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EFFECT OF HUMIC ACID SPRAY ON GROWTH CHARACTERISTICS OF WHEAT VARIETIES

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Abstract: A field experiment was conducted in 2018-2019 in Iraq according split-plot. The varieties as main treatment (Baghdad 2 and Sham 6), spraying dates (elongation stage, endothelium stage and flowering stage) sub-treatment while the humic acid concentrations occupied (3,1.5,0 cm3. L^{-1}) as sub-treatment. The differences were significant between different treatments. The variety Baghdad 2 was significantly superior in traits, plant height, number of branches, spikes, grains per spike, and weight of grain. The total yield of grains was 9.13 ton. ha^{-1}. The spraying dates showed significant differences, as the spraying at the flowering stage was better in most characteristics, area of the flag leaf, spike length, number of grains/ $pike^{-1}$, weight of grain.gm, and total yield Spray at the endometrium stage resulted in maximum height, spike, while spray at the highest value in the variety number of beaches reached 434.79 beaches .m^2, the number of spikes.m2 380.21 spike.m^2. The humic acid concentrations showed a significant difference. The humic acid as resulted in maximum plant height, area of flag, number of tillersperm2, spike length, number of spikes per m^2, the number of grains per spike, weight of 1000 grain and the total yield of grains. The interaction between the varieties and the spraying dates C and S, the combination C2 + S3 was superior to the size of the flag leaf area cm^2, weight 1000 grain.gm and the total yield of grains ton. ha^{-1}. 36.74 cm2, 8.60 cm, 37.83 g, 9.97 ton. ha^{-1}.

Keywords: Wheat, Foliar Fertilizers, Humic Acid Fertilizer, Varieties.

1. Introduction

The wheat crop Triticum aestivum L. is one of the most important cereal crops in the world belonging to family Poaceae Nutrient management of the crop from the beginning of growth until the last stages require application of nutrients, including growth promoters. The addition of organic fertilizer in appropriate quantities usually helps to improve the growth conditions of the plant because of its effect on other processes including the development of tillers, length of spikes, number of grains in spike, grain weight and the total yield to its effect on the. Organic fertilization has significant effect on wheat productivity and the varieties differ in their response to the organic fertilizer [1]. The addition of humic

acid to the wheat plant in different concentrations showed a significant effect on yield components at 12.5 kg. ha^{-1}.

Humic acid is one of the compounds resulting from the decomposition of the organic matter contains in combination with nitrogen, oxygen, hydrogen and carbon and in different proportions resulting in compounds with different molecular weights when adding these materials to plant nutrition have a fundamental role in improving growth and that through its effect on photosynthesis and respiration. The cycle works to activate certain enzymes and inhibit other enzymes as well as increase the plant's resistance to harsh environmental conditions during the growing season in addition to increasing the permeability of the cell membranes and stimulating many vital interactions of the plant [2] observed that adding the acid at a rate of 2 kg. ha^{-1} of the humic indicated the superiority in weight of grain.

2. Materials and Methods

The field experiment was conducted in the winter season 2018-2019 in the Nile district according to split plot with three according Randomized Complete Blok Design (The varieties (Baghdad 2 and Sham 6) were the main plot (C1 and C2) while the three spray dates (the elongation stage and lining stage the flowering stage) occupied subplot (S3, S2, S1), while the humic acid fertilizer concentrations (3,1.5,0 cm^3. L^{-1}) sub sub plot (F3, F2, F1). The recommended agronomic practices were followed Soil samples were randomly collected for estimating physical and chemical properties at 0-30-0 cm depth.

Table 1. Soil quality parameters of the experimental field.

Characteristic	Value
Electrical conductivity (EC)	3.19 D/S.m2
Degree of reaction (pH)	7.13 g.kg-1
Organic matter	1.59 g.kg-1
Nitrogen ready	73.20mg.kg-1
Phosphorous is ready	12.81mg.kg-1
Potassium is ready	277mg.kg-1
Sand	176 g.kg-1
Clay	341g.kg-1
Silt	484 g.kg-1
Soil Texture	Silt clay

The triple super phosphate fertilizer at a rate of 100 kg. ha^{-1} P2O5 was added before planting and urea fertilizer was added 200 kg. ha^{-1} in two batches, the first at the branching stage and the second at the end of the lining stage. The crop was sown on 20 November 2018 with at a rate of 30 kg. $Dunum^{-1}$.

Table 2. Humic acid fertilizer components.

Material	Ratio
Humic acid	15 %
Folvic acid	16.5%
Organic matter	16.5%
Potassium	2%
Sea weed	2%

Studied Traits: Ten plants were randomly taken from each experimental unit, and the plant height was measured from the soil surface level to the top of the spike, the main branch without a tip. Colorful rings were used at the beginning of the branch stage [3]. Tiller number.m^2 were recorded from an area of 1 m^2 (the median lines are the distance between one line and another 20 cm. Flag leaf area.cm^2 were recorded from main stems and according to the equation- the length of the leaf X the width of the leaf from the middle X 0.95 [4]. Spike length.cm was calculated according to the average length of ten spikes per experimental unit. It was measured

from the base of the spike to the end of the spike without the tip during the harvest stage. Number of spikes.m^2: were counted from the harvested plants per unit area and Number of grains per $spike^{-1}$: is the average number of grains of 25 spike randomly taken within the experimental unit. The weight of 1000 grain.gm: was randomly counted and the grains were weighed [4]. The grains yield. It was calculated on plants harvested from one square meter of the middle lines and randomly.

3. Results and Discussion

Plant height.cm: The plant height differed significantly among varieties the differences were maximum in Sham 6 (102.95 cm) and minimum in Baghdad 2 (96.97 cm). They may be due to genetic nature, which was better reflected in response to the surrounding environmental conditions (Table 3). Similar was observed by [5]. There was a significant effect of spraying dates on this trait, maximum in S2 (101.23) cm and minimum in S3 (98.44 cm). Because application at elongation stage help in growth and elongation and meet the higher growth requirements for the plant, and the large surface area subject to absorption, and t provides to meet the needs of the plant at this stage. The concentration of humic acid spray had a significant effect in this trait. The F3 gave the best average mean of 103.24 cm compared to the control treatment with the lowest average of 97.44 cm. This result is consistent with the findings of [4]. There were no significant differences for the interaction between the variety and the spraying dates. The treatment C2 + F3 was significantly superior and gave the highest value of 106.56 cm, while the lowest was in C1 + F1 (94.22 cm). The combination S2 + F3 was superior (105.20 cm), while the combination S3 + F1 gave the lowest height (95.87 cm. The combination C2 + S2 + F3 excelled and gave the highest average of this trait of 109.67 cm which gave the lowest average of 91.17 cm.

Table 3. Effect of Humic acid and application dates on plant height in wheat varieties.

Varieties	**Spray dates**	**humid acid fertilizer cm^3. L^{-1}**			**Average**
		F1	F2	F3	**C× S**
C1	S1	95.73	97.43	99.67	97.61
	S2	95.77	97.10	100.73	97.87
	S3	91.17	95.77	99.40	95.44
C2	S1	100.23	101.30	106.97	102.83
	S2	101.20	102.90	109.67	104.59
	S3	100.57	100.70	103.03	101.43
L. S. D (0.05)			1.56		N.S
Fertilizer concentrations / **Varieties**		F1	F2	F3	Average C
C1		94.22	96.77	99.93	96.97
C2		100.67	101.63	106.56	102.95
L. S. D (0.05)			0.90		1.05
Fertilizer concentrations / **Spray dates**		F1	F2	F3	Average S
S1		97.98	99.37	103.32	100.22
S2		98.48	100.00	105.20	101.23
S3		95.87	98.23	101.22	98.44
L. S. D (0.05)			1.10		1.01
Average F		97.44	99.20	103.24	

L. S. D (0.05)	0.63

The Flag Leaf Area cm²: There was no significant effect of variety on this characteristic (Table 4). There was significant difference for the spray dates, and was maximum in S3 (35.21 cm²) while was minimum in t S2 (31.77 cm2). There was significant difference between the spray concentrations, F3 gave the maximum average leaf area of 35.97 cm², while F1 g the lowest average of 30.02 cm². This may be due to the fact that organic acids have a positive effect on the growth and development of the root and vegetative system and improve the utilization of nutrients that led to an increase in the leafy area. This result agreed with [6]. The results showed that there were significant differences for the bilateral interference between C + S, as the combination C2 + S3 exceled and gave the highest average of 36.74 cm2 compared to the combination C1 + S2, which gave the lowest average of 30.94 cm2. F and S + F as well as the triple interference between C + S + F.

Table 4. Effect of dates and concentrations of humic spray on the characteristic (flag leaf area) cm² for two varieties of wheat.

Varieties	Spray dates	Humic acid fertilizer cm³. L⁻¹			Average
		F1	F2	F3	C× S
C1	S1	29.53	32.40	34.53	32.16
	S2	27.57	31.83	33.43	30.94
	S3	30.73	34.07	36.23	33.68
C2	S1	31.03	34.17	35.93	33.71
	S2	30.27	32.87	34.63	32.59
	S3	30.97	38.20	41.07	36.74
L. S. D (0.05)			N.S		1.65
Fertilizer concentrations Varieties		F1	F2	F3	Average C
C1		29.28	32.77	34.73	32.26
C2		30.76	35.08	37.21	34.35
L. S. D (0.05)			N.S		N.S
Fertilizer concentrations Spray dates		F1	F2	F3	Average S
S1		30.28	33.28	35.23	32.93
S2		28.92	32.35	34.03	31.77
S3		30.85	36.13	38.65	35.21
L. S. D (0.05)			N.S		0.753
Average F		30.02	33.92	35.97	
L. S. D (0.05)			1.127		

Tillers Number.M2: Table (5) that there was a significant difference between the factors studied by its effect on the number of tillers, variety C2 outperformed and gave the highest average of 443.79 tiller. 2, while variety C1 gave the lowest average of 421.16 tiller, the reason may be due to the variation of varieties in this trait, it may be due to the hereditary nature of it or due to the superiority of the variety in the area of the flag leaf, which has a positive effect in increasing the efficiency of photosynthesis and thus the formation of new tillers. These results are consistent with the results of [7], the varieties differ among themselves in this variety. The results of the same table indicated that there were significant differences between spraying dates, then the date of S1 exceeded, giving the highest average of 434.79 tiller.m2 compared to the date S3, which gave the lowest average of 430.69

tiller.m^2, Perhaps the reason is due to the fact that spraying with humic acid led to encouraging photosynthesis in the production of carbohydrates and the speed of their transportation to the places of vegetative growth in the branching and subsequent stages, which led to the development and growth of primary and secondary branches and this led to an increase in the number of tillers. those who indicated through their experiments that sprinkling wheat plants with humic acid showed that there was a significant effect of vegetative traits, which in turn was reflected by an increase in the number of tillers.

Concentrations of spraying had a significant effect on this trait, as the concentration exceeded F3 by giving it the highest mean of 433.98 tiller. m^2 compared to the concentration of F1 (control treatment), which gave the lowest average of 430.91tiller. m^2. The reason is due to the focus of the work on increasing the absorption of some major nutrients, especially phosphorus, potassium and calcium, as well as some of the smaller elements, including manganese and iron, which have a direct and indirect role in improving plant growth and development. This, in turn, is reflected in the increase in the number of tillers in the plant. This result is consistent with the results of [5], as it was found that the addition of humic resulted in an increase in the number of abnormalities. While the results showed that there were no significant differences for the bilateral inter-action between C + S C + F and S + F as well as the triple interference C + S + F

Table 5. Effect of dates and concentrations of humic spray on the trait (number oftillers.m^2) for two varieties of wheat.

Varieties	Spray dates	Humic acid fertilizer cm^3. L^{-1}			Average
		F1	F2	F3	C× S
C1	S1	422.77	424.13	424.57	423.82
	S2	419.53	421.17	421.77	420.82
	S3	416.20	419.23	421.10	418.84
C2	S1	444.53	445.27	447.50	445.77
	S2	442.10	442.33	444.70	443.04
	S3	440.30	443.07	444.27	442.54
L. S. D (0.05)			N.S		N.S
Fertilizer concentrations Varieties		F1	F2	F3	Average C
C1		419.50	421.51	422.48	421.16
C2		442.31	443.56	445.49	443.79
L. S. D (0.05)			N.S		3.78
Fertilizer concentrations Spray dates		F1	F2	F3	Average S
S1		433.65	434.70	436.03	434.79
S2		430.82	431.75	433.23	431.93
S3		428.25	431.15	432.68	430.69
L. S. D (0.05)			N.S		2.371
Average F		430.91	432.53	433.98	
L. S. D (0.05)			1.078		

Spike Length: Table (6) showed that was no significant effect of the items in this characteristic. From the same table data, there are significant differences between spray dates, as the date S3 exceeded and gave the highest average of 8.58 cm, while S2 gave the lowest average of 8.20 cm. Perhaps the reason is that spraying

humic showed a better incentive for spike growth and development due to the availability of continuous food supplies, on the other hand, these nutrients play an important role in raising the efficiency of photosynthesis, which led to encouraging better growth of the spike. This was clearly reflected in an increase in spike length, and that the appropriate environmental conditions before the spike phase resulted in reducing competition between the spike and the rest of the other plant parts on the nutrients, which in turn reflected an increase in spike length, these results agreed with [8], [9]. While the results of the same table indicated that there were significant differences between the fertilizer concentrations used, as the concentration exceeded F3 by giving the highest average of 8.89 cm, while the concentration F1 (control treatment) gave the lowest average of 7.78 cm.

The reason for this is due to the need of the plant for the high concentrations of plant growth, especially in the early stages of spike formation (the emergence and development of the spike). There are also elements that encourage the transport of carbohydrates and nutrients in plant tissues such as potassium and in the event of its deficiency leading to a reduction in the yield components agreed to these results with [10]. As for the bilateral interaction between C + F, it had a significant effect in this characteristic, as the combination C1 + F3 overtook the rest of the combinations and gave the highest average of 8.97 cm and did not differ significantly from the combination C2 + F3, which gave an average of 8.82 cm while the combination C1 + F1 gave less Average was 7.64 cm. While the bilateral interference between C + S and S + F did not have a significant effect in this characteristic, while there was a significant effect of the triple interference between C + S + F as the combination C1 + S3 + F3 exceled as it gave the highest average of 9.43 cm while the combination C1 + S2 + F1 the lowest average was 7.53 cm.

Table 6. Effect of humic spray dates and concentrations on the trait (spike length. Cm) for two varieties of wheat.

Varieties	Spray dates	Humic acid fertilizer $cm^3. L^{-1}$			Average
		F1	F2	F3	C× S
C1	S1	7.83	8.23	8.77	8.28
	S2	7.53	8.03	8.70	8.09
	S3	7.57	8.70	9.43	8.57
C2	S1	7.60	8.37	8.77	8.24
	S2	7.77	8.43	8.73	8.31
	S3	8.40	8.43	8.97	8.60
L. S. D (0.05)			0.375		N.S
Fertilizer concentrations Varieties		F1	F2	F3	Average C
C1		7.64	8.32	8.97	8.31
C2		7.92	8.41	8.82	8.39
L. S. D (0.05)			0.217		N.S
Fertilizer concentrations Spray dates		F1	F2	F3	Average S
S1		7.72	8.30	8.77	8.26
S2		7.65	8.23	8.72	8.20
S3		7.98	8.57	9.20	8.58
L. S. D (0.05)			N.S		0.125
Average F		7.78	8.37	8.89	
L. S. D (0.05)			0.153		

Spike Number: Showed table (7) that there are significant differences between the levels of factors studied in the number of spike characteristics. Variety C2 excelled by giving it the highest average of 380.75 spike. m2 compared to variety C1, which gave the lowest average of 377.69 spike. m2. The reason may be due to the variation of varieties in this capacity due to their genetic variation, which reflected on their competitiveness on different growth requirements, which led to their difference in the production of spikes per unit area. This result is consistent with the results of [11]. Through the same table data, he noted that there were significant differences between spray dates, as S1 exceeded by giving him the highest average of 380.21 spike. m2, while the appointment gave S3 the lowest average of 378.49 spike.m^2. Perhaps the reason is attributed to the role of potassium in the hormonal balance process between oxinate and cytokinin and this may have found an opportunity to reduce apical dominance and then increase the ability of the plant to produce traces with spike primers and this was reflected in the increase in the number of spikes.

These results were consistent with what [12] found Significant increase in the number of spikes when spraying wheat plants with humic organic fertilizer compared to not adding, concentrations of humic acid affected significantly in this trait, as F3 concentration gave the highest average of 379.53 spike. m^2 did not differ statistically from F2, which gave an average of 379.36 spike m^2, while the control treatment F1 gave the lowest average of 378.77 spike. m^2 the results of bilateral interference showed Show C + S to the superiority of the C2 + S1 combination by giving it the highest average of 382.18 spike. m^2, while the combination C1 + S2 gave the lowest mean of 377.23 spike. m^2 and did not differ statistically from the combination C2 + F2, which gave an average of 381.04 spike m^2, while the combination C1 + F1 gave the lowest average of 377.54 spike m^2.

Table 7. Effect of dates and concentrations of humic spray on the trait (number of spikes.m^2) for two varieties of wheat.

Varieties	Spray dates	Humic acid fertilizer cm^3. L^{-1}			Average
		F1	F2	F3	C× S
C1	S1	377.47	378.43	378.83	378.24
	S2	376.83	377.37	377.50	377.23
	S3	378.33	377.20	377.20	377.58
C2	S1	381.37	382.73	382.43	382.18
	S2	380.17	380.70	381.17	380.68
	S3	378.43	379.70	380.07	379.40
L. S. D (0.05)			0.835		0.615
Fertilizer concentrations Varieties		F1	F2	F3	Average C
C1		377.54	377.67	377.84	377.69
C2		379.99	381.04	381.22	380.75
L. S. D (0.05)			0.482		0.45
Fertilizer concentrations Spray dates		F1	F2	F3	Average S
S1		379.42	380.58	380.63	380.21
S2		378.50	379.03	379.33	378.96
S3		378.38	378.45	378.63	378.49
L. S. D (0.05)			N.S		0.435
Average F		378.77	379.36	379.53	

L. S. D (0.05)	0.341

The results of the same table also indicated the existence of a significant effect of bilateral interference between C + F, as the com-bination C2 + F3 exceled and gave the highest average of 381.22 spike m^2. The results also indicated that there was no significant effect of bilateral interference between S + F. C + S + F had a significant effect on this characteristic. The combination gave C2 + S1 + F2 the highest average of 382.73 spike m2, while the combination C1 + S2 + F1 gave the lowest average of 376.83 spike.m2. Grains Number.Spike^{-1}: Showed table (8) there was a significant effect of varieties on this trait, as variety C2 gave the highest mean of 64.27 grain. Spike^{-1} while variety C1 gave the lowest average of 61.02 grain. Spike -1, table data indicated that there were significant differences between spray dates, as the S3 date exceeded the rest of the dates by giving it the highest average of 65.71 grain. Spike^{-1} while the appointment gave S1 the lowest mean of 59.96 grain. Spike^{-1}, Perhaps the reason is due to the role of organic fertilizer in raising the efficiency of photosynthesis and contributing to reducing the rate of miscarriage in florets by reducing competition between them on the acting products, as well as the role that potassium within the fertilizer components play specifically in the hormonal balance process may have a positive role in the development Flowers and increased the probability of fertilization of flowers and their development into grains, perhaps this was a direct cause of the increase in the number of grains of spike. This finding was consistent with the findings of [13], [2], [9], the results of Table (8) showed a significant effect of the concentrations. The F3 concentration exceeded and gave the highest average of 63.74 tablet grain. Spike^{-1} while he gave the control treatment the lowest average of 61.15 grain. Spike^{-1} Perhaps the reason is due to the availability of a greater amount of food for the spike, which led to an increase in the fertility rate in the flowers, and therefore this ratio led to an increase in the grain contract and less abortion, which in turn led to an increase in the number of grains in the spike.

These results agreed with [14], who stated that plants can Holding its seeds if they are equipped with photosynthesis products only, as a result of the fact that humic acid has a role in increasing the absorption of major and minor elements, which have a vital role in germination of pollen grains and the growth of pollen tube, which in turn works to increase the fertility rate in flowers and then increase the number of grains in the spike.

Table 8. effect of dates and concentrations of humic spray on the trait (number of grain. Spike^{-1}) for two varieties of wheat.

Average	Spray dates	Humic acid fertilizer cm^3. L^{-1}			Average
		F1	F2	F3	C× S
C1	S1	53.00	56.80	55.67	55.16
	S2	61.13	62.57	62.83	62.18
	S3	63.03	66.47	67.67	65.72
C2	S1	65.53	64.43	64.33	64.77
	S2	61.50	61.73	63.83	62.36
	S3	62.70	66.27	68.13	65.70
L. S. D (0.05)			N.S		1.673
Fertilizer concentrations Varieties		F1	F2	F3	Average C
C1		59.06	61.94	62.06	61.02
C2		63.24	64.14	65.43	64.27
L. S. D (0.05)			N.S		2.86
Fertilizer concentrations Spray dates		F1	F2	F3	Average S
S1		59.27	60.62	60.00	59.96
S2		61.32	62.15	63.33	62.27
S3		62.87	66.37	67.90	65.71
L. S. D (0.05)			1.49		1.18
Average F		61.15	63.04	63.74	
L. S. D (0.05)			0.86		

The results of the table showed the bilateral interference between C + S to the presence of significant differences between the combinations, so the combination C1 + S3 was superior by giving it the highest average of 65.72 grain. Spike^{-1} it did not differ significantly from the combination C2 + S3, which gave 65.70 grain. Spike^{-1} while the combination gave C1 + S1 the lowest average of 55.16 grain. Spike^{-1}. While the same table data indicated a significant effect of bilateral interference between S + F as the combination S3 + F3 exceled and gave the highest average of 67.90 grain. Spike^{-1} while the combination S1 + F1 gave the lowest mean of 59.27 grain. spike^{-1}. Table data also showed that there was no significant effect of bilateral interference between C + F as well as triple interference between C + S + F. Weight 1000 Grain: Showed table (9) there are significant differences between the levels of factors studied, by their effect on the weight of 1000 grain, the variety C2 was superior, as it gave the highest average of 37.30 g, while varitey C1 gave the lowest mean 30.80 g. The reason may be attributed to the difference of the varieties in the genotypes and the extent of the varieties' response to environmental factors and additives, these results were consistent with the findings of [1], which showed that varieties differ in their response to organic fertilization. While the results of the table indicated that there were significant differences between spray dates, S3 exceeded the appointment, gave the highest average of 36.98 g, and S1 gave the lowest average 30.07 g. The reason may be attributed to the increase in the indicators of vegetative growth and then the increase in food savings that have a role in raising the efficiency of the Source and the efficiency of transporting that dry substance to the estuary Sink, which leads to the in-crease in the increase in the components of the product from the weight of a grain and the number of grains [14].

While the concentrations of spraying fertilizer had a significant effect in this trait, the concentration exceeded F3, as it gave the highest average of 34.72 g, while the control treatment gave the lowest average of 33.24 g. The increase in weight was attributed to increased levels of carbon representation and processes of food production due to the positive effect of humic acid. These results were consistent with the findings of [15].

Table 9. Effect of dates and concentrations of humic spray on the quality (weight of 1000 grain. Kg) for two varieties of wheat.

Varieties	Spray dates	Humic acid cm^3. L^{-1}			Average
		F1	F2	F3	C× S
C1	S1	23.17	24.50	23.27	23.64
	S2	29.50	32.53	35.83	32.62
	S3	35.43	36.80	36.13	36.12
C2	S1	36.50	36.40	36.57	36.49
	S2	37.63	37.13	38.00	37.59
	S3	37.20	37.80	38.50	37.83
L. S. D (0.05)			1.07		0.84
Fertilizer concentrations / Varieties		F1	F2	F3	Average C
C1		29.37	31.28	31.74	30.80
C2		37.11	37.11	37.69	37.30
L. S. D (0.05)			0.62		2.07
Fertilizer concentrations / Spray dates		F1	F2	F3	Average S
S1		29.83	30.45	29.92	30.07
S2		33.57	34.83	36.92	35.11
S3		36.32	37.30	37.32	36.98
L. S. D (0.05)			0.75		0.59
Average F		33.24	34.19	34.72	

L. S. D (0.05)	0.43

The results of the table showed the same significant differences for bilateral interference between C + S, as the combination C2 + S3 exceled by giving it the highest mean of 37.83 g, while the combination C1 + S1 gave the lowest mean of 23.64 g. The results of the table indicated that there was a significant effect of bilateral interference between C + F. The combination C2 + F3 exceled and gave the highest average of 37.69 g while the combination C1 + F1 gave the lowest mean of 29.37 g. Also, the results of the table showed the same to the existence of significant differences for the bilateral interference between S + F, given the combination S3 + F3, as it gave the highest average of 37.32 g compared to the combination S1 + F1, which gave the lowest aver-age of 29.83 g. Also, table data indicates a significant effect of the triple interference between C + S + F as it gave the combination C2 + S3+ F3 gave the highest average of 38.50 g, while the combination gave C1 + S1 + F1 the lowest average of 23.17 g.

Total Yield: The data in Table (10) indicated that there was a significant effect between all levels of the studied factors through their effect on the characteristics of the total grain yield. As the variety C2 excelled by giving it the highest average of 9.13 ton. Ha^{-1} it exceeded the variety C1, which gave the lowest average of 7.19 ton. Ha-1 The reason may be due to the difference in the genotype composition, in spite of the superiority of this variety in the characteristics of the yield components number of spikes m^2, number of grains. Spike and weight of 1000 grains. This was reflected in the increased grain yield. Data of same table indicated that there was a significant effect with regard to spraying dates, as the S3 date gave the highest average of 9.20 ton. ha^{-1} Outperforming the rest of the dates, while the appointment gave S1 the lowest rate of 6.98 ton. ha^{-1}, evidence from the same table showed that there were significant differences between the concentrations of humic fertilizer, as F3 gave the highest mean average, outperforming the rest of the concentrations amounting to 8.47 ton. ha^{-1}. Increase the number of spikes m^2 Number of grain. Spike and weight of 1000 grain, which gave the highest rate of this trait to the role that humic organic acid gives to it because it contains amino acids and nutrients.

Table 10. Effect of foliar fertilization on spray dates, concentrations and interference between them on yield.

Varieties	**Spray dates**	**Humic acid fertilizer cm^3. L^{-1}**			**Average**
		F1	F2	F3	**C× S**
C1	S1	4.63	5.27	4.91	4.93
	S2	6.80	7.69	8.50	7.66
	S3	8.45	9.23	9.23	8.97
C2	S1	9.12	8.97	8.99	9.03
	S2	8.80	8.73	9.24	8.92
	S3	8.82	9.51	9.97	9.43
L. S. D (0.05)			0.26		0.25
Fertilizer concentrations Varieties		F1	F2	F3	Average C
C1		6.63	7.39	7.54	7.19
C2		8.91	9.07	9.40	9.13
L. S. D (0.05)			0.15		0.76
Fertilizer concentrations Spray dates		F1	F2	F3	Average S
S1		6.88	7.12	6.95	6.98
S2		7.80	8.21	8.87	8.29
S3		8.63	9.37	9.60	9.20
L. S. D (0.05)			0.18		0.18
Average F		7.77	8.23	8.47	

L. S. D (0.05)	0.10

This cycle led to the availability of appropriate conditions to activate the photo-synthesis process, which reflected on the increase of all components of the grain yield and in turn led to an increase in the total yield of grains. These results are consistent with the findings of [6], who achieved an increase in the concentration of humic acid through addition, which gave a significant increase in the yield of wheat grains. The results of Table (10) showed significant differences for the bilateral interference between C + S, as the combination C2 + S3 gave the highest average of 9.43 ton. ha^{-1}, while the combination C1 + S1 gave the lowest average of 4.93 ton. ha^{-1}. The table showed a significant effect of bilateral interference between C + F, as the combination C2 + F3 outperformed by giving it the highest average superior to the rest of the combinations, which amounted to 9.40 ton. ha^{-1}. S + F had a significant effect on this characteristic, as the combination gave S3 + F3 the highest average of 9.60 tons. 1- while the combination S1 + F1 gave the lowest average of 6.88 ton. ha^{-1}. The data of the same table indicated that there was a significant effect of triple interference, as the combination C2 + S3 + F3 exceled by giving it the highest average of 9.97 ton. ha^{-1}.

4. Conclusion

In conclusion, the results of the bilateral interaction between the varieties and the fertilizer spraying concentrations C + F indicated the presence of a significant effect among the combinations, as the combination C2 + F3 was superior to the plant height number of spikes, the weight of 1000 grain, and the total grain yield, C1 + F3 combination outperformed the spike length. Cm and it gave 8.97 and the results of the research showed that there were significant differences in the bilateral interaction between appointment and concentration S + F, and the combination S3 + F3 was superior in the following characteristics to the number of grains. The total grain, the combination S2 + F3 excelled in the height of the plant only.

Supplementary Materials:

No Supplementary Materials.

Author Contributions:

D. Z. Al-fayyadh and A. A. Hasson methodology, writing—original draft preparation, A. K. Hussein and R. K. Hassan; writing—review and editing, D. Z. Al-fayyadh; paraphrasing. All authors have read and agreed to the published version of the manuscript.

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any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content.

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