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EFFECT OF SOME ORGANIC COMPOUNDS APPLICATION ON FABA BEAN (VICIA FABA) PRODUCTIVITY AND SEED QUALITY AND SALINE SOIL PROPERTIES

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ABSTRACT: *Two field experiments were conducted during two successive seasons in 2007/2008 and 2008/2009 at Gelbana Village Sahl –El Tina Plane (Notrh Sinia).The study aimed to identify the integrated effect of NPK fertilizer and humic acid application either solely or in combination with organic manure "compost " as will as full treatments included humic acid+ compost +NPK on yield and its attributes, chemical composition and seed quality of two faba bean genotypes namely Giza3 and Nobaria 1. Split plot design with three replicates was used. The results indicated that application of humic acid +compost+NPK was more effective than NPK fertilizer in significantly increases in yield and yield components of both varieties, where percentage of increases in seed yield reached to 17.54 and 12.5%, for Giza 3 and Nobaria 1 varieties, respectively. Corresponding significant increments in macronutrients (N, P and K) and micronutrients (Fe, Cu, Zn and Mn) in seeds. Such increases were a combined by corresponding decreases for such nutrients in stems. Significantly increases in crude protein and total carbohydrate percentages in seeds were obtained. However crude protein % decreased in stem for both Giza3 and Nobaria1 cultivars. For germination percentage humic acid only was effective for Giza3 and Humic acid +compost+NPk was effective for Nobaria1. Significant increase in shoot, radical length, fresh and dry weight of seedling and electrical conductivity (EC) for both studied genotype. Giza 3 cultivar was more affected by this treatment and surpassed Nobaria 1 cultivar in all studied parameters. Increases in EC (dSm^{-1}), soluble cation and catlon and available potassium in the soil. The obtained data showed that combination treatments specially full treatment included humic acid + compost + NPK fertilizer produced further significant increases for all studied characters for Giza 3 and Nobaria 1 faba bean varieties .The beneficial effect of combined treatments cleared through enhancing the chelating agent by active groups of macronutrients and forming organo-metalic complexes which are considered as a storehouse and more mobile or available to uptake by plants and in turn reflected positively on development of yield and its components for faba bean crop.*

Key words: *Faba bean, NPK fertilizer, Humic acid and Compost*

INTRODUCTION

Faba bean (*vicia faba .L*) is an important seed crops in Egypt. It serves a source of protein in the human diet, especially for those with low income. In addition; faba bean plants improve the fertility of soil by providing substantial in put of N2 fixation. The government encourages faba bean cultivation through the development of new improved cultivars and production packages for higher productivity.

Addition of compost to the soil improving the chemical and physical properties of the soil, increases soil organic matter content and offers the nutrient elements for growing crops (El-Shafie and El-Shikha 2003). Nitrogen, phosphorus and potassium are major essential elements required for physical mechanisms of plant growth. Mixing organic with inorganic fertilizers had a great effect on productivity. Where the balanced nutrients composition of the compound fertilizer is a key factors dicing the effectiveness of the mineral fertilizer improving growth and yield of bean plants (Hamail *et al.*, 1996). Mahmoud *et al.* (2004), reported that application of organic manures at rates of 4.8 and 7.1 t/ha caused an enhancement in faba bean growth .They added also that organic fertilizer alone or mixed with chemical fertilizer was superior to chemical nitrogen fertilizer alone in the yield and components . The growing need for sustainable agriculture has led to renewed interest in recycling of crop residual and organic materials as sources of soil organic matter and plant nutrients in restoring soil and sustaining crop productivity (Phongpan and Mosier, 2003). The input of nutrients as either fertilizers or manners had large effects on soil productivity as measured by crop yield .Manured soil had higher content of organic matter and number of micro fauna fertilized soils and were more enrich in P,K,Ca and Mg in top soil and nitrate N,Ca and Mg in sub- soils (Edmeades, 2003). Seed quality has direct influences on the success of crop and significantly contributes to productivity levels (Bewley and Black, 1994).

El- Gala (1978) found that the addition of purified humic acid resulted in an increase of the amount of Fe,Mn,Zn and Cu in soil solution. The increase in the amount of water soluble forms of Fe, Mn, Zn, and Cu was related to ability of humic substances to react and from chelating compound with these elements. Tan and Tantiwiramanond (1983) found that seed yield, protein and oil content of peanut were increased with increasing level of humic acid up to 20 kg/ha thereafter it declined Nardi *et al.* (1999), attributed the beneficial effect of humic acid on plant growth, since it had a gibberellin like activity. They suggested that humic fractions exhibited an auxin like activity, exhibiting higher amount of phenolic and a considerable amount of carboxyl, showed the best metabolic effect. Humic acid have been found to a profound effect on not the biological activity and soil structure, but also on plant itself. This is due to their positive effect on the increment in plant nutrition and their availability to the growing plants (Nardi *et al.*, 2002). Humic acid could

induce the increase of the root absorptive surface through an ordered remodeling of the root morphology (Schmidth *et al.*, 2007). It has recently been shown that humic acid could interact with root organic acid exudation and are able to change root area, primary root length, number of lateral root and lateral root density (Canellas *et al.*, 2008).

This research stated the hyposis that using external treatments such as humic acid and compost might alleviate the adverse harmful effect originated from salinity. Therefore, the objectives of this investigation are to (1) Study the response of two Egyptian faba bean cultivars namely Giza 3 and Nobaria1 to NPK or humic acid either individually or in combination with organic acid compost to show the best treatment that give the highest effect on a) Yield and yield components. b) Macro- and micronutrients concentrations in seeds and stems. c) Crude protein percent in seeds and stems. d) Total carbohydrates percent in seeds and e) Germination percent, shoots and roots length, fresh and dry weight of seedling and electrical conductivity (EC). (2) Find an explanation for this response on the bases of test attributes

MATERIALS AND METHODS

Two field experiments were conducting during two successive seasons 2007/2008 and 2008/2009 in saline soil of a private farm in Galbana Village, Sahl- El Tina (North Sinai) Egypt to clear the efficiency of NPK fertilizers or Humic acid either separately or in combination with compost as well as humic acid association with compost and NPK fertilizers on yield and yield components of two Egyptian faba bean (*vicia faba L.*) varieties namely Giza 3 and Nobaria 1 , chemical composition, seed quality and physical and chemical properties of soil. The experiment was laid out using split plot design with three replications. The varieties were disturbed in the main plots, while the fertilization treatments were allocated in sub plots. Representative surface soil samples (0-30) were taken before and after the performance of the experiment, where some physical and chemical properties (Table 1) were determined using the standard methods according to Black (1965) and Jackson (1973). The sowing dates were on November 25 and 28 in the first and second seasons, respectively. Two seeds were in hill and 20 cm spacing, after emergency plants were thinned to one plant per hill. The area of each experimental unit was 3 x 3.5 m^2 .

The treatments were as follow: 1-NPK fertilizer (control), 2-Humic acid, 3-Humic acid + compost, 4-Humic acid + NPK, 5-Compost + NPK and 6-Humic acid + compost +NPK.

Phosphorus was added as calcium superphosphate (15% P2O5) at rate of 150 kg/fed .before sowing. Potassium as potassium sulphate (48% K2O) was applied at a rate of 50 kg/fed. as recommended rate after 35 days from cultivation .Basic application of nitrogen at the rate of 20 kg/fed . was added before the first irrigation (after thinning) directly in the form of ammonium

nitrate (33.5%N) as an activating dose. All the agronomic treatments were performed according to the standard recommendations of faba bean. The compost as an organic fertilizer was mixed before cultivation with the upper 15 cm of the soil at a rate of 10 m3/ fed. Table (2): show some chemical properties of compost used in the study.

Table (1): Mechanical and chemical properties of the experimental soil before planting [Mean of two growing seasons].

Crosse sand (%)	Fin sand (%)	Silt (%)	Clay (%)	Texture	O.M (%)	CaCO3 (%)	pH (1:2.5)*
10.89	59.1	13.01	16.8	Lomy sand	0.60	7.30	7.9
EC (dS/m)	cation (mg/l) Soluble				Soluble anion(mg/l)		
7.0	Ca++	Mg++	Na+	K+	HCO3	Cl-	SO-4
	41.25	17.41	21.45	2.11	2.84	22.23	55.19
Available macronutrients (mg/kg)							
N	P	K					
10.21	5.15	120.32					

*: Soil-water suspension.

Table (2): Chemical characteristics and nutrients content of the applied compost[Mean of two growing seasons].

pH 1:2.5 Extract	EC (dS/m)	Total macronutrients (%)			DTPA extractable (mg/kg)				C/N
		N	P	K	Fe	Mn	Zn	Cu	
7.25	5.76	1.73	0.86	1.23	25.9	38.8	25.6	3.4	20.0

Also, faba bean seeds were coated with humic acid at rate of 5% before sowing .Humic acid composition was determined by using $Bacl_2$ precipitation methods as described by Fataftah *et al.* (2001). The different constituents of the applied humic acid were determined and illustrated in Table (3).

Table(3): Main characteristics of the used humic acid.

Components and unites	Values
Humic acid %	3.1
Organic matter/ total solid (%)	40.81
Total humic acid/ total solid (g/l)	174.11
Organic carbon(%)	25.13
C/N ratio	2.96
pH	7.55
EC(dS/m)	5.8

At full mature, the plots of faba bean plants harvested in middle of May for both seasons, respectively. Random samples of ten guarded plants from each plot were taken to stimulate the following characters. Plant height (cm), 2-Weight of pods (g/ plant), 3-Seed yield (g/ Plant) and 4-Seed yield (ardab/ fed.) (ardab =155 kg).

At Seed Technology Research Department, Field Crops Research, Institute, Agricultural Research Center during 2007/2008 and 2008/2009, laboratory experiments were carried out to assess seed quality from the field experiments. Germination percentage was expressed by the percentage of normal seedlings at the end of testing period according to the International Seed Testing Association (I.S.T.A, 1985). Three replication of 50 seeds were planted in boxes of (40x20x20 cm) dimension containing sterilized sandy soil. The boxes were watered and incubated at 20°C in germination chamber for (10 days). Normal seedlings were count and expressed as the germination percentage at the final count. Ten normal seedlings from each replicate were taken to measure shoot and radical length (cm). the seedling dry weight according to Kirshasamy and Seshu (1990).

For Electrical conductivity(µscm-1g-1) Twenty five seeds per replicate were weighed and soaking an 250 ml of deionizer water at 20°C foe 24 hours . Electrical conductivity of seed leachates was estimated according to (I.S.T.A.1985) .

For chemical analysis, the harvested plants were air- dried, oven-dried at 70°C for 48 hrs and weighted. The dried plants were separated from items into seeds and stems and ground. The fine powder was wet digested according to Chapman and Pratt (1961). Nitrogen content (%) was determined in digestions by microkjeldahk methods. Phosphorus percent, potassium percent, crude protein percent as well as Fe, Cu, Zn, and Mn concentrations in seeds and stems and total carbohydrate percentage in seeds were determined according to A.O.A.C. (1990). Results were statistical analysis according to Sendecor and Cochran (1982), where least significant differences at 0.05 level of significant were used to compare means.

RESULTS AND DISCUSSION

Yield and yield components.

Data in Table (4) indicate that plant height (cm), weight of pods and seed yield (g/plant) and seed yield (ardab/fed.) were significantly positive affected for the studied treatments and between treatments and varieties. The genetic variability among cultivars as well as the effect of various treatments that added (Ismail and Abdel –Momen,2007). is quite clear that values of yield and its components were increased significantly with the addition of humic acid for Giza3 and Nobaria1 faba been cultivars except for plant height for Giza 3 genotype compared with NPK fertilizer alone (control), where the weight of pods and seed yield (g/plant) increased from 140.0 to151.6 for weight of pods

and from 36.1 to 58.2 for seed yield (g/plant) for Giza3 variety and from 122.1 to 138.0 for weight of pods and from 18.8 to 22.1 (g/plant) for seed yield for Nobaria 1 variety at NPK and humic acid ,respectively . The beneficial effect of humic acid application on the yield of faba bean has been reported by some workers, Taha *et al.* (1991) reported that the concentration of 300 ppm humic acid produced the highest dry matter in broad bean . Also,this effect could be attributed to the favorable effects of the tested treatments on plant growth, root development and nutrients uptake (El-Gamal and Tantawy, 2010).

Table (4): Mean values of growth parameters for Giza 3 and Nobaria 1 as affected by the studied treatments in the two seasons (2007-2008/2008-2009) seasons.

Treatments	Varieties	Plant Height (cm)	Weight of pods (g/plant)	Seed yield (g/plant)	Seed yield (ardab/fed.)
NPK	Giza 3	100.0	140.0	36.1	5.7
	Nobaria1	105.0	122.1	18.8	2.4
Humic acid	Giza 3	96.6	151.6	58.2	6.7
	Nobaria 1	112.0	138.0	22.1	2.7
Compost+ humic acid	Giza 3	72.3	161.1	61.8	8.8
	Nobaria 1	129.0	137.1	23.8	3.3
Humic acid+NPK	Giza 3	120.0	180.7	85.1	9.6
	Nobaria 1	122.0	150.9	44.3	5.9
Compost+NPK	Giza 3	117.0	175.6	79.4	10.1
	Nobaria 1	120.5	141.8	38.8	5.2
Compost+humic acid+NPK	Giza 3	124.0	185.4	99.9	10.6
	Nobaria 1	123.0	159.0	46.1	5.4
L.S.D. V * 5%		0.44	0.21	0.03	0.17
T ** 5%		0.53	0.40	0.03	0.20
TXV*** 5%		1.10	0.82	0.07	0.29
C.V.****		10.16	11.22	11.06	12.33

*: Verities.
** : Treatments.
***: Treatments X varieties.
****: Coefficient of variation.

Addition of humic acid in association with compost yielded significant increases in weight of pods and seed yield (g/plant) over NPK fertilizer alone, where the obtained yields were 161.1 and 61..8, respectively for Giza 3 variety data were 137.2 and 23.8, respectively, for Nobaria variety Such treatments

produced significantly increases for plant height for Nobaria 1 genotype .In case of Giza 3 genotype prior treatment could not bring any improvement for plant height as compared with mineral fertilizer alone .The positive effect of humic acid on these parameter has been demonstrated by Khristeva and Lukyanenko (1962) they found that humic material enter the plant during early stages of growth and acts as supplementary sources of polyphones that serve as respiratory catalysts. In addition, Schnitzer and Khan (1972)suggested that humic substances exert two type of effects in relation to plants :a) indirect effects which involve humic acid acting as suppliers and regulators of plant nutrients similar to synthetic on exchanges, and b) direct which occur when humic substances are taken by plant roots Zancani *et al.* (2009), reported that humic acid could modify the profile of organic acid secreted cells, increasing oxalic and citric acids secretion and decreasing succinic and malic acids exudation .This would lead to a parallel increases in substrate availability for oxidative respiration as it may be inferred by the enhancement of cellular ATP and glucose-6- phosphate concentration and consequently by the decrease AOX (mitochondrial alternative oxidase) activities being the phosphorylating cytochrome pathway the most favored. Also the higher yield because of compost application may be owing to nutrients supplied by it (Sharma *et al.*, 1988 and Panwar *et al.*, 1998) and improvement in soil physical properties which led to better soil physical health (Sharma, 1986).

Application of humic acid in combination with NPK fertilizer resulted in more significant increments in plant height than NPK fertilizer (control), where the obtained plant heights were 120.0 and 122.0 cm for Giza 3 and Nobaria 1varieties respectively. Such treatment induced increases significantly in weight of pods seed yield (g/plant) and seed yield (ardab/fed.) for Giza3 and Nobaria 1cultivars surpassed NPK fertilizer.

Also, compost association with NPK produced high significant increases in all studied parameters, where seed yield (ardab/fed.) recorded 10.1 and 5.2 for Giza 3 and Nobaria 1 faba bean varieties, respectively. The favorable significant effect of the combination between compost and NPK fertilizer may be explained by the effect of compost on increasing crop yield due to the reducing soil salinity and /or the increase in the availability of certain plant nutrients due to the application of such materials .Accordingly, the growing plants will have better environmental conditions with a relatively low stress on growth, such results are in good harmony with those reported by El-Sedfy *et al.* (2002); Dott *et al.* (2003); El-Shafie and El-Shikha (2003). Moreover, a promotive effect was observed when humic acid associated with compost and NPK fertilizer, where faba bean responded significantly over plants received NPK alone in seed yield (ardab/fed.), by about 10.6 and 5.4 for Giza 3 and Nobaria 1 genotypes, respectively.

Mineral Concentrations

Macronutrients concentration

The data in Table (5) show that highly significant and positive effected in mean values of macronutrients concentrations (%) in seeds and stems at treatments as well as treatments x varieties interaction of two faba bean cultivars under study. These data also showed significant increases in nitrogen concentration of seeds due to the application of humic acid fertilizer, where the found nitrogen contents were to 3.02 and 2.80 for Giza 3 and Nobaria 1 genotypes, respectively. Such treatment also had a significant effect on phosphorus and potassium concentrations in seeds for both tested cultivars. These results are in agreement with those reported by Stevenson (1982) who found that humic substances have stimulating effect on nutrients uptake and growth rate. Taha *et al.* (1991) concluded that increasing the rate of added humic acid lead to increase in plant uptake of nutrients and its yield. Tisdole *et al.* (1997) also reported that humic acid application caused highly root system growth and this might have resulted an increase in surface area, which would have led to more nutrients uptake by providing better means for greater absorption.

Concerning the combination of humic acid with compost or NPK fertilizer, data in Table (5) showed that these treatments produced high significant increments in macronutrients concentrations, where phosphorus and potassium concentrations amounted to 0.525 and 0.556, respectively, for phosphorus concentration and o.84 and 0.97, respectively, for potassium concentration for Giza 3 variety and its were o.483 and 0.520, respectively, for phosphorus concentration and 0.66 and 0.77 respectively for potassium concentration in case of Nobaria 1 variety for the prementioned treatments, respectively . It is obvious that humic acid combination with NPK fertilizer induced higher increases in macronutrients concentrations more than humic acid combination with compost. Association humic acid with NPk fertilizer studied by several investigators, Guminski (1968) reported that the increased N uptake by the faba bean crop for humic acid application was attributed to better use efficiency of applied nitrogen fertilizers in the presence of humic acid. Humic acid application would sustain the flow of ammorical nitrogen for longer period of time. The increased phosphorus uptake was due to the action of forming humophosphate complexes which could be easily assailable by plants (Szymanski, 1962) and this explains the more phosphorus uptake by faba bean. Deb and Datta(1967) found that in the presence of humate, the plants could use phosphate fertilizer fully at the humic molecules and the phosphate anion compete on an almost equal basis.

As for compost combined with mineral fertilizer, it could be noted that NPK fertilizer action was effective in producing high significant increases nitrogen, phosphorus and potassium concentrations of seeds (Table, 5);

These contents were 3.32, 0.546 and 0.90, respectively, for Giza 3 variety, while in case of Nobaria 1 variety the contents were 3.22, 0.501 and 0.70, respectively. The increased uptake of the macronutrients was due to added supply of nutrients and well developed root system and better absorption under balanced nutrients application resulting in better absorption of water and nutrients (Dott *et al.*, 2003). The results are in consonance with the finding of Badran *et al.* (2001), Osman *et al.* (2002) and EL-Shafie and EL-Shikha (2003).

Table (5): Macronutrients concentration (%) in seeds and stems of Giza 3 and Nobaria 1 as affected by the studied treatments (2007-2008 /2008-2009)seasons.

Treatments	Varieties	Seeds			Stems		
		N%	P%	K%	N%	P%	K%
NPK	Giza 3	2.84	0.424	0.70	0.85	0.12	1.84
	Nobaria 1	2.47	0.406	0.59	0.94	0.14	1.90
Humic acid	Giza 3	3.02	0.440	0.81	0.85	0.09	1.71
	Nobaria 1	2.80	0.448	0.62	0.93	0.085	1.89
Compost+humic acid	Giza 3	3.24	0.525	0.84	0.81	0.080	1.62
	Nobaria 1	2.90	0.483	0.66	0.92	0.080	1.79
Humic acid +NPK	Giza 3	3.75	0.556	0.97	0.60	0.06	1.61
	Nobaria 1	3.10	0.520	0.77	0.91	0.006	1.72
Compost+NPK	Giza 3	3.32	0.546	0.90	0.75	0.077	1.63
	Nobaria 1	3.22	0.501	0.70	0.92	0.072	1.79
Compost+humic +NPK	Giza 3	3.91	0.585	0.99	0.60	0.046	1.54
	Nobaria 1	3.30	0.530	0.81	0.90	0.063	1.70
L.S.D V* 5%		0.10	0.003	0.008	0.01	N.S	0.03
T** 5%		0.07	0.002	0.011	0.004	0.01	0.2
TxV*** 5%		0.16	0.005	0.017	0.013	N.S	0.46
C.V ****		7.32	8.27	7.51	9.60	9..89	8.67

*: Varieties
**: Treatments
***: Treatments x varieties
****: Coefficient of variation.

Furthermore, high significant response on seeds macronutrients concentrations for plants supported with humic acid in presence of compost and NPK fertilizer, where nitrogen, phosphorus and potassium concentrations reached to 3.91, 0.585 and 0.99, respectively, for Giza 3 cultivar and also were 3.30, 0.530 and 0.81, respectively, for Nobaria 1

cultivar. On the other hand, different treatments decreased macronutrient concentrations in stems for both tested varieties.

Micronutrients concentration

Results in Table (6) show that micronutrients concentrations were positively affected significantly for treatments .However, treatments x varieties produced non significant effect on micronutrients concentrations in seeds and stems for Giza 3 and Nobaria 1with some exceptions.

The result also indicated that the effect of different treatments on the mean values of the micronutrients in seeds and stems for two faba been cultivars under study. The results revealed the positive effect of humic acid either singly or in association with compost in enhancing the uptake and accumulation various nutrients in seeds for Giza 3 and Nobaria 1 genotypes, where ferrous and copper concentrations reached to 267.0 and 273.0, respectively for ferrous concentration and 13.0 and 14.0, respectively for copper concentration for Giza 3 cultivar. In case of Nobaria 1 cultivar and the values were 147.0 and 183.0, respectively for ferrous concentration and 12.0 and 13.0, respectively for copper concentration for the treatments of humic acid alone and its together with compost, respectively . Dekock (1955) reported that humic substances prevented immobilization of Fe and P and facilitate their translocation from roots to stems.

The results showed that mineral fertilizer was enriched by adding of either compost or humic acid, where the efficiency of combination NPK fertilizer with compost was more than using NPK alone (Table, 6). The observed significant increases in Zn and Mn concentrations in seeds amounted to 39.0 and 86.0, respectively, for Giza 3 genotype, also 30.0 and 71.20, respectively, for Nobaria 1 genotype. In case of NPK + humic acid and its were 42.0 and 90.0, respectively, for Giza 3 variety, also 32.0 and 73.01, respectively, for Nobaria 1 variety. The promotive effect of NPK fertilizer coupled with compost may be due to the fact that most of organic manure is promoted microbial activity in the soil as well as improve soil structure, leading to enhanced aeration in bulky in nature, contain small amounts of nutrients and their main value lies in the supply of organic matter to the soil, promotes microbial activity to enhanced aeration and water holding capacity. Coincidence results obtained such conclusion confirm those of Eissa (1996) and EL-Koumey (1999). Also the positive effect of NPK fertilizer was greatly improved when added with compost and humic acid, where the highest significant increases for ferrous and copper concentrations in seeds for faba bean varieties. The concentrations were 446.0 and 14.0, respectively for Giza 3 cultivar, while in Nobaria 1 cultivar; data recorded 337.0 and 13.0, respectively. Such treatment also had the highest significant effect on zinc and manganese by 44.0 and 98.0, respectively, for Giza 3 variety and 33.0 and 74.58, respectively, for Nobaria 1 variety. From these results, it can be

concluded that, the efficiency of combination treatment were more than using NPK fertilizer only. However micronutrient concentrations were decreased in faba bean stems as affected by different treatments indicating more nutrients translocation to the valuable sites in faba bean and consequently increases nutrients % in those sites i.e. seeds as found by Zandonadi *et al.* (2007). This was true for both studied varieties.

Table (6): Microelements concentration (mg/kg) in seeds and stems for Giza 3 and Nobaria 1 as affected by the studied treatments (2007- 2008/ 2008-2009)seasons.

Treatments	Varieties	Seeds (mg/kg)				,Stems (mg/kg)			
		]Fe	Cu	Zn	Mn	Fe	Cu	Zn	Mn
NPK	Giza 3	206.0	12.0	24.0	70.67	240.0	7.0	9.0	28.0
	Nobaria 1	163.0	10.0	19.0	60.30	287.0	10.0	12.0	38.0
Humic acid	Giza 3	267.0	13.0	31.0	76.0	210.0	7.0	8.0	27.0
	Nobaria 1	147.0	11.0	22.0	63.40	259.0	9.0	11.0	38.0
Compost+humic acid	Giza 3	273.0	14.0	34.0	83.0	201.0	6.0	7.0	26.0
	Nobaria 1	183.0	12.0	25.0	51.38	253.0	9.0	10.0	37.0
Humic acid +NPK	Giza 3	424.0	13.0	42.0	90.0	195.0	5.0	6.0	22.0
	Nobaria 1	332.0	13.0	32.0	73.01	242.0	8.0	9.0	37.0
Compost+NPK	Giza 3	437.0	14.0	39.0	86.0	195.0	6.0	6.0	26.0
	Nobaria 1	310.0	13.0	30.0	71.20	244.0	9.0	8.0	36.0
Compost+humic +NPK	Giza 3	446.0	15.0	44.0	98.0	186.0	4.0	5.0	21.0
	Nobaria 1	337.0	14.0	33.0	74.58	239.0	8.0	8.0	36.0
L.S.D V* 5%		49.86	N.S.	0.83	10.08	20.10	0.41	1.72	0.24
T**5%		18.97	1.3	1.12	10.77	10.71	0.56	1.13	0.51
TxV*** 5 %		52.7	N.S.	N.S	N.S	N.S	1.15	N.S	1.02
C.V ****		6.83	7.18	9.98	8.43	9.53	9.27	8.36	9.36

*: Varieties
** : Treatments
***: Treatments x varieties
****: Coefficient of varition

Crude Protein and Total Carbohydrate

The results in Table (7) revealed that Crude Protein and carbohydrate % in seeds and stem showed highly significant differences between varieties, treatments and VxT interaction. For Crude Protein in seeds, the highest values were (24.44 and 20.63) by compost +humic acid +NPK application followed by (23.44 and 19.38) with humic acid+ NPK for two varieties, respectively, compared with the control (17.75 and 15.44), while crude

protein were decreased in stem .The highest values were (5.31 and 5.81) by NPK application for two varieties respectively. Guminski (1968) found that humic acid application had a definite impact on the protein and nucleic acid synthesis, which indirectly indicate the increased uptake of various nutrients essentially N,K and Ca .According to Madlian(2002) the protein content of peanut was significantly increased as results of humic acid application.

For carbohydrate % in seeds the highest values were (76.0 and 74.30) by Compost+ Humic +NPK application for two the varieties followed by (74.30, 73.90 and 74.10, 73.10) by compost +NPK and humic acid +NPK application respectively for two varieties (Giza 3 and Nobaria 1).

Table (7): Crude protein and carbohydrate percentage of Giza 3 and Nobaria 1 as affected by the studied treatments (2007-2008/2008-2009)seasons.

Treatments	Varieties	Crude protein (%)		Total carbohydrates (%) in seeds
		seeds	stems	
NPK	Giza 3	17.75	5.31	72.5
	Nobaria 1	15.44	5.88	70.8
Humic acid	Giza 3	18.88	5.31	73.90
	Nobaria 1	17.50	5.81	71.40
Compost+humic acid	Giza 3	20.25	5.06	73.5
	Nobaria 1	18.13	5.75	72.2
Humic acid +NPK	Giza 3	23.44	3.75	74.1
	Nobaria 1	19.38	5.69	73.1
Compost+ NPK	Giza 3	25.56	4.69	74.3
	Nobaria 1	20.0	5.75	73.9
Compost+Humic+NPK	Giza 3	24.44	3.75	76.0
	Nobaria 1	20.63	5.63	74.3
L.S.D V* 5%		0.58	0.08	0.86
T** 5 %		0.45	0.02	0.66
TxV *** 5 %		1.0	0.08	1.45
C.V. ****		9.2	8.61	9.47

*: Varieties.
**: Treatments.
***: Treatments x varieties.
****: Coefficient of variation.

Seedling Vigor Characters

Table (8) revealed that different significantly germination percentage, shoot, radical length (cm), fresh and dry weight seedling (g) and electrical conductivity (EC) at varieties, treatments and TxV interaction . Also, data showed the high response of two varieties of faba been under salinity soil to humic acid and compost for 2007-2008 and 2008-2009growing seasons. Humic acid+ NPK+compost significantly. increased germination %compared to control (72vs 45) for Giza 3 variety. While humic acid alone was significantly increased germination % compared to control (74vs 48) for Nobaria 1.The highest values of shoot length were obtaiend for Giza 3 under humic acid (30.60) and Nobaria 1 under compost +humic +NPK(30.80cm),than control (21.50 and 20.30)for two varieties respectively. While the low values in radical length were obtained with Giz3 and Nobaria 1 under control treatment (11.50 and 10.90, respectively) . For fresh and dry weight seedling (g), the highest values were obtained with Giza3 under the treatment with humic acid alone (4.80 and 0.36) while the highest values were (4.80 and 0.28) for Nobaria 1 when found with humic acid +NPK application. The least values of electrical conductivity were obtained by Giza 3 under humic acid +NPK (9.22) and Nobaria 1 under humic acid (15.81).

Table (8): Germination (%) and seedling characteristics of Giza3 and Nobaria1. as affected the studied treatments (2007-2008 and 2008-2009)seasons .

Treatments	Varieties	Germination (%)	Shoot length (cm)	Radical length (cm)	Fresh weight of seedling (g)	Dry weight of seedling (g)	Electrical conductivity (EC) dS/m
NPK	Giza 3	45	21.50	11.50	3.00	0.20	18.70
	Nobaria 1	40	20.30	10.90	3.11	0.17	20.83
Humic acid	Giza 3	72	30.60	13.68	4.82	0.27	14.09
	Nobaria 1	45	25.5	12.0	3.16	0.21	15.81
Compost+humic acid	Giza 3	52	27.90	12.30	3.58	0.24	16.96
	Nobaria 1	50	29.50	11.60	4.65	0.22	19.92
Humic acid +NPK	Giza 3	67	24.50	11.60	3.80	0.23	9.22
	Nobaria 1	50	27.73	12.80	4.80	0.27	18.67
Compost+ NPK	Giza 3	50	25.2	17.80	3.94	0.24	16.70
	Nobaria 1	50	23.8	12.80	3.68	0.18	17.60
Compost+Humic+NPK	Giza 3	65	30.1	16.80	4.46	0.36	12.32
	Nobaria 1	72	30.80	14.60	4.06	0.28	17.80
L.S.D V* 5%		2.43	0.054	0.033	0.48	0.004	0.05
T** 5 %		2.14	0.047	0.082	0.40	0.005	0.03
TxV*** 5 %		4.66	0.10	0.165	0.87	0.01	0.072
C.V****		11.61	10.8	12.33	13.22	11.23	10.24

*: Varieties
**: Treatments
***: Treatments x varieties
****: Coefficient of variation.

Soil Properties

Data in Table (9) indicated that, the treatment of humic acid addition either singly or in combination with NPK and compost increased EC (dSm^{-1}) and the content of soluble cation and anion in the tested soil with some expectation as compared with NPK alone.

As for available macronutrients, it was found that seed coated with humic acid induced the highly increases in available potassium by about 32.93% but decreased available nitrogen and phosphorus. While humic acid association with compost and NPK fertilizer produced the highest available macronutrients with some expectation as comparing with mineral fertilizer used alone. The percentage increases in available nitrogen amounted to 35.71 and 28.57%. Also combined treatment of compost + NPK increased available nitrogen and phosphorus, where the percentage increases in available phosphorus reached to 62.5% surpassed the control treatment. Compost combination with NPK induced decreased available potassium. Application of compost + humic acid + NPK increased available phosphorus but decreased available nitrogen and potassium in the soil under study.

Table (9): Mean of chemical analysis of soil as affected by the studied treatments.

Properties and unites	The studied treatments					
	NPK	Humic acid	Humic acid + compost	Humic acid + NPK	Compost + NPK	Humic acid + Compost+NPK
EC (dSm-1)	4.4	4.5	6.0	4.8	3.8	4.5
Soluble ions (mg/l)						
Ca2	15.5	19.5	32.0	18.5	16.5	17.0
Mg2	5.47	7.44	10.7	8.58	8.53	11.79
Na+	24.7	20.0	28.4	16.2	12.7	18.4
K+	0.53	0.53	0.9	0.56	0.63	0.56
H2CO3	2.47	2.47	2.28	1.9	2.28	2.28
Cl_	7.68	11.52	20.1	11.52	10.8	10.56
SO4	36.05	33.48	44.56	30.42	25.22	34.86
Available macronutrients (mg/kg)						
N	14.0	7.0	19.0	18.0	17.0	11.0
P	8.8	6.68	9.18	10.33	14.3	12.29
K	164	218	214	132	117	138

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تأثير اضافة بعض المركبات العضوية علي إنتاج وجودة بذور الفول البلدى وخصائص التربة الملحية

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الملخص العربي

أقيمت تجربتان حقليتان لموسمين متتالين ٢٠٠٧/٢٠٠٨ و٢٠٠٨/٢٠٠٩ فى قرية جلبانة – منطقة سهل الطينة – شمال سيناء وتهدف هذة الدراسة إلي إستبيان مدى تأثير إضافة التسميد المعدني أو حامض الهيوميك إما في صورة منفردة أو متحدين مع الكمبوست علي المحصول ومكوناتة والتركيب الكيماوى لبذور وسيقان الفول البلدي وجودة البذرة لصنفي الفول البلدي (جيزة ٣ ونوبارية ١) تحت الدراسة بالاضافة الي بعض الصفات الكيميائية للتربة تحت الدراسة واستخدم تصميم التجربة علي صورة القطع المنشقة. وأوضحت النتائج المتحصل عليها فاعلية حامض الهيوميك+compost+NPK وتفوقة علي التسميد المعدني في إحداث إستجابة معنوية فى المحصول ومكوناتة حيث وصلت الزيادة النسبية لمحصول البذرة إلي١٧,٥٤ و ١٢,٥ لكل من جيزة ٣ و نوبارية ١ علي التوالي. وأيضا زيادة معنوية في محتوي البذرة من العناصر الكبري (نيتروجين – فوسفور – بوتاسيوم) والعناصرالصغري (حديد– نحاس– زنك– منجنيز) ونقص محتوي السيقان من هذة العناصر مقارنة بالكنترول كما إنه أدت المعاملةبحامض الهيوميك منفرد الى ارتفاع نسبة الإنبات لبذور صنف جيزة ٣ بينما ادت المعاملة بحامض الهيوميك+Compost+NPK الى ارتفاع نسبة الانبات لبذور صنف نوبارية وقد وجد ان استخدام حامض الهيوميك يقلل من pH التربة مما يجعل الوسط ملائم للإنبات ويجعل العناصر أكثر تيسرا فى التربة مما يسهل على النبات إمتصاصها. بالرغم من وصول نسبة الانبات الى ٧٢% إلا أن البذور الناتجة من الزراعة لا يفضل إستخدامها

كتقاوى نتيجة لانخفاض الانبات عن النسبة المسموح بها وانما تستخدم فى الإستهلاك الغذائي .كما ارتفعت نسبة البروتين والكربوهيدرات فى الحبوب عن السيقان الخضراء في صنفي الفول البلدي تحت الدراسة. كما تفوق الصنف جيزة ٣ علي الصنف نوبارية ١ في كل الصفات السابقة. وسجلت النتائج تفوق المعاملات المشتركة وخاصة إضافة حامض الهيوميك مع الكمبوست والتسميد المعدني حيث كان الأكثر تأثيرا في النتائج المتحصل عليها في هذة الدراسة لصنفى الفول البلدي وقد يرجع التفوق الخاص لهذة المعاملة الي قدرة حامض الهيوميك علي جلب المغذيات الكبري والصغري وتكوين معقدات معدنية- عضوية تعتبر مخزون عنصري اكثر صلاحية وتيسر للنباتات تحت ظروف الاراضي تحت الدراسة مما يؤثر ايجابيا علي زيادة إنتاجية وتحسين صفات الجودة في بذور كلا الصنفين (جيزة ٣و نوبارية ١).