# Effect planting distances and spraying with yeast extract (Fylloton) on growth traits and yield of two summer squash hybrids (*Cucurbita pepo L.*).

Mustafa Ammar Al-Fakhri

Amer Abdullah Al-Jubouri

Department of Horticulture and Garden Engineering / College of Agriculture and Forestry / University of Mosul.

#### Gmail – <u>alfakhrymustafa@gmail.com</u>

#### Abstract

The experiment was conducted in the vegetable field of the Department of Horticulture and Landscaping / College of Agriculture and Forestry / University of Mosul for the spring season 2019. To study the effect of planting distances between plants (35 and 45 cm) with the use of Fylloton yeast extract sprayed on the leaves at concentrations (0, 1.5, 3, 4.5) ml L<sup>-1</sup> on the vegetative growth and yield of two summer squash hybrids (Aseel and Marvel).A factorial experiment was conducted in the split-split plots in a randomized complete block design (R.C.B.D) with three replications. Where the hybrids were placed in the main plots and the planting distances were placed within the sub plots (Sub-plots), while yeast extract (Fylloton) was placed in the sub sub-plots. The results of the research showed the hybrid Aseel excelled in most vegetative growth traits (plant length, number of leaves, leaf area and percentage of fruit set) while the hybrid Marvel was superior in both traits (number of female flowers and number of male flowers). As for the planting distances, there was no significant effect on the vegetative growth traits except for the characteristic of the number of male flowers in which the planting distance of 35 cm between plants was excelled and the same treatment excelled in terms of early yield and total yield (4.14, 46.54) ton.ha<sup>-1</sup>, respectively. While the spray treatment gave Fylloton yeast extract at a concentration of 4.5 ml. L<sup>-1</sup> has the highest significant values in these traits.

#### Introduction.

Summer squash (*Cucurbita pepo* L.) of the Cucurbitaceae family is native to Central and North America, from where it spread to all parts of the world (14). It is one of the important economic crops and has а nutritional value and is grown in Iraq and a number of countries in the world due to its nutritional value as well as for its seeds that are used in nutrition and which are characterized by a high content of oils (46%), proteins (34%), carbohydrates (10%) and fibers (2.8%) (18). In addition to being widely used for medicinal purposes (7), squash cultivars differ genetically in the nature of vegetative, flowering and fruiting growth, One of the important conditions for the successful production of vegetable crops is the selection of appropriate cultivars, and it is important to maintain the performance of varieties under environmental different conditions to determine the extent to which they are adapted to these conditions (17). The planting distances between plants are one of the factors that affect the success of the crop, as planting at spaced distances gives plants dense vegetative growth and a crop of good qualities until the production of the unit area may decrease While planting at close distances produces plants that do not reach their natural sizes in growth, which affects the productivity of the plant and that the traits of the crop are less than the cultivation of spaced distances. (16.)Foliar fertilizers are among the factors that affect various physiological processes that affect vegetative growth and yield (3.)In previous years, many research were conducted to study the effectiveness of foliar nutrients and their direct effects in improving the growth and productivity of crops, and many researches indicated that foliar nutrients are considered an assistant, necessary and effective factor with fertilizers to increase productivity (15.(The use of organic

fertilizers, including yeasts, as foliar fertilizers (12). One of the new technologies that have been widely used as a growth stimulant.

#### Materials and methods.

The experiment was conducted in the vegetable field of the Department of Horticulture and Landscape Engineering, College Agriculture and Forestry of ,University of Mosul in the spring season 2019 summer squash seeds were planted in black plastic bags, and the planting medium was peat moss on April 24, 2019 and then transferred to the experiment site after the appearance of the first real leaf in the cultivation terraces due to the delay and intensity of rain and low temperatures in Nineveh province, where the plants were planted on terraces with a length of 4 m, with a width of (1) m, and between the terraces (75)cm.The study included the cultivation of two hybrids of Summer squash, Aseel, and Marvel (Dutch hybrids) and two planting distances (35 and 45) cm between plants and foliar spraying (with Fylloton yeast extract) produced by the Italian company Biolchim. It is an organic fertilizer nitrogenous liquid veast extract that contains brown algae and also contains Organic nitrogen 6% and carbon 25.2% were used in four levels (zero, 1.5, 3, 4.5) ml.  $L^{-1}$  water Where the plants sprayed the first spray after 20 days, that is, after 4-5 true leaves appeared, and the second spray after (15) days from the first spray. The spraying was conducted to the stage of complete wetness, where the area of the experimental unit was 4 m2 and the number of plants was 10 and 12 plants, according to the proven planting distances. A factorial experiment was conducted using the Split Split Plots system within a randomized complete block design (R.C.B.D) with three replications. The experiment included (16) factorial treatments resulting from the triple interaction of factors  $(2 \times 2 \times 4)$  in addition to comparison, the averages were done after data recording Using the least significant difference test "Duncan's Multiple Range Test" at the 5% probability level (4).

#### **Results and discussion**.

### 1- Plant height (cm).

Table (1) shows that the spraying treatment with yeast extract at a concentration of 4.5 ml  $L^{-1}$  was significantly excelled in this trait to the rest of the spraying treatments and gave the highest significant values, amounting to (42.83) cm compared to the lowest plant height (32.91) cm when the control treatment. As well as the hybrid Aseel significantly excelled on the hybrid Marvel and gave the highest plant height (39.20) cm. No significant differences were observed between the planting distance treatments. In the two interactions between yeast extract and hybrids, th

e treatment of the interaction between the hybrid Aseel with a concentration of 4.5 ml.L<sup>-</sup> excelled on all other interaction treatments and gave the highest value (44.33 cm). While the lowest plant height was (31.66) cm as a result of the interaction of the Marvel hybrid with not spraying with yeast extract .In the biinteraction between yeast extract and cultivation distances, the treatment of the interaction between cultivation at a distance of (35) cm with spraying at a concentration of 4.5 ml  $L^{-1}$  of the extract excelled on all other interaction treatments and gave the highest plant height (44.33 cm). The lowest plant height was (31.50) cm as a result of the interaction between the planting distance (45) cm and no spraying with yeast extract, while there were no significant differences between the treatments of hybrids and planting distances. In the triple interaction treatments, it is clear from Table (1) that the treatment of the interaction between planting at a distance of (35) cm and spraying with yeast extract at a concentration of 4.5 ml  $L^{-1}$  for the hybrid Aseel gave the highest value for plant height and reached (47.00) cm It significantly excelled in all other interaction treatments. While the interaction between planting at a distance of (45) cm and not spraying with the extract for the same hybrid gave the lowest plant height (30.33 cm).

Hybrid	hybrid		Yeast Ext	ract m.L <sup>-1</sup>		planting	hybrid
effect	distances	4.5ml L <sup>-1</sup>	$3 \text{ml } \text{L}^{-1}$	$1.5 \text{ml L}^{-1}$	0	cm	nyona
20.20	42.66	47.00	43.66	42.00	38.00	35	
39.20	а	а	b	b c	d	cm	A sool
a	35.75	41.66	36.66	34.33	30.33	45	Aseel
	а	b c	d-f	g-i	k	cm	
	35.33	41.66	35.66	33.33	30.66	35	
35.91	а	b c	e f	hi	j k	cm	Marvel
b	36.50	41.00	37.33	35.00	32.83	45	
	а	с	de	f-h	Ιj	cm	
	42.83		38.33	36.16	32.91	Vesst extract effect	
	а		b	с	d	i east extract effect	
	44.33		40.16	38.16	34.16	Assal	
	а		b	с	e	Aseel	× extract
Dianting	distance offect	41.33	36.50	34.16	31.66	Morvol	hybrid
Flaining	, distance effect	b	d	e	f	Iviai vei	-
	39.00	44.33	39.66	37.66	34.33	35	× avtraat
	a	а	с	d	e	cm	× extract
36.12		41.33	37.00	34.66	31.50	45	distances
	a	b	d	e	f	cm	uistallees

 Table (1):- Hybrids, planting distance, spraying with yeast extract Fylloton, and the interaction between them in plant height for summer squash. (cm).

## 2 - Number of leaves (leaf.plant<sup>-1</sup>).

Table (2)showed that the plants sprayed with yeast extract at a concentration of 4.5 ml  $L^{-1}$  significantly excelled on all other treatments and gave the highest value (27.83) leaf.plant<sup>-1</sup>compared to the lowest number of leaves (20.25).  $leaf.plant^{-1}$  when control .Hybrid significantly treatments Aseel excelled on Marvel hybrid with the highest number of leaves (24.20) leaf-1, which gave the lowest number of leaves (22.95) leaf.plant No significant differences were observed between the planting distance treatments (35 and 45) cm. In the bi-interaction treatments between spraying with yeast extract and hybrids, it is clear from Table (2)The interaction treatment between spraying yeast extract at a concentration of 4.5 ml  $L^{-1}$  was excelled on hybrid Aseel or hybrid Marvel and gave the highest significant value in a number of leaves (27.83 leaf.plant<sup>-1</sup>).As for the biinteraction between yeast extract and planting

distances, the interaction treatment between a distance of (35) cm and spraying with the extract at a concentration of 4.5 ml  $L^{-1}$ excelled on all other interaction treatments and it amounted to (29.50) leaf.plant<sup>-1</sup> Compared with the lowest number of leaves for plants grown under planting distance (45) cm and not spraying with the extract. While there were no significant differences between the treatments of hybrid interactions and the cultivation distances for this trait. In the triple interaction between the studied factors, it is noted that the treatment of spraying with yeast extract and spraying at a concentration of 4.5 ml L<sup>-1</sup> with planting at a distance of (35) cm with hybrid Aseel or hybrid Marvel significantly excelled on all other interaction treatments and gave the most number of leaves (30.00) and (29.00) leaf.plant<sup>-1</sup> and the lowest number of leaves was (19.33) leaf.plant<sup>-1</sup> when the two interactions were between no spraying with the extract and planting at a distance of (35 and 45) cm with the hybrid Marvel.

Hybrid	hybrid			Yeast Extr	act m.Ll-1	planting	Hybrid
effect	planting × distances	4.5ml L <sup>-1</sup>	$3 \text{ml } \text{L}^{-1}$	1.5ml L <sup>-1</sup>	0	distance s	
						cm	
24.20	25.75	30.00	26.66	24.00	22.33	35	Aseel
a	a	a	b	c d	d-f	cm	
	22.66	25.66	23.33	21.66	20.00	45	
	a	b c	c-e	d-g	f g	cm	
22.95	23.41	29.00	23.66	21.66	19.33	35	Marvel
b	a	a	c-e	d-g	g	cm	
	22.50	26.66	22.66	21.33	19.33	45	
	a	b	de	e-g	g	cm	
		27.83	24.08	22.16	20.25	Y	east extract effect
		a	b	c	d		
		27.83	25.00	22.83	21.16	Aseel	× extract
		a	b	c d	e		hybrid
Planting	distance effect	27.83	23.16	21.50	19.33	Marvel	
		a	c	de	f		
	24.58	29.50	25.16	22.83	20.83	35	× extract
	a	a	b	с	d e	cm	planting
	22.58	23.16	23.00	21.50	19.66	45	distances
	a	b	c	c d	e	cm	

 Table (2):- Hybrids, planting distance, spraying with yeast extract Fylloton, and the interaction between them in the number of leaves for summer squash.( leaf.plant<sup>-1</sup>).

## **3-** Leaf area of the plant (dm<sup>2</sup> plant<sup>-1</sup>).

Table (3) shows that plants sprayed with a concentration of 4.5 ml  $L^{-1}$  of yeast extract significantly excelled in leaf area on all other spraying treatments and gave the highest value of (497.8) dm<sup>2</sup> plant<sup>-1</sup> While the lowest leaf area was (195.8) dm<sup>2</sup> plant<sup>-1</sup>when treated with no spraying with the extract. From the table, it is clear that the hybrid Aseel was superior, giving the highest leaf area amounted to (349.2) dm<sup>2</sup> plant<sup>-1</sup>, compared with the hybrid Marvel, which gave the lowest value for that trait, which amounted to (314.6) dm<sup>2</sup> plant<sup>-</sup> <sup>1</sup>.While no significant differences were observed for the plants grown under the planting distances of (35 and 45) cm. In the biinteraction treatments, it is noted that between spraying yeast extract and hybrids, the two treatments of spraying the extract at a concentration of  $4.5 \text{ ml L}^{-1}$  with hybrid Aseel and hybrid Marvel, giving the highest value

respectively for both treatments and they excelled on the rest of the other interaction coefficients, while the lowest value for leaf area was (191.1) dm<sup>2</sup> plant<sup>-1</sup>as a result of the interaction treatment between no spraying with extract and for the Marvel hybrid. As for the interaction treatments between spraying with yeast extract and planting distances. The two spraying treatments with yeast extract at a concentration of 4.5 ml  $L^{-1}$  and at a distance of 35 or 45 were significantly superior to the rest of the other interaction treatments, giving a value of (523.9)  $dm^2$  plant<sup>-1</sup> and (471.7)  $dm^2$ plant<sup>-1</sup>, respectively compared to the lowest value of the leaf area, which amounted to (168.8)) dm<sup>2</sup> plant<sup>-1</sup>when treated without spraying with the extract with a planting distance of 45 cm. From the same table, it is clear that the triple interaction treatments between spraying with yeast extract at a level of 4.5 ml  $L^{-1}$  and for a planting distance of 35

for leaf area (510.0) and (485.7)  $dm^2$  plant<sup>-1</sup>,

cm and for the hybrid Aseel .It significantly excelled on the rest of the other triple interaction treatments and gave the highest value of leaf area, which reached (555.8) dm<sup>2</sup> plant<sup>-1</sup>.While the non-spraying treatment with yeast extract and cultivation at a distance of 45 cm and for the hybrid Aseel had the lowest value for leaf area and reached (165.2)  $dm^2$  plant<sup>-1</sup>.

Hybrid	hybrid		Yeast Extr	ract m.L <sup>-1</sup>	-	planting	Hybrid
effect	distances	$4.5 \text{ml L}^{-1}$	$3 \text{ml } \text{L}^{-1}$	$1.5 \text{ml L}^{-1}$	0	cm	Tryond
	384.1	555.8	431.5	313.1	235.8	35	
349.3	а	а	b-d	e-g	g h	cm	Accel
а	314.5	464.2	370.4	258.2	165.2	45	Aseel
	а	a-c	c-e	f-h	h	cm	
	314.2	492.1	311.2	243.8	209.8	35	
314.6	а	a b	e-g	f-h	g h	cm	Marual
b	315.1	479.4	349.8	258.6	172.3	45	Ivial ver
	а	a b	d-f	f-h	h	cm	
	497.8		265 7 h	268.4	195.8	Vesst extract effect	
	a		303.70	С	d	Teast ex	tract effect
	510.0		400.9	285.6	200.5	Assol	
	a		b	C d	e	Aseei	$\times$ extract
Dlontin	a distance offect	485.7	330.5	251.2	191.1	Morrial	hybrid
Planting distance effect		а	с	d-e	e	Ivial vei	
	349.1	523.0 0	271.2 h	278.4	222.8	35	× avtraat
	a	323.9 a	371.30	с	C d	cm	~ extract
	314.7	471.7	360.1	258.4	168.8	45	distances
	а	а	b	с	d	cm	uistallees

Table (3):- Hybrids, planting distance, spraying with yeast extract Fylloton, and the interaction between them in the leaf area of a summer squash plant. (dm<sup>2</sup> plant<sup>-1</sup>).

The averages that share the same alphabetic letter for each factor and for each overlap do not differ significantly among themselves according to Duncan's test under the 5% probability level. It is clear from Tables (1, 2, 3) (plant height, number of leaves/plant, leaf area) that the Aseel hybrid was significantly excelled on the Marvel hybrid due to the control of genetic factors specific to the hybrid and the difference of hybrids in their response to different environmental conditions. All treatments of foliar spraying with yeast extract significantly excelled on the control treatment, which is due to the role of foliar nutrients and their effect on plant growth and yield increase and to the role of bio-fertilizers in increasing the absorption of nutrients, increasing carbon

metabolism and increasing membrane permeability, which is positively reflected on the increase in vegetative growth indicators in general (10). The great role of yeast extract in improving vegetative growth traits is due to the fact that these fertilizers contain carbon and nitrogen, in addition to various amino and organic acids that increase the vital activities of the plant. Activating them by stimulating enzymatic systems and increasing the formation of nucleic acids (RNA and DNA) (13) and stimulating the production of plant hormones such as (auxins, cytokinins), which encourages cell division processes, which is reflected in an increase in plant height and number of leaves (11).

## **4** - number of female flowers (flower plant<sup>1</sup>).

Table (4) shows that spraying with yeast extract led to a significant increase in the number of female flowers compared to no spraying, and the most number of flowers was (17.41) flower plant<sup>-1</sup>as a result of spraying with a concentration of 4.5 ml  $L^{-1}$  of yeast extract, While the lowest number was (9.08) flower plant-1 when treated without spraying. The table also shows the superiority of the hybrid Marvel over the hybrid Aseel in the number of female flowers. As for the cultivation distances, the results in the same table show that there are no significant differences between the two distances. The interaction treatments between yeast extract and hybrids had some significant differences in this trait, where the interaction treatment between spraying with a concentration of 4.5 ml  $L^{-1}$  of the extract with the hybrid Marvel gave the most number of female flowers and reached (19.66) flower plant-1, significantly excelled on all other interaction treatments.As for the interaction treatments between yeast

extract and planting distances, it is noted from the same table that spraying treatment with a concentration of 4.5 ml  $L^{-1}$  of yeast extract and planting at a distance of 35 cm between plants gave the most number of female flowers and reached (19.83) flower plant<sup>-1</sup> and It is significantly excelled on all other interaction treatments and the least number of female flowers was (8.50) flower plant<sup>-1</sup>as a result of the non-spray treatment with the extract with a distance of 45 cm between plants, while no significant differences appeared in this trait between the two interactions between hybrids and planting distances. As for the triple interaction treatments. Table (4) shows that the interaction treatment between spraying with a concentration of 4.5 ml  $L^{-1}$  of yeast extract with planting at a distance of 35 cm between plants and for the Marvel hybrid gave the highest number of female flowers and reached (23.33) flower. All treatments. The least number of female flowers was (8.00) flower.plant-1 when treating the overlap between no spraying with the extract with a distance of 45 cm and for the hybrid Aseel.

hybrid	hybrid	Yeast Extract m.L <sup>-1</sup>				planting distances	Hybrid
distances	distances	4.5ml L <sup>-1</sup>	3ml L <sup>-1</sup>	$1.5 \text{ml L}^{-1}$	0	cm	nyond
	12.58	16.33	13.66	11.33	9.00	35	
11.66	a	b c	c-e	d-g	g	cm	Aseel
b	10.75	14.00	11.33	9.66	8.00	45	
	a	c d	d-g	f g	g	cm	
	16.41	23.33	18.00	14.00 c d	10.33	35	
14.37	а	а	b	14.00 C d	e-g	cm	Marvel
а	12.33	16.00	13.00	11.33	9.00	45	
	a	b c	c-f	d-g	g	cm	
	17.41		14.00	11.58	9.08	Yeast ex	xtract effect

 Table (4):- Hybrids, planting distance, spraying with yeast extract Fylloton, and the interaction between them in the number of female flowers of summer squash plant. (flower plant-1).

a		b	с	d		
15.16		12.50	10.50	8.50	Aseel	
b		с	c d	d		× extract
Planting distance effect	19.66	15.50	12.66	9.66	Marvel	hybrid
	а	b	с	d		
14.50 a	19.83	15.83	12.66	9.66	35	
1100 0	а	b	с	d	cm	× extract planting
11.54 a	15.00	12.16	10.50	8.50	45	distances
	b	с	C d	d	cm	

Means that share the same alphabet for each factor and for each overlap do not differ significantly among themselves according to Duncan's test under 5% probability level

## 5- The number of male flowers (flower plant<sup>-1</sup>).

From table (5) it appears that spraying extract with the with veast three concentrations gave the most number of male flowers and significantly excelled in the treatment of no spraying with yeast extract. The highest number of male flowers (23.08) plant<sup>-1</sup>when spraying with flower а concentration of 4.5 ml  $L^{-1}$  of the extract compared to the lowest number (15.08) flower plant<sup>-1</sup>when treated without spraying with the extract. Table (5) also shows that the hybrid Marvel significantly excelled on the hybrid Aseel in the number of male flowers.We also find that the treatment of planting at a distance of 35 cm gave the most number of male flowers amounted to (21.25) flower plant<sup>-1</sup> significantly excelled on the treatment of planting at a distance of 45 cm. It is clear from Table (5) that the interaction treatment between spraying with yeast extract at a concentration of 4.5 ml  $L^{-1}$  with the hybrid Marvel gave the most number of male flowers and reached (25.50)flower plant<sup>-1</sup>, significantly excelled on all other interaction treatments. As for the interaction treatments between yeast extract and planting distances, it caused significant differences in the number of male flowers, especially the interaction between spraying with a concentration of 4.5 ml L<sup>-1</sup> of yeast extract and planting at a distance of 35 cm between plants. The highest number of male flowers was (23.33) flower plant<sup>-1</sup>, as a result of the treatment of the interaction between the hybrid Marvel and the planting at a distance of 35 cm, which differed significantly from the treatment of the interaction between the hybrid Aseel and the planting distance of only 45 cm.As for the triple interaction between the factors, the same table shows that the interaction treatment between spraying with a concentration of 4.5 ml  $L^{-1}$  of yeast extract with planting at a distance of 35 cm and for the Marvel hybrid significantly excelled on all other interaction treatments in the number of male flowers with a value of (30.33) flower plant<sup>-1</sup>Comparison with the lowest number when treating the interaction between no spraying with the extract and a distance of 45 cm between plants and the hybrid Aseel.

**Table (5):-** Hybrids, planting distance, spraying with yeast extract Fylloton, and the interaction between them in the number of male flowers of the summer squash plant. (flower plant<sup>-1</sup>).

Hybrid	hybrid		Yeast Extra	act m.L-1		planting		
effect	planting × distances	4.5ml L <sup>-1</sup>	$3 \text{ml } \text{L}^{-1}$	1.5ml L <sup>-1</sup>	0	cm	Hybrid	
	19.16	22.66	20.33	17.66	16.00	35		
17.16	a b	b	b-d	c d	e-g	cm	Aseel	
b	15 16 h	18.66	16.00	13.66 f σ	12.33	45		
	15.100	c-d	e-g	15.001 g	g	cm		
	23.33	30.33	23.33	21.00	18.66	35		
20.00	а	а	b	b c	c-d	cm	Marvel	
а	16.66	20.66	17.00	15.66	13.33	45		
	a b	b-d	d-f	e-g	f g	cm		
	23.08		19.16	17.00	15.08	15.08 d Yeast extract effect		
	a		b	с	d			
	20.66		18.16	15.66	14.16	Aseel		
	b		b c	d	d	Ascer	× extract	
Planting	distance effect	25.50	20.16 b	18.33	16.00	Marvel	hybrid	
1 functing		а	20.10 0	b c	c d			
21.25		26.50	21.83	19.33	17.33	35		
	a	а	b	b c	c d	cm	× extract	
	15.91	19.66	16.50	14.66	12.83	45	distances	
	b	b c	de	e f	f	cm		

### 6 - Percentage of fruit set.

Table (6) that all spraying treatments with yeast extract led to a significant increase in the percentage of fruit set compared to the treatment of no spraying with yeast extract. The treatment of spraying with the extract at a concentration of 4.5 ml L<sup>-1</sup> gave the highest percentage of fruit setting (66.37%) compared to the lowest rate (56.76%) when treated without spraying with the extract. The Aseel hybrid was significantly superior to this trait by a value of (66.93%) on the Marvel hybrid,

which gave a value of (56.28%).No significant differences were observed between plants grown under planting distances of 35 and 45 cm.As for the effect of the two interaction factors, it is clear from the same table that the interaction treatments between spraying yeast extract with hybrids that the spraying treatment with a concentration of 4.5 ml L<sup>-1</sup> of yeast extract and for the hybrid Aseel gave the highest percentage of fruit set (70.44%).While the interaction treatment between no spraying with the extract and the Marvel hybrid gave the lowest percentage of fruit set (50.22%). There was also a significant effect as a result of the interaction treatments between spraying with yeast extract and planting distances. The treatment of the interaction between spraying with yeast extract at a concentration of 4.5 ml  $L^{-1}$  with a distance of 45 cm resulted in the highest percentage of fruit set and reached (72.08%). While the lowest percentage of fruit set was (48.64%) when treating the interaction between no spraying with the extract at a distance of 35 cm. While there were no

significant differences between the interaction treatments between the cultivation distances. In the triple interaction treatments, Table (6) shows that the interaction treatment between spraying with a concentration of 4.5 ml L<sup>-1</sup> of yeast extract with a distance of 45 cm and for the Marvel hybrid gave the highest percentage of fruit set and reached (74.05%).While the lowest percentage of fruit set was (38.33%) when treating the non-spraying with the extract with a distance of 35 cm and for the Marvel hybrid.

 Table (6):- Hybrids, planting distance, spraying with yeast extract Fylloton, and the interaction between them in the percentage of fruit set of summer squash.

	hybrid		Yeast Ext	ract m.L <sup>-1</sup>		planting	
hybrid	planting × distances	4.5ml L-1	3ml L-1	1.5ml L- 1	0	cm	Hybrid
	64.01	68.77	67.24	(1.07  a  d)	58.95	35	
66.93	а	a b	a b	01.07 a-d	a-d	cm	Aseel
а	69.86	72.11	71.29	69.20 a h	67.67	45	10001
	а	а	а	08.39 a D	a b	cm	
	44.28	50.57	45.36	42.89	38.33	35	
56.28	а	b-e	с-е	de	e	cm	Marvel
b	68.28	74.05	72.69	64.28	62.11	45	
	а	a	а	a b	a-c	cm	
	66.37	l	64.14	4 59.15 56.76		Veget entropt offeet	
	a		a b	a b	b	r east e	xtract effect
	70.44		69.26	64.73	63.31	Assal	
	а		а	a b	a-c	Aseel	× extract
Dianting	distance affect	62.31	59.02	53.58	50.22	Morvol	hybrid
Planung	distance effect	a-c	a-c	b c	с	Marver	
	54.14	59.67	56.30	51.98	48.64	35	× extract
	a	b-d	c d	d	d	cm	planting

69.07	72.08	71.99	66.33	64.89	45	distances
a	a	a b	a-c	a-c	cm	

The Marvel hybrid excelled in the traits (number of male flowers, number of female flowers) except for the trait of the percentage of fruit set in which the hybrid Aseel surpassed This may be due to the genetic factors related to the hybrid, which led to its excel in these traits. The planting distances did not have a significant effect on these traits except that the planting distance of 35 cm between plants was significantly higher than the number of male flowers at the planting distance of 45 cm.All treatments of foliar spraying with yeast extract were significantly excelled on the control treatment, and spraying with yeast extract at the level 4.5 ml.l-1 gave the highest values in all the mentioned traits. The reason for the early flowering may be due to the nutrients, including N and C, which are contained in the yeast extract, which led to an increase in the efficiency of the photosynthesis process and led an increase in carbohydrates, stimulating the vegetative buds and turning them into flower buds and reducing the time for the emergence of the first flower, This is consistent with what he found (8) when studying the cucumber plant. It may also be due to the yeast extract containing nutrients that enter the composition of some enzymes and activate their work, as well as regulating the vital activities in the plant, including stimulating flowering, which leads to early flowering (6). .

## 7- Early yield (ton ha<sup>-1</sup>).

Table (7) shows that there was a significant increase in the early yield with spraying yeast extract at a concentration of 4.5 ml  $L^{-1}$ , which gave (5.73) tons ha<sup>-1</sup> compared to the lowest yield, which amounted to (1.32 tons ha-1) when treated without spraying with the extract. As for the effect of the hybrid, the Aseel hybrid was significantly excelled with a value of (3.49) tons ha<sup>-1</sup> compared with the hybrid Marvel, which gave a yield of (2.77)

tons ha-1, and the treatment of planting at a distance of 35 cm between plants was significantly excelled at a distance of 45 cm and gave (4.14) tons ha<sup>-1</sup> compared with (2.12)ton ha<sup>-1</sup> at a distance of 45 cm.In the two interaction treatments between spraying with yeast extract and hybrids, the results of the same table show that the interaction treatment between spraying with a concentration of 4.5 ml  $L^{-1}$  of the extract with the hybrid Marvel gave the highest early yield of (6.16) tons ha It significantly excelled on all other treatments, while the lowest yield was (0.61)ton ha<sup>-1</sup> when treating the interaction between no spraying with the extract and the hybrid Marvel. Also, we find from Table (7) that there are significant differences in the interaction treatments between spraying with yeast extract and cultivation distances, and the highest yield Early (8.38) tons. ha<sup>-1</sup> when spraying with a concentration of 4.5 ml  $L^{-1}$  of yeast extract with a distance of 35 cm between plants and significantly different from all other treatments. While the interaction between no spraying with yeast extract with a distance of 45 cm gave the least significant value in the early yield reaching (0.96) tons ha<sup>-1</sup>The interaction treatments between hybrids and planting distances led to some significant differences in the early yield, and the highest vield of the early yield (5.07) ton ha<sup>-1</sup> when planted at a distance of 35 cm and for the hybrid Aseel, which differed significantly from the rest of the other interaction treatments and compared to the lowest production of the early yield that It reached (1.90) ton  $ha^{-1}$  at a distance of 35 cm with the Marvel hybrid. From the same table, we find that the triple interaction treatments between the studied factors caused significant differences in the trait of the early yield, and the highest production was (8.64) tons ha-1 when spraying with a concentration of 4.5 ml  $L^{-1}$  of yeast extract with cultivation at a distance of 35 cm for the Marvel hybrid and

differed significantly from the All treatments except the interaction between spraying 4.5 ml.1<sup>-1</sup> of yeast extract with cultivation at a distance of 35 cm and for the hybrid Aseel. While the interaction between no spraying with yeast extract with planting at a distance of 35 cm and the Marvel hybrid gave the least significant value in the early yield, reaching (0.36) tons ha<sup>-1</sup>.

Table (7):- Hybrids, planting distance and spraying with yeast extract Fylloton, and th	e
interaction between them in the early yield of summer squash. (ton ha $^{-1}$ )	

Hybrid	hybrid		Yeast Extra	ct ml.L <sup>-1</sup>		planting distances	planting distances	
effect	distances	$4.5 \text{ml L}^{-1}$	3ml L <sup>-1</sup>	1.5ml L <sup>-1</sup>	0	cm	Hybrid	
	5.07	8.11	5.10	4.09	2.99	35		
3.49	a	а	b	с	de	cm	Aseel	
a	3.20	2.51	2.28	1.77	1.06	45	10001	
	b	e f	e f	f g	g h	cm		
	1.90	8.64	2.57	1.25	0.36	35		
2.77	b	а	e f	g h	h	cm	Marvel	
b	2.33	3.68	2.61	2.19	0.86	45		
	b	cd	e f	e f	g h	cm		
	5.73		3.14	2.32	1.32	Vaasta	vtroot offoot	
	а		b	с	d	Yeast extract effect		
	5.31		3.69	2.93	2.03	Accel		
	b		с	d	e f	Aseei	× extract	
Planting	a distance effect	6.16	2.59	1.72	0.61	Marvel	hybrid	
	Planting distance effect		de	f	g			
	4.14	8.38	3.84	2.67	1.68	35		
	a	а	b	c d	f	cm	× extract	
	2.12	3.09	2.44	1.98	0.96	45	distances	
	b	с	de	e f	g	cm		

8 - Total yield (ton  $ha^{-1}$ ).

Table (8) shows the effect of spraying with yeast extract on the total production of fruits (tons.  $ha^{-1}$ ), where the treatment of spraying

with a concentration of 4.5 ml  $L^{-1}$  of yeast extract was significantly excelled on giving the highest yield of (55.99 tons. ha<sup>-1</sup>) and differed significantly from the rest of the treatments The lowest yield was (24.38) tons ha<sup>-1</sup> when treated without spraying with the extract. There was no significant difference between hybrids in this trait. The planting distance (35) cm between plants had a significant effect in increasing the total production of fruits, which reached (46.54) tons ha<sup>-1</sup> compared to the planting distance (45) cm, which gave the lowest production (30.16) ton ha<sup>-1</sup>. Table (8) also shows that the interaction treatments between spraying yeast extract with the hybrids led to significant differences in the total production of fruits, and the highest production reached (58.54) tons ha<sup>-1</sup> for the interaction treatment between spraying with a concentration of 4.5 ml  $L^{-1}$  of yeast extract with the hybrid Marvel and they significantly. than differed all other treatments, but the total production decreased to (23.41) tons ha<sup>-1</sup> when treating the interaction between no spraying with yeast extract and the hybrid Marvel. The interaction treatments between yeast extract and planting distances had a significant effect on increasing

the total fruit production and it reached (67.13) tons ha<sup>-1</sup> when spraying with a concentration of 4.5 ml  $L^{-1}$  of yeast extract with a planting distance of 35 cm. The total yield decreased to (19.77) tons ha<sup>-1</sup> when treated with no spraying with the extract at a distance of 45 cm. The interaction factors between hybrids and planting distances resulted in significant differences in the total production of fruits as it reached (49.09) tons ha<sup>-1</sup> when the hybrid Aseel with a distance of 35 cm Compared to the lowest yield (28.85 tons ha<sup>-1</sup>) for the same hybrid with a distance of 45 cm. The triple interaction treatments also led to significant differences in the total fruit production, which amounted to (68.30) tons ha<sup>-1</sup> for the spraying treatment with a concentration of 4.5 ml L<sup>-1</sup> of yeast extract with a distance of 35 cm with the hybrid Marvel and it differed significantly from all treatments except for the interaction treatment between spraying with a concentration of 4.5  $ml.L^{-1}of$ yeast extract and Aseel hybrid.Compared with the lowest total fruit production (19.63) tons ha<sup>-1</sup> when the interaction between no spraving with yeast extract with a distance of 45 cm and for the Marvel hybrid.

	28.85	40.92	29.11	25.44	19.92	45		
	b	de	f g	g h	h	cm		
	43.98	68.30	43.86	36.57	27.19	35		
37.72	а	а	c d	e f	g h	cm	Morvol	
a	31.47	48.77	31.44	26.03	19.63	45	Ivial vel	
	b	b c	f g	g h	h	cm		
55.99			39.23	33.78	24.38	Vaget o	wtroat affaat	
	а		b	с	d	I east extract effect		
	53.43		40.81	36.27	25.36	Accel	× avtract	
	b		с	с	e	Aseel	<ul> <li>extract</li> </ul>	
Planting	g distance effect	58.54 a	37.65 c	31.30 d	23.41 e	Marvel	nybrid	
	46.54	67.13	48.19	41.83	29.00	35	35 cm × extract	
	a	а	b	с	d	cm		
	30.16	44.85	30.27	25.73	19.77	45	distances	
	b	b c	d	d	e	cm	uistallees	

The trait of the early yield by which the hybrid Aseel was significantly excelled on the Marvel hybrid is due to the genetic factors related to the hybrid, which led to its excelled in this trait.The treatment of planting at a distance of

(35) cm between plants gave the highest values in the traits (early yield, total yield) compared to planting at a distance of (45) cm between plants, and this is due to the increase in the number of plants per area and unit area

in close distances compared to their number in spaced distances ( 2(.All foliar spraying yeast treatments with extract were significantly excelled on the control treatment (no spray), and spraying with yeast extract at the level 4.5 ml.l<sup>-1</sup> gave the highest values in all yield traits. The reason may be due to the positive role of yeast extract in increasing the flower set and then increasing the total vield.Or, the reason may be due to the vital role of yeast extract, which led to the formation of a good vegetative system, which is the reason for the accumulation of large amounts of sugars that help in increasing cell division and thus increase the total yield (6).

## References

1 - Al-Badran, Hataf Hammoud Jassem. (2009). Effect of planting date, method and distance on the growth and yield of summer squash (Cucurbita pepo. L). In unheated greenhouses. Master's thesis. College of Agriculture - University of Basra - Iraq.

2 - Al-Dougji, Issam Hussein Ali, Abdul Razzaq Othman Hassan and Nadia Nasser Hamid. (2009). Effect of planting distance and soil coverage on the growth and yield of Cucumber (Cucurbita pepo. L). Cultivated in greenhouses. Basra Journal of Agricultural Sciences, 22(2): 24-33.

3 - Al-Rawi, Enas Yassin (2004). Effect of spraying garlic hydrazide extract and urea on growth, flowering, and yield of summer squash. Master's Thesis, College of Agriculture, University of Baghdad.

4 - Al-Rawi, humbled Mahmoud and Abdel Aziz Khalaf Allah. (2000). Design and Analysis of Agricultural Experiments, Ministry of Higher Education and Scientific Research, University of Mosul, Iraq.

5 - Al-Zubaidi, Ali Hassan Ali (2018). Effect of foliar spraying (Basfoliar Kelp and Fylloton) on the growth of two eggplant cultivars (Solanum melongena. L). And their productions. Journal of Babylon University / Pure and Applied Sciences and Engineering Sciences / Volume (26), No. (1). 6 - Al-Shamry, Aziz Mahdi Abd and Omar Ghazi Yahya Saud. (2013). Effect of spraying with some organic nutrients and breeding method on the growth and yield of three cucumber crosses under protected cultivation conditions. Diyala Journal of Agricultural Sciences, 5 (2): 283-294.

7 - Al-Mawsili, Muzaffar Ahmed. (2007). Medical plants mentioned by the heavenly books. Ministry of Higher Education and Scientific Research, University of Mosul, Iraq.

8 - Hussein, Wafaa Ali. (2002). Effect of garlic, licorice root and urea extracts on vegetative, flowering, yield and qualitative characteristics of cucumber plant (Cucumis sativus. L). Master Thesis . College of Agriculture, University of Baghdad. Iraq.

9 - Muhammad, Abdul Azim Kazem. (1985). Practical experiments in plant physiology, Dar Al-Kutub Institution for Printing and Publishing, University of Mosul - Ministry of Higher Education and Scientific Research -Republic of Iraq.

10 - Muslat, Muwaffaq Mizban and Omar Saleh Musleh. (2012). Basics of Organic Agriculture. Ministry of Higher Education and Scientific Research. Anbar University. Iraq.

11 - Ayas, H. And Gulser, F.(2005). The effect of sulfer and humic acid on yield components and macronutrients contents of spinach (*Spinacea oleracea* L.) Var.Spinoza.Journal of Biological Sciences,5(6):801-804.

12 - Blunden, G.(1991). Agricultural uses of Seaweed and Seaweed extracts p 66-81 . In.M.D. Cuiry G. Blunden (eds) Seaweed resources in Europ : uses and potential J. Willy and sons, Ltd., Chichester, U.K.

13 - Citak, S. And Sonmez, S .(2010).Effect of conventional and organic fertilization on spinach (*Spinacea oleracea* L.) growth, yield , vitamin C and nitrate concetration during two successive seasons. Scientia Horticulturae, 126(4):415-420.

14 - Dilson, A.B. (2002). Origin and evolution of cultivated cucurbita. Ciencia Rural, 32 (5): 715-723.

15 - K. Kostadinov and S. Kostadinova.(2014). Nitrogen Efficiency in eggplantS (*Solanum melongena* L.) depending oN fertilizing. Bulgarian Journal of Agricultural Science, 20 (No 2), 287-292 Agricultural Academy.

16 - MacGillivray,J.H.(1961).Vegetable Production.New York;McGraw-Hill Book Comp,Inc.

17 - Nerson, H. (2005). Effect of fruit shape and plant density on seed yield and quality of squash .Scientia Hort. Abst. 105(3): 293-304.

18 - Whitaker, T. W. and G. N. Davis (1962). Cucurbits . InterScience Pub., Inc., N.Y. p.249.