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IMPROVEMENT OF SANDY SOIL PROPERTIES AND ITS PRODUCTIVITY OF PEANUT BY USING ORGANIC COMPOST AND FOLIAR SPRAY WITH BORON

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ABSTRACT: *A field experiment was carried out at a newly reclaimed sandy soil at South-Tahrir Sector Al-Behira Governorate, Egypt during a summer season of the two successive years of 2007 and 2008 under sprinkler irrigation system. This study aimed at identifying the positive effects of organic compost and foliar spray with boron on improving some soil properties as well as pod yield, seed yield and its attributes of oil, protein and nutrient contents of peanut plants. The organic compost was added at the rates of 0, 10, 20 and 30 m^3/feddan, while, boron was added at the rates of 0, 100, 200 and 300 mg B/L, as boric acid. Data obtained could be summarized as follows:*

- Application of organic compost led to improve some soil properties, i.e., (soil bulk density, hydraulic conductivity, soil pH and ECe. In addition, a markedely increased was occurred in each of total porosity, soil organic matter content and available contents of N, P, K and B. The farourable conditions of these soil properties were achived at the highest rate of organic compost.

- A pronounced increase was achieved in each of pod yield, seed yield and its components of peanut plants as well as oil, protein and nutrient contents of (i.e., N, P, K and B) of peanut seeds. The greatest values for the above mentioned traits were recorded with the highest appled rate of 30 m^3 compost/fed.

- Foliar spray with boron resulted in a significantly increase for each of the previous plant parameters of the peanut in both studied season as compared with the control. The greatest values were attained by the foliar spray with the applied rate of 200 mg B/L, except of B, which achieved the maximum values of B uptake at 300 mg B/L.

It was noteworthy that the all soil and plant characters under study were significantly increased due to the interaction between organic compost and foliar spray with boron.

Key words: *Sandy soil, Organic compost, Foliar spray with boron, Peanut plants, Soil properties.*

INTRODUCTION

Although sandy soils differ in their origin, formation and properties, yet they can be considered as one group having common problems. Such problems concerned here are the physical, chemical and biological properties. However, Skeletal in nature of these soils, are associated with low total porosity, rapid hydraulic conductivity, low water retention and available water range. Thus, the newly reclaimed sandy soils need organic amendments to enhance the retained nutrients and water, which otherwise leach out quickly.

Due to intensive farming, Egypt is considered one of the heavy consumer of chemical fertilizer. The use of chemical fertilizers has been doubled during two decades, hence the coincident application of compost is frequently recommended firstly for improving biological, physical and chemical properties. Secondary, to get high and clean agricultural yield products free from undesirable high doses of heavy metals and other chemical pollutants. Limited research has been done to quantify the beneficial effect of applying organic compost to Egyptian sandy soils. Applying compost to sandy soils is a good way to recycle the agricultural wastes and increase its organic matter content which may help in solving the sandy soil problems. Tejada and Gonzalez (2003) stated that compost is of great agricultural interest because of its organic matter content. Compost has been used extensively for reclamation of marginal soils. It has the unique ability to improve soil properties and the growing media physically, chemically and biologically.

Addition of compost to soil leads to ameliorate soil structure and bulk density. Composts influenced soil C : N ratio, substantially increased soil organic carbon and soil microbial biomass carbon concentrations. Recently. Tsadials *et al.*, (2005) found that, after three years of compost application, organic matter content, water retention capacity, available water and infiltration rate were significantly increased, whereas bulk density and aggregate instability index were decreased. Pandey and Shukla (2006) found that application of composted yard waste on the movement water in a sandy soil and they found that water and P retention in the soil were increased.

Foliar feeding is often the most effective and economical way to correct plant nutrient deficiencies, hence foliar feeding of nutrients has became an established procedure in crop production to increase yield and improve the quality of crop products. This procedure can also improve utilization and lower environments pollution through reducing the amounts of fertilizers added to soil (Abou-El-Noor, 2002). In this concern, foliar application of boron was successfully used for correcting its deficiency in peanut.

Boron is an important element in plants metabolism and it is believed to play the most significant role in the translocation of suger molecules (Matoh, 1997). In addition, Noor *et al.* (1997) proved the importance of applied boron for increasing peanut yield. The role of boron includes also, cell wall synthesis, lignifications, cell wall structure integrity, carbohydrate

metabolism, RNA metabolism, phenol metabolism, respiration indole acetic acid (IAI) metabolism and as part of the cell membranes. Better growth and good yield were obtained when crops were supplied with boron.

Peanut (*Arachis hypogaea* L.) is considered one of the most important legume and oil seed crops cultivated in newly reclaimed sandy soils. The objective of this research was evaluate the positive effects of applied organic compost and foliar spray with boron on some soil properties of a newly reclaimed sandy soil and its productivity of peanut.

MATERIALS AND METHODS

A field experiment was carried out at a newly reclaimed sandy soil at South-Tahrir Sector, Al-Behira Governorate, Egypt during a summer seasons of the two successive years of 2007 and 2008, under sprinkler irrigation system. This study was conducted to identify the effect of organic compost at the rates of 0, 10, 20 and 30 m^3/fed. and foliar spray with boron at the rates of 0, 100, 200 and 300 mg B/L on improving some soil properties as well as pod yield, seed yield and its attributes of oil, protein and nutrients content of peanut seed.

The experimental soil (0-30 depth) was taken before the performance of the experiments. Some physical and chemical analysis of experimental soil and used organic compost were determined according to Black (1965) and Page *et al.* (1982) as shown in Tables (1 and 2). Soil available macronutrients were determined by methods cited by Chapman and Pratt (1961) and soil available boron was extracted by hot water and determined colorimetrically (Wolf, 1971).

Peanut (*Arachis hypogaea* L. Giza 6 cv.) was inoculated just before sowing with the specific rhizobium bacteria inoculants. Seeds of peanut were sown in hill 10 cm apart in ridges on the 18th and 21th of April in the 1st and 2nd seasons, respectively.

Basic application of phosphorus fertilizer, as calcium super phosphate (15.5% P_2O_5) was added during the seed bed preparation at the rate of 30 kg P_2O_5/faddan. Potassium sulphat (48% K_2O) at the rate of 50 kg/fed was applied, however, nitrogen fertilizer was applied at a rate of 30 kg N/fed. as ammonium sulphate (20.6% N). Both N-and K-fertilizers were applied in two equal doses, i.e., at planting and one month later. The normal cultural practices for peanut were applied as recommended in the sector. Sprinkler irrigation was applied as plants needed. Peanut was manually harvested on September 10th and 14th in the first and second seasons, respectively.

The experimental design was split-plot with four replicates and the plot area was 10.5 m^2, and consisting of five rows (3.5 m length and 60 cm between rows). Organic compost rates were arranged in the main plots, while the concentrations of boron were randomly distributed in the sub-plots.

Table (1): Some physical and chemical properties of the tested soil .

Characters	a- Physical properties								
Seasons	Praticale size distribution%				Texture class	Bulk density g/cm^3	Total porosity	Available water %	Hydraulic conductivity (cm/min)
	Coarse sand	Fine sand	Silt	Clay					
2007	79.97	14.59	2.5	2.94	Sandy	1.46	44.90	6.42	15.76
2008	76.98	16.82	1.77	4.43	Sandy	1.43	46.04	6.85	14.24

Table (1): Continued :

Characters	b- Chemical properties															
Seasons	pH (1-2.5)	EC (dSm^{-1})	Total $CaCO_3$ %	O.M. %	CEC	Soluble ions soil paste exctract (mep/L)								Available nutrients mg/kg			
						Cations				Anions							
						Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}$	HCO_3^{-}	Cl^{-}	$SO_4^{=}$	N	P	K	B
2007	7.82	0.73	1.21	0.29	4.32	2.32	1.69	3.05	0.25	-	2.60	2.51	2.20	28.00	4.10	53.0	0.23
2008	7.91	0.69	1.38	0.38	4.13	2.22	1.53	2.86	0.30	-	2.56	2.27	2.08	39.00	5.02	60.0	0.30

Table (2): Some chemical analysis of used organic compost .

ECe (dS/m)	pH	O.C	O.M	C/N	CEC	Total Macronutrients %			Micronutrients (mg/kg)				Weight of 1m^3
						N	P	K	Zn	Fe	Mn	B	
3.48	7.72	28	48.27	14.31	64.65	1.96	0.72	1.22	32.36	85.72	39.13	12.3	630 kg

The experimental treatments can be described as follows, treatments of control, 10, 20 and 30 m^3 compost/fed as a main plots, 0, 100, 200 and 300 mg B/L. boric acid as sub plots.

Foliar spraying with boron was done twice at vegetative stage (30 days after sowing) and at pod development period (50 days after sowing) at the rate of 400 L/fed in each spray.

At harvest: the yield and its components were recorded. Ten plants of the middle two rows were taken randomly to record pods and seed weight /plant (g), seed index and shilling %. Whole plot was harvested and the pods were air dried to calculate pods and seed yields per feddan.

Chemical analysis: Seed content of NPK and B was determined using the methods described by Chapman and Pratt (1961) and Wolf (1971). Protein content % was calculated by multiplying N% by 6.25. Seed oil content % was determined by using Soxhlet apparatus and petroleum ether as an organic solvent as described by A.O.A.C. (1990).

All data were statistically analyzed according to Snedecor and Cochran (1982). Means of different treatments were compared using the L.S.D. test at 5% probability. Soil samples were collects from the surface layer of each plot (0-30 cm) to determined some physical and chemical analysis according to Hesse (1971), Lovenday (1974) and Black and Hartge (1986).

RESULTS AND DISCUSSION

I- Effect of organic compost on some soil properties:

1. Bulk density and total porosity :

Data in Table (3) showed that application of different rates of the compost improved soil bulk density at harvesting stage during the two studied seasons of 2007and 2008. Since bulk density decreased at any rate of addition, while the relatively high bulk density value was attained for the untreated soil. Applying different rates of compost caused a gradually decreased for the values of bulk density, where the best improved effect was subjected with the highest rate of organic compost. These findings are in harmony with those outlined by Celik *et al.*, (2004) who found that, the soil bulk density tended to decrease due to increasing the organic matter sources such as compost and manure. Concerning total prorsity %, the obtained data in Table (3) cleared that the values of total porosity were increased with raising the applied rates of compost up to 30 m^3/fed over the control. In this concern, Aggelides and Londra (2000) stated that, application of organic compost to the soil considerably improved its physical properties by increasing total porosity. These results are in harmony with Ngakatawa *et al.* (2001), Salem (2003), Othman *et al.* (2005) and El-Shouny *et al.*, (2008).

2. Saturated hydraulic conductivity:

Results in Table (3) indicated that, increase the rates of organic compost caused a considerable decreased in saturated hydraulic conductivity in soil.

This reduction could be attributed to the migration of fine particles of compost causing the clogging macrospores or a reduction in the pore size. Also, results revealed that, the reduction in saturated hydraulic conductivity was high decreased with in adding of compost. These findings may be also due to that compost which leads to raise of soil water holding capacity, causes a pronounced increase soil matrix potential as a result of increasing soil surface area (Hillel, 1982). These results are also in harmony with El-Eweddy (2005), Othman *et al.* (2005) and El-Shikha *et al.* (2008).

3-Soil organic matter:

Organic matter content is listed in Table (3), and it is well known that it plays an important role in the amelioration of sandy soils through its effective role in soil aggregation and nutritional balance. Data showed that organic matter contents in the studied soil was effected by the different applied rates of compost, however, addition of organic compost substantially increased its total content. The greatest increase was subjected with the highest rate of application. A similar result was reported by Tsadials *et al.* (2005).

4. Soil pH:

Data in Table (3) revealed that, soil pH values were gradually decreased in the studied sandy soil with increasing the applied of compost. This decrement was more pronounced with the highest rate of application (30 m^3/fed). These findings are in agreement with those obtained by El-Ghamry *et al.* (2004), El-Eweddy (2005) and El-Shouny *et al.*, (2008) whose are arguments that the decrease in the soil pH is mainly due to the formation of organic acids as a result of compost decomposition and more Co_2, which was released with increasing the metabolic activity of the root system. The later plays an important role as H^+ pumping which also contributes to the soil pH decrement (Salem, 2003 and Reda *et al.*, 2006).

5- Soil electrical conductivity (EC):

Data in Table (3) revealed that, the initial EC values of the studied soils at the two season slightly decreased at the end of the experiments as a result of the applied compost rates. In this respect, compost application at 30 m^3/fed was the most effective in decreasing EC. This may be due to the positive effect of active organic acids that are released from applied compost on soil aggregation as well as creating conductive pores that encouraged the leaching of the exess soluble salts (Reda, *et al.*, 2006 and El-Shouny *et al.*, 2008).

Table (3): Effect of organic compost on some properties of the tested soil at harvesting stage.

Rates of compost	Bulk density (g/cm^3)	Total porosity %	Hydraulic conductivity cm/min	O.M, %	pH (1-2.5)	EC (dS/m)	Available nutrient contents (mg/kg soil)			
							N	P	K	B
2007 season										
0	1.46	44.90	15.76	0.29	7.80	0.73	28.00	4.10	53.00	0.23
10	1.38	47.92	5.58	0.42	7.76	0.72	60.88	4.50	73.00	0.25
20	1.36	48.86	5.00	0.45	7.63	0.66	67.98	6.03	88.00	0.31
30	1.32	50.18	4.84	0.49	7.60	0.62	71.32	6.28	90.36	0.36
Mean	1.38	47.92	7.79	0.41	7.70	0.68	57.04	5.22	76.09	0.29
2008 season										
0	1.43	46.03	14.24	0.38	7.78	0.69	39.00	6.02	60.00	0.30
10	1.32	50.18	5.54	0.46	7.72	0.63	66.77	6.35	87.17	0.39
20	1.28	51.69	4.94	0.53	7.61	0.60	72.03	6.42	97.50	0.44
30	1.23	53.58	4.80	0.62	7.59	0.56	76.54	6.68	102-10	0.51
Mean	1.31	50.37	7.38	0.45	7.67	0.62	63.58	6.36	86.69	0.41

6. Availability of some nutrients:

The obtained data in Table (3) manifested the impacted of compost on the availability of N, P, K and B in the soil however, their contents tended to increase as the organic compost increased up to 30 m^3/fed. The increase in availability of these nutrients in the treated soil over control is more attributed to the influence of organic compost on reduction of pH values as well as to the compost products contain a considerable variety of macro and micronutrients. Compost is a good source for N,P and K, and it is also contained micronutrients essential for plant growth. Sinc compost contains relatively stable sources of OM, its nutrients are supplied in a slow-release not only provides some nutrients, but also often makes current fertilizer programs more effective. Speir *et al.* (2004) reported that, the samples from the field trial soil total C,N and P were increased markedly with increasing the applied compost rates. These results are in agreement with those obtained by El-Sayed *et al.* (2006) and Mahmoud (2006).

II- Yield and yield components:

a) Effect of organic compost :

Pods and seed yields and their components (pods and seed weight/plant, 100 seed weight and shelling %) as effected by application of compost are presented in Table (4). Data showed that application of compost significantly increased all these plant parameters in the two growing seasons. The increase was higher in 2008 than in 2007 growing season. In this concern, the highest rate of compost (30 m^3/fed) exhibited the greatest values comparing to the control treatment. The positive impacts of compost on yield and its components of peanut plants are mainly due to improving soil physical and chemical properties, during preparing the suitable bed for germination and development of plant growth that reflect on resultant yield. Moreover, compost is considered an important source of humus, macro and microelements carrier, and on the same time increase the activity of the useful microorganisms. Similar results were reported by Abd El-Mottaleb *et al.* (2006), El-Sayed *et al.* (2006) and Mahrous *et al.* (2006).

B) Effect of foliar spray with boron:

Foliar application is considered as one of the most effective and fast method of correcting nutrient deficiency as remedy for disorders resulting from unfavorable soil factors.

The crop yield and its components as affected by foliar spray with boron are recorded in Table (4). It is clear from the obtained spray data that sparing with the three different levels of boron (100, 200 and 300 mg/L) significantly increased all the previous plant parameters of the peanut plants in both season as compared with the control (sprayed with tap water). In this concern, spraying the plants with B level of 200 mg/L gave the greatest values comparing the control.

Table (4): Effect of applied compost and foliar spray of boron on yields of pods and seeds as well as their components during the two studied seasons.

Treatments	Pods weight (g/plant)		Seed weight (g/plant)		100 Seed weight (g/plant)		Pods yield (kg/fed.)		Seed yield (kg/fed.)		Shelling %	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Compost (m^3/fed)												
0	25.72	25.91	15.96	16.24	69.22	74.14	1028	1088	637.91	681.75	61.85	62.40
10	26.92	27.71	17.65	19.06	72.03	77.68	1072	1181	706.50	812.75	65.67	68.47
20	28.42	29.67	19.95	20.96	76.16	80.37	1172	1249	822.50	882.50	70.05	70.34
30	30.09	29.88	21.44	21.23	77.49	81.65	1225	1266	872.50	899.75	71.34	70.83
Mean	27.78	28.29	18.75	19.37	73.72	78.46	1124	1196	759.85	819.18	67.22	68.01
L.S.D. at 0.05	0.16	0.27	0.16	0.16	0.35	0.33	6.43	10.85	5.03	7.31	0.65	0.51
Foliar spray with Boron (mg/L.)												
0	24.69	24.87	15.64	15.41	68.50	71.37	1000.50	1044.25	633.50	646.50	63.04	61.65
100	27.61	28.61	18.64	19.69	73.02	78.82	1118.75	1211.00	755.50	834.25	67.33	68.69
200	29.72	30.18	20.89	21.61	77.93	82.72	1204.00	1278.50	846.75	915.50	70.14	71.24
300	29.03	29.55	19.72	20.79	75.46	80.81	1175.25	1251.75	803.50	880.50	68.16	70.18
Mean	27.76	28.30	18.72	19.37	73.72	78.43	1124.62	1196.37	759.81	819.18	67.16	67.94
L.S.D. at 0.05	0.19	0.15	0.15	0.12	0.22	0.22	7.71	5.98	5.09	4.70	0.60	0.47

The positive response of peanut plants to B application reflects the low content of available B in the soil (Table, 1) and its essential roles in plant metabolism synthesis of nucleic acid, tissue development and sugar translocation facitlity (Marschner, 1998). The current results of positive effect of foliar spray with B on peanut pod and seed yields as well as their attributes are in a good agreement with those reported by Rifaat *et al.* (2004), Khalifa (2005), Nassar (2005) and Nasef *et al.* (2006).

C- Interaction effects between organic compost and Foliar spray with boron:

Concerning the interaction effects between the applied compost and foliar spray with boron on peanut yield and its components, data in Table (5) indicated that increasing of the applied compost and boron rates tended to increase yield and its components of peanut. The greatest values (Table, 5) were obtained by application of 30 m^3 compost/fed with foliar spray with 200 mg B/L.

This means that the interaction between organic compost and foliar spray with boron led to enhance plant utilization for nutrients and water, which was reflected in a good growth and biological yield. These results are in full agreement with those obtained by El-Sayed *et al.* (2006) and Mahrous *et al.* (2006).

III- Chemical constituents of peanut seeds:

a) Effect of organic compost:

The effect of organic compost on N, P, K and B uptake, as well as protein and oil (kg/fed) of peanut plants are shown in Table (6). Results showed that there were significant increases in the uptake of the studied nutrients (N, P, K and B), protein and oil as percentages or kg/fed in both growing seasons. The highest rate of compost (30 m^3/fed) gave the highest increments for all the aforementioned perameters. The beneficial effects of organic compost are more attributed to the ability of organic matter in rendering soil available nutrients as well as chelation of these nutrients by humic substances, help to increase the respiration rate, the metabolism and the growth of plants. Such favourable conditions causing the plant to require more nutrients from soil and fertilizers. El-Dsouky and Attia (1999) found that the application of organic manure was significantly superior to the control, recording a high uptake of N, P and K by peanut. It appears that organic acids produced from decomposed organic substances may partially ehance the release of nutrients in the soil that in turn, results in more uptake of nutrients by plant. Similar results were reported by Ewais (2006) and Mahrous *et al.* (2006).

Table (5): Interaction effect between the applied organic compost and foliar spray with boron on pod and seed yield as well as their components during the two studies seasons.

Compost (m^3/fed)	Borm (mg/L)	Pods weight (g/plant)		Seed weight (g/plant)		100 seed weight (g)		Pods yield (kg/fed)		Seed yield (kg/fed)		Shelling %	
		2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
	0	22.03	21.53	12.98	12.44	65.50	66.88	892	904	519	522	58.19	57.79
0	100	25.81	26.36	15.79	16.42	68.44	73.21	1032	1107	631	689	61.19	62.29
	200	27.92	28.41	18.03	18.66	72.52	79.57	1116	1193	720	783	64.58	65.68
	300	26.87	27.35	17.05	17.47	70.44	76.92	1074	1148	681	733	63.44	63.87
Mean		25.72	25.91	15.96	16.24	69.22	74.14	1028	1088	637.91	681.75	61.85	62.40
	0	24.19	24.64	14.48	14.75	67.36	70.24	967	1034	578	618	59.85	59.86
10	100	26.55	27.75	17.68	19.03	71.46	78.25	1062	1179	707	808	66.61	68.57
	200	28.49	29.39	19.82	21.63	76.22	82.26	1139	1263	794	929	69.72	73.59
	300	28.09	29.07	18.62	20.86	73.11	80.00	1123	1250	747	896	66.53	71.75
Mean		26.83	27.71	17.65	19.06	72.03	77.68	1072	1181	706.50	812.75	65.67	68.47
	0	25.85	26.30	17.14	16.61	69.99	73.01	1059	1104	701	697	66.21	63.15
20	100	28.20	29.75	19.88	21.55	75.31	81.27	1156	1264	815	915	70.54	72.43
	200	30.36	32.35	22.05	23.83	81.35	84.29	1244	1358	904	1000	72.67	73.63
	300	29.28	30.30	20.73	21.87	78.04	82.94	1229	1272	870	918	70.80	72.17
Mean		28.42	29.67	19.95	20.96	76.16	80.37	1172	1249	822.50	882.50	70.05	70.37
	0	26.44	27.02	17.97	17.84	71.17	75.36	1084	1135	736	749	67.92	65.83
30	100	29.90	30.46	21.23	21.78	76.87	82.56	1225	1294	869	925	70.99	71.50
	200	32.14	30.58	23.67	22.35	81.66	84.77	1317	1300	969	950	73.61	73.08
	300	31.89	31.48	22.92	22.96	80.27	83.94	1275	1337	916	975	71.88	72.93
Mean		30.09	29.88	21.44	21.23	77.49	81.65	1225	1266	872.50	899.75	71.34	70.83
L.S.D.		0.20	0.22	0.14	0.13	0.27	0.28	5.93	7.13	5.13	4.83	0.58	0.46

Table (6): Effect of applied organic compost and foliar spray with of boron on some chemical compositions of peanut seeds during the two studies seasons.

	Nitrogen uptake (kg/fed)		Phosphors uptake (kg/fed)		Potassium uptake (kg/fed)		Boron uptake (g/fed)		Seed protein				Seed oil			
									%	Kg/fed	%	Kg/fed	%	Kg/fed	%	Kg/fed
	2007	2008	2007	2008	2007	2008	2007	2008	2007		2008		2007		2008	
Compost (m^3/fed)																
0	15.11	20.37	2.18	1.77	8.41	8.69	17.33	21.17	14.88	94.43	18.57	127.31	38.94	248.40	40.06	273.11
10	20.72	27.20	2.45	2.31	10.18	10.87	21.48	26.31	18.26	129.50	20.82	171.00	39.82	281.32	41.31	335.74
20	28.92	31.80	3.01	2.69	13.22	12.85	29.33	30.81	21.65	180.75	22.59	197.75	42.59	350.30	42.72	370.02
30	33.56	35.83	3.40	3.21	15.06	14.72	32.02	32.95	23.97	209.75	24.79	224.95	44.41	287.47	43.45	390.94
L.S.D. at 0.05	0.76	0.64	0.15	0.08	0.15	0.14	0.15	0.23	-	4.25	-	3.98	-	2.09		2.83
Foliar speay with Boron (mg/L.)																
0	19.44	21.39	2.04	1.93	9.45	9.23	15.93	17.20	18.70	121.49	20.22	133.73	40.32	256.99	41.26	267.55
100	23.69	29.31	2.74	2.44	11.66	11.96	23.93	26.32	19.31	148.05	21.88	183.19	41.15	312.98	41.66	348.74
200	27.79	32.41	3.19	2.90	13.06	13.14	29.57	31.93	20.12	173.71	22.10	203.65	41.85	357.88	42.09	386.28
300	27.41	32.09	3.08	2.72	12.69	12.81	30.74	35.80	20.69	171.31	22.54	201.52	42.45	343.25	42.55	375.99
L.S.D. at 0.05	0.53	0.51	0.09	0.09	0.16	0.16	0.16	0.15	-	3.57	-	3.16	-	2.07	-	2.16

b) Effect of foliar spray with boron:

As shown in Table (6) foliar spray with boron up to 200 mg/L significantly increased seed N, P and K contents in both seasons. These, contents of nutrients declined by raising the rate of B up to 300 mg/L, since the contents remained higher than the control treatment. These results showed that B foliar spray enhanced NPK assimilation and translocation from the source (leaves) to the sink (seed). This results agreed with the findings of El-Shazly *et al.* (2003) and Nassar (2005).

Data in Table (6) showed that the applied B as foliar addition positively increased B uptake in peanut seeds in both growing seasons. The increases of B uptake were recorded with raising the B rates up to 300 mg/L at the two seasons. These results are mainly related to the positive effect of B on seed yield of peanut (Table, 4). These results confirmed with the finding outlined by Jiang *et al.* (1994) who stated that, the concentration of B in groundnut plants increased with increasing B fertilizer rates.

Concerning seeds oil and protein as % and content, data in Table (6) showed that, both protein and oil % of peanut plants in both seasons significantly increased by increasing the applied foliar spray rates with B up to 300 mg B/L as compared with the control. Moreover, the highest protein and oil % in both seasons were attained at the highest level of B (300 mg/L), followed by 200 mg/L, 100 mg/L and control. However, the foliar spray with 200 mg B/L gave the greatest values of seed protein and oil content. These results are supported by those of Rifaat *et al.* (2004), Khalifa (2005), Nassar (2005) and Nasef *et al.* (2006) who stated that, the highest oil and protein contents in peanut plants were obtained with the foliar addition of B at the highest concentration of 300 mg B/L. The beneficial effect of spray with B may be attributed to the role of B on fundamental metabolic reactions and acceleration protein synthesis. Also, B is involved in a number of metabolic pathways (sugar transport, respiration, carbohydrate, RNA, IAA and phenol metabolism or a cascade effect which is known for photohormones (Parr and Loughman, 1983).

In addition, the interaction effect between organic compost and foliar spray with boron on NPK and B uptake as well as protein and oil contents of seeds was significant (Table, 7). The greatest values of NPK uptake, protein and oil contents were obtained by application of 30 m^3 compost/fed with 200 mg/L boron. However, the greatest values of B uptake were obtained by application 30 m^3 compost/fed with 300 mg B/L. This results are more related to the beneficial effects of compost and boron on metablic processes and growth which in turn reflected positively on chemical constituents of peanut seed.

From this results, it can be concluded that application of 30 m^3 compot fed and foliar spray with 200 mg compost B/L could improve seed yield and its quality of peanut plants under the conditions of this experiment.

Table (7): Interaction effect between the applied organic compost and foliar spray with boron on nutrients uptake as well as protein and oil contents in seed during the two studies seasons.

Compost (m^3/fed.)	Boron (mg/L)	Nutrients uptake in seeds								Protein content (kg/fed)		Oil content (kg/fed)	
		Nitrogen uptake (kg/fed)		Phosphor uptake (kg/fed)		Potassium uptake (kg/fed)		Boron uptake (g/fed)					
		2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
0	0	11.46	14.35	1.40	1.30	5.81	6.27	10.48	12.68	71.62	89.68	199.19	208.22
	100	13.82	20.87	2.33	1.72	8.58	8.75	16.21	19.08	86.37	130.43	245.08	575.25
	200	17.56	23.72	2.42	2.11	9.72	9.94	20.80	24.50	109.75	148.25	280.80	413.06
	300	17.63	22.57	2.58	1.97	9.53	9.52	21.86	28.44	110.18	141.06	269.47	295.54
	Mean	15.11	20.37	2.18	1.77	8.41	8.69	17.33	21.17	94.43	127.31	248.40	273.11
10	0	15.95	19.34	2.19	1.66	8.14	8.21	13.52	15.82	99.68	120.87	223.45	252.51
	100	20.14	26.82	2.33	2.18	10.03	10.66	20.14	24.48	125.87	167.62	276.86	330.87
	200	23.82	31.67	2.69	2.78	11.51	12.35	25.48	30.56	148.87	197.93	322.12	386.74
	300	23.00	31.00	2.61	2.59	11.05	12.27	26.81	34.40	143.75	197.62	305.44	374.79
	Mean	20.72	27.20	2.45	2.31	10.18	10.87	21.84	26.31	129.50	171.00	281.32	335.74
20	0	23.20	24.04	2.10	2.16	11.07	10.17	18.85	18.67	145.00	150.25	293.57	292.67
	100	27.87	32.84	2.93	2.65	13.20	13.17	28.19	29.64	174.18	205.25	343.11	386.95
	200	32.72	36.00	3.61	3.10	14.37	14.50	34.71	36.10	204.50	225.00	383.29	427.20
	300	31.92	34.33	3.39	2.92	14.26	13.58	35.58	38.83	199.50	214.56	382.71	403.09
	Mean	28.92	31.80	3.01	2.69	13.22	12.85	29.33	30.81	180.75	198.75	350.30	370.02
30	0	27.15	27.86	2.50	2.62	12.80	11.98	20.87	21.64	169.68	174.12	311.76	316.82
	100	32.93	36.72	3.38	3.23	14.85	15.26	31.19	32.09	205.81	229.50	386.87	401.91
	200	37.08	38.28	4.06	3.61	16.66	15.77	37.30	36.57	231.75	243.27	440.31	417.14
	300	37.09	40.46	3.75	3.41	15.93	15.89	38.74	41.53	231.81	252.87	415.40	430.56
	Mean	33.56	35.83	3.40	3.21	15.06	14.72	32.02	32.95	209.75	224.95	387.47	390.94
L.S.D.		0.61	0.56	0.11	0.08	0.14	0.13	0.18	0.20	4.11	3.32	2.11	2.41

Finally: It could be concluded that the superiority impact of organic compost application on soil properties and yield of peanut plants may be due to improve the soil aggregation, porosity and bulk density, thus creating a better plant root environment. In addition, such organic substances improve water holding capacity of sandy soils and reducing water loss by leaching as well as supplies avariety of macro and micronutrients. Moreover, it supplies significant quantities of organic matter and hence improves CEC (cation exchang capacity of soil), and soil ability to hold nutrients. Again, organic compost supplies beneficial microorganisms to soils.

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تحسين خواص الأرض الرملية وإنتاجيتها من الفول السودانى بإستخدام الكمبوست العضوى والرش بالبورون

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الملخص العربي

أجريت تجربة حقلية على ارض رملية حديثة الاستصلاح في قطاع جنوب التحرير بمحافظة البحيرة - مصر خلال الموسم الصيفى لعامين متتاليين ٢٠٠٧-٢٠٠٨ ، تحت نظام الري بالرش ، وتهدف هذه لدراسة إلى استبيان تأثير إضافة الكمبوست العضوي والرش بعنصر البورون على تحسين بعض خواص التربة وكذلك محصولي القرون والبذور بالإضافة إلى المحتوى من المغذيات (النتروجين والفوسفور والبوتاسيوم والبورون) الزيت ، البروتين لبذور نباتات الفول السودانى وقد أضيف الكمبوست بمعدلات صفر ــ ١٠ــ ٢٠ ــ ٣٠ متر مكعب فدان ، بينما أضيف البورون بتركيزات صفرــ ١٠٠ ــ٢٠٠ ــ٣٠٠ ملليجرام /لتر في صورة حمض البوريك رشا على النباتات .

يمكن تلخيص أهم النتائج المتحصل عليها فيما يلي :

- إضافة الكمبوست العضوي أدت إلى تحسين بعض خواص التربة حيث انخفضت قيم كل من الكثافة الظاهرية ومعامل التوصيل الهيدولكي والرقم الهيدروجينى (pH) ومعامل التوصيل الكهربي (EC) ، بينما زادت قيم كل من المسامية الكلية ومحتوي التربة من المادة العضوية والمغذيات الميسرة (النتروجين والفوسفور والبوتاسيوم والبورون) ، وقد تفوق المستوي الأعلى من الكمبوست على باقي المعاملات في تحسين خواص التربة السابقة تحت الدراسة.
- كما إضافة الكمبوست العضوي إلى زيادة معنوية لمحصول القرون والبذور لنباتات الفول السوداني ، كذا محتوى البذور من المغذيات (النتروجين والفوسفور والبوتاسيوم والبورون)، الزيت والبروتين . وقد سجلت أعلى القيم عند معدل الإضافة بـ ٣٠ م^{3} كمبوست فدان .

- أدي الرش الورقي لنباتات الفول السوداني بمحاليل عنصر البورون إلى زيادة معنوية في كل القياسات النباتية تحت الدراسة المشار إليها سابقا في كلا موسمي النمو مقارنة بمعاملة الكنترول ، وقد سجلت أعلى القيم عند رش النباتات بالبورون بمعدل ٢٠٠ ملليجرام B /لتر ، فيما عدا عنصر B في البذور حيث سجل أعلى القيم عند الرش بمعدل ٣٠٠ ملليجرام B /لتر .
- الجدير بالذكر أن التأثير المشترك لإضافة الكمبوست والرش بالبورون متحدة معا قد أدى إلى زيادة معنوية في جميع القياسات السابقة لكل من التربة الرملية ونباتات الفول السوداني النامية عليها .
- ومن ثم يمكن القول بان إضافة الكمبوست العضوي بمعدل ٣٠م^{٣} /فدان للتربة الرملية ، ورش البورون على نباتات الفول السوادنى بمعدل ٢٠٠ ملليجرام /لتر يؤدي إلى تحسين خواص التربة ويضمن الحصول على أعلى إنتاجية من محصول الفول السودانى ومكوناته.