J. Soil Sci. and Agric. Eng., Mansoura Univ., Vol. 5 (6): 767 - 778, 2014

EFFECT OF FOLIAR APPLICATION WITH ASCORBIC, HUMIC ACIDS AND COMPOST TEA ON NUTRIENTS CONTENT AND FABA BEAN PRODUCTIVITY UNDER SANDY SOIL CONDITIONS.

Khafaga E.E.E[1]; Salwa. A. Hasanin[2] and Rania M. El-Shal[3]

1 Soils, Water and Environment Research Institute, Agric. Res. Centre Giza.

2 The Central Lab for Organic Agriculture Centre Giza.

3 Soil and Water Dept., Faculty of Agriculture Tanta Univ.

ABSTRACT

A field experiment was conducted at Ismailia Agriculture Research Station in winter through two successive seasons of 2011/2012 and 2012/2013, it aims to study the effect of foliar application, organic acids and compost tea on some nutrients concentration and faba bean productivity in sandy soil. Plants were sprayed with foliar application, ascorbic, humic acid with rate of 2, 4, 6 and 8 m.L.$^{-1}$ also compost liquid tea i.e. 500 L fed^{-1} at three periods e.g. 21, 45 and 60 days from sowing.

Results showed that the application of ascorbic acid, humic acid and compost tea at high rates increased seed yield, pod yield, 100 grains and No.of branches per plant in both seasons. The mean values of grains yield were 0.989 in the first season and 0.992 Mg fed^{-1} in the second season for plants treated with ascorbic acid, 1.031 in the first season and 1.036 Mg.fed^{-1} for plants treated with humic acid and 0.889 in the first season and 0.895 Mg.fed^{-1} in the second season for plants treated with compost tea foliar application. On the other hand, the mean values combined of two seasons of pod yield were 1.195 Mg.fed^{-1} for ascorbic acid; 1.221 Mg.fed^{-1} for humic acid and 1.204 Mg.fed^{-1} for compost tea foliar application respectively. Macronutrients and micronutrients content in grains increased with increasing ascorbic rate, humic acid and compost tea compared with control.

It could be suggested that faba bean plants grown under sandy soil conditions and foliar application with ascorbic acid at rate of 6 and 8 m.L.$^{-1}$,humic aicd 6 m.L.$^{-1}$ and compost tea at rate of 8 m.L.$^{-1}$ to increase grains yield as well as seed chemical contents of faba bean plants.

Keywords: Ascorbic acid, Humic acid, Compost tea, Faba bean productivity- Macro-Micronutrients content in seeds.

INTRODUCTION

Faba bean is an important crop in the crop rotation in Egypt, due to its fixation of atmospheric nitrogen, which enriches the soil with nitrogen and organic matter and improving water use efficiency of the cropping system Ahmed *et al*. (2003). Broad bean is nutritionally important vegetable all over the world, containing 20-36% protein for human and animal consumption. In Egypt, broad bean is considered the principal winter leguminous crop used as a source of protein. In addition, broad bean plants can improve soil fertility by providing a substantial input of N fixation.

The sandy soil texture is characterized with very low organic matter, low water holding capacity and high nutrient losses by leaching, these tend to

deficiency of macro and micro-nutrient in semi-arid regions, (Shafeek *et al*. 2013).

Humic acid, as a commercial product contains 44-58% C, 42-46% O, 6-8% H and 0.5-4% N, as well as many other elements improves soil fertility and increases the availability of nutrient elements by holding them on mineral surfaces, (Larcher, 2003). Humic acid materials increase soil organic matter, particularly for the sandy soils in Egypt, and hence improve its physical, chemical and biological properties. Consequently, the availability of nutrients for plants as well as soil characteristics should be improved of faba bean plants, (El-Ghozoli 2003). Humic substances improve yield and quality of a variety of plants, including grains, (Ulukan 2008). Humic acids improve plant physiological processes by enhancing the availability of major and minor nutrients as well as enhancing the vitamins, amino acids, and also auxin and cytokinin contents of the plants, (Vanitha and Mohandass 2014). Turan *et al*. (2011) indicated that humic acid had positive impacts on dry weight and the N, P, K, Fe, Mn and Zn uptake of faba bean plants. Mackowiak *et al*. (2001) indicated that application of humic acid positively influenced micronutrients availability, in soil. Hussein and Hassan (2011) indicated that humic acids are important soil components; improve nutrient availability and have impact on other important chemical, biological, and physical properties of soils. Sebastiano, *et al*. (2005) found that humic acid had a positive effect on plant growth, seed yield and quality, and photosynthetic metabolism of durum wheat crop. The foliar application of humic acid caused a transitional production of plant dry mass with respect to unfertilized control and split soil N application. EL-Galad, *et al.* (2013) revealed that humic acid and compost rates application significantly increased the soil available K, Fe, Mn and Zn in both seasons .Abd El-Gawad (2013) declared that humic acid at the rate of 8 kg fed^{-1} increased protein percentage of seeds in the two seasons.

Compost tea is a water tea of plant soluble nutrients and microorganisms from compost. Crops can directly benefit from the macro-and micronutrients found in compost tea. Foliar fertilization with compost tea allows nutrients to be absorbed by the plants directly through stomata on their leaf surfaces. Compost tea can provid nutrients to the soil through soil drenches, (Mousa *et al*. 2006) and Nasef *et al*. (2009). Meshref *et al*. (2010) found that compost tea have positive effect on N, P and K concentration and its uptake because of the role of organic extracts which develop the root system of plant and improved nutrient uptake. Abd-El-Hameed (2008) reported that spraying of compost tea either in a single form or in combination with mineral fertilization led to a positive effect on N, P and K concentrations of pea plants and their uptake (mg/plant). Abd El-Kader and El-Shabury (2013) reported that compost tea; humic acid and bio-fertilizer on seeds soaking or foliar application were significantly increases seed yield and yield components of faba bean.

Ascorbic acid is an important primary metabolite in plants that functions as an antioxidant, an enzyme cofactor and a cell signaling modulator in a wide array of crucial physio- logical processes, including biosynthesis of the cell wall, secondary metabolites and phytohormones, stress tolerance, photo protection, cell division and growth (Wolucka *et al*. 2005). Bolkhina *et al*.

(2003) pointed out that ascorbic acid is the most abundant antioxidant which protects plant cells. Ascorbic acid is currently considered to be a regulator on cell division and differentiation and added that ascorbic acid is involved in a wide range of important functions as an antioxidant defense, photo proteins and regulation of photosynthesis. The present study aimed to evaluate the effect of ascorbic, humic acids and compost tea combined with N, P and K application of recommended dose on nutrients content in seeds and faba bean productivity in sandy soil.

MATERIALS and METHODS

A Field experiment was carried out during the two successive winter seasons of 2011/2012 and 2012/ 2013 at Ismalia Farm Agriculture Research Station to study the effects of ascorbic, humic acids and compost tea on concentration of macro-micronutrients in seeds of faba bean (Sakha 3) and its productivity in sandy soil. Some chemical and physical analysis of the experimental soil was taken before cultivation and prepared according to Piper (1950).and Page *et al*. (1982) (Table 1).

Table 1: Some physical and chemical properties of the experimental soil.

Coarse sand (%)	**Fine sand (%)**	**Silt (%)**	**Clay (%)**	**Soil Texture**	**OM (%)**	**$CaCO_3$ (%)**
4.86	75.98	5.17	13.99	Sandy loam	0.45	1.2

pH (1:2.5)	EC* (dSm^{-1})	**Soluble cations (meq/l)**				**Soluble anions (meq/l)**		
		Ca^{++}	Mg^{++}	Na^{+}	K^{+}	HCO^{-}_3	Cl^{-}	SO^{--}_4
7.90	1.83	5.61	3.47	8.34	0.88	1.93	7.14	9.23

Available Macronutrients ($mg.kg^{-1}$)			**Available Micronutrients ($mg.kg^{-1}$)**		
N	P	K	Fe	Mn	Zn
35.22	2.97	172	2.58	1.25	0.63

Compost tea was prepared by soaking one m^3 from compost in 1000 L water, for 48 hrs, then filtered and the leached was used as compost tea and the chemical analysis of compost tea is shown in Table (2). The compost teas analyses were done according to the standard methods as described by Brunner and Wasmer (1978).

Humic acid analysis was carried out in order to determine the carbon, N, P, K, Organic carbon and organic matter as described by (Jackson, 1967). Sulfur was determined using barium chloranilate method (Beaton, 1968). Fe, Mn, and Zn were determined by using Atomic Absorption (model GBC 932), according to Cottenie *et al*. (1961). Humic acid analysis is presented in Table (3).

Table 2: Chemical analysis of compost tea.

EC (dSm^{-1})	pH	C	O.M	N	P	K	Fe	Mn	Zn	Cu
		(%)					($mgkg^{-1}$)			
2.74	7.63	12.0	30.0	1.85	0.56	2.41	129	78.0	55.0	32.0

Table 3: humic acid analysis

Available macro-micronutrients content in humic aicd										
C%	N%	C/N ratio	EC (dSm^{-1})	O.M (%)	P%	K%	S%	Fe	Mn	Zn
								$mg.kg^{-1}$		
46.25	1.84	25.13	1.68	66.81	0.43	3.75	3.95	386	214	22.55

The seeds of faba bean (*Vicia faba* L.) cv. (Sakha 3) were obtained from the Agricultural Research Center, Giza, Egypt. The faba bean seeds were sown in the 15 November in both seasons at the rate of 30 $kgfed^{-1}$.seeds The experimental area of plot was 5 m length X 10 m width. The distance between rows was 50 cm. Seeds of faba bean were sown in hill on one side of ridge at rate of 3 seeds per hill with 20 cm between hills. One plant per hill was maintained by thinning at 21 days after sowing. Seeds yield at harvest was recorded in 25 April in both seasons. Urea (46 N %) was the source of mineral nitrogen fertilizer, which was applied at the rateof 30 kg N fed^{-1} and applied in two equal doses at 21 and 45 days after sowing. Phosphorus as calcium super phosphate (15.5% P_2O_5) was added at the rate of 31 kg P_2O_5 fed^{-1} during soil preparation while potassium sulphate (48 % K_2O) at the rate of 47 kg K_2O fed^{-1} was added in two equal doses at 21 and 45 days from sowing. The experimental treatments were arranged in a randomized complete block design with three replicates.

The applied treatments were as follows:

1-Control (mineral fertilizers at recommended dose).
2-Foliar application of ascorbic acid at rates of 2, 4, 6 and 8 m L^{-1}.
3-Foliar application of humic acid at rates of 2, 4, 6 and 8 m L^{-1}.
4-Foliar application of compost tea at rates of 2, 4, 6 and 8 m L^{-1}

Seeds that sprayed by foliar application with ascorbic, humic acids and compost tea received 500 L fed^{-1} on three periods after 21, 45 and 60 days from sowing respectively.

Plant analyses: samples of seeds were ground and 0.5 g powder of each was digested by concentrated digestion mixture of H_2SO_4/ $HClO_4$ acids according to Sommers and Nelson (1972). Nitrogen was determined by micro Keldahl, according to Jackson (1967). Phosphorus was determined spectrophotometrically using ammonium molybdate/ stannus chloride method according to Chapman and Pratt (1961). Potassium was determined by flame photometer, according to Page *et al*. (1982). Fe, Mn, and Zn were determined by using Atomic Absorption (model GBC 932), according to Cottenie *et al*. (1961), Crude protein content was estimated by conversion of nitrogen percentage to protein (Kang *et al*. 2012). Protein % calculated by the equation= N% X Conversion factor (6.25).

All data were subjected to statistical analysis according to Snedecor and Cochran (1990).

RESULTS AND DISCUSSION

Yield and yield components:-

The beneficial effects of ascorbic , humic acids and compost tea rates combined with N,P and K recommended fertilizers dose on faba bean yield and yield components in the studied sandy loam soil are presented in Table (4). Data showed that faba bean seeds yields tend to increase in plant treated with humic acid at a rate of 8 m L^{-1} in both seasons. The treatments of tested ascorbic, humic acids and compost tea had direct effect on faba bean yield. On the other hand, the organic acids and compost tea as foliar applications were significantly increased grains yield weight (Mg fed^{-1}) and 100 grains weight (g) in both seasons. Also, the effect of humic acid on faba bean plant led to increase the yield and yield components with increase rate application. The relative increase of mean values of combined two seasons effect of ascorbic, humic acids and compost tea were 11.75 % , 19.00 % and 2.53 % for seed yield ; 4.09 % , 6.36 % and 4.88 % for pod yield and 38.51 % , 46.25 % and 28.52 % for 100 grains weight respectively. These results are in agreement with Shafeek *et al*. (2013) found that the foliar application of humic acid at different levels i.e. 2 or 4 g L^{-1} had a statistical significant effect on the parameters of broad bean plant growth in the two seasons. Gad *et al*. (2012) indicated that foliar spray with ascorbic acid at 200 ppm increased grains yield, pod yield and 1000-grain of peas.

Table 4: effect of ascorbic, humic acids and compost tea on yield and yield component in both seasons.

Treatments	Rates m/L	Weight of seed yield ($Mgfed^{-1}$)		Mean	Weight pod yield ($Mgfed^{-1}$)		Mean	Weight of 100 seeds (g)		Mean	No. of branches $plant^{-1}$		Mean
Seasons		1st	2nd		1st	2nd		1st	2nd		1st	2nd	
Control		0.864	0.872	0.868	1.142	1.155	1.148	38.46	39.12	38.29	2.41	2.85	2.63
Ascorbic acid	2	0.927	0.953	0.940	1.168	1.179	1.174	48.20	48.63	48.42	3.84	3.98	3.91
	4	0.956	0.973	0.965	1.196	1.198	1.197	52.19	52.22	52.21	3.86	4.06	3.96
	6	0.981	0.985	0.983	1.198	1.205	1.202	53.07	53.12	53.10	4.25	4.38	4.32
	8	0.989	0.992	0.991	1.203	1.209	1.206	53.28	53.34	53.31	4.32	4.41	4.37
Mean		0.963	0.976	0.970	1.191	1.198	1.195	51.69	51.83	51.76	4.11	4.25	4.14
Humic acid	2	0.896	0.904	0.900	1.198	1.204	1.201	52.48	52.55	52.52	5.71	5.77	5.74
	4	1.049	1.053	1.051	1.208	1.215	1.212	55.96	56.04	56.00	6.25	6.38	6.32
	6	1.083	1.088	1.086	1.226	1.233	1.230	56.73	56.82	56.78	6.88	7.00	6.94
	8	1.096	1.098	1.097	1.234	1.246	1.240	58.67	58.77	58.72	6.94	7.04	6.99
Mean		1.031	1.036	1.033	1.217	1.225	1.221	55.96	56.05	56.00	6.45	6.55	6.50
Compost tea	2	0.846	0.854	0.850	1.188	1.195	1.192	41.29	41.47	41.38	3.22	3.44	3.33
	4	0.873	0.879	0.876	1.196	1.208	1.202	51.00	51.22	51.11	3.58	4.01	3.80
	6	0.880	0.890	0.885	1.204	1.213	1.209	51.63	51.94	51.79	4.12	4.18	4.15
	8	0.943	0.958	0.951	1.208	1.218	1.213	52.49	52.66	52.58	4.56	4.67	4.62
Mean		0.886	0.895	0.890	1.199	1.209	1.204	49.10	49.32	49.21	3.87	4.08	3.97
LSD. 5% Rate		0.0025	0.0018	---	ns	ns	-----	1.025	0.880	----	0.690	0.487	----
LSD.5% Organic		0.0022	0.0016	----	ns	ns	----	1.083	0.762	----	0.598	0.422	----
R. X. O		***	***	-----	ns	ns	----	***	***	----	ns	ns	-----

Data presented in Table (4) Showed that all tested treatments of organic acids and compost tea improved branches parameters of faba bean compared with control in both seasons. Also, the foliar application by humic acid at a rate of 8 m L^{-1} led to enhancement branches number per plant. The highest values of number of branches (6.94 and 7.04) in the first and the second seasons respectively. The corresponding relative increase of two seasons for branches per plant were (57.41 %; 147.14 % and 50.95 %) when plants treated with ascorbic acid; humic acid and compost tea, respectively. Concerning, the foliar application of ascorbic, humic acids and compost tea were significantly increased the branches per plant in both seasons, while the interaction between organic acids, compost tea and rates had insignificant effect on branches per plant. These results are in agreement with Abd El-Kader and El-Shaboury (2013) who reported that the effect of compost tea; humic acid and bio-fertilizer foliar application had significant increased for No. of branches per plant in two seasons. As well as , from results ascorbic , humic acids and compost tea combined with recommended dose of N,P and K fertilizerscan be added to sandy soil to obtain good quantity and quality of faba bean yield. Thus, it can be concluded that the increment of seed yield fed^{-1} in response to apply treatments is mainly due to the increases in no. of branches, pod yield and 100 grain weight. The increases in yield and its components might be due to the effect of all treatments tested on enhancing parameters of faba bean plants.

Nitrogen, phosphorus, potassium and protein concentration in the grains of faba bean.

The effect of ascorbic, humic acids and compost tea rates combined with N, P and K fertilizers at recommended dose on macronutrients concentration in faba bean seeds are presented in Table (5).. Results indicated that the addition of ascorbic, humic acids and compost tea combined with recommended dose of N, P and K fertilizers led to increase with increasing rate of all treatments. On the other hand, the application of all tested treatments significantly increased P concentration in both seasons, while the N and K showed no significantly increased in first season. The rates of all treatments were significantly increased N, P and K in both seasons. The relative increases of mean values of N, P and K concentration in faba bean seeds were 7.72 %, 18.45 % and 4.03 % in the first season, while 6.56 %, 17.05 % and 2.29 % in the second season for N ; 14.28 %, 23.91% and 23.91 % in the first season and 27.28 %, 48.50 % and 48.50 % in the second season for P and 11.90 % , 17.84 % and 12.43 % in the first season and 13.37 % , 23.53 % and 12.83 % for K in the second season in seeds of faba bean plants treated with ascorbic acid; humic acid and compost tea compared with control. Also, the increases of N, P and K concentration in seeds of faba bean in response to the applied treatments can be arranged as humic acid > ascorbic acid> compost tea for N in the first and the second season; humic acid > Compost tea > ascorbic acid for P in the first and the second season and humic acid > compost tea > ascorbic acid for K in the first season and Humic acid > ascorbic acid > compost tea in the second season, respectively. Similar results were obtained by Gad *et al*. (2012)

showed that foliar application with humic acid resulted in the highest values of N , P and K (%) concentration in seeds of pea plants for two seasons compared with control. Meshref *et al*. (2010) found that compost tea have positive effect on N concentration and its uptake because of the role of organic extracts which develop the root system of plant and improved nutrient uptake. Hussien and Hassan (2011) found that the foliar application of humic acids increased the uptake of P and K.

Table 5: effect of organic acids and compost tea on macronutrients concentration in grains of faba bean during both seasons

Treatments	Rates m/L	N (%)		Mean	Protein (%)		Mean	P (%)		Mean	K (%)		Mean
Seasons		1st	2nd		1st	2nd		1st	2nd		1st	2nd	
Control		2.98	3.05	3.02	18.63	19.06	18.88	0.35	0.33	0.34	1.85	1.87	1.86
Ascorbic acid	2	3.14	3.17	3.16	19.63	19.81	19.75	0.37	0.36	0.37	1.98	2.03	2.01
	4	3.16	3.20	3.18	19.75	20.00	19.88	0.39	0.41	0.40	2.07	2.12	2.10
	6	3.26	3.30	3.28	20.38	20.63	20.50	0.42	0.44	0.43	2.10	2.15	2.13
	8	3.28	3.31	3.30	20.50	20.69	20.63	0.43	0.45	0.44	2.13	2.17	2.15
Mean		3.21	3.25	3.23	20.06	20.31	20.19	0.40	0.42	0.41	2.07	2.12	2.09
Humic acid	2	3.47	3.51	3.49	21.69	21.94	21.81	0.41	0.43	0.42	2.09	2.13	2.11
	4	3.50	3.55	3.53	21.88	22.19	22.06	0.45	0.47	0.46	2.15	2.18	2.17
	6	3.57	3.61	3.59	22.31	22.56	22.44	0.48	0.51	0.50	2.20	2.23	2.22
	8	3.59	3.62	3.61	22.44	23.62	22.56	0.50	0.53	0.52	2.27	2.31	2.29
Mean		3.53	3.57	3.55	22.06	22.58	22.31	0.46	0.49	0.47	2.18	2.21	2.20
Compost tea	2	2.95	2.99	2.97	18.44	18.69	18.56	0.39	0.42	0.41	1.94	1.98	1.96
	4	3.08	3.14	3.11	19.25	19.63	19.44	0.44	0.47	0.46	2.06	2.08	2.07
	6	3.16	3.19	3.18	19.75	19.94	19.88	0.49	0.53	0.51	2.14	2.17	2.16
	8	3.20	3.24	3.20	20.00	20.25	20.00	0.51	0.54	0.53	2.17	2.20	2.10
Mean		3.10	3.14	3.12	19.38	19.63	19.50	0.46	0.49	0.47	2.08	2.11	2.07
LSD. 5% Rate		0.458	0.451	------	ns	0.761	----	0.028	0.039	----	0.260	0.045	----
LSD.5% Organic		ns	ns	-----	ns	0.659	----	0.024	0.034	---	ns	0.039	----
R. X. O		ns	ns	-----	ns	ns	----	ns	ns	----	ns	ns	---

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Concerning the effect of all treatments on protein content in seeds of faba bean plants,data indicated that there was significant increase in the second seasons, while there is no significant in the first season. The reduction of protein (%) content in seeds reflect the decrease in N % concentration. The highest values of protein (%) content in seed plants treated with humic acid were 22.44 % and 23.62 % in the first and the second season compared with other treatments. These results are in agreement with those obtained by Abd El-Kader and El-Shaboury (2013) they found that the protein (%) content in seeds of faba bean was not significant as affected by compost tea, humic acid and bio-fertilizer as foliar and soaking of seeds. The corresponding relative increase of protein (%) content in seeds of faba bean plants as affected with ascorbic , humic acids and compost tea were 7.67 %, 18.41% and 4.02 % in the first season and 6.55 %, 18.47 % and 3.00 % in the second season respectively , compared with control. These results are in agreement with Shaban *et al*. (2012) they showed that the foliar application of compost tea and humic acid combined with mineral N fertilizer caused significant increases in seed protein contents. Nassar and Abdo (2009) found

that ascorbic acid at concentration of 400 or 600 ppm increased significantly the percentage of crude protein in seeds of Egyptian lupine cv. Giza 2.

Effect of foliar application with organic acid and compost tea on content of some micronutrients in grains of faba bean

The concentrations of some micronutrients (Fe, Mn and Zn) in seeds of faba bean for both seasons are presented in Table (6). Data show that the applying of ascorbic, humic acids and compost tea caused markedly increases in concentrations of Fe, Mn and Zn for grains of faba bean, with a more pronounced increasing the rates. The highest mean values of Fe, Mn and Zn concentrations in grains of faba bean were 117.91, 43.94 and 26.23 mg kg^{-1} respectively for plants treated with humic acid compared with other treatments in both season. These results are in agreement with Turan *et al*. (2011) indicated that the humic acid application caused increase of Fe, Mn., Cu and Zn composition of faba bean plants. The Fe and Zn were significantly increase in seeds of faba bean plants in both seasons as affected all treatments and its rates.

Table 6: effect of organic acid and compost tea on micronutrients concentration in grains of faba bean during both seasons

Treatments	Rates m/L	Fe (mg kg^{-1})		Mean	Mn (mg kg^{-1})		Mean	Zn (mg kg^{-1})		Mean
Seasons		1st	2nd		1st	2nd		1st	2nd	
Control		91.84	61.93	76.89	40.83	40.95	40.89	20.49	20.72	20.61
Ascorbic acid	2	98.19	99.52	98.86	41.52	41.64	41.58	21.44	21.59	21.52
	4	104.36	104.47	104.42	41.69	41.77	41.73	21.63	21.84	21.74
	6	108.68	109.24	108.96	41.88	41.92	41.90	22.73	22.94	22.84
	8	109.71	110.17	109.94	41.92	41.98	41.95	22.94	23.04	22.99
Mean		102.56	97.07	99.81	41.57	41.65	41.61	21.85	22.03	21.94
Humic acid	2	112.59	113.10	112.85	42.63	42.71	42.67	25.47	25.80	25.64
	4	117.53	117.85	117.69	43.41	43.85	43.63	26.13	26.27	26.20
	6	119.41	120.31	119.86	44.69	44.74	44.72	26.41	26.55	26.48
	8	120.94	121.55	121.25	44.71	44.75	44.73	26.53	26.71	26.62
Mean		117.62	113.98	117.91	43.86	44.01	43.94	26.14	26.33	26.23
Compost tea	2	103.10	103.28	103.19	40.58	40.73	40.66	22.41	22.58	22.50
	4	105.91	107.22	106.96	40.96	41.05	41.01	22.59	22.63	22.61
	6	109.33	109.57	109.45	41.22	41.35	41.29	22.63	22.68	22.66
	8	110.24	110.36	110.30	41.36	41.55	41.46	22.79	22.88	22.84
Mean		107.15	107.55	107.35	41.03	41.17	41.10	22.61	22.69	22.65
LSD. 5% Rate		5.75	5.31	---	3.28	ns	---	1.09	1.82	----
LSD.5% Organic		4.98	4.60	----	ns	1.27	----	0.97	1.57	----
R. X. O		ns	ns	----	ns	ns	---	ns	ns	----

On the other hand, the effect of organic acids and compost tea on Mn concentration in seed was significant in the first season, while the effect of foliar application by organic acids and compost tea on Mn was significantly in

the second season. The corresponding relative increase of Fe, Mn and Zn concentration in seeds were 29.80 %, 53.35 % and 39.61% for Fe ; 1.76 % , 7.46 % and 0.51 % for Mn and 6.45 % , 27.27 % and 9.89 % for Zn as affected by ascorbic , humic acids and compost tea compared with control respectively. These results are in agreement by Paksoy *et al*. (2010) found out that humic substances played a major role in plant nutrient uptake and growth parameters in plant seedlings. Meshref *et al*. (2010) reported that compost tea have positive effect on nutrients concentration and its uptake because of the role of organic extracts which develop the root system of plant and improved nutrient uptake.

CONCLUSION

The obtained results revealed that foliar application for faba bean plants with ascorbic, humic acids and compost tea are very beneficial to the crop growth , pods yield , grain yield and improve nutrients content in seeds. It could be suggested that faba bean plants grown on sandy soil conditions and foliar application with ascorbic acid at rate 6 and 8 m L^{-1} ,humic aicd at 6 m L^{-1} and compost tea at rate of 8 mL^{-1} to produce increasing grain yield and improve its quality as well as grain chemical contents of faba bean plants.

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تأثير إضافة رش أحماض الاسكوربيك والهيوميك ومستخلص الكمبوست رشا على محتوى العناصر وإنتاجية الفول البلدى تحت ظروف الأراضى الرملية

الحسينى المرسى السيد خفاجى [١]، سلوى عبد العزيز عبد الرحيم حسانين[٢] ورانيا محمد الشال
١- معهد بحوث الأراضى والمياه والبيئة – مركز البحوث الزراعية
٢- المعمل المركزى للزراعة العضوية – مركز البحوث الزراعية
٣- قسم الأراضى والمياه- كلية الزراعة – جامعة طنطا

أجريت تجربة حقلية فى محطة البحوث الزراعية بالاسماعيلية فى موسمي ٢٠١٢/٢٠١١ و ٢٠١٢/ ٢٠١٣ . لدراسة تاثيرإضافة بعض الأحماض العضوية ومستخلص الكمبوست رشا على محتوى بعض العناصر وإنتاجية الفول البلدى فى الأرض رملية. تم إستخدام حبوب الفول صنف سخا٣ . تم إضافة حمض الهيوميك والأسكوربيك ومستخلص الكمبوست بمعدلات ٢, ٤ , ٦ و ٨ ملى / لتر على التوالى . كانت معاملات مستخلص الكمبوست بمعدل ٥٠٠ لتر للفدان على ثلاث فترات ٢١ و ٤٥ و ٦٠يوم بعد الزاعة.

وجد من النتائج المتحصل عليها أن محصول الحبوب ومحصول القرون ووزن ال ١٠٠ حبة وعدد الفروع للنبات الواحد إزداد بزيادة المعدلات المضافة خلال موسمي الزراعة . لوحظ أن متوسط إنتاجية حبوب الفول البلدى كانت ٠.٩٨٩ ميجا جرام لكل فدان فى الموسم الأول و ٠.٩٩٢ ميجا جرام للفدان فى الموسم الثانى عند إضافة حمض الأسكوربيك، أيضا ١.٠٣١ ميجا جرام للفدان فى الموسم الأول و ١.٠٣٦ ميجا جرام للفدان فى الموسم الثانى بإضافة حمض الهيوميك و ٠.٨٨٩ ميجا جرام للموسم الأول و ٠.٨٩٠ ميجا جرام فى الموسم الثانى بإضافة مستخلص الكمبوست. ومن ناحية أخرى وجد أن متوسط الموسمين لمحصول القرون هى ١.١٩٥ ميجا جرام للفدان للمعاملة بحمض الأسكوربيك و ١.٢٢١ ميجا جرام للفدان للمعاملة بحمض الهيوميك و ١.٢٠٤ ميجا جرام للفدان للمعاملة بمستخلص الكمبوست على التوالى. زاد تركيز العناصر فى الحبوب بزيادة معدلات أحماض الاسكوربيك والهيوميك ومستخلص الكمبوست بالمقارنة بالكنترول.

نستطيع أن نشير إلى أنه يمكن زراعة الفول البلدى تحت ظروف الأراضى الرملية وإضافة أحماض الأسكوربيك والهيوميك بمعدلات ٦و ٨ ملى/ لتر وكذلك مستخلص الكمبوست بنفس المعاملات للحصول على زيادة فى إنتاجية الفول البلدى ومحتوى العناصر فى الحبوب.