



EFFECT OF HUMIC ACID SPRAYING ON GROWTH AND YIELD OF WHEAT (*TRITICUM AESTIVUM* L.)

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Abstract

A field experiment was conducted during Autumn season (2017-2018) in AL-Muthanna University / Agriculture college / Agricultural experiment and research station which located in Albandar district (3 Km southwest from Al-Muthanna city) to knowing the effect of spraying four concentration from humic acid (0, 5, 10, 20) mL⁻¹ on the growth and yields attributes of the wheat crop Ebaa variety 99, the experiment was applied by Spilt-Plot design by using Randomized Complete Block Design (R.C.B.D), Humic acid was put in the main plot with three replicates ,the results showed exceeding of 20 mg L⁻¹ concentration on some growth and yield attributes as the height of plant, flag leaf area, the number of the spikes in one M² and the grain yield which gave means attained 82.40 cm, 43.3 cm², 275.5 spike M⁻², 55.13 grain spike⁻¹ and 4.779 tan H⁻¹ of the mentioned attributes, whereas the control treatment (without any addition) gave the lowest mean to the same attributes attained 74.35 cm, 33.7 cm², 222.5 spike M⁻², 46.42 grain spike⁻¹, 3.174 tan H⁻¹.

Key words: Wheat, humic, foliar spraying.

Introduction

Wheat crop *Triticum aestivum* L. from an important crops from the nutritional side and it ranked first between the crops in the world and Iraq from an important and the planting area and it is one of the most widespread crops (shafashq and Aldbaby, 2008) and It is an essential source of human and animal nutrition and a source of essential amino acids, vitamins, minerals, dietary fiber and beneficial phytochemicals (Shewry, 2009). In the recent years there was an interesting in the leaf nutrition as an organic molecular spraying which has no negative effect on the environment as humic acid (Senn, 1991), the leaf fertilization by humic acid increase the ability of plant and soil to keep water , photosynthesis and antioxidant of photosynthesis (Fujii *et al.*, 1995), the leaf spraying by humic also led to increasing leaf area index (Figliolia *et al.*, 1994) and it also contains a number of organic compounds which it help in increasing the growth and yield of the plant and it used to decrease the adverse effect of the salt stress and developing the root system (El-Hefny,2010) and it being an active source of carbon for activity of microorganism, as well as increasing the availability of some nutrients through it ability to chelated some of elements and synthesis the chelating complexes that make the element ions free in the soil solution and increase the absorption opportunities from the plant (El-Sharkawy and Abdel-Razzak, 2010) and it also working on the stimulating and inhibition of another enzyme and increase the plant tolerance to the severe environmental conditions as increasing of temperature, salinity, increase the permeability of the cellular membrane and

stimulating many biological reactions in the plant (Shalash *et al.*, 2011).

Methods and Materials

A field experiment was conducted during Autumn season (2017-2018) in Albandar district (3 Km Southwest from Al-Muthanna city) to knowing the effect of humic acid on the growth and yield of wheat Ebaa variety 99, arandom samples from soil were taken at depth (0-30) cm from different locations then a combination sample was prepared to make some physical and chemical analysis of the study region which showed in the table (1), the experiment was applied by Spilt-Plot design by using Randomized Complete Block Design (R.C.B.D) and by three replicates, the main plots including four concentration form humic acid (0,5,10,20) ml L⁻¹, the experiment land was plowed two orthogonal plows and then the area softened and divided into 12 plots. The area of the plot was 1 × 2 m and the distance which separates between the plots attained 1m, the plant of the experiments were planting at one date 23\11\2017, the planting was in the lines and the distance between line and the other 20 cm as 5 lines of the one plot and with 2 m length of the single line ,the amount of seeding rate which adopted was 120 kg H⁻¹ of the Ebba 99 variety and with a depth 5 cm and the grazing process was manually carry out as it needed and the irrigation process was also carried out on a regular and depending on the wet condition of the field. The following attributes were studied:

The mean of the 10 plants which was taken randomly from each experimental unit from the middle lines, the plant height, the area of the flag leaf, the

number of the spikes per square meter, the number of grains in the spike and the grain yield, the data was analyzed by using Genstat software by analysis of variance method and for all studied attributes and the

comparing of means was conducted by using the least significant differences (L.S.D) at probability level (0.05) (Al-Rawi and khalfAllah, 1980).

Table 1 : Some of the physical and chemical attributes of experiment field soil (depth 0-30 cm)

Attributes	Value	Unit
pH	7.1	
Available Nitrogen	23	Mg Kg ⁻¹
Available Phosphor	8	Mg Kg ⁻¹
Available Potassium	46	Mg Kg ⁻¹
Soil seperators		
Soil texture	—	Silt Clay Loam
Sand	335	gm Kg ⁻¹
Silt	481	gm Kg ⁻¹
Clay	184	gm Kg ⁻¹

Results and Dissection

The results in the table (2) showed a significant differences between the treatments of humic acid of all growth attributes, as noted significantly exceeding of spraying by 20 ml L⁻¹ concentration in the plant height attribute which attained 82.40 cm and the flag leaf area (cm²) attained 343 cm², whereas the control treatment the lowest to the plant height which attained 74.35 cm and flag leaf area 33.7 cm².

As for the yield and its components the results showed a significant differences between treatments of humic acid in the yield and its component where the spraying by 20 mg L⁻¹ concentration significantly exceeding in the number of spikes (m²) which attained 275.5 spike m², the number of grains in the spike attained 55.13 grain spike and the grain yield 4.779 tan H⁻¹, whereas the control treatment (without any addition) recorded the lowest mean of number of the spikes attained 222.5 spike m² tan H⁻¹, the number of grain in the spike attained 46.42 grain spike⁻¹ and the grain yield 3.174 tan H⁻¹ table (2) the reason may be due to the effect of humic acid in increasing the vital activity of plant and increase the absorption rate to the nutrients and thus increase the growth rate of the plant or may be the reason due to the hormonal effect of humic acid on the cell cytoplasm and the cellular wall, which leads to increase the speed of cell division and growth and thus increase the height of the plant and this result agreed with what found by (Hashim, 2018), as for the leaf area (cm²) the reason may be due to the role of Humic acid in provide the largest amount of food which transfer to the leaves and which was positively reflected on the expansion of leaves cells and thus increase the area of flag leaf and this result agreed with (Al-Fahdawi, 2017) and (Hashim, 2018) who found that the area of the flag leaf of other field crops increasing by spraying concentration from humic acid. As for the yield and its

component the results showed significant differences between the treatments of humic acid on the yield and its component as the 20mg L⁻¹ concentration significantly exceeding in the number of spikes (m²) 275.5 spike m² as compared with control treatment which gave mean attained 222.55 spike m² the reason may be due to the effect of humic acid in the increasing of biological activity of the plant and increase the rate of the absorption to the nutrients and thus increase the growth of the plant this maybe due to the role of the humic acid in the stimulated of humic acid hormone which led to increase the growth of the plant in addition to its role in the availability of water and nutrients to the plant which is reflected in the activity of the photosynthesis process, which is reflected in the end on the number of fertile spikes per square meter and this result agreed with what found by (Hashim, 2018), whereas the number of the grains in the spike was attained 55.13 grain spike⁻¹ while the control treatment recorded the least mean attained 46.42 grain spike⁻¹ the reason may be due to increasing the flag leaf area which prepares a good opportunity to reduce the incidence of abortion as a result of less competition among them of food products which increase the number of grains and this result agreed with what found by (Hashim, 2018) who pointed to increase the number of grains in the spike in the wheat crop by increasing the concentration of humic acid, whereas the yield of gains (Tan H-1) attained 3.174 Tan H-1, while the control treatment recorded the least mean attained 3.174 Tan H-1, the reason maybe due to the reason may be due to an increase in the number of spike per meter and the number of spike grains and may be the reason due to the positive role of hemic and fulvic acids in the efficiency of enzymes, phytonutrients and metabolism, which leads to aggregation a high amount of carbohydrates (Al-Fahdawi, 2017) and (Hashim, 2018).

Table 2 : The effect of adding Humic acid concentration on the studied attributes of wheat crops

Effect of foliar spraying	Plant height	Flag leaf area	Number of spike m ²	Number of grains in the spike	The grain yield
0	74.35	33.7	222.5	46.42	3.174
5	77.26	39.4	264.4	50.78	4.149
10	78.70	41.0	265.3	52.63	4.700
20	82.40	43.3	275.5	55.13	4.779
(0.05) value L.S.D	5.461	5.80	15.98	4.733	0.6538

References

- Al-Fahdawi, R.S.G.K. (2017). The effect of spraying with Humic acid on the growth and yield attributes of barley variety *Hordeum vulgare* L. Ms thesis. Field crops dep. Agriculture college, Alanbar University.
- Al-Rawi, K.M. and khalfallah, M.A. (1980). Design and analysis of agricultural experiments. Directorate of Dar al kutub for Printing and Publishing - Iraq.
- El-Hefny, E.M. (2010). Effect of saline irrigation water and humic acid application on growth and productivity of two cultivars of cowpea (*Vigna unguiculata* L. Walp). *Australian Journal of Basic and Applied Sciences*, 4(12): 6154-6168.
- El-Sharkawy, G.A. and Abdel-Razzak, H.S. (2010). Response of cabbage plants (*Brassica oleraceae* var.) capitata to fertilization with chicken manure, mineral nitrogen fertilizer and humic acid. *Alex. Sci. Exch. J.*, 31: 416-432.
- Hashim, M.A. (2018). The effect of Humic acid and potassium on the growth and yield of bread wheat (*Triticum aestivum* L.). *The journal of Thi-Qar of agricultural sciences*, 7(1).
- Senn, T.L. (1991). *Humates in Agriculture*, Acres USA, Jan.
- Shafashq, S.A. and Aldibabi, A.A. (2008). The production of field crops. First Edition. Dar al fikr al arabi, 594.
- Shalsh, J.S.; Ismail, A.A. and Ghazi, A.S.K. (2011). The Response of olive seedlings to leave nutrition with hemoglobin and iron and zinc mixture. *The journal of agricultural sciences*. 43(1) : 58-75.
- Shewry, P.R. (2009). Wheat. *J. Expe. Bot.*, 60(6): 1537-1553.