J.Soil Sci. and Agric. Eng., Mansoura Univ., Vol. 8(1):35 - 40, 2017

Effect of Some Organic Extracts and Ascorbic Acid Applied as Foliar Spray on the Growth, Productivity and NPK Uptake of Wheat.

Diab, M. M.[1] ; Kh. M. Ghanem[2]; M. M. Elbordiny[3]; E. A. M. Osman[4] and Sammar , F. Zahran[4]

[1-] **Soils Dept., Fac. Agric., Al-Azhar Univ., Cairo, Egypt.**
[2-] **Environ . and Bio. Agric., Dept., Fac. Agric., Al-Azhar Univ., Cairo, Egypt.**
[3-] **Soils Dept., Faculty of Agric., Ain Shams Univ., Cairo, Egypt.**
[4-] **Soils, Water and Environment Res. Inst., Agric. Res. Center, Giza, Egypt.**

ABSTRACT

The present investigation was carried out at El- Gemmeiza Agricultural Research Station, El-Gharbia Governorate, Egypt, during two winter seasons of 2010/2011 and 2011/2012 to evalute the effect of foliar application of some organic extracts (potassium humate& fulvate, compost tea) and ascorbic acid on the growth of wheat crop (*Triticum aestivum L.*) variety Gemmeiza 9 with speial stress on its uptake of NPK and productivity. Ascorbic acid was added at the rate of 1g L^{-1}, while either potassium humate or fulvate at rate of 10% K_2O whereas the compost tea at rate of 5 cm l^{-1} (300L fed^{-1}.). Such organic extracts and ascorbic acid were added as a foliar spray on wheat plant in two equal split portion at dressing and panicle period initiation (35 and 50 days from planting), respectively. The experiment was arranged in one factor randomized complete block design with three replicates. The results indicate that the spike number/m^2, grain number & weight /spike and 1000 grain weight (g) as well as grain, straw and biological wheat yield were improved significantly by using either potassium humate or fulvate as compared with control, but it remarked that there is no effect of organic extracts and ascorbic acid on plant height (cm). In this concern, it was remarked that foliar application of organic extracts significantly increased the uptake of NPK in grain with a marked superiority for potassium fulvate than other treatment which gave the highest mean values. In other words, spraying potassium fulvate were more effective on the uptake NPK of wheat grain as compared with control treatment in both seasons. Moreover in cease was observed for NPK uptake by grain with spraying of potassium humate. The results also indicated that spraying either potassium humate or fulvate gave the highest significant values of NPK uptake of wheat straw and biological yields. The same tendency was obtained by foliar application of compost tea in both ones, with a little inferiority on other two treatments. So, based on the above results, it is recommended that applying some organic extracts such as potassium fulvate or humate is essential to obtain acceptable wheat yield under similar conditions.

Keywords: wheat yield, potassium humate, fulvate, compost tea, ascorbic acid.

INTRODUCTION

Wheat (*Triticum aestivum L.*) is the most vital cereal crops that widely grown in Egypt and all over the world. Even though wheat is useful as a livestock feed. In Egypt, the total cultivated area of wheat reached about 3.392 million faddan and the total production of them exceeded 9.279 million tons with an average of Faddan (FAO, 2016). In Egypt, wheat production is not adequate for local consumption. This calls for bigger attention of all the concerned to increase the productivity to meet the continuous demand and decrease the gap between the production and consumption of wheat. Consequently, great efforts have been made to achieve suitable agronomic practices for obtaining maximum productivity of wheat with optimum quality properties.

Potassium humate as the salt of humic acid is characterized by its dark color, water soluble but alkali insoluble. It also influences the plant growth together directly and indirectly. The direct effects are attributed to its metabolic activity in plant growth. Whereas, the indirect effect due to improves physical, chemical and biological soil condition. (Tejada *et al*., 2006 - Bakry *et al.*, 2013) indicated that applied humic acid as foliar spray enhanced growth and yield of wheat plants as compared with control treatment, taller spikes ; greater No. of spike lets/spike ; heavier 100 grains weight (grain index) ; higher grain and biological yields / plant ; higher grain, straw and biological yields (ton fed^{-1}), harvest index, protein % and protein yield (kg fed^{-1}). (Tufail *et al.,* 2014) found that humic acid consistently had a positive effect on wheat growth and yield as well as yield components. The raise of humic acid concentration led to improve the growth of either roots or shoots and yield production. In this conceive, it was concluded that application of humic acid to the soils is a good source to increase their fertility. Also, spraying with fulvic acid enhanced ion uptake by roots, where fulvic acid application exhibited the transport of phosphorus to the grains that presumably was accompanied by a high rate of organic substances transport (Xudan, 1986). He also, concluded that the spraying of wheat plants with fulvic acid gave higher water and chlorophyll content as well as the root absorption rate in comparison with control treatment. Foliar spraying with Fulvic acid can reduce the loss at grain number that due to hot-dry winds at booting. Fulvic acid due to the small molecular structure is more efficient to penetrate through the plant roots. Chen and Aviad (1990) found that use of humic and/or fulvic acid in nutrient solution or as a foliar application at the concentrations of 25 to 300 mg L^{-1} increased plants growth.

It well known that compost tea which produced by mixing it, with water and incubating for a definite period, either actively aerated or none aerated with and without additives to increase microbial densities during their production (NOSB, 2004 and Scheuerell, and Mahaffee, 2002). The main performance objectives for used compost tea in agriculture are to promote crop health and to decrease the pesticide needs through enhanced disease suppression or resistance towards diseases. Also, the use of water soluble compost tea led to increase and availability of nutrients for plants, consequently it decrease fertilizer requirements and associated costs. Moreover, the increase in soil microorganism populations improve soil properties and increase rooting depth and plant growth. (Khalid *et al.,*

2006) concluded that the applying compost with compost tea improved vegetative growth characters and phosphorous content, but nitrogen content was decreased. Based on their results, it recommended, that use compost with compost tea was essential for increasing the production (quantity and quality), as well as, it is cheap and expressed cash money, which improving the farmer income. Also, the use of these organic products is safe for human health.

In this concern, ascorbic acid plays a very important role in plant growth, cell wall metabolism and cell expansion, cell division, root development, shoot apical meristem formation and photosynthesis. Moreover, it is cofactors for enzyme activity and belongings on plant antioxidation capacity, as well as heavy metal evacuation and detoxification and stress resistance (Zhang, 2012). Bakry *et al.*, (2013) found that the spraying ascorbic acid gave a significant increases in studied character of wheat plants, the tallest plants, the highest number of tillers and spikes plant^{-1}, spike length and greatest number of spikelet's spike^{-1} as well as highest grain and biological yield (g) per plant, heaviest 100 grain weight, highest grain, straw and biological yield (ton fed^{-1}). Ascorbic acid also has an important role in preserving the activity of enzymes. In this respect, Hussein, and Khursheed (2014) found that foliar spraying wheat plants with 200 ppm ascorbic acid under drought condition alleviated the inhibitory effect of drought through enhancing plant growth, biomass and some chemical and biochemical leaves constituents.

The aim of this investigation is to study the effect of spraying some organic extracts (potassium humate& fulvate, compost tea) and ascorbic acid on growth and productivity of wheat (*Triticum aestivum L.*) variety Gemmeiza 9 in order to find out the most proper treatment resulted in acceptable figures of wheat yield, its components and uptake of NPK as well.

MATERIALS AND METHODS

Two field experiments were carried out during winter seasons of 2010/2011 and 2011/2012 at El-Gemmeiza Agricultural Research Station, El-Gharbia Governorate, Egypt, to investigation the effect of foliar spraying of some organic extracts (K- humat & fulvate and compost tea) and ascorbic acid on wheat yield and its components. Its uptake of NPK was calculated. Where, this plant represents a main crop that widely cultivated in Egypt. Some physical and chemical analyses of soils in which the experiments were carried out are presented in Table (1), which were measured and determined according to Ryan *et al.*, (1996).

Grains of (*Triticum aestivum, L.*) variety Gemmeiza 9 were sown at the rate of 60 Kgfed^{-1}., in 20th and 24th November in the first and second seasons, respectively. The area of each plot was 10.5 m^2 (3.0 width and 3.5 m length) which equivalent (1/400 fed.). The preceding crop was maize in the first season and soybean in the second season. The experiment was arranged in one factor randomized complete block design with three replicates, as follows:

T1- Control (With water).

T2 and T3 (Potassium humate and fulvate 10 % K_2O) and T4 compost tea at rate of 5cm/L. (300 L Fad^{-1}) .Finely T5 Ascorbic acid at rate of 1 gm L^{-1}.

Inorganic fertilization (100%) was applied according to the recommendation of the ministry of Agriculture in Egypt , i.e. 75Kg N, 15Kg P_2O_5 and 24Kg K_2O fed.,$^{-1}$ That applied in the forms of ammonium nitrate (33.5% N), super phosphate (15% P_2O_5) and potassium sulphate (48% K_2O). Nitrogen fertilizer was applied in two equal portions prior, (the first at 22 days from sowing and the second at 45 days from sowing). Phosphorus and potassium were applied in one dose at sowing.

Table 1. Some physical and chemical properties of experiment soil.

Soil characteristics	Values	
	1st season	2nd season
Particle size distribution		
Sand %	16.77	15.60
Silt %	21.90	23.45
Clay %	61.33	60.95
Texture Class	Clay	Clay
Chemical and physical properties		
pH (in soil-water suspension) (1:2.5) *	7.88	8.21
EC dSm^{-1} (extract 1:5)**	0.59	0.64
$CaCO_3$ %	3.55	3.10
OM %	1.95	1.88
Water soluble cations (meq/L soil past)		
Ca^{++}	2.1	2.6
Mg^{++}	1.14	1.15
K^+	0.38	0.45
Na^+	2.05	2.11
Water soluble anions (meq/L soil past)		
CO_3^-	--	--
HCO_3^{--}	1.32	1.9
Cl^-	1.95	1.99
SO_4^{--}	2.40	2.42
Available NPK (ppm)		
Nitrogen (N)	30.0	21.0
Phosphorus (P)	8.80	9.97
Potassium (K)	350	307

*** = (1:2.5) soil-water suspension** ****= (1:5) soil-water extract**

Compost tea extraction; Compost water extract was prepared by soaking the complete mature compost in previously stored tap water (1: 10 w/v) to avoid the chlorine harmful effect on the compost microbial load. The compost extract was kept in shaded place for seven days and stirred from time to time (Diver, 2002, Scheuerell and Mahaffee, 2002). Then the extract was filtered and kept at room temperature (22 ±3°C) until used. The microbiological characteristics of the compost water extract were carried out in the Analytical and Studies Lab. Soil, Water and Environment Research Institute (SEWERI), Agriculture Research Center, Giza, Egypt, and presented in Table (2a).

Table 2 a. Microbiological characteristics of compost tea under investigation.

Parameters	Measurements
Dehydrogenase enzyme activity (TPF/ µg ml CWE)	67.7
Total count of bacteria CFU/ ml CWE	0.035 X 10^7
Total count of fungi CFU/ ml CWE	0.013 X 10^5
Total count of actinomycetes CFU/ ml CWE	0.022 X 10^6

CWE = Compost water extract.

Determination of dehydrogenase activities in soil: the activity of enzyme was determined according to the method of (Casida *et al.,* 1964). Total bacteria were estimated by the method of (Allen, 1959). A Total fungus was determined according to the method described by (Allen, 1950). Actinomycetes were determined by the method given by (Jensen, 1930). Analysis of potassium humate, fulvate and compost tea was shown in Table (2 b).

Table 2b. Chemical analysis of potassium either Humate, or fulvate and compost tea used in this study.

Elements	Potassium humate	Potassium fulvate	Compost tea
pH	8.50	2.28	6.83
EC (dS/m)	56.80	58.50	2.11
O.M (%)	21.98	14.18	23.8
C (%)	12.75	8.40	13.8
C/N	7.33	11.50	11.04
Macro nutrients (%)			
N	1.74	0.76	1.25
P	0.27	0.14	0.49
K	9.50	9.15	0.76
Micro nutrients (ppm)			
Fe	105	74.60	215
Zn	2.75	11.40	86
Mn	14.9	1.85	101
Cu	0.40	0.27	84

Humic acid was extracted according to the method described by Stevenson (1982) 50 g of compost sample were taken and shaken with 500mL of dispersion agent i.c., 1 N KOH solution. The freshly prepared 1N potassium hydroxide (the solution contains 120 grams KOH Per litter (10% K2O) suspensions were left overnight and then filter or centrifuged and hence the filtrates contain humic and fulvic acids.

Isolation and purification of humic and fulvic acid were prepared according to the method described by Posner (1966). The extract of organic substances with alkali solution was adjusted first to pH 1.0 with H_2SO_4 Conc. (acidification). Then, it was allowed to stand 24h to precipitate the humic acid. The supernatant contains the fulvic acid.

The supernatant contains the fulvic acid fraction and the precipitate is identified as the humic fraction of hums. (The acid- soluble fraction is fulvic acid whereas the acid insoluble fraction is humic acid (Kononva, 1966).

Ascorbic acid was added at the rate of 1g $L^{-1.}$

In mention before, potassium humate and fulvate (10% K_2O) were added as a foliar spray on wheat plant at rate of 5 cm/l (300Lfed^{-1}.), in to equal split portion to be added at basal dressing and panicle period initiation (35 and 50 days from planting), respectively. Normal agricultural practices were followed concerning irrigation, management and pest control.

At harvest (after 150 days from sowing), ten plants were taken randomly from each plot to determine the following parameters: plant height (cm), spike number m^{-2} and 1000-grain weight (g) as well as grain number and weight /spike.

Plant of each plot were harvested, air dried and weighted, separated in to grains, straw, then calculated yield/fed., to determine the following Characters: Grain and straw and biological yield/fed., (kg) as well as determination of N, p and K uptake of such yields.

Wheat grain and straw samples were dried at 70 $^{\circ}$C, ground and wet digested. Nitrogen was determined using the modified kjeldahl method. Phosphorus was determined calorimetrically (Ryan *et al.,* 1996). Potassium was determined by the flame photometer (Black, 1982). Protein % in grains was calculated by multiplying N % by 5.75.

The results were statistically analyzed using the M. STATC Statistical package (crop and Department), Michigan state university, Michigan U.S.A to calculate F ratio according to (Snedecor and Cochran, 1980). L.S.D was used to differentiate means at the level of 5 % (Waller and Duncan, 1969).

RESULTS AND DISCUSSION

Some yield components as affected by foliar spray of some organic extracts and ascobic acid:

Generally, data in Table (3) revealed that the spike number/m^2 and 1000 grain weight (g) as well as grain number and weight /spike were improved significantly by using either potassium humate or fulvate as compared with control treatment in both seasons. The same trend was observed when ascorbic acid or compost tea was sprayed for such parameters in second one only. In addition, the results indicated that there wasn't significant effect of foliar application of all treatments on plant height in both seasons. The metabolic effects of potassium humate in promoting plant growth is due to the increasing cell membrane permeability, respiration and photosynthesis processes and root cell elongation, subsequently increasing abovementioned parameters. Also, ascorbic acid is known as a growth regulating factor which in fluencies many biological processes. It acts as co-enzymatic reactions by which carbohydrates, and proteins are metabolized, as well as it involved in photosynthesis and respiration processes. These findings are confirmed by (El- Kobisy *et al.,* 2005), who reported that ascorbic acid is synthesized in the higher plants and affects on the growth and development of plants; as well as t is the product of D-glucose metabolism that influence on some nutritional cycles activity in higher plants and play a vital role in the electron transport system. Moreover, these results according to the finding of (Cheng, *et al.,* 1998) who stated that spraying humic acid improved the grain filling intensity, and enhanced the drought resistance of wheat.

Compost tea application also has shown to be reduced fertilizer requirements for seedlings; and increased root length. These results are confirmed by (Mackowiak et al., 2001 and Madlain, and Salib, 2002) who stated that the beneficial effect of humic acid may be attributed to improving the availability of micronutrients in soil by complexion that prevent early micronutrients deficiency.

The results of Table (3), showed that all treatments has a positive effect on the above mentioned growth parameters, where ascorbic acid is the best one that gave the highest values.

Table 3. Effect of foliar application of organic extract and ascorbic acid on plant height (cm), spike No. /m^2, grain No. /spike, grain weight/ spike (g) as well as 1000 grain weight (g) of wheat plant in both seasons.

Treatment	Plant height(cm)			Spike No./m^2			Grain No/spike			Grain weight/ spike (g)			1000 grain weight (g)		
	season			season			season			season			season		
	1st	2nd	mean	1st	2nd	mean	1st	2nd	mean	1st	2nd	mean	1st	2nd	mean
Control *	108.3	111.7	110.0	523.3	488.0	505.7	57.67	48.67	53.17	2.00	2.13	2.07	41.44	36.80	39.12
Potassium humate	108.0	111.0	109.5	573.3	528.0	550.7	54.33	46.67	50.50	2.40	2.42	2.41	51.52	44.80	48.16
Potassium fulvate	108.0	109.0	108.5	542.3	476.7	509.5	47.00	41.00	44.00	2.20	2.16	2.18	54.18	46.00	50.09
Compost Tea	107.7	111.3	109.5	540.7	511.7	526.2	43.00	46.67	44.84	2.27	1.98	2.13	48.80	46.18	47.49
Ascorbic acid	108.3	110.3	109.3	524.0	532.7	528.4	49.67	55.33	52.50	2.60	2.28	2.44	46.78	46.23	46.51
LSD at 0.05	NS	NS		26.5	47.3		6.76	9.18		0.37	0.29		5.12	1.38	

***(Without foliar)**

Wheat yield as affected by foliar spray of some organic extracts and ascorbic acid:

Data in Table (4) revealed that the grain, straw and biological wheat yield were increased significantly by using either potassium humate or fulvate as compared with control (without spraying) in both seasons. These results may be attributed to the potassium humate and fulvate lead to increase the solubility of many nutrients, by forming complex compounds. As a consequence, the use of humic substances (humate or fulvate) has often been proposed as a method to improve wheat crop production. These findings are in a good agreement with that achieved by Eyheraguibel, *et al.,* (2008) who noticed that the humic substances were effective on plant growth and inorganic nutrition, seedling growth, root growth, shoot development and the uptake of nutrients.

Table 4. Effect of foliar spray of some organic extracts and ascorbic acid on grain, straw and biological yield (kg/fed) of wheat plant in both seasons.

Treatments	Grain yield (kg/fed)			Straw yield (kg/fed)			Biological yield (kg/fed)		
	season			season			season		
	1st	2nd	mean	1st	2nd	mean	1st	2nd	mean
Control *	3517	2559	3038	4047	3229	3638	7564	5788	6676
Potassium humate	3915	3801	3858	4357	4304	4331	8271	8105	8188
Potassium fulvate	4142	3752	3947	4518	4213	4366	8660	7965	8313
Compost Tea	3535	3337	3436	3922	3726	3824	7456	7063	7260
Ascorbic acid	3560	3148	3354	3996	3705	3851	7556	6853	7205
LSD at 0.05	392.5	329.0		522.2	383.3		898.2	661.3	

***(Without foliar)**

These results were also very close with the results obtained by Ouatmane *et al.,* 2002). They concluded that potassium humate or fulvate exhibited an elemental composition related to the nature of the initial wastes. Also, an increase in the dry matter yield was significantly observed due to potassium humate or fulvate treatments. The same trends were obtained in case of the compost tea where, it may improve plant vigor by encouraging deeper root growth. In additionally, other factors that make wheat plant more vigorous, combined with compost tea application, may be a better for best wheat management.

NPK uptake as well as protein % of wheat grain as affected by foliar spray of some organic extracts (either K-humate or fulvate & compost tea) and ascorbic acid:

The results in Table (5) generally indicated that the foliar application of used organic extract as well as ascorbic acid gave a significant increase in NPK uptake of grain. This was true for two seasons. Exception was found in case of N uptake in the first season only. Where there is no obvious trend was observed, addition, spraying potassium fulvate was more effective on NPK uptake than other treatments in both seasons where, the highest mean values were attained. While, compost tea gave the least values, lout still higher than control treatments. However, the foliar spray of all substances gave a significant increase in protein content and potassium fulvate has a higher beneficial effect than other ones. These results could be related to the direct effects of organic extracts on the permeability of cell membranes, which stimulate inorganic nutrient to move through the plasma membranes resulting an increase in transport of various inorganic nutrients to sites of metabolic need. These findings are in harmony with those outlined by (Rizk and Mashour, 2008) who found that applied potassium humate as foliar spray increased wheat dry matter yield as well as nutrients uptake (*i,e*., N, P, K, Fe, Mn ,Zn and Cu).

Moreover, El-Desuki, (2004) concluded that humic acid as foliar spray enhanced growth, nutrients uptake and yield as well as improved the quality of the production of some crops. Adani *et al.,* (2006) pointed out that all humic substances are composed for chemically complex, non-biochemical components, which are seems as a largely hydrophilic amorphous, dark colored liquid or powder and resistant to chemical and biological yield degradation. (Habashy, and Ali, laila, 2005) indicated that the N, P and K in grain have been significantly increased by application of 50 ppm humic acid individually or in combination with 30 ppm indelicate acid.

Table 5. Effect of foliar spray of some organic extracts and ascorbic acid on NPK uptake as well as protein % of wheat grain in both seasons

Treatment	N uptake, grain season			P uptake, grain season			K uptake, grain season			Protein % season	
	1st	2nd	mean	1st	2nd	mean	1st	2nd	mean	1st	2nd
Control *	64.65	47.18	55.92	9.71	7.09	8.40	15.07	11.01	13.04	10.58	10.72
Potassium humate	63.89	61.48	62.69	10.38	10.00	10.19	15.41	14.82	15.12	9.78	12.75
Potassium fulvate	76.88	69.07	72.98	11.66	10.43	11.50	17.83	16.00	16.92	10.58	12.15
Compost Tea	62.66	59.03	60.85	9.72	9.16	9.44	15.37	14.51	14.94	10.24	11.23
Ascorbic acid	68.90	57.44	63.17	10.68	8.86	9.77	16.61	13.79	15.20	10.47	10.51
LSD at 0.05	NS	15.46		1.134	1.148		1.355	1.195		NS	NS

***(Without foliar)**

NPK uptake of wheat straw and biological yield as affected by foliar spray of some organic extracts (K-humate or fulvate & compost tea) and ascorbic acid

Results in Table (6) showed that the foliar spray of either potassium humate or fulvate gave the highest significant values of NPK uptake of wheat straw and biological yield in both seasons. Also, the same trend was obtained by spraying compost tea in both ones. While, ascorbic acid has not positive effect on NPK uptake in both seasons where in most cases, the obtained values were lower than control treatment (without foliar application).

Table 6. Effect of foliar spray of some organic extracts and ascorbic acid on NPK uptake of wheat straw and biological yield in both seasons.

Treatment	N uptake, straw season			P uptake, straw season			K uptake, straw season			N uptake, biological season			P uptake, biological season			K uptake, biological season		
	1st	2nd	mean	1st	2nd	mean	1st	2nd	mean	1st	2nd	mean	1st	2nd	mean	1st	2nd	mean
Control *	14.57	11.60	13.09	4.40	3.51	3.96	71.35	56.90	64.13	79.23	58.70	68.97	14.11	10.60	12.36	86.42	67.91	77.17
Potassium humate	18.22	18.04	18.13	5.35	5.29	5.32	79.96	78.99	79.48	84.70	79.52	82.11	16.22	15.29	15.76	96.13	93.81	94.97
Potassium fulvate	19.87	18.50	19.19	4.87	4.51	4.69	75.97	70.95	73.46	96.07	87.56	91.82	16.45	15.61	16.21	93.66	86.96	90.31
Compost Tea	14.91	14.19	14.55	4.31	4.10	4.21	69.74	66.27	68.01	77.67	73.22	75.45	14.04	13.26	13.65	85.14	80.79	82.97
Ascorbic acid	14.55	12.39	13.47	3.99	3.72	3.86	64.19	59.61	61.90	78.83	70.83	74.83	14.10	12.58	13.34	79.87	73.40	76.64
LSD at 0.05	4.99	4.76		1.36	1.31		11.51	12.48		11.04	16.11		2.13	2.19		13.16	13.55	

***(Without foliar)**

The obtained results are being confirmed that potassium humate or fulvate can increase the uptake of certain nutrients and stimulate the dry matter production of wheat straw. The wheat plants take more inorganic nutrients due to the best growth of root systems.as well as, the stimulation of ion uptake by humic materials were related to its direct effect on membrane permeability. It is also related to the surface activity of humic substances (humate and fulvate) as a result from the presence of hydrophilic and hydrophobic sites.

These findings are in agreement with that obtained by (Neri *et al.*, 2002a) who found that humic acids can be used as foliar spray to make more efficient for nutrients utilization This may be explained to the role of humic substances in raising the concentration of messenger ribonucleic acids in plant cell. Whereas, messenger ribonucleic acids is essential for many biochemical processes within cells. Also, (Neri *et al.*, 2002b) demonstrate that humic acids reduce the speed of droplet drying while their wetting action may increase nutrients absorption. These results agree with those obtained by (Ali, Laila and Elbordiny, 2009) who concluded that the uptake of N, P and K of both of straw and grain of wheat plant was increased by spraying of humic acid as compared to control treatment.

On conclusion and based on the current results, it is advisable to spraying either potassium fulvate or humate and compost tea to achieve acceptable wheat yield under similar conditions.

REFERENCES

Adani F., M. Sepagnol and K. G. J. Nierop, (2006). Biochemical origin and refractory properties of humic acid extracted from maize plants. The contribution of lignin. Biogeochem.DOI10:1007/s 10533-006-9052- 4.

Allen, O. N. (1950). Experiments in Soil Bacteriology. Burgyess Publishing Co., USA, 150 p.

Allen, O. M., (1959). "Experiments in Soil Bacteriology". 1st Ed. Buregss Publishing Co., Minneapolis, Minnesota, USA, pp. 117.

Ali, Laila K. M. and M. M. Elbordiny, (2009). Response of Wheat Plants to Potassium Humate Application. Journal of Applied Sciences Research, 5: 1202-1209.

Bakry, B. A., T. A. Elewa, M. F. El- kramany and A. M.Wali, (2013). Effect of humic and ascorbic acids foliar application on yield and yield components of two Wheat cultivars grown under newly reclaimed sandy soil. Intl. J. Agron. Plant. Prod. 4: 1125-1133.

Black, C. A. (1982). "Methods of Soil Analysis." Amer. Sec. Agron. Inc. Publisher. Madison, Wisconsin, U S A.

Casida, L. E., D. A. Klein and T. Santoro, (1964). Soil dehyderogenase activity. Soil Sci., 98: 371-376.

Chen, Y. and T. Aviad, (1990). Effect of humic substances on plant growth. In: American Society of Agronomy and Soil Science Society of America (eds.), Humic substances in soil and crop sciences; Selected Readings. American Society of Agronomy, Madison, WI, pp. 161- 186.

Cheng, F. J., D. Q. Yang and Q. S. Wu, (1998). Physiological effects of humic acid on drought resistance of wheat. Chinese J. of Applied Ecology., 4-6: 363-367.

Diver, Steve, (2002). Notes on compost teas for plant disease control ATTRA publication available at httb://www.attra.org/attar-pub/comptea – htmt

El-Desuki, M., (2004). Response of onion plants to humic acid and mineral fertilizers application. Annals of Agric. Sci., Moshtohor, 42:1955-1964.

El-Kobisy, D. S., K. A. Kady, R. A. Medani and R. A. Agamy, (2005). 'Response of pea plant Pisum sativum L. to treatment with ascorbic acid'. Egypt. J. Appl. Sci., 20: 36-50.

Eyheraguibel, B., J. Silvestre and P. Morard, (2008). Effects of humic substances derived from organic waste enhancement on the growth and mineral nutrition of maize. Bioresource Technology, 99: 4206-4212.

FAO STAT (2016), © FAO Statistics Division, March, 2016.

Habashy, N. R. and Aly, Laila, K. M., (2005). Effects organic growth–promoting substances as humic acid and indol – acetic acid on wheat crop with special reference to some chemical composition. Minufiya J, Agric. Res., 30: 1607-1624.

Hussein, Z. K., and M. Q. Khursheed, (2014). Effect of foliar application of ascorbic acid on growth, yield components and some chemical constituents of wheat under water stress conditions. Jordan Journal of Agricultural Sciences, 10:55-64.

Jensen, H. L. (1930). The genus Micromonospora orskov, a little known group of soil microorganisms. Proc. Linneon Soc. News. Wales. 40: 231- 248.

cited from (Abeer Mohamed Omar Mohamed Ahmed Shoeip) isolation and identification of certain halophilic nitrogen fixers and its roles inimproving saline soil fertility and productivity., ph.d. (2015), Faculty of Agriculture, Cairo, Al-Azhar University

Khalid, Kh. A., S. F. Hendawy and E. El-Gezawy, (2006). Ocimum basilicum L. Production under Organic Farming. Research Journal of Agriculture and Biological Sciences 2(1): 25-32, 2006.

Kononova, M. (1966) Soil Organic matter. 2 nd Ed. New York, Peragmmon press, 544p.

Mackowiak, C. L., P. R. Grossl and B. G. Bugbee, (2001). Beneficial effects of humic acid on micronutrient availability to wheat. Soil Sci. Soc. Am. J., 65: 1744-1750.

Madlain, M., and M. Salib, (2002). The integrated effect of humic acid and micronutrients in combination with effective micro-organisms on wheat and peanut grown on sandy soils. Zagazig J. Agric. Res., 29: 2033- 2050.

MSTA-C (1989). A microcomputer program for the design, management and analysis of agronomic research experiments. Michigan State University.

Neri, D. Lodolini, E. M. Savini, G. P.Sabbatini, G. Bonanorni and F. Zucconi, (2002a). Foliar application of humic acids on strawberry (Cv Onda). ISHS Acta Horticulture 594:297-302. International Symposium on Foliar Nutrition of Perennial Fruit Plants.

Neri, D. Lodolini, E. M. Luciani, M. Sabbatini and P. G. Savini, (2002b). The persistence of humic acid droplets on leaf surface. Proc. ISon Foliar Nutrition, M. Tagliavini et al. (Ed). Acta Hort. 594: 303-308.

NOSB, (2004). Compost Tea Task Force Final Report. National Organic Standards Board. April 6, 2004. www.ams.usda.gov/nosb/meetings/CompostTeaTaskForceFinalReport.pdf

Ouatmane, A., V. D'Orazio, M. Hafidi, and N. Senesi, (2002). Chemical and physicochemical characterization of humic acid-like materials from composts. Compost Sci. And-Utilization., 10: 39-46.

Posner,A. M. (1966). The humic acid extracted by varios reagents from a soil. European J. of Soil Science.vol.17:1,5113. (Waite Agricultural Research Institute, University of Adelaide, South Australia).

Rizk, A. H. and A. M. A. Mashour, (2008). Effect of foliar application with K-humate on growth and uptake of some nutrients by wheat and broad bean plants. Egypt. J. Soil Sci., 48: 457-465.

Ryan, J., S. Garabet, K. Harmsen and A. Rashid, (1996). A Soil and Plant Analysis Manual Adapted for the West Asia and North Africa Region. ICARDA, Aleppo, Syria. 140 pp.

Scheuerell, S. J. and W. F. Mahaffee, (2002). Principles and prospects for plant disease control. Compost Science & Utilization, 10: 313-338.

Snedecor, G. W. and W. G. Cochran, (1980). One way classification- Analysis of variance- The random effect model – Two ways classification (Eds) In Statistical Methods. The lo was state univ. Press Ames lowa USA, 215-273.

Stevenson, F.J. (1982) Humus chmemistry. John Wiley, New York. 443pp.

Tejada, M., C. Garcia, J. L. Gonzales, and M. T. Hernandez, (2006). Organic amendement based on fresh and composted beet vinasse: Influence on soil properties and wheat yield,"Soil Sci. Soc. Am. J., 70: 900-908.

Tufail, M., K. Nawaz and M. Usman, (2014). Impact of Humic acid on the Morphology and Yeild of Wheat (Triticum aestivum L.). World Applied Sciences Journal 30: 475-480.

Waller, R. A. and C. B. Duncan, (1969). A bays rule for symmetric multiple comparison problem Amre. Stat Assoc. Jour. December: 1485-1503.

Xudan, X. (1986). The effect of foliar application of fulvic acid on water use, nutrient uptake and wheat yield. Aust. J. Agric. Res., 37:343-350.

Zhang, Y., (2012). Ascorbic Acid in Plants: Biosynthesis, Regulation and Enhancement. Dordrecht: Springer.

تأثيرالأضافة الورقية لبعض المستخلصات العضوية وحامض الاسكوربيك على أنتاجية القمح وامتصاصها لعناصر النتروجين والفوسفور والبوتاسيوم

محمد دياب موسى درة[١] , خالد محمد غانم[٢], محمود محمد البردينى[٣], عصام الدين عبدالعزيز محمد عثمان[٤] و سمر فهمى عبد المنعم فهمى زهران[٤].

[١]- قسم الاراضى- كلية الزراعة – جامعة الأزهر.

[٢]- قسم البيئة والزراعة الحيوية - كلية الزراعة – جامعة الأزهر.

[٣]- الاراضى - كلية الزراعة – جامعة عين شمس.

[٤]- قسم خصوبة الاراضى وتغذية النبات – معهد الأراضى والمياة والبيئة – مركز البحوث الزراعية.

أجريت هذة الدراسة فى محطة البحوث الزراعية بالجميزة ، محافظة الغربية، مصر وذلك خلال موسمى الشتاء ٢٠١٠/٢٠١١ و ٢٠١١/٢٠١٢ لدراسة تأثير الرش الورقي ببعض المستخلصات العضوية (هيومات وفلفات البوتاسيوم وشاي الكمبوست) وحمض الاسكوربيك على أنتاجية المحصول وبعض مكونات نبات القمح بالأضافة الى امتصاصة لعناصر النتروجين والفوسفور والبوتاسيوم. ولتحقيق هذا الهدف تم تصميم التجربة ذات العامل الواحد فى قطاعات كاملة العشوائية فى ثلاثة مكررات. ويمكن تلخيص أهم النتائج على النحو التالي : -أظهرت النتائج ان عدد السنابل /م٢ وعدد الحبوب / بالسنبلة ووزن الحبوب / السنبلة ووزن ١٠٠٠ حبة وكذلك وزن المحصول الكلى (الحبوب والقش) للقمح قد تحسن معنويا باستخدام هيومات وفلفات البوتاسيوم مقارنة بمعاملةالكنترول (بدون أضافة اى معاملات) كما أوضحت ان الرش الورقى بـا لمستخلصات العضوية المذكورة سابقا قد اعطى زيادة معنوية فى امتصاص النتروجين الفوسفور والبوتاسيوم بالحبوب مقارنة بالكنترول (بدون رش ورقي) فى كلا الموسمين. وكان الرش بفلفات البوتاسيوم أكثر فعالية على امتصاص عناصر NPK فى حبوب القمح في كلا الموسمين..وقد لوحظ نفس أتجاه النتائج للنتروجين والفوسفور والبوتاسيوم الممتص عند أضافة هيومات البوتاسيوم .كما أظهرت النتائج أيضا أن الرش بكل من هيومات أوفلفات البوتاسيوم أدى الى الحصول على اعلى قيم لأمتصاص النيتروجين والفوسفور والبوتاسيوم فى كل من محصولى القش والبيولوجيى وكان ذلك واضحا ومعنويا في كلا الموسمين. وقد لوحظ من النتائج نفس الاتجاه أى زيادة معنوية فى NPK بالأضافة الورقية بشاي الكمبوست في كلا الموسمين . وبناء على ماسبق من نتائج من هذة الدراسة يمكن التوصية بالأضافة الورقية لهذة المستخلصات العضوية وعلى الأخص فلفات وهيومات البوتاسيوم للحصول على افضل محصول ممكن من القمح تحت نفس ظروف هذه التجربة. كما يحب استعمال شاى الكمبوست لنفس الهدف.