1962). Cucurbits. Botany, cultivation, and . *Cucurbits. Botany, cultivation, and utilization* .