
Effect of Amino Acids and Salicylic Acids on The Vegetative Growth Adjectives of Two Hybrids of Summer Squash (*Cucurbita pepo* L.).

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ABSTRACT

The experiment was carried out in the vegetable field of the Department of Horticulture and Landscape Engineering / College of Agriculture and Forestry / University of Mosul for the spring season 2021 to study the effect of amino acids and salicylic acid on the growth characteristics and yield of two squash hybrids. The experiment included three factors, represented by hybrids (Clarita and Crown), which were placed in the main plots of the experiment, while the second factor was amino acids and salicylic acid, with three concentrations of each (zero, 1.5 ml / l, 3 ml / l) and (zero, 250 ppm, 500 ppm) respectively which are placed in the secondary blocks. The results showed the superiority of the Clarita hybrid in most of the vegetative growth traits, as well as the superiority of the main factors in all vegetative growth traits and the number of days required for the emergence of the first female flower under high levels of spraying. The triple interaction of Clarita cultivar under high levels of spraying gave significant values for the same traits, with Crown cultivar outperforming under high levels of spraying. The high spraying in the number of days required for the emergence of the first female flower compared to the Clarita variety under comparison with the superiority of the Crown variety in the number of female and male flowers and the superiority of the Clarita variety in the sexual ratio as well as the superiority of the plant grown under the high spray level of salicylic acid, while the Crown variety under the level of Spraying 3 ml / liter and 500 ppm had the lowest values in the sex ratio of the plant compared to the crown cultivar under comparison and the spray level was 250 ppm.

1. Introduction

The squash plant (Squash and its scientific name is (Summer squash) is among the vegetable crops of the Cucurbitaceae family. The squash plant is grown in Iraq in two loops (spring and autumn) as well as the possibility of planting it under plastic tunnels in the winter season (Al-Saeedi, 2003). Its original home is North and Central America, and then its cultivation expanded to include all parts of the world (Dilson, (2002). The cucurbit family has 122 genera and 900 species and is considered one of the important plants that provide humans with edible products (Heneidak), Khalik, 2015) and (2002 Bisognin.

A study conducted by Marie (and Mohammed 2010) in his study in the Dohuk governorate of two genotypes of zucchini squash, the local variety Mulla Ahmed and the hybrid Opal type-HED, indicated a significant superiority of the variety Mulla Ahmed in the characteristic of plant height over the other variety. And that (Al-Dusky 2010) and (Refai and Mohamed, 2009) confirmed the existence of a difference between zucchini squash cultivars among themselves in the number of leaves / plant and in the total leaf area. Radiya (2002) mentioned in his study on zucchini squash plants in Egypt that the variety Biruni was significantly superior in the speed of emergence of female flowers and their number and increase in the sexual ratio compared to the summer Mabrouka.

In a study conducted by Hussein and others ((2009 at the University of Baghdad) on the growth of three cultivars of zucchini squash, Ghouta al-Sham (Syrian) and the Dutch Dp-5302)) and the local variety (Mulla Ahmed), they noticed a significant increase in Ghouta al-Sham (Syrian) in The characteristics of vegetative growth represented (plant height, number of leaves and leaf area) compared to the other two varieties. Tonight (2007) was studied in Mosul on four varieties of zucchini squash, namely (Local, Syrian Future, Bather EL.Bether and (Tala). The results showed that the two varieties (Syrian Future). and

Tala) were significantly superior to the other two cultivars in the characteristics of vegetative growth, the number of female flowers and the sexual ratio. In a study at the University of Basra by Abdullah and Al-Maliki (2016) on two zucchini squash hybrids (Amjad and Jamila) they noticed that the hybrid Jamila was significantly superior in the characteristics of The vegetative growth represented by plant height and number of leaves, while the hybrid Amjad excelled in the leaf area of the plant. Al-Mamouri (2005) studied four hybrid varieties of zucchini squash, namely Opline, Amjad, Five stars, Tokay, and found that Opline cultivar was significantly superior in vegetative growth characteristics for both The lugs.

Sarhan (2011) concluded in a study he conducted in Dohuk to compare the Suheimie squash variety with the local variety named Mulla Ahmed, and found that Suheimie cultivar was significantly superior to the local variety in the number of female flowers and sexual ratio. Al-Jubouri et al. (2001) concluded in their study of seven pure strains of squash (S1, S2, S3, S4, S5, S6, S7) that the strain S4 is significantly superior in the characteristics of floral growth represented by the number of female flowers, the number of male flowers and the sexual ratio over the rest of the strains. In a study by Nesmith, Hoogenboom (1994), it was found that there were significant differences in the characteristics of flowering growth among the studied cultivars of squash (Lemondrop, Dixie, Senator, Elite, Meigs). They noticed that the sex ratio was similar in the two cultivars (Senator, Elite) compared with the rest of the cultivars. The studied cultivar, Dixie, produced more than 50% of the female flowers compared to the male flowers, while the cultivar Senator produced more male flowers than the female flowers. Al-Khashab (2008) found in his study in Mosul on three varieties of zucchini squash (Nadi, Asma and Mulla Ahmed) that the variety Nadi gave the highest nationality and contract ratio.

And for the purpose of increasing the productivity of the squash crop, we have to develop and increase the productivity of the crop through the use of foliar spraying with salicylic acid, where (AL-Rubaye and Abd Atia, 2016) found that spraying the vegetative total of squash plants with salicylic acid and at three spraying levels are (0, 3 and 5) mmol. They observed that plants treated with a concentration of (5) mmol were significantly superior in the characteristics of plant height and the percentage of chlorophyll in leaves. A study was mentioned by Samra et al. (2015) in Syria on cucumber plants through the use of salicylic acid at two concentrations (1, 0.5 mmol) in Three different treatments, namely soaking the seeds for 12 hours and irrigating young plants and seedlings with the two concentrations studied, gave an increase in the total number of flowers (male and female) compared to the control treatment.

Al-Rubaie and Abdel-Rasoul (2016) indicated in a study using three concentrations of salicylic acid (4, 2, 0 M) sprinkled on zucchini squash plants, it was found that the concentration (4) M was significantly superior to all vegetative growth characteristics for both growing seasons. In a study by Abd El-Mageed et al. (2016) on the squash plant when using salicylic acid at a concentration of 1 mmol, the results of the research were good with the use of deficient irrigation of the plant, which indicated the role of acid in the plant's tolerance to water stress conditions with an improvement in vegetative growth characteristics Also, in a study by Jafari et al. (2015) on the cucumber plant, they noticed the superiority of plants treated with salicylic acid in the leaf area of the plant when it was used at a concentration of (10) mmol compared to plants treated with silicon or the comparison. Singh (and Singh 2016) explained that spraying salicylic acid on cucumber plants at a concentration of (0.5 mM) led to an increase in plant height (120.31 cm).

Baba et al. (2017) mentioned in a study to find out the effect of spraying of salicylic acid (2, 1, 0) mmol on the growth characteristics and yield of strawberry plants, cultivar Camarosa growing in the field, using salicylic acid spraying in two stages, the first at the stage of opening 3-4 leaves and the second after 15 days from the first spray, the results showed the superiority of the spray treatment with a concentration of 2 mmol in the characteristics of flower growth, as it gave the longest flowering period of 80-34 days and an increase in the number of flowers compared to the treatment without spraying.

Shehata and Abdelgawad (2019) indicated in a study on the zucchini squash plant using amino acids as a spray on the shoots at a concentration of (1000, 500, 0) ppm and in three stages (45, 35, 25) days after planting, where they noticed that the treatment (1000) ppm It promoted plant growth as well as led to an increase in sexual ratio. And Faten et al. (2010) showed that foliar spraying of squash plants with amino acids led to an increase in plant growth. In a study by Merzah and Aboohanah (2020) by foliar spraying of zucchini squash plant with amino acids and at three concentrations (0, 1.5, 3 ml / liter), where the measured data showed an outperformance in the weight of 1000 seeds and the strength and vitality of the seeds, which was the result of an increase in the number of branches and area Leafy plants as a result of the increase in the formation of organic acids formed within the plant due to the increase in the process of photosynthesis.

Jassim (2012) found that spraying with ascorbic acid at a concentration of 40 mg. L-1 and chelated iron at a concentration of 600 mg. L-1, led to an increase in the indices of flowering growth of zucchini squash, and the results of Neeraga et al. (2005) showed that treating tomato plants with amino acids led to an increase in the number of flowering clusters. Arancon et al.

(2006) indicated that after using humic acid extracted from vermicompost led to an increase in the number of flowering clusters. In the number of flowers for cucumber plants. Cohen (2002) concluded when spraying tomato plants with amino acids led to a reduction in flower drop.

Jasim et al. (2015) indicated in their study on zucchini squash plants, they found that foliar spraying with humic acid on squash plants growing in saline soils gave an increase in the number of leaves compared to the treatment compared to the comparison treatment. In a study by Mohren et al. (2007) on Zucchini squash plants showed that repeated spraying with ethephon solution three times, after each of the first, third and fifth leaves, at a concentration of 500 mg/l, led to a decrease in the sex ratio in contrast to an increase in the number of female flowers. In order to improve the vegetative and flowering growth of the plant, this research aims to know the effect of hybrids, salicylic acid and amino acid on the vegetative and flowering growth characteristics of zucchini squash.

2. Materials and methods.

The experiment was carried out in the field of horticulture and landscaping, College of Agriculture and Forestry, University of Mosul during the spring season 2021 for the purpose of knowing the effect of salicylic acid and amino acid on the vegetative and flowering characteristics of two squash hybrids. Length (4 m), width (70 cm), and the distance between the replicas (50 cm), and then drip irrigation pipes were installed in the middle of the terrace.

The seeds of two zucchini squash hybrids (Clarita and Crown) were planted in small plastic containers (8 cm in length and 9 cm in diameter) and soil consisting of a mixture of (garden soil (1), peat moss (1) and animal manure (2)) on 3/12/2021. Irrigation by spraying the seeds using a fungicide Stroma at a concentration (1 g / 1 liter) of water to get rid of diseases and the seeds began to germinate 5 days after planting in plastic containers, and the real leaves appeared to appear 10 days after planting, the seedlings were moved to the permanent place and seedlings were planted on 4/4/ 2021 and then carry out service operations such as irrigation, hoeing and spraying with the insecticide (Super Serene) whenever needed. The study included three factors, namely:

The first factor: the hybrid Two hybrids of pumpkin (CLARITA) will be used, the country of origin is the United States of America, and another hybrid is (CROWN).

The second factor: amino acid in three levels (zero, 1.5 ml / liter, 3 ml / liter).

The third factor: salicylic acid in three levels (zero, 250 ppm, 500 ppm), where the plants are sprayed in three batches, the first one week after planting and the second when flowering, with the third batch spraying 15 days after the second spray, this experiment was organized using a split cutting system according to a split design – plot system with in (RCBD) and with three replications, where the hybrids are placed in the main plots, while acids are placed in the sub-plots with the same importance. Thus, the experiment included 18 factorial treatments (2 x 3 x 3) and with three replications.

Studied traits: _

The readings were taken for the following characteristics:

- 1- Plant height (cm. plant⁻¹).
- 2 - number of leaves plant⁻¹.
- 3- Leaf area (cm²/plant).
- 4- Number of male flowers. Plant⁻¹.
- 5 - Number of female flowers. Plant⁻¹.
- 6- Sex ratio.

3. Results and discussion .

1 - height of the plant.

The results of the analyzes in Table (1) show a significant difference between the cultivars, where Clarita cultivar significantly outperformed the plant spike trait with a value of (58,469) cm compared to the Crown variety, which gave low values for the plant spike trait, which amounted to (46.766) cm.

As for the effect of spraying with salicylic acid, the plants that were treated with a spray level of 500 ppm showed a significant superiority in terms of plant height, with a value of (61.557) cm, compared with the untreated plants, which gave the lowest values for plant height, with a value of (45,241) cm.

Whereas, the plants that were not treated with amino acid gave the lowest values for plant height, which amounted to (48,057) cm, compared with the plants sprayed with amino acid, with both concentrations (1.5 and 3) ml / liter and values reached (53.259 and 56,538) cm, respectively.

As for the interaction between the hybrids and the amino acid, as Table (1) shows the superiority of the hybrid Clarita under the spray level (3ml/L) significantly and with a value of (62.519) cm compared with the hybrid Crown under the comparison, which gave the lowest plant height, which reached (62.519) cm.

As for the interaction between hybrids and salicylic acid gave the plants growing under comparison to the hybrid Crown the lowest values for plant height, with a value of (39.963) cm compared with plants grown under the spray level (500) ppm for the hybrid Clarita, which gave the highest value for plant height (65.296) cm.

As for the interaction between histidine and salicylic acid, the plants grown under the spraying level of (3) ml / liter of histidine and (500) ppm of salicylic acid showed the highest values for plant height, reaching (68,833) cm compared with the plants grown under comparison, which gave the lowest height per plant and reached (41.833) cm.

As for the triple interaction, Clarita cultivar excelled under spraying level of (500) ppm of salicylic acid and (3) ml / liter of histidine, giving the highest values in plant height, reaching (71.333) cm compared with the growing plants under comparison of Crown cultivar, which gave the lowest values. The height of the plant reached (38.777) cm.

Table (1): Hybrids and spraying with amino acid and salicylic acid and the interaction between them in plant height (cm) for summer squash.

Hybrid	Salicylic acid	amino acid			Hybrid × Salicylic acid	Hybrid effect
		control	1.5 m/l	3 m/l		
Clarita	0	44.890 e-g	51.887 c-f	54.780 b-e	50.519 c	58.469 a
	250 ppm	56.557 b-d	60.780 a-c	61.443 a-c	59.593 a b	
	500 ppm	61.777 a-c	62.777 a-c	71.333 a	65.296 a	
Crown	0	38.777 g	40.557 fg	40.557 fg	39.963 d	46.766 b
	250 ppm	40.553 fg	42.220 fg	44.780 e-g	42.518 d	
	500 ppm	45.787 d-g	61.333 a-c	66.333 ab	57.818 b	
Hybrid × amino acid	Clarita	54.408 bc	58.481 ab	62.519 a	effect Salicylic acid	
	Crown	41.706 e	48.037 d	50.557 cd		
Salicylic acid × amino acid	0	41.833 c	46.222 bc	47.668 bc	45.241 c	
	250 ppm	48.555 bc	51.500 b	53.112 b	51.056 b	
	500 ppm	53.782 b	62.055 a	68.833 a	61.557 a	
effect amino acid		48.057 b	53.259 a	56.538 a		

2- Number of leaves. Plant⁻¹.

Table (2) shows the significant superiority of the hybrid Clarita in the number of leaves, which amounted to (46.0622 leaves/plant), compared with the lowest number of leaves observed under the control treatment, with a value of (42.6056) leaves/plant.

As for the effect of amino acid, the plants grown under the high level of spraying (3) ml / liter outperformed, where the number of leaves was (46.075) leaves / plant compared with the lowest number of leaves for the plants growing under the comparison and the number of leaves was ((43.092 leaves / plant).

Salicylic acid does not differ, as the plants grown under the high level of spraying (500ppm) outperformed, with a value of (47,5744) leaves/plant compared to the lowest number of leaves for plants grown under the comparison and the number of leaves was (41.445) leaves/plant.

As for the bilateral interaction of salicylic acid with the hybrids, where the plants grown under comparison of the hybrid Crown gave the lowest values in the number of leaves and reached (40,7411) leaves/plant compared to the plants grown under the spray level (500 ppm) for Clarita, which gave the highest number of leaves of the plant amounted to (((50.1856) leaf/plant.

While the plants grown under comparison of the hybrid Crown gave the lowest values for the number of leaves and a value of (41.6667) leaves/plant compared with the plants grown under the spray level (3) ml/liter of the amino acid of the hybrid Clarita, which gave the highest number of leaves that reached (48,2233) leaves/ Plant.

While the binary interactions between the two acids gave a significant difference, as the plants growing under the levels (500 ppm) and (3) ml / liter gave the highest number of leaves of the plant reached (51.112) leaves / plant compared with the least number of leaves of the plant that got under the comparison (40.557). plant's leaf.

As for the triple interaction, the plants growing for the hybrid Clarita outperformed under the two spray levels (3) ml / liter and (500 ppm) the highest number of leaves of the plant reached (53.890) leaves / plant compared to the plants grown under the comparison of the hybrid Crown, which gave the least number of leaves It reached (40,333) leaves/plant.

Table (2): Hybrids and spraying with amino acid and salicylic acid and the interaction between them in the number of leaves for summer squash.

Hybrid	Salicylic acid	amino acid			Hybrid × Salicylic acid	Hybrid effect
		control	1.5 m/l	3 m/l		
Clarita	0	40.780 fg	41.777 e-g	43.890 c-f	42.1489 c	46.0622 a
	250 ppm	44.667 c-e	46.000 b-d	46.890 bc	45.8522 b	
	500 ppm	48.110 b	48.557 b	53.890 a	50.1856 a	
Crown	0	40.333 g	40.890 fg	41.000 fg	40.7411 c	42.6056 b
	250 ppm	41.890 e-g	42.000 e-g	42.447 e-g	42.1122 c	
	500 ppm	42.777 d-g	43.780 c-g	48.333 b	44.9633 b	
Hybrid × amino acid	Clarita	44.5189 b	45.4444 b	48.2233 a	effect Salicylic acid	
	Crown	41.6667 d	42.2233 cd	43.9267 bc		
Salicylic acid × amino	0	40.557 f	41.333 ef	42.445 d-f	41.445 c	

acid	250 ppm	43.278 c-e	44.000 b-d	44.668 b-d	43.9822 b
	500 ppm	45.443 bc	46.168 b	51.112 a	47.5744 a
effect amino acid		43.092 b	43.833 b	46.075 a	

3- leaf area / plant.

Table (3) shows the significant superiority of the hybrid Clarita in the leaf area characteristic of the plant, which amounted to ((4018.4) cm² compared with the lowest leaf area of the plant observed under the control treatment, with a value of (3377.2) cm².

As for the effect of the amino acid, the plants grown under the high level of spraying (3) ml / liter outperformed, where the leaf area of the plant was (4010.7) cm² compared to the lowest leaf area of the plants grown under comparison, and the leaf area was (3342.0 cm²).

Salicylic acid does not differ, as the plants grown under the high level of spraying (500ppm) outperformed the leaf area of the plant, which amounted to (4698.3) cm² compared to the lowest leaf area of the plants grown under comparison which was (2879.6 cm²).

As for the binary interaction of salicylic acid with the hybrids, where plants grown under comparison of the hybrid Crown gave the lowest values in the leaf area of the plant, which amounted to (2588.4) cm² compared to plants grown under the spray level (ppm 500) for the variety Clarita, which gave the largest leaf area of the plant amounted to (4879.8) cm².

As for the interaction between the hybrids and the amino acid, the plants grown under the spray level (3) ml / liter of the amino acid of the hybrid Clarita gave the largest leaf area of the plant amounted to (4377.5) cm² compared to the plants grown under the comparison of the hybrid Crown, which gave the least leaf area of the plant amounted to (3022.4)) cm².

As for the interaction between amino acid and salicylic acid, the plants grown under the spray level (3) ml / liter of amino acid and the spray level (500 ppm) of salicylic acid gave the largest leaf area of the plant amounted to (5181.5) cm² compared to the lowest leaf area of the plant under comparison which was (2422.0) cm².

While the plants grown for the hybrid Clarita under the spraying levels (500ppm) and (3) ml / liter gave the largest leaf area of the plant amounted to (5447.3) cm² compared to the plants grown under the comparison hybrid Crown, which gave the least leaf area of the plant amounted to (2163.5) cm².

Table (3): Hybrids and spraying with amino acid and salicylic acid and the interaction between them in leaf area cm² /plant for summer squash.

Hybrid	Salicylic acid	amino acid			Hybrid ×Salicylic acid	Hybrid effect
		control	1.5 m/l	3 m/l		
Clarita	0	2680.5 gh	3285.9 d-g	3546.0 c-g	3170.8 c	4018.4 a
	250 ppm	3867.0 b-f	4008.0 b-e	4139.1 b-d	4004.7 b	
	500 ppm	4437.7 a-c	4754.4 ab	5447.3 a	4879.8 a	
Crown	0	2163.5 h	2765.4 gh	2836.4 f-h	2588.4 d	3377.2 b
	250 ppm	2886.8 f-g	3012.3 e-h	3180.0 d-h	3026.4 cd	
	500 ppm	4016.8 b-e	4617.8 ab	4915.7 ab	4516.8 ab	
Hybrid × amino acid	Clarita	3661.7 b	4016.1 ab	4377.5 a	effect Salicylic acid	
	Crown	3022.4	3465.2	3644.0		

		c	bc	b	
Salicylic acid× amino acid	0	2422.0 e	3025.6 de	3191.2 d	2879.6 c
	250 ppm	3376.9 d	3510.2 d	3659.6 cd	3515.5 b
	500 ppm	4227.2 bc	4686.1 ab	5181.5 a	4698.3 a
effect amino acid		3342.0 b	3740.6 a	4010.7 a	

4- number of days for the first female flower to appear on the plant.

Table (4) shows the superiority of the Crown hybrid in the number of days for the appearance of the first female flower on the plant, as the period was (37.9259) days compared to the hybrid Clarita, which was delayed in the appearance of the first female flower on the plant and the period was (38,2593) days.

As for the effect of amino acid, the plants grown under the spraying level (3) outperformed (3) ml / liter in the early appearance of the first female flower on the plant ((37.2778 days) compared to the plants grown under the comparison, which was delayed in the flowering process as it needed (38.8333) days for flowering.

While the effect of salicylic acid and below the spray level (ppm 500) gave the least number of days needed for the appearance of the first female flower on the plant and the number of days amounted to (36.2222) days compared with the plants planted under comparison, which delayed the emergence of female flowers and needed (40.4444). flowering day.

While the binary interaction of salicylic acid with the hybrids by giving the plants grown under comparison and for both hybrids Clarita and Crown had the highest values in the number of days required for the appearance of the first female flower on the plant, and it reached (40.6667 and 40.2222) days, respectively, compared to the plants grown under the spray level (ppm 500). For both hybrids, Clarita and Crown, which gave the least number of days required for the appearance of the first female flower on the plant, and with a number of days that reached (36.3333 and 36.1111) days for flowering, respectively.

While the interaction between hybrids and amino acid, where the plants grown under the spray level gave (3) ml / liter of amino acid for the hybrid Crown, the least number of days required for the appearance of the first female flower on the plant was (37,111) days compared with the plants grown under the comparison of the hybrid Clarita Where it gave the largest number of days required for the appearance of the first female flower on the plant reached (39.0000) days.

The interaction between amino acid and salicylic acid did not differ. Plants grown under the spray level (3) ml/liter of amino acid and the spray level (ppm 500) of salicylic acid gave the least number of days needed for the appearance of the first female flower on the plant, which amounted to (35.5000) days compared to With the longest number of days required for the appearance of the first female flower on the plant under comparison, it reached (41.3333) days for flowering.

As for the triple interaction between hybrids and acids, the plants grown under the spraying level of (3) ml/liter of amino acid and the spraying level of (500 ppm) of salicylic acid outperformed the hybrid Crown in the least number of days needed for the appearance of the first female flower on the plant, which amounted to (35.3333) days compared to With the longest number of days required for the appearance of the first female flower on the plant under comparison and for the hybrid Clarita, it reached (41,6667) days for flowering.

Table (4): Hybrids and spraying with amino acid and salicylic acid and the interaction between them in the number of days for the appearance of the First female flower on the plant for summer squash.

Hybrid	Salicylic acid	amino acid			Hybrid × Salicylic acid	Hybrid effect
		control	1.5 m/l	3 m/l		
Clarita	0	41.6667 a	40.6667 a-c	39.6667 c-e	40.6667 a	38.2593 a
	250 ppm	38.6667 e-g	37.6667 g-i	37.0000 ij	37.7778 b	
	500 ppm	36.6667 i-k	36.6667 i-k	35.6667 kl	36.3333 c	
Crown	0	41.0000 ab	40.3333 b-d	39.3333 d-f	40.2222 a	37.9259 b
	250 ppm	38.3333 f-h	37.3333 h-j	36.6667 i-k	37.4444 b	
	500 ppm	36.6667 i-k	36.3333 j-l	35.3333 l	36.1111 c	
Hybrid × amino acid	Clarita	39.0000 a	38.3333 bc	37.4444 de	effect Salicylic acid	
	Crown	38.6667 ab	38.0000 cd	37.1111 e		
Salicylic acid × amino acid	0	41.3333 a	40.5000 b	39.5000 c	40.4444 a	
	250 ppm	38.5000 d	37.5000 a	36.8333 ef	37.6111 b	
	500 ppm	36.6667 f	36.5000 f	35.5000 g	36.2222 c	
effect amino acid		38.8333 a	38.1667 b	37.2778 c		

5 - the number of female flowers / plant.

The results showed that there were significant differences between the studied treatments in the number of female flowers of the two hybrids Clarita and Crown, as shown in Table (5), where the hybrid Crown was superior to the hybrid Clarita, giving (2.30370) female flower/plant and superior to the hybrid Clarita, which gave the least number of female flowers amounted to (1.85704) female flower / plant.

As for the effect of amino acid, the spraying level of (3) ml/liter of amino acid gave the highest values in the number of female flowers, which amounted to (2.27444) female flowers/plant, compared with the least number of female flowers observed under comparison, with a value of (1.94222) female flower/ plants .

The effect of salicylic acid does not differ, as the spray level (500ppm) of salicylic acid gave the highest values in the number of female flowers and reached (2.41556) female flower/plant compared with the least number of female flowers observed under comparison, with a value of (1.78889) female flower/plant.

As for the interaction between hybrids and salicylic acid, the Crown hybrid significantly outperformed under the spray level (ppm500) of salicylic acid with a value of (2.6044) female flower/plant compared with the lowest values in the number of female flowers of the hybrid Clarita under comparison (1,5689) female flower/plant.

The interaction between hybrids and amino acid showed a significant difference, where plants grown under spraying level (3) ml / liter of amino acid of the hybrid Crown gave the highest values in the number of female flowers and reached (2.4800) female flowers / plant compared with the lowest values in the number of female flowers of the hybrid Clarita Under comparison (1.7267) female flower / plant.

It was observed from the interaction between amino acid and salicylic acid. Plants grown under the spray level (3) ml / liter of amino acid and the spray level (500 ppm) of salicylic acid gave the highest values in the number of female flowers and reached

(2.8067) female flowers / plant compared to the lowest Values in the number of female flowers under comparison (1.6933) female flower/plant.

As for the triple interaction between hybrids and acids, plants grown under the spraying level of (3) ml / liter of amino acid and the level of spraying (ppm 500) of salicylic acid for the hybrid crown outperformed the largest number of female flowers and reached (2.9200) female flowers / plant compared with the lowest values In the number of female flowers under comparison for the hybrid Clarita (1.4867), female flower/plant.

Table (5): Hybrids and spraying with amino acid and salicylic acid and the interaction between them on the number of female flowers / summer squash plant.

Hybrid	Salicylic acid	amino acid			Hybrid × Salicylic acid	Hybrid effect
		control	1.5 m/l	3 m/l		
Clarita	0	1.4867 h	1.5333 gh	1.6867 f-h	1.5689 e	1.85704 b
	250 ppm	1.7400 f-h	1.7600 f-h	1.8267 e-h	1.7756 de	
	500 ppm	1.9533 c-h	2.0333 c-g	2.6933 ab	2.2267 bc	
Crown	0	1.9000 d-h	1.9933 c-h	2.1333 c-f	2.0089 cd	2.30370 a
	250 ppm	2.1600 c-f	2.3467 b-e	2.3867 b-d	2.2978 b	
	500 ppm	2.4133 b-d	2.4800 a-c	2.9200 a	2.6044 a	
Hybrid × amino acid	Clarita	1.7267 c	1.7756 c	2.0689 b	effect Salicylic acid	
	Crown	2.1578 b	2.2733 ab	2.4800 a		
Salicylic acid × amino acid	0	1.6933 d	1.7633 cd	1.9100 b-d	1.78889 c	
	250 ppm	1.9500 b-d	2.0533 bc	2.1067 bc	2.03667 b	
	500 ppm	2.1833 b	2.2567 b	2.8067 a	2.41556 a	
effect amino acid		1.94222 b	2.02444 b	2.27444 a		

6 - number of male flowers / plant.

Table (6) shows the superiority of the hybrid Crown over the hybrid Clarita, given (2.7722) male flower / plant and superior to the hybrid Clarita, which gave the least number of male flowers reached (2.2652) male flower / plant. We did not notice any significant effect of acids on the number of male flowers / plants.

As for the interaction between hybrids and salicylic acid, where the hybrid Crown significantly outperformed under the spray level (250 ppm) of salicylic acid with a value of (2.9511) male flower / plant compared with the lowest values in the number of male flowers of the hybrid Clarita under comparison (2.0356) male flower / plant.

It was noted from the interaction between the hybrids and the amino acid that there was a significant difference, as the plants grown under the comparison of the hybrid Crown gave the highest values in the number of male flowers and reached (2.8933) male flower / plant compared with the lowest values in the number of male flowers of the hybrid Clarita under the comparison (2.0711) male flower / plant .

As for the interaction between amino acid and salicylic acid, the plants grown under comparison of amino acid and the spray level (250 ppm) of salicylic acid gave the highest values in the number of male flowers and reached (2.9800) male flowers/plant compared with the lowest values in the number of male flowers under comparison for each Of the amino acid and salicylic acid, with a value of (2.0733) male flower / plant.

As for the triple interaction, the plants grown under comparison of amino acid and spray level (250 ppm) of salicylic acid hybrid crown gave the highest values in the number of male flowers and it reached (3.7467) male flower / plant compared with the lowest values in the number of male flowers under comparison for each of the acid Amino and salicylic acid for the hybrid Clarita with a value of (1.8400) male flower / plant.

Table (6): Hybrids and spraying with amino acid and salicylic acid and the interaction between them in the number of male flowers / summer squash plant.

Hybrid	Salicylic acid	amino acid			Hybrid × Salicylic acid	Hybrid effect
		control	1.5 m/l	3 m/l		
Clarita	0	1.8400 b	2.0133 b	2.2533 b	2.0356 c	2.2652 b
	250 ppm	2.2133 b	2.9600 ab	2.1200 b	2.4311 a-c	
	500 ppm	2.1600 b	2.3600 b	2.4667 b	2.3289 bc	
Crown	0	2.3067 b	2.7733 ab	2.7200 ab	2.6000 a-c	2.7722 a
	250 ppm	3.7467 a	2.4667 b	2.6400 b	2.9511 a	
	500 ppm	2.6267 b	2.8133 ab	2.8567 ab	2.7656 ab	
Hybrid × amino acid	Clarita	2.0711 c	2.4444 a-c	2.2800 bc	effect Salicylic acid	
	Crown	2.8933 a	2.6844 ab	2.7389 ab		
Salicylic acid × amino acid	0	2.0733 b	2.3933 ab	2.4867 ab	2.3178 a	
	250 ppm	2.9800 a	2.7133 ab	2.3800 ab	2.6911 a	
	500 ppm	2.3933 ab	2.5867 ab	2.6617 ab	2.5472 a	
effect amino acid		2.4822 a	2.5644 a	2.5094 a		

7- sex ratio.

Table (7) shows the superiority of the Clarita hybrid in the sex ratio, with a value of (1.25148), over the Crown hybrid, which gave the lowest values for this trait, with a value of (1.25874). There was no significant effect of the amino acid on that trait.

While the spray level (500ppm) of salicylic acid gave the lowest values in the sex ratio, with a value of (1.809) compared with the other two levels of each of the comparison and spray level (250ppm), which gave the highest values for this trait, which were (1.3261) and (1.3583). straight . We did not notice any significant differences between hybrids and salicylic acid and amino acid for that trait.

As for the interaction between histidine and salicylic acid, the plants grown under the spraying level of (3) ml/liter of histidine and the spraying level of (500 ppm) of salicylic acid gave the lowest values in the sexual ratio of flowers and amounted to (0.9460) compared with the highest values in that percentage. Under comparison and spraying level (250ppm) for each of the amino acid and salicylic acid, where the sexual ratio of flowers was (1.5167).

As for the triple interaction, the plants growing for the two hybrids Clarita and Crown under the spraying level of (3) ml / liter of histidine and the spray level of (500 ppm) of salicylic acid gave the lowest values in the sexual ratio of flowers and reached

(0.9133) and (0.9787), respectively, compared with the highest The values in that percentage were obtained under the comparison and spraying level (250 ppm) for each of the amino acid and salicylic acid and for the crown hybrid, where the sexual ratio of flowers was (1.7533).

Table (7): Hybrids and spraying with amino acid and salicylic acid and the interaction between them in the sex ratio of summer squash.

Hybrid	Salicylic acid	amino acid			Hybrid × Salicylic acid	Hybrid effect
		control	1.5 m/l	3 m/l		
Clarita	0	1.2400 ab	1.3067 ab	1.3367 ab	1.2944 a	1.25148 a
	250 ppm	1.2800 ab	1.7433 a	1.1600 ab	1.3944 a	
	500 ppm	1.1033 ab	1.1800 ab	0.9133 b	1.0656 a	
Crown	0	1.3367 ab	1.4433 ab	1.2933 ab	1.3578 a	1.25874 b
	250 ppm	1.7533 a	1.0700 b	1.1433 ab	1.3222 a	
	500 ppm	1.1533 ab	1.1567 ab	0.9787 b	1.0962 a	
Hybrid × amino acid	Clarita	1.2078 a	1.4100 a	1.1367 a	effect Salicylic acid	
	Crown	1.4144 a	1.2233 a	1.1384 a		
Salicylic acid × amino acid	0	1.2883 ab	1.3750 ab	1.3150 ab	1.3261 a	
	250 ppm	1.5167 a	1.4067 a	1.1517 ab	1.3583 a	
	500 ppm	1.1283 ab	1.1683 ab	0.9460 b	1.0809 b	
effect amino acid		1.3111 a	1.3167 a	1.1376 a		

4. Discussion.

Plant height and leaf area are among the indicators used by researchers to characterize vegetative growth, which depends on cell division and elongation, which increases the size of the vegetative group, and makes it more efficient at intercepting sunlight, converting light energy into chemical energy, and increasing the output of photosynthesis. All of these activities are affected by the quantity and quality of nutrients absorbed by the plant on various biological processes such as photosynthesis and transpiration, which are positively reflected (AlMrani, 2010) and (Abdul-Rasol et. al., 2004).

The increase in plant height when sprayed with organic fertilizer is due to the fact that the organic fertilizer stimulates cell division (Cytokinins & Auxins) and cellular elongation (Gibberellins) (and the reason for this may be due to the abundance of the necessary nutrients, whether major or minor, in these fertilizers and its effect on the process of photosynthesis and respiration. As part of DNA, RNA, such as nitrogen and phosphorous, is included in the composition of nucleic acids necessary for cell division and increasing the number of internodes, and then increasing the length of the plant. Perhaps the positive role of the organic fertilizer is due to its direct intervention in the metabolic and functional processes of the plant, which leads to an increase in cell division and cell elongation (Muscolo et al, 2002).

This is due to the fact that organic fertilizers contain important nutrients for plants, including nitrogen, which plays an important role in the manufacture of proteins necessary for the formation of leaves (Goartney et al 1967). In addition to the homogeneity of the foliar spray supply to plants with nutrients (Brayan, 1999).

Also, seaweed extracts contain many nutrients and auxins that stimulate cell division of plant tissues, which causes an increase in the leaf area of the plant and the efficiency of the photosynthesis process, thus improving the vegetative and root growth of the plant.

The above can be explained by the effect of marine extracts on the balance between the number of male and female flowers because they contain auxins that alter the flowering system in favor of female flowers (Mauorya, 1987), and this is consistent with what was found (Serhan et al., 2013) on cucumber plants when sprayed with algae extracts. However, what was found by Astifaou and Mohamed, 2012) on the squash plant when spraying with 1 force Sea extract, the number of male flowers decreased by increasing the concentration of spray with this extract.

As for the sexual ratio, it decreased with an increase in the concentration of organic fertiliser. There was the largest number of female flowers and the lowest number of male flowers, while the highest sexual ratio occurred among the comparison plants. The reason for this may be due to the nutrients contained in the plant organic fertilizer that are included in the composition of the number of enzymes and activate their work, in addition to regulating the vital activities carried out by the plant, including stimulating flowering due to the increase in the area of the leaf surface and the number of branches on the plant, which leads to its flowering early compared to non-fertilized plants, and this is consistent with what was found by (Sarhan et al. , 2013); (Mohammed, 2009); And (Saleh et al., 2012) on the cucumber plant and (Astafu and Muhammad, 2012) on the zucchini plant.

Retrieved from a master's thesis of the first researcher.

Role of amino acid and salicylic acid on the vegetative growth Objectives of two squash hybrids (*Cucurbita pepo L.*).

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The experiment was carried out in the vegetable field of the Department of Horticulture and Landscape Engineering / College of Agriculture and Forestry / University of Mosul for the spring season 2021 to study the effect of amino acids and salicylic acid on the growth characteristics and yield of two squash hybrids. The experiment included three factors, represented by hybrids (Clarita and Crown), which were placed in the main plots of the experiment, while the second factor was amino acids and salicylic acid, with three concentrations of each (zero, 1.5 ml / l, 3 ml / l) and (zero, 250 ppm, 500 ppm) respectively which are placed in the secondary blocks. The results showed the superiority of the Clarita hybrid in most of the vegetative growth traits, as well as the superiority of the main factors in all vegetative growth traits and the number of days required for the emergence of the first female flower under high levels of spraying. The triple interaction of Clarita cultivar under high levels of spraying gave significant values for the same traits, with Crown cultivar outperforming under high levels of spraying. The high spraying in the number of days required for the emergence of the first female flower compared to the Clarita variety under comparison with the superiority of the Crown variety in the number of female and male flowers and the superiority of the Clarita variety in the sexual ratio as well as the superiority of the plant grown under the high spray level of salicylic acid, while the Crown variety under the level of Spraying 3 ml / liter and 500 ppm had the lowest values in the sex ratio of the plant compared to the crown cultivar under comparison and the spray level was 250 ppm.

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