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Assessment of the Spraying with Ascorbic Acid and the Growth Regulator Kinetin on the Growth Characteristics of Sunflower Irrigated with Alkaline Water in Ramadi District

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Abstract: The field experiment was implemented in accordance to map' our study in a private field in the Sufiya area of Ramadi District - Anbar Governorate during the spring season of the year 2022 to study the effect of some chemical properties of the Euphrates River and ascorbic acid at concentrations of (0, 5, 10) g/L, and concentrations of spraying the growth regulator kinetin at concentrations of (0, (100, 200) g/L in the growth characteristics of the Sunflower growth of the BANNER variety under the system of factorial experiments, with a sectors design and three time. The study gave the following results, as It was found that there were significant differences, as plants sprayed with high concentrations of ascorbic acid (0, 5, 10) gave significant differences between the characteristics of (plant height, stem diameter, number's leaves, leaf area index, and chlorophyll percentage) (131.49, 1.633, 28.87, (49.48 and 27.54, respectively. The addition of ascorbic acid was not affected significantly, and we did not notice significant various in the grade (leaf area) affected via spraying ascorbic acid. The concentrations sprayed with the growth regulator kinetin (0, 10, 20) gave significant differences in threshing structures (height of plant and diameter's stem). And the index of leaf area and chlorophyll percentage (124.07, 1.689, 25.59, 46.83), respectively. The addition of kinetin did not affect it significantly, and we did not notice significant differences in the traits (leaf area and number of leaves). The values of the moral interaction of the traits studied varied throughout them, and the irrigation water was Weak alkaline with levels ranging between (8.2 - 8.8).

Keywords: Ascorbic Acid, Kinetin, Euphrates River, the Sunflower, Anbar Province.

INTRODUCTION

The Euphrates River is one of the main rivers that has been subjected to the influence of many human activities, and its waters feed a fertile agricultural basin within the borders of the Mesopotamia region. Human uses represented by industrial, agricultural and domestic activities directly affect the quality of this river's water (Al-Khafaf, 1997) and therefore the physical and chemical properties. The water surface has an influential factor in the role of activities of antioxidants such as ascorbic acid, especially if it exceeds the threshold level, as it causes biotic environmental pressure and it causes some pressure on its biological environment (Mane et al., 2010). The sunflower, Helianthus annuus L., is considered the important industrial crops of because the contain of seeds a high level of high-quality oil (50-35%), which is very beneficial to humans because it helps maintain the level of cholesterol in the blood, due to the high percentage of essential containing a large amount of fat that called unsaturated fatty acids (Oleic acids). The acid and Linoleic acid, which reach about of 90% (Al Subaihi and Al-Ani, 2020). Due to their high protein content, the seeds are also used as good feed for cultivation of animals and poultry (36%), carbohydrates (20-22%), oil (6%), and minerals (Rizk and Ali 1982). Its fields are used for beekeeping, which means an increase in the pollination rate and also a higher level of fertilization with a lower level of empty seed production, which is one of the factors that may affect the quantities of seed yield (Safar, 1990). The deficit in the Arab world in general and Iraq in particular exceeded the production of vegetable oils by about 90%, which made it import about 286 thousand tons of crude oil in 1995 to meet the requirements of the oil

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industry (Khader et al. 1997). Developing sunflower cultivation and improving production rates are considered a basic necessity to respond to many nutritional and industrial needs that require a serious pause by specialists to work on expanding the crop and and increasing production quantitatively and qualitatively to advance the agricultural sector, as the production of the sunflower crop in Iraq for the spring and autumn periods (super grains) reached 7,500 tons for the year 2011, an increase of 2,300 tons over the two seasons of the year. In 2010 The total area cultivated with the sunflower crop for the spring and fall periods of 2011 was approximately 22,600 dunums, an increase of 5,800 dunums over the previous year (Agricultural Statistics Yearbook,2009). The average level of productivity on a hectare scale globally reached more than one and a half thousand tons, with a total production amount of about 33 million tons, with an estimated area of 23.68 hectares in 2009 (Acharya, 2011). The growth of the sunflower crop is determined by a large group of factors, including environmental factors related to soil conditions, climate, water, and organisms and their interactions, including those related to genetic assets and their relationship to soil and crop service processes. Choosing the density constitutes an appropriate way to control the percentage and efficiency of interception of effective rays in the process of photosynthesis (Goksay et al., 1997). Increasing plant density (Goksay et al., 1997). Increasing plant density with the availability of suitable conditions for growth may lead to an increase in seed yield, but after exceeding the optimum density, any increase in plant density will lead to a decrease in seed yield because the total number of plants per unit area does not compensate for the resulting decrease in plant yield (Al-Amiri, 2001). Also, the genotype varies in the extent of its response to plant density depending on the genetic ability of the structure to compete and the ability of its plant to transform manufactured nutrients from the source to the downstream. Therefore, choosing the genotype with high productivity represents the other direction after plant density. The aim of the experiment is to find out the best spray composition of ascorbic acid to give the best growth, to find the most appropriate spray concentration with the growth regulator kinetin, which contributes to the best growth in sunflowers, to know the interaction with the two-study side for the same purpose above.

MATERIALS AND METHODS

Field work and sampling, the field experiment was implemented in the fall season of 2021 within a private field in the Sufiya area, which is located in the Ramadi district. The system that was followed included three practical iterations according to a completely randomized block design, and the study included two factors: spraying ascorbic acid at concentrations (0, 5, 10) g/L and the second factor is spraying with the growth regulator kinetin (0, 1, 2) grams/liter in the vegetative growth characteristics of the sunflower crop, Class "Banner". Random samples of soil were got it from different locations of the targeted field before it planting, at a depth ranging between 0-30 cm. They were dried, then smoothed, and a sample was taken from them, and a set of chemical and physical analyzes were conducted on them, shown in Table (1). The experimental land was prepared by plowing with a plow, then smoothed and leveled, and then divided into experimental units with dimensions of (4 x 3) m, so that the area of the experimental unit became 12 m2. The agricultural system for the experiment was drawn in the form of lines, where the experimental unit contained 5 lines, the spaces between one line and another were 60 cm, and the area between one sock and another was 25 cm.

Table 1: Shows the physical and chemical properties of the soil before planting' procedure

Parameters	Unit	Results
EC	dS.m-1	2.5
pH	----	7.81
N	mg.kg-1	60.0
P	mg.kg-1	8.21
K	mg.kg-1	174.33
O.M	%	0.78
The sand	m.kg	356
Alluvial	m.kg	420
Clay	m.kg	224
Texture	----	loam
F.C	%	26
P.W. P	%	12
A. W	%	14

The field planting process took place on August 4, 2021, and was done by placing 3-4 seeds in one hole and organizing the watering process immediately after planting, and with the arrival of the appearance of three or four true leaves of the plant, it was reduced to one plant in the hole. Samples were taken from the

water of the Euphrates River, specifically in Ramadi District. This station is located at the Burisha Bridge, which is a service bridge located under the Ramadi Expressway Bridge. This station is located at latitude (27'46.28° (33'north) and longitude (15' east). 25.47°43) located on the left side of the Euphrates River before it enters Ramadi (Figure 2-3). his station is 6 kilometers away from the Ramadi-Al-Jaraishi Bridge (Ramadi Dam). The water current in it is somewhat moderate and the width of the river at this station is (250) meters. The distance between this station and the next station is (10.1) kilometers, in a rural area that is more residential and industrial than agricultural. All types of agriculture spread before this area and it is characterized by a dense population adjacent to the Euphrates River. Reed and papyrus plants are spread on both sides of the river and inside the water body, but not in great density. This water was used in the irrigation process, and some of its physical and chemical properties were studied, as shown in Table (2).

Table 2: Some physical and chemical properties of irrigation water

Parameters	Unit	Result
T.air	%	23
T.water	%	20
Salinity	g/L	0.611
PH	----	8.7
Total alkalinity	)L/mg caco3(	190

A fertilizer was added in a two-batch system, the first a month after planting and the second 14 days after the first fertilization, where nitrogen fertilizer was added at a rate of 180 kg N/ha using urea (46% N). As for the use of phosphate, the addition was at a rate of 80 kg P2O5/ha using Triphosphate spore fertilizer (46% P2O5). As a fertilizer source, one batch before planting (Al-Ani 2012), a spray solution for the growth regulator kinetin and ascorbic acid was prepared using (100 ppm) for each treatment and using water as a spray solution at (350 liters/ha). The spraying process was carried out early in the morning using a hand sprinkler with Note that there is no wind during the spraying process. The spraying process on the plant continued until drops of the solution fell from the ends of the leaves to the ground (complete wetness). Then, measurements of the study indicators were carried out, and the two lines each one of experimental unit were covered to protect it from attacking birds.

GROWTH CHARACTERISTICS

Plant height (cm): The measurement of plant height comes from the maturity stage and is measured from the surface of the soil down to the base of the disk and at the average of the total number of ten plants taken from the two security lines for each experimental area (Beard and Shu Geng, 1982).

Stem diameter (cm): The stem diameter was measured at the third phalanx using a Vernier micrometer after the flowering process was completed.

Number of leaves: The total number of leaves for each plant is calculated, starting from the first green leaf visible on the surface of the soil until the last leaf on the plant itself (Hunt, 1982).

Leaf area (cm^2) was measured the sum of the squares of the leaf lengths of one plant multiplied by 0.65.

Leaf area index: It represents the result of dividing the leaf area of a single plant by the area it occupies on the ground based on the plant densities used in the study (Hunt.1982). Chlorophyll percentage: The percentage of chlorophyll in the plant was calculated by pinching the leaf with the SPAD device for more than one leaf per plant.

RESULTS AND DISCUSSION

Plant height: The plant height appeared clearly in the results of the statistical analysis and is attributed to spraying the plants with the kinetin regulator. Where the highest plant height was recorded at the high concentration of 129.81 cm was applied with the factor (0), which recorded the lowest average plant height of 124.07 cm. The results also showed that there were significant differences. As a result of plant height, as a result of spraying plants with ascorbic acid, the highest plant height was recorded at 131.49 cm, compared to the comparison factor (0), in which the lowest rate of plant height was recorded at 122.33 cm. This is due to the importance of vitamin C in increasing the efficiency of transporting carbon assimilation products, forming calcium, producing energy, and building acids. Fatty, chlorophyll, matter, and nuclear, and all of this enhances the basis for plant growth processes, including plant height. This is confirmed by Nasrallah et al. (2014) and Magalhaes and Church (2006). As for the interaction between the spraying agent's kinetin and ascorbic, it was showed that there were significant indicators if the high concentration of ascorbic acids and kinetin recorded increase average in the plant height of 135.70 cm compared to the unsprayed agent if it gave the lowest plant height of 119.93 cm (Table3).

Leaf's area: The results of the statistical analysis showed that there were no significant indicators in the leaf area characteristic as a result of spraying with ascorbic acid at the high concentration, which reached 4141 cm compared to the comparison factor (0). The lowest rate of leaf area was recorded at 2611 cm. The results also showed that there were no significant differences as a result of spraying with a regulator. Kinetin growth recorded the highest rate (3844) cm compared to the comparison factor (0), which reached 2787 cm. The results of the interaction between the two spraying agents after it compared showing there were no significant variation, as the increasing concentration in the leaf space about 4774 cm when noted to the lowest concentration in the leaf area of 2241 cm without spraying.

Table 3: Impact of spraying with ascorbic acid (vit.c) with kinetin to the plant height(cm)

		Ascorbic acid concentration			
		0	**5**	**10**	**Rate**
Kinetin concentration	**0**	119.93	122.70	124.07	124.07
	1	123.70	127.47	129.81	126.79
	2	128.57	130.20	135.70	129.81
		122.33	126.84	131.49	
	l.s.d	**C=0.773**	**K=0.773**	**C*k=1.340**	

Table 4: Impact of spraying with ascorbic acid (vit.c) with kinetin to the leaf area (cm)

		Ascorbic acid concentration			
		0	**5**	**10**	**Rate**
Kinetin concentration	**0**	2241	2606	2986	2787
	1	2678	3339	3773	3384
	2	3442	4206	4774	3844
		2611	3263	4141	
	l.s.d	**C= 202.4**	**K=202.4**	**C*k=350.6**	

Stem diameter: The stem diameter characteristic of the plants in the current study showed that there were significant differences in it as a result of the spraying process with the growth regulator kinetin, as the increasing stem diameter was recorded at a concentration of 1.689 cm after compared it the comparison factor (0), which recorded the lowest rate of stem diameter characteristic of 1.512 cm. Kinetin has a role in increasing The percentage of dissolved sugars, nitrogen, phosphorus, and potassium in the flag leaf. Cycosinoids, in general, have effective role in stimulating the movement and transfer of mineral and organic nutrients from old to newly growing parts of the plant, which affects the formation of estuaries and their preference in attracting and accumulating nutrients. They also have an activity in facilitating the process of absorption and transfer. Mineral elements from the soil and regulate their distribution in multiple directions through the transport vessels and plant tissues, which increased the diameter of the stem. The results also showed that there were significant lesions as a result of spraying with ascorbic acid in terms of stem diameter. The highest stem diameter was recorded at a concentration of 1.633 cm compared to the comparison factor (0), which reached the lowest rate of 1.531 cm as a result of it responding well to all spray solutions containing vitamin C, which led to The number of vascular bundles increased to accommodate this influx of nutrients, which was reflected in an increase in the diameter of the stem and the number of vascular bundles.

The results of the interaction between them showed significant differences, as the high concentration of the two workers recorded the highest average for stem diameter of 1.720 cm compared to the lowest number with the interaction between the two workers, which reached 1.433 cm.

The highest stem diameter was recorded at a concentration of 1.633 cm after compared it the comparison factor (0), that reached less rate of 1.531 cm as a result of it responding well to all spray solutions containing vitamin C, which led to the number of vascular bundles increased to accommodate this influx of nutrients, which was reflected in highest in the diameter of the stem and the number of vascular bundles. The results of the interaction between them showed significant differences, as the high concentration of the two workers recorded the highest average for stem diameter of 1.720 cm compared to the lowest number with the interaction between the two workers, which reached 1.433 cm (**Table 4)**.

Table 5: Effect of spraying with ascorbic acid (vit.c) and kinetin on stem diameter(cm)

		Ascorbic acid concentration			
		0	**5**	**10**	**Rate**
Kinetin concentration	**0**	1.497	1.653	1.720	1.512
	1	1.433	1.530	1.630	1.587
	2	1.607	1.577	1.717	1.689
		1.623	1.531	1.633	
	l.s.d	**C= 0.0903**	**K=0.0903**	**C*k=0.1564**	

Leaves' Number: The number of plant leaves in the current study showed high rates for the number of leaves, which reached 28.64 compared to the comparison factor (0), which reached 27.40, according to the results of the statistical analysis. On the other hand, the results of the study showed that the significant differences affected the number of leaves as a result of spraying with ascorbic acid, at a rate of 28.87 compared to the comparison factor (0), which is considered the lowest rate, as it reached 24.60. As a result of analyzing the interaction between the two workers, statistically significant differences were found if there was the highest rate of interaction between the two workers, which was 32.07, compared to the unsprayed worker, which was 23.67, who had the lowest interaction coefficient between them (**Table 7).**

Leaf area index; The significant differences in the characteristic of the leaf area were showed as a result of spraying it with the growth regulator Kinetin, where the highest average was recorded at 25.59 after compared it with comparison factor (0), which reached the lowest rate of 18.52. The significant differences were showed in the characteristic of the leaf area. As a result of spraying with ascorbic acid, the highest rate was 27.54 after compared it the comparison factor (0), which had the lowest rate of 17.36.

The superiority of the spray treatment with vitamin C may be due to the fact that this vitamin is a growth regulator that has many effects on biological processes. An increase in RNA was found to increase vitamin C. It works as an enzymatic chaperone, especially when metabolizing carbohydrates and proteins, and is used in carbon metabolism and respiration. It also led to an increase in the pigment content, which was reflected in an increase in the efficiency of the carbon metabolism process, which was reflected in the evidence of leaf area. The significant differences were showed between them as a result of spraying with the agents ascorbic and kinetin, and the highest interaction reached 31.77 after compared it the unsprayed comparison factor, which gave the lowest indication of leaf area, which was 14.87 (**Table 6).**

Chlorophyll ratio: The significant differences were showed in the character of the chlorophyll level as a result of spraying it with the growth regulator Kinetin, where the highest percentage of chlorophyll was recorded at the concentration of 46.83 after compared it with the differentiation factor (0), which reached the lowest rate of 43.58. The results of the statistical analysis also showed that there were significant differences in the character of the chlorophyll percentage. As a result of spraying, it with ascorbic acid, the elevation percentage of chlorophyll was recorded, which amounted to 49.48, after compared it with the comparison factor (0), which reached the lowest rate, which was 41.74.

Table 6: The effect of spraying with ascorbic acid (vit.c) and kinetin on leaf area index

		Ascorbic acid concentration			
		0	**5**	**10**	**Rate**
Kinetin concentration	**0**	14.87	17.30	19.90	18.52
	1	17.80	22.27	25.10	22.51
	2	22.90	27.97	31.77	25.59
		17.36	21.72	27.54	
	l.s.d	**C= 1.350**	**K=1.350**	**C*k=2.339**	

Table 7: The effect of spraying with ascorbic acid (vit.c) and kinetin on the number of leaves

		Ascorbic acid concentration			
		0	**5**	**10**	**Rate**
Kinetin concentration	**0**	23.67	23.27	26.87	27.40
	1	32.07	23.67	30.87	24.82
	2	26.47	27.53	28.20	28.64
		24.60	28.87	27.40	
	l.s.d	**C= 1.649**	**K=1.649**	**C*k=2.856**	

As for the interaction between the factors sprayed with kinetin and ascorbic acid, there were significant variation, as increase concentration was recorded with an interaction between them of 52.00 compared to the unsprayed comparison factor. With ascorbic acid and the growth regulator kinetin, if the lowest concentration between them is 40.80.

Spraying these solutions resulted in a highest number of green leaves and chlorophyll content being preserved, which helped increase the efficiency of the carbon assimilation levels and then highest the products of this process, especially carbohydrates. This is what encouraged the plant to increase its vascular bundles and the chlorophyll pigment with it.

This is due to the positive role of kinetin, which works to increase the elasticity, flexibility and expansion of cell walls. Kinetin affects by delaying the aging period and a Plant leaves and chlorophyll content in leaves.

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