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Effect of Organic Fertilizer Extract on Morphological Characteristics for Bread Wheat

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Abstract. The field experiment conducted in one of the fields located in Babylon-Iraq, during the agricultural season 2020-2021. In order to study the effect of spraying different levels of organic fertilizer extract on the morphological characteristics of spikes wheat for three local cultivars of wheat. The experiment was conducted by Randomized Complete Block Design (RCBD) with split plot system and with three replications. The levels of spraying with organic compost extract were represented in the main plot and were 0, 2.5, 5 and 7.5 ml.L⁻¹ and three cultivars IPA99, Rashid, Abu Ghraib, were represented by the subplot, and the following results were recorded: The fertilizer concentration 7.5 ml.L⁻¹ was significantly excelled in all studied traits, the spike length and its stalk, awns length and diameter of spike, and they were respectively 13.71 cm, 19.16 cm, 7.16 cm, and 1.62 cm. As for Rashid cultivar excelled in the trait of spike and stalk, length 15.17 and 23.87 cm, respectively. While the IPA99 cultivar was excelled on the diameter of spike trait 1.61 cm, while Abu Ghraib excelled in the awns length trait with a total average 7.57 cm.

Keywords. Fertilizer extract, Morphological, Bread wheat, Awns, Diameter of spike.

1. Introduction

In Iraq, the wheat crop is one of the important crops and represents the main pillar for providing food security [1,2]. Morphological traits are one of the main traits in the study and classification of plant, and this is due to the multiplicity of these traits and the ease of viewing them with the naked eye [3,4]. The other importance is to know the characteristics of the purpose of selecting varieties that give a distinct yield per unit area, that mean increasing productivity [5-7]. The cultivar choice when planting has an effective effect on increasing productivity and improving growth characteristics and yield, throughout the growth period specified for each cultivar, i.e. the cultivar was affected by the planting date, cultivation method and irrigation periods during the growing season. [8,9]. Represents the final product of the growth and development processes, and any change that may occur in one of these processes affects the quantity and quality of the yield and is controlled by the production of dry matter in the stage of grain filling as a result of the photosynthesis process that takes place In the green parts of the plant (source), which is described as exporting, and the ability of the grain to receive the



products of photosynthesis (sink), In a study conducted by [10,11], to show the relationship between the source and the estuary in several cultivars of wheat, they found significant differences in the size, weight and density of the grains of the ears of the cultivars included in the study.

There are many studies that showed the importance of organic fertilization in obtaining specification of the quality and quality of the spike, which is reflected positively on the yield.

[12,13], showed that there are significant differences between wheat cultivars in the trait of spike length. [14], indicated that there was a significant increase in spike length and weight when spraying wheat plants with compost extracts of 2 and 4 ml. L⁻¹ and at a rate of three sprays in different stages of growth. The concentration of 4 ml.L⁻¹ is significantly excelled in the traits of the above-mentioned yield. [15,16], that the effect of foliar spraying of compost extract on rice plants at different stages of growth, they noticed a significant and clear increase in the growth rate and panicles length, [17,18], also found significant differences between the cultivars of wheat in the study in the spike length and its stalk. [19,20] note a strong relationship between the length of the spike holder and the yield.

The awns is the closest plant part to the ears that carry the grain, and since it intercepts the solar rays falling on the plants, its presence is necessary for the plant through its participation in the photosynthesis process and thus its contribution to the construction and formation of the grain through the processing of grains with the products of the photosynthesis process and thus plays the role of the source that transports nutrients to the estuary grains, [21,22]. Since the awns remains green and effective for a good period, it remains effective in the photosynthesis process throughout this period and even for a longer period than the leaves of the plant that start with drought and this was confirmed by [23,24], that awns continues to supply grains with photosynthesis products for longer periods, while the role of most plant parts in the processing process declines. that awns contributes effectively to increasing the productivity of wheat from by increasing the components of the yield. As [25,26] mentioned when studying different varieties of wheat that the non-leaf parts of the plant organs, including the awns, play an important role in providing the plant with the components of photosynthesis due to its ability to carry out the process of photosynthesis because it contains chlorophyll. [27,28]. The cultivar test has an effective role in increasing productivity, and this is evidence of the resistance extent of the chosen cultivar from among several cultivars to soil salinity and the type of fertilizer added to it. came the importance of research in focusing on this important part of the parts of the wheat plant to know the effect of spraying with organic fertilizer extract on some specifications of the morphological characteristics spikes for several local cultivars of bread wheat.

2. Materials and Methods

The field experiment conducted in one of the fields located in Babylon-Iraq, during the agricultural season 2020-2021. In order to study the effect of spraying different levels of organic fertilizer extract on some traits of the spike for three local cultivars of bread wheat. Cultivation was conducted in a clay loam soil, with a sand content of 26.4%, a percentage of silt 34.6%, a percentage of clay 39.0%, 7.78 pH, (EC) 2.8 dsm⁻¹, organic matter 12.1 g.kg⁻¹, available phosphorous 5.43 mg .kg⁻¹, available potassium 2.05 mg. kg⁻¹ and total nitrogen is 1.78 g.kg⁻¹.The experiment was conducted according to the arrangement of split plots, and the treatments were distributed using the Randomized Complete Block Design (RCBD) with three replicates.

The levels of spraying with organic fertilizer extract were represented in the main plot and were 0, 2.5, 5 and 7.5 ml.L⁻¹, while the cultivars IPA99, Rashid, Abu Ghraib were represented by the subplot, The experimental land, after being prepared, was divided into three replicates, and each replicate was divided into three main plot, the dimensions of one plot 7 × 5 m, and each main plot was divided into three sub plot, the dimensions of one plot 7 × 1.5 m, each replicate contained 12 experimental units, the sum of treatments is 36 units with an area of 5.2 m² and planted in each experimental plot, cultivar in 6 rows, the distance between the row 25 cm, and the distance between the grains on the same row 5 cm. The planting took place on 12/12/2020 for the three cultivars obtained from the Department of Seed Certification in Babylon province.

The extracts fertilizer was sprayed in three stages of plant life, namely, the tillage stage, elongation, and booting, by a hand pump. The spraying was conducted in the early morning to avoid drying of the

solution. Tri-calcium superphosphate fertilizer was added at a rate of 100 kg.ha⁻¹ when plowing. As for the nitrogen fertilizer, which comes from urea, it was added at a rate of 180 kg.h⁻¹. It was added in three batches to three stages of plant growth. The crop was harvested on 2021 /5/17/ after the cultivar plants reached physiological maturity, by turning the spikes color to yellow and the leaves and stems stiffened. Ten spikes were taken from each sample to study the following traits: the average spike length and its stalk(cm), the average own length, and the average of diameter spike.

The results were statistically analyzed according to the design used using the statistical package from the Statistical Package for Social Science (SPSS). The results were analyzed using the least significant differences (L.S.D) test at the 0.05 probability level to find statistical differences between the arithmetic means of treatments.

3. Results and Discussion

3.1. Spike Length

Table .1 shows that there is a significant effect of the extract of organic fertilizers ,cultivars and the interaction between them on the trait of spike length. Spraying wheat plants with s organic extract at a concentration 7.5 ml L⁻¹ led to positive significant differences in spike length and gave the highest of 13.71 cm compared to the plants that were not sprayed (control), which gave the lowest value of 11.87 cm. The reason for this increase is due to the effective role of the seaweed extracts because it contains micro and macro nutrients, in addition to the basic plant hormones such as auxins and cytokine's, which have the greatest role in increasing the activity of plant cells. Increasing its breadth also leads to the stimulation of some enzymes, including photosynthetic enzymes, which help in increasing the representation of chlorophyll, which is reflected in the revitalization of the plant in general and the spike in particular, which is the final recipient of the products of the metabolic and vital activities of the plant Also, supplying the plant with nutrients during the different stages of growth leads to reducing competition between the spike and other parts of the plant, which is reflected in the morphological characteristics of the spike.

This is consistent with what was found by [2,15], on the wheat plant. From Tables. 1, that the wheat cultivars also differed significantly in spike length, where the Rashid cultivar achieved the highest average of 15.17 cm, while the Abu Ghraib cultivar achieved the lowest rate of 10.43 cm. The reason for this may be due to the fact that the cultivar Rashid possesses the genetic characteristics that led to giving its traits the highest averages in these traits, which is a good indication of the trend of the spike length compared to the rest of the cultivars under study, and this agrees with[12,18]. The interaction between cultivars and spraying with organic extracts fertilizer had a significant effect on increasing the spike length trait compared to the interaction treatments, which gave the lowest value 9.96 cm, were represented by the control treatment and the Abu Ghraib cultivar, while the Rashid cultivar cultivar and concentration 7.5 ml L⁻¹ achieved the highest rate of 16.30cm, and this is evidence of the difference in response to spraying with organic extract according to the cultivar. The levels of the spike length at different conditions are shown in Figure.1, for three cultivars and fertilizer extract

Table 1. The effect of fertilizer extracts, cultivars and interference between them on spike length cm.

Fertilizer extract ml.L ⁻¹	Cultivars			Mean fertilizer extract
	Abu-Ghraib	AL-Rashid	IPA-99	
0	9.96	14.36	11.30	11.87
2.5	10.23	14.90	11.66	12.26
5	10.63	15.13	12.23	12.66
7.5	10.93	16.30	13.90	13.71
Means cultivars	10.43	15.17	12.27	
L.S.D=0.05	Cultivars 0.44	Extract fertilizer 0.35		Ffertilizer× cultivar 0.52

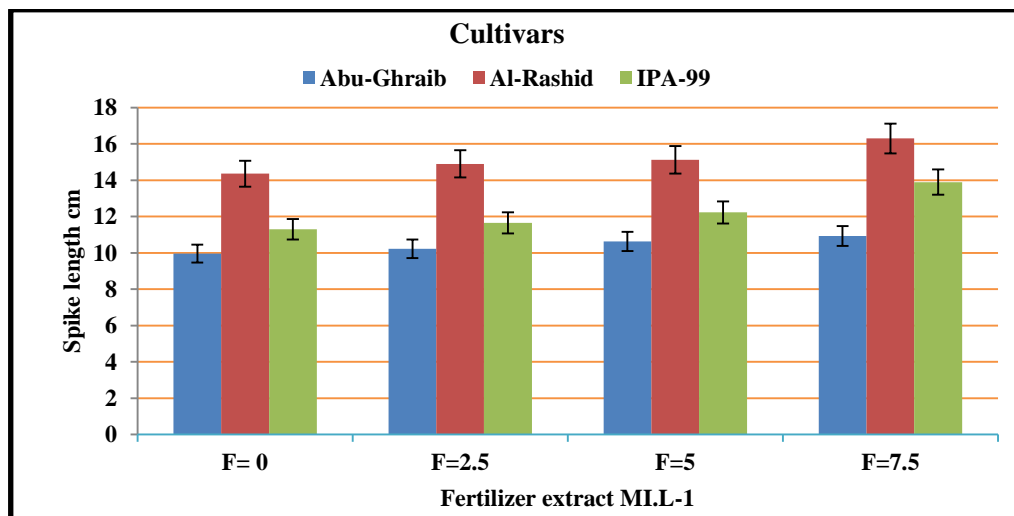


Figure 1. Effect of fertilizer extracts and cultivars on spike length.

3.2. Stalk Length

The results of the statistical analysis in Table .2, showed that there are significant differences in the length of the spike stalk between the cultivars and the levels of organic fertilizer extract and the interaction between them in this trait. The spraying treatment with concentration 7.5 ml.L^{-1} gave the highest significant value of 19.16 cm. While the average length of the lowest spike stalk was significant in the control treatment, by recording the lowest value of 17.58 cm, with a decrease of 8.24%. This result indicates the importance of spraying plants with seaweed extract, which led to the availability of quantities of nutrients and hormones that led to the rapid division and elongation of cells, which was reflected in an increase in the growth average of the spike stalk.

This is consistent with what was observed by [14,19], on the wheat plant of a significant increase in the panicle length when sprayed with organic extract. The cultivar Rashid gave the highest significant average in the trait of the spike stalk length reached 23.87 cm, while the Abu Ghraib cultivar had the lowest significance in this trait with an average of 13.39 cm. This result agree with [11,23], found regarding the existence of significant differences in the spike stalk length among the wheat cultivars included in his study. As for the interaction between the cultivars and the levels of spraying with seaweed extract fertilizer, that the level 7.5 ml.L^{-1} and the Rashid cultivar was significantly higher in the spike stalk length with a value of 24.93 cm Compared to the Abu Ghraib variety that was not sprayed with organic fertilizer extract. The lowest value was recorded 12.76 cm, which means the variation in the response of the varieties included in the study to the process of spraying with organic fertilizer extract. The levels of the stalk length at different conditions are shown in Figure. 2, for three cultivars and fertilizer extract.

Table 2. The effect of fertilizer extract ,cultivars and interference between them on stalk length cm.

Fertilizer extract ml.L^{-1}	Cultivars			Means extract fertilizer
	Abu-Ghraib	AL-Rashid	IPA-99	
0	12.76	23.13	16.86	17.58
2.5	13.18	23.50	17.23	17.99
5	13.37	23.93	18.20	18.50
7.5	14.26	24.93	18.53	19.16
Means cultivars	13.39	23.87	17.70	
L.S.D 0.05	Cultivars 0.26	Fertilizer extract 0.32	Ffertilizer× cultivar 0.48	

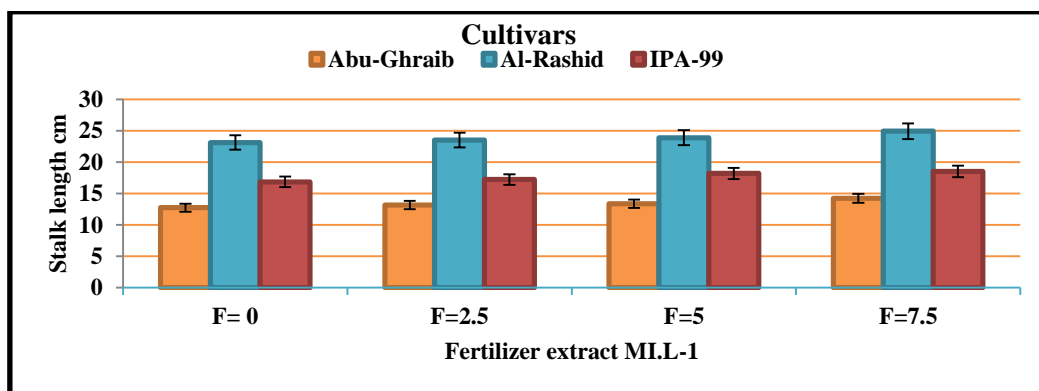


Figure 2. Effect of fertilizer extracts and cultivars on stalk length.

3.3. *Awns Length*

Table. 3 shows that the addition of fertilizer extract led to an improvement in the length of the awns, with the highest average reaching 7.16 cm at a concentration 7.5 ml L⁻¹. While the lowest value in the control treatment was 5.75 cm. It is also noted that plants of concentration 2.5ml L⁻¹ and concentration 5ml L⁻¹ did not record any significant differences and the reason for this is due to the role of organic fertilizer extract because of its nutritional elements Growth regulators were reflected in the increase in the awns length in addition to the increase in the period of green awns remaining. This means that chlorophyll remains and thus leads to an increase in its contribution to the photosynthesis process, and this is consistent with what was found by [21,9] also indicated that the cultivars also differed significantly in this trait. The cultivar Abu Ghraib gave the highest value of 7.57 cm, while the cultivar Rashid gave the lowest value of 5.07 cm. The reason may be due to the different cultivars according to the genotypes of each cultivar, and the long awns cultivars are considered to have better performance because, after the aging of the leaves, the awn remain a contributor to the photosynthesis process [10,8]. The levels of the awns length at different conditions are shown in Figure. 3, for three cultivars and fertilizer extract.

Table 3. The effect of fertilizer extract, cultivars and interference between them on awns length cm.

Fertilizer extract ml.L ⁻¹	Cultivars			Mean extract fertilizers
	Abu-Ghraib	AL-Rashid	IPA-99	
0	7.13	4.36	5.76	5.75
2.5	7.33	4.83	6.10	6.08
5	7.36	5.20	6.36	6.30
7.5	8.46	5.90	7.13	7.16
Mean cultivars	7.57	5.07	6.33	
L.S.D 0.05	cultivars	fertilizer extract	fertilizer× cultivar	
	0.41	0.38	N.S	

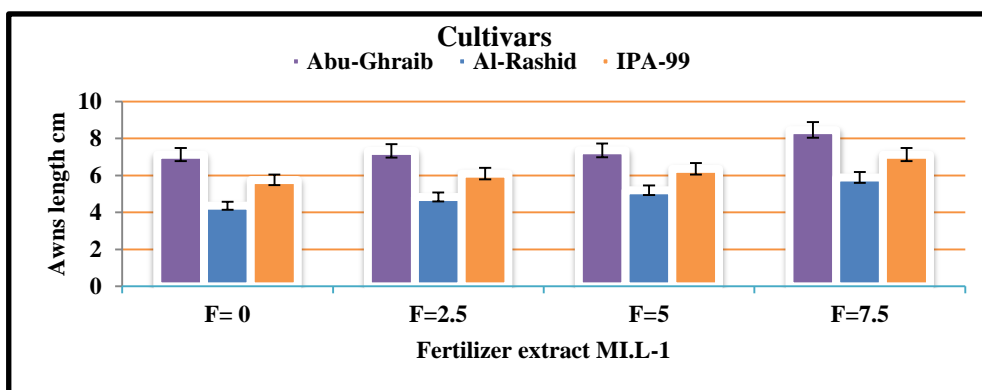


Figure 3. Effect of fertilizer extracts and cultivars on awns length.

3.4. Spike Diameter

The results of the statistical analysis in Table 4, showed that spraying with organic extract at a concentration of 7.5 ml.L⁻¹ gave the highest averages in the diameter of spike, which amounted to 1.62cm, while the control treatment gave the lowest averages in these the traits amounted to 1.43cm. The concentration 7.5 ml.L⁻¹, did not differ significantly from the concentration 5 ml.L⁻¹ in The trait of the diameter of spike. The reason is due to the positive effect of spraying with the organic extract fertilizer by supplying the plant with its needs of nutrients. [13,10]. It was also noted from the data of the same table that the trait of the diameter of spike was the highest significance in the cultivar IPA 99, where it recorded the highest average of 1.61cm while the Rashid cultivar was the least significant, as it recorded the lowest value of 1.44 cm. This is due to the efficiency of the representative cultivar .The interaction between cultivars and spray levels with organic extract, where the concentration 7.5 ml L⁻¹ and the cultivar IPA 99 gave the highest average diameter of spike 1.71cm, while the cultivar Rashid gave the concentration 0 ml. L⁻¹. The lowest value 1.36 cm [24]. The levels of the spike diameter at different conditions are shown in Figure. 4, for three cultivars and fertilizer extract.

Table 4. The effect of fertilizer extract , cultivars and interference between them on spike diameter (cm).

Fertilizer extract ml.L ⁻¹	Cultivars			Means extract fertilizer
	Abu-Ghraib	AL-Rashid	IPA-99	
0	1.39	1.36	1.54	1.43
2.5	1.47	1.41	1.58	1.48
5	1.52	1.47	1.63	1.54
7.5	1.60	1.55	1.71	1.62
Means cultivars	1.49	1.44	1.61	
L.S.D 0.05	cultivars	fertilizer extract		fertilizer× cultivars
	0.39	0.58		0.71

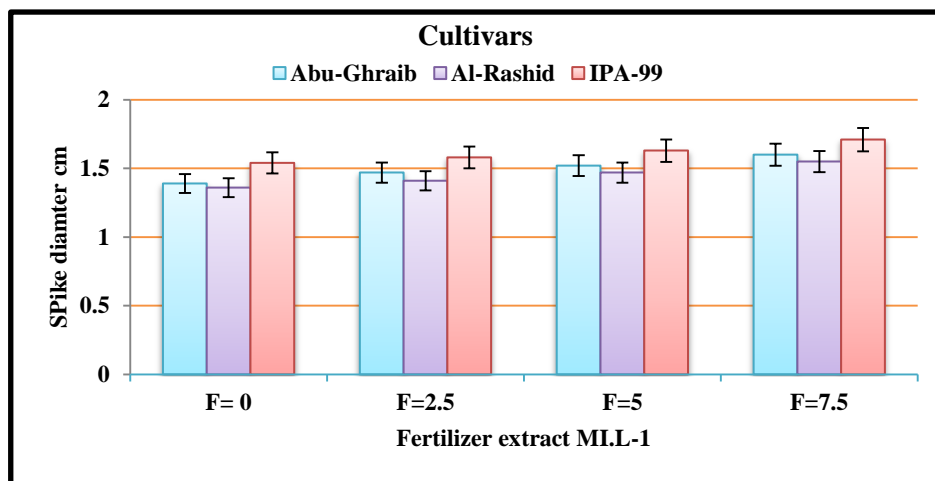


Figure 4. Effect of fertilizer extracts and cultivars on spike diameter.

Conclusions

Conclude from the experience that spraying wheat plants with organic fertilizer extract in three stages of plant life led to an improvement in the specifications of the morphological characteristics spikes, and this was reflected in the varietal response to these additives. The results showed that fertilizer concentration 7.5 ml.L⁻¹ was significantly excelled in all studied traits, the spike length and its stalk, awns length and diameter of spike. As for Rashid cultivar excelled in the trait of spike and stalk, length. While the IPA99 cultivar was excelled on the diameter of spike trait, while Abu Ghraib excelled in the awns length trait.

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