Research Article

Effect of ground fertilization and foliar spraying of seaweed extract and microelements in the components of *Triticum eastivum L.*

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ABSTRACT

A field experiment was conducted to study the effect of ground and leaf additives applied as a foliar spray on on some growth and yield characters of wheat (*Triticum aestivum L.*). The experiment included dissolving different concentrations were used for the marine extract, and It was doubled the weights up to 30 g in 10 liters of water, spraying in two growth phases, (after tillering andheading) with per treatment (ground fertilizer) N. ha^{-1}, P. ha^{-1} and K.ha^{-1}. The results were processed statistically with the analysis of variance, and differences between means. The results showed that the treatment of ground fertilizer 30 g, increased significantly the vegetative growth characters and gave the best plant height and leaf area. In general, there were no significant differences between fertilizer treatments when spraying levels increased, but there was a decrease in the number of leaves. Spraying at heading gave the best results for the overall studied growth characters. There is interference; the treatment ground application 30 g sprayed at heading had the highest means. This effect persisted in the yield, grain biological yield components, where the fertilization treatment gave 30 g but there was no significant difference between the treatment of ground fertilization only and other foliar spraying treatments. In general, spraying the mixture at high concentrations doubled the grain yield, for spraying in heading stage compared when ground fertilization.

Key Words: *Ground addition; Triticum eastivum; Foliar spray; Local class; Algae extract mixture; Microelements*

INTRODUCTION

Of the main grain crops grown in Iraq *Tritium eastivum L* Wheat, which is ranked first in terms of domestic consumption, food and industrial, which prompted producers to search for many attempts to increase the result of the development of new varieties with high production capacity, but this did not depend on the service operations only, but to pay attention to leaf feeding where the fertilizer is sprayed on the vegetative group with high production potential. However, this did not depend solely on service operations, but rather on attention to leaves feeding. Fertilizer sprayed the vegetative group with harmless concentrations and at the critical crop growth stages. Iraq's central soils tend to be alkaline ranging from 7.5 to 8.2 PH, making phosphorus and micro nutrients complex and not plant ready. Several studies have shown that the best way to add nutrients to the plant to obtain the highest yield in quantity and quality is through fragmentation of fertilizer by adding it to the soil and spraying it on the vegetative total of the plant [1,2]. Showed that the leaf fertilization with iron, zinc and magnesium resulted in an improvement in the occurrence and there was no significant difference between them, and spraying with zinc and magnesium only. It also concluded [1] that spraying with zinc or an iron solution or both resulted in an increase in grain yield. As noted, a combination of micronutrients leads to Green Zit 3 (the use of compost) Increase in dry weight and weight of 1000 grains and grain [3]. And the quality of significant effects in the characteristics of vegetative growth and components of the effect when spraying the plants of wheat with organic fertilizer Hemic acid, and also [4]. Seaweed extract (SWE) concentrates are known to Produces many beneficial effects on plants and it contains growth promoting hormones such as indole-3-acetic acid (IAA), indole-3-butyric acid (IBA) and Cytokinins, trace elements (Fe, Cu, Zn, Co, Mo, Mn and Ni), vitamins and amino acids . Seaweed extracts have been reported to stimulate the growth and yield of plants, enhance tolerance to environment stress, and improve nutrients availability and nutrients uptake from the soil [5]. The existence of significant effects between the stages of spraying of wheat plants (when the flowering and heading and elongation). Potassium treated treatments excelled at a 16% concentration at the beginning of the heading phase on the rest of the soil spraying to increase the qualities of vegetative growth and its components and components [6]. Concluded that the spray of the wheat with a mixture of nutrients (nitrogen, phosphorus, potassium, zinc, copper, boron, magnesium, and molybdenum). In six spray stages, spraying plants with nutrients at growth sites (The highest average number of grains/spike, 1000 grain weight, biologic yield and grain yield was given. and the lack of research on paper nutrition and nutritional balance between the major and micro nutrients within the plant. The purpose of the study is to know the response of Wheat to leaf feeding and to adopt the supplemental method (ground with spray) because of its advantages that may contribute to solving the problems related to meeting the plant's need for fertilizer. Also, determining the stages of spraying the nutrients to be in accordance with the requirements of the plant during its various stages of growth.

MATERIALS AND METHODS

The field experiment was conducted in the Mussaib district, which is 5 km away from the Technical College/Mussaib during the 2018/2019 season in the soil of the Greene mix. The soil plowed two perpendicular tillage's and then fertilized with the first batch of nitrogen fertilizer with a quantity of N 50 kg/ha, at a rate of P 100 kg/ha, then it was smoothed, softened and divided into 20 × 4 m boards the experiment was designed according to design of split panels. The seeds of the Aba 99 (local variety). Plants were planted in 15/11/2018 at a rate of 100 kg/ha in lines 15 cm between each line. And when the plants were perfected with a solution of 25% algae extract and 5% amino acids mixed with micro-magnesium, iron, and zinc (10 g of seaweed, micro-amino acid and 10 ml of water) were dissolved. The weights were then increased to obtain other spraying parameters where the percentage of compounds in the compound doubled as follows:

- Ground fertilization only 50 Kg P/ha+100 Kg N/ha. +50 Kg (Comparative treatment).
- Ground fertilization with 10 g/liter of water.
- Ground fertilization with 13 g/10 liters of water.
- Ground fertilization with 16 g/10 liters of water.

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- Ground fertilization with 19 g/10 liters of water.
- Ground fertilization with 21 g/10 liters of water.
- Ground fertilization with 24 g/10 liters of water.
- Ground fertilization with 27 g/10 liters of water.
- Ground fertilization with 30 g/10 liters of water.

After completing heading spikes plants were sprayed with the same spraying treatments and the second batch of nitrogen fertilizer was added 50 Kg N/ha, spray was sprayed by a hand spray and the spraying times were observed early in the morning and added a diffuser (washing powder) of 15 g in 100 liters of water was added to reduce surface tension and to increase the efficiency of the spray solution to ensure the complete wetness of the leaf, 10 plants were taken in each experimental unit;

- Number of leaves.
- Plant height (cm) from soil surface to the last node.
- Leaf area (cm^2) by multiply the length of the leaf. * Maximum width of the leaf * 0.96 Based on [3,7].

When the plant maturity was ascertained, a square meter of each experimental unit was harvested to calculate the number of wheat spikes/ m^2 and yield cereal and straw yield. Ten plants were randomly selected to calculate the number of grains of spikes and the weight of 100 grains then the biological yield (grain weight+hay weight). Statistical analysis was carried out using the Gen Stat program (Agricultural Statistics Software). Data at each monitoring date were analyzed separately and the results are presented in a tabular representation. The averages were compared between them according to the method of the least significant difference (A.F.M) and at the level (Probability of 5% based on 17) [8].

RESULTS AND DISCUSSION

Spraying factors significantly affected plant height (Table 1). Where the treatment gave (9) soil fertilization 30+ g in 10 liters of water above the averages of 113.5 cm and the lowest was the comparison treatment (soil fertilization only) reached 75.5 cm. There were no significant differences between soil fertilization coefficients of 16+ g to 30+ g in 10 liters of water alternately. As for the time of spraying, it gave the time of spraying after heading the spikes the highest height of the plant 122.7 cm compared to 113.5 cm, when spraying after the stage of the tillering. With the interaction gave Treatment (9) Ground fertilization 30+ g in 10 liters of water the date of spraying when heading spikes higher averages where it reached 118.1 cm.

Although there were no significant differences between spraying factors, plant height was significantly increased by increasing levels [8,9], where they found an increase in plant height significantly with increased concentration of iron and zinc in the spray solution. This is due to the increase in the concentration of the elements in the compound, especially iron, zinc and manganese. The role of IAA in the formation of the amino acid tryptophan, from which the hormone is, derived thus increasing plant height. Spraying treatments did not have a significant effect on the number of leaves despite, the significant increase in that trait with increasing spraying levels, but there was a significant decrease in treatments 24 g up to 30 g in 10 liter water. For the date of spraying has gave spraying when heading spikes significantly the appointment after the tillering is completed. For the interaction, the treatment gave ground fertilization 30+ gm in 10 liters of water and at heading reached 10.51.

In general, significant differences were observed in the number of leaves that it Narrow range between sufficiency and toxicity with respect to some micronutrients [9] The same (Table 1) shows the continued increase in the area of the science leaf until the treatment of soil fertilization 30 g in 10 liters of water, reaching 46 cm, despite the absence of significant differences between most spraying treatments, especially spraying Fertilizers 19+ g up to 30 g in 10 liters of water This effect is identical to the number of leaves. For the spraying date, the spray time was given when heading the spikes higher than the average after the tillering of the cycle; it was 43.06 cm and 37.01 cm2 respectively. And the interference was given, Treatment Soil fertilization 24+ g in 10 liters of water and after the heading highest averages reached 49.03 cm. Nutrients, iron, zinc and manganese, play an important role in many biological and physiological processes plants such as photosynthesis, respiration, chlorophyll formation, energy production, enzymatic reactions and building nucleic acids and fatty acids, leading to an increase in the products of the representation and then provide high food stocks, which reduced the case competition between plant parts provided a better opportunity for growth and increased area the leaf as well as the role of zinc in building many metabolic and synthetic compounds all enter into the growth and expansion of cells and build new cells, which drive towards increasing the area of the top leaf [10,11].

The significant increase in the number of spikes/ m^2 continued with an increase in spraying levels of 378.0 spikes/m^2 treatment Ground fertilization 30 g in 10 liters of water (Table 2). There was no significant differences between treatments only ground fertilization and ground fertilization 21+ g in 10 liters of water and ground fertilization 10+ g and up to 30 g in 10 liters of water. Give the spray time at heading the spikes above the averages compared to the spray time after tillering, the branches were 330.73 and 266.88 spikes/m^2 respectively, and when interaction treatment gave soil fertilization +30 g in 10 liters of water and after heading the spikes above the averages

TABLE 1

Ground and foliar fertilization in some characteristics of vegetative growth of wheat.

Treat	Number of spikes/m2		Average	Spike length (cm)		Average	Number of spikes/m2		Average
	After Tillering	After Heading the spike		After Tillering	After Heading the spike		After Tillering	After Heading the spike	
1	198.4	207	202.7	9	9.7	9.3	63.3	77.5	70.4
2	255	255.4	255.2	8.4	10.3	9.4	71.6	82.3	76.9
3	246.4	245.6	246	9.4	10.7	10	70.5	88.6	79.5
4	267.4	336.2	301.8	10.2	11.7	10.9	79.5	85.2	82.3
5	250.5	350.5	300.5	10.8	12	11.4	83.2	91.6	87.4
6	278.5	344.8	311.6	12.5	12.4	12.4	85.3	92	88.6
7	288	390.5	339.2	12.6	12	12.2	87	92.5	90.6
8	298.3	410	354.1	13.2	12.7	12.9	88.3	94.3	91.3
9	319.5	436.6	378	14	14.3	14.1	91.8	97	94.4
Average	266.88	330.73		11.15	12.2		80.05	89	
L.S.D (5%)	114.4	140.1	151.3	2.75	3.37	3.65	14.39	17.63	19.04

amounted to 436.6 spike/m^2. While the lowest value at the treatment of soil fertilization and the treatment of the complete tillering amounted to 198.4. The addition of nutrients at critical stages to the evolution and development of branches and spikes has played several roles These include providing, a continuous food supply of these nutrients and their actions in improving growth opportunities and by increasing the leaves' content Chlorophyll and its role in raising the efficiency of photosynthesis and thus increase the outputs of representation, which reduced the state competition within a plant materially to increase the number of spikes [12,13]. The spikes length was significantly increased with increased concentration of spraying despite the absence of significant differences between ground fertilization coefficients 10+ g to 30 g in 10 liters of water. as for the spraying time, the treatment was gave to spraying at heading the spikes about unmatched spraying after tillering where the length of the spike was 12.2 cm and 11.15 cm, respectively. Gave interaction in the treatment Ground fertilization 30+ g in 10 liters of water after filling the ears above the averages reached 14.3 cm. The addition of elements and spray coincided with the stages of the development of spike, which means a better incentive for growth and development. To provide continuous food supply on the one hand and the role of these nutrients in raising the efficiency Photosynthesis on the other hand, which encouraged a better growth of the spike, reflected clearly on the increase in length [14].

opportunity to reduce the incidence of abortion, in flowers to reduce If they compete for the product [12,14].

The fertilizer treatment had a significant effect on the weight of 100 grains (Table 3). Although there was no significant difference between fertilizer transactions, soil fertilization 10+ g and up to 22+ g in 10 liters of water, treatment gave its fertilizer soil fertilization 30 g in 10 liters of water above averages reached 6.85 g although there is no significant difference between them, and treatment soil fertilization 27+ g in 10 liters of water. Date of spraying, exceeded spraying than date at heading the spikes after tillering of the branches where they were given 4.92 g and 5.91 g respectively. The maximum interaction in fertilizer treatment was ground fertilization 30 g In 10 liters of water and at heading reached 7.80 g. Spraying had no apparent effect on weight grain of 100 grain, but spraying generally gave a significant increase high concentrations of spraying and at critical growth stages. This may be due to the increased efficiency of photosynthesis. The process of transferring products of photosynthesis from the site of manufacture in the leaves to storage, sites in the grain, as well as increased production of energy and ATP formation and the construction of sugars, starch, proteins and building sinter and the formation of nucleic acids stored in the grain, leading to weight increase [12,14,15].

TABLE 2

Ground and foliar fertilization in some yield components.

Treat	Number of spikes/m2		Average	Spike length (cm)		Average	Number of spikes/m2		Average
	After Tillering	After Heading the spike		After Tillering	After Heading the spike		After Tillering	After Heading the spike	
1	198.4	207	202.7	9	9.7	9.3	63.3	77.5	70.4
2	255	255.4	255.2	8.4	10.3	9.4	71.6	82.3	76.9
3	246.4	245.6	246	9.4	10.7	10	70.5	88.6	79.5
4	267.4	336.2	301.8	10.2	11.7	10.9	79.5	85.2	82.3
5	250.5	350.5	300.5	10.8	12	11.4	83.2	91.6	87.4
6	278.5	344.8	311.6	12.5	12.4	12.4	85.3	92	88.6
7	288	390.5	339.2	12.6	12	12.2	87	92.5	90.6
8	298.3	410	354.1	13.2	12.7	12.9	88.3	94.3	91.3
9	319.5	436.6	378	14	14.3	14.1	91.8	97	94.4
Average	266.88	330.73		11.15	12.2		80.05	89	
L.S.D (5%)	114.4	140.1	151.3	2.75	3.37	3.65	14.39	17.63	19.04

TABLE 3

Ground and foliar fertilization in weight 100 grain, grains yield and Biological yield.

Treat	weight of 100 grain (g)		Average	Grain yield (t/ha)		Average	Biological yield (t/ha)		Average
	After Tillering	After Heading the spike		After Tillering	After Heading the spike		After Tillering	After Heading the spike	
1	3.5	5	4.25	5.2	6.22	5.71	10.3	11.2	10.7
2	4.35	5.4	4.96	6.2	6.76	6.47	11	12.5	11.75
3	4.8	5.1	4.95	6.2	6.8	6.7	12.5	12.9	12.7
4	4.5	5.8	5.15	6.66	6.7	6.72	13	16	14.25
5	5.1	5.2	5.15	7.1	7.65	7.37	14.9	16.8	15.85
6	4.5	6.7	5.1	7.35	7.66	7.5	16.2	17.3	15.75
7	4.5	6.1	5.3	7	8.16	7.58	16.88	18.6	17.74
8	6.2	6.1	6.15	8	8.35	8.17	17.8	18.7	18.25
9	6.9	7.8	7.35	8.3	9.4	8.85	19.2	20.3	19.75
Average	4.92	5.91		6.89	7.52		14.64	16.03	
L.S.D	1.59	1.947	2.103	1.525	1.868	2.017	1.445	2.502	3.309

The increase in the number of grains/spike continued with an increase in spraying levels and the treatment of soil fertilization 30+ g in 10 liters of water, where the number of grains 94.4 of spike. no significant differences between transactions soil fertilization only and soil fertilization 10 +g in 10 liters of water as well as soil fertilization, 13+ g up 30+ g in 10 liters of water alternately. For Spraying the treatment was exceeded to spraying at heading the spikes for the equivalent after tillering is completed and gave 89.00 and 80.05 grain/spike respectively. And the maximum interaction at treatment was ground fertilization 30 g in 10 liters of water and after heading the ears with 97.0 grain/spike. Regularity of nutrition increases the composition of grains in one spike, as well as the role of zinc in increasing grains. The vaccine increases the probability of fertilization and the formation of flowers, which led to an increase in the number of spike grains. Or the role of nutrients in raising the efficiency of the photosynthesis and provides an appropriate

The increase between different spray concentrations was minor in other growth parameters, and this may be attributed to the inability to determine the appropriate concentration in the spray solution for the nutrient, since the range may be narrow between the sufficiency and the toxicity, especially with respect to some small nutrients [9]. As well as the difference of plants and their stages of growth in terms of determining the safe and efficient concentration of the nutrient element [16].Continue method of increase in the number of grains of spike, in the grain yield where the increase in spray levels and until treatment Soil fertilization of 30+ g in 10 liters of water, although there is no significant difference between soil fertilization only, and Fertilizer treatments ground fertilization 10+ g up soil fertilization 22+ g in 10 liters of water, as well as no significant differences between treatments Soil fertilization 22+ g to soil fertilization 30 g in 10 liters of water. Time of spraying at heading was significantly higher than that of the total grain

yield, where they gave 7.52 and 6.89 t/ha respectively. For the intervention, the treatment gave ground fertilization 30+ g in 10 liters of water at heading highest average was 9.40 t/ha compared to 5.20 t/ha soil fertilization only. Spray treatments, especially at heading the spikes provided a better chance of growth, which was clearly reflected on the results of adjectives. Which led to an increase in the accumulation of dry matter and thus greater efficiency in the transport of these substances from their manufacturing sites (source) towards grain (downstream) accompanied by lengthening grain filling and thus increasing productivity [2,14,17]. The yield of the biologically increased by increasing the levels of spraying to land fertilization of 30 g in 10 liters water where it gave 19.75 t/ha. There were no significant differences between the transactions of soil fertilization 10+ g Up to soil fertilization 24+ g in 10 liters of water. spraying date at heading the spikes is significantly higher than after tillering of the branches where they gave 16.03 and 14.64 t/ha, respectively. Treatment gave ground fertilization 30+ g in 10 liters of water at time of heading the spikes highest average of 20.30 t/ha compared to 10.30 t/ha for soil fertilization only. This supports the role of action Fertilization of ground and leaf in increasing the weight of vegetative parts resulting in to Increased Biological yield and grain yield this means that leaves feeding is effective and useful under specific conditions absorption of in appropriate soil conditions [18].

CONCLUSION

The results showed that the treatment of ground fertilizer 30 g, increased significantly the vegetative growth characters and gave the best plant height and leaf area . In general, there were no significant differences between fertilizer treatments when spraying levels increased, but there was a decrease in the number of leaves. But there was no significant differences between the treatment of ground fertilization only and other foliar spraying treatments In general, spraying the mixture at high concentrations doubled the grain yield, for spraying in heading stage compared when ground fertilization. Therefore, it is advised to adopt the foliar spray treatments at a concentration of 30 g for the same concentration of soil fertilization.

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