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EFFECT OF COMPOST AND COMPOST TEA APPLICATION ON FABA BEAN CROP AND SOME SOIL BIOLOGICAL AND CHEMICAL PROPERTIES

El-Gizawy, E. S. A. *; **A. A. I. Atwa*; N. I. Talha* and R. A. I. Mostafa****

***Soils, Waters and Environment Res. Institute, ARC, Egypt.**

****Field crop Res. Institute, ARC, Egypt**

ABSTRACT

The objective of this investigation was to study the effect of addition of organic matter i.e, composted rice straw, compost tea and their interaction on the yield and seed nutrients content of faba bean (*vicia faba* L.) cv. Sakha 1 and some soil biological and chemical properties. A field experiment was conducted in the Experimental Farm of Sakha Agric. Res. Station in two successive winter seasons of 2010/2011 and 2011/2012. Results showed that soil organic matter content was increased, while values of soil salinity (ECe) were reduced and there was a slight reduction in soil pH with compost addition at rates 2 and/or 4 tons/fed.

Data recorded the highest significant increases in nodule numbers and its dry weight as compared to control. Also, these treatments recorded significant increases the biological activity of soil in terms of increasing the soil total bacteria, as well as dehydrogenase activity and nitrogenase activity that increase the soil fertility, improved plant quality, as well as environmentally safe and eco-friendly, that positively turn on faba bean yield production.

The interaction between compost and compost tea gave better results in increasing the seed yield especially for application of 4 tons /fed with compost tea spraying at 50 days after sowing increased the seed yield by 51%, 53.1% relative to control in the two seasons (2010/2011 and 2011/2012), respectively. Nutrients content (N, P and K) of faba bean seeds was significantly increased in all treatments compared with the control. Also, the results showed that application of rice straw compost was effective for increasing available N, P and K in soil as compared to the control. Based on the results of the current study, the combinations between rice straw compost and compost tea are considered as an integrating nutrient management to improve the soil biological and chemical properties and yield of faba bean crop.

Keywords: Composted rice straw; Compost tea; faba bean yield and soil bio-chemical properties.

INTRODUCTION

Increasing the crop production is the main goal of many individuals and institutions of agriculture and related fields to meet the urgent need of all populations of the world. Chemical fertilizers have been used heavily to fulfill this main goal. However, much of the early criticism of the extensive use of inorganic fertilizers that caused the degradation of soil itself and environmental pollution; namely eutrophication of lakes and reservoirs. Through much investigation worldwide, it is evident that excessive fertilizers uses have been associated with pollution of both ground and surface water.

The primary problem appears to come from nitrates, but other nutrients including heavy metals may add to the problems. Surface runoff of added inorganic fertilizers to soils causes the transfer of large quantities of nitrogen and phosphorus to different water bodies causing serious problems with algae bloom and eutrophication killing fish and other organisms.

Recently, the world is oriented toward sustainable agriculture to minimize pollution sources. The use of organic fertilizers out of plant residues and animal manures for composts and compost tea have shown many advantages over chemical fertilizers and therefore are recommended in agricultural practices worldwide. Rechcigl (1995) reported that the use of any organic manure in addition to the mineral fertilizers (NPK) increased dry matter, yield and N, P and K uptake by plants. El-Sharawy *et al*., (2003) reported that the concentration of N, P, K, Fe, Mn, Zn and Cu either in leaves or in grains of faba bean was significantly increased due to the application of cotton stalks and rice straw composts. This increase in nutrients availability resulted in higher dry matter and grain yields of faba bean than untreated plants. Khater *et al*., (2004) showed positive benefits for improving soil characteristics under study due to amendments application where an improvement in the values of bulk density, hydraulic conductivity, soil consistence, available water content, pH value, organic matter content and the released content of available nutrient i.e. N, P, K, Fe Mn, Zn and Cu were recorded. Wolf and Snyder (2004) stated that various advantages have been cited for compost use, such as improvement of CEC. pH, water retention, soil structure, soil organic matter and disease suppression with a decrease in fertilizer need and damage from soil contaminants. In addition, organic matter produces a number of chelates substances that keep several metallic elements available over wide range of pH. Zhao *et al.*, (2011) reported that soil NO_3 movement out of the effective crop root zone is an important pathway of N losses in winter faba bean- summer maize rotation system. Takahashi *et al*. (2007) found that the fertilizer requirement for an equivalent yield was decreased in soils with compost application than without. Therefore, the main purpose of this investigation was to study the effect of organic fertilizer application from different sources (rice straw compost and compost tea) on some soil properties, yield and nutrients uptake by faba bean plants.

MATERIALS AND METHODS

The research work was undertaken at the Experimental Farm of Sakha Agric. Res. Station during two winter seasons of 2010/2011 and 2011/2012, to evaluate effect of application of rice straw compost, compost tea and their interaction, on soil properties, yield and seed nutrients content of Sakha 1 faba bean cultivar. The treatments were used in this present study as the following:

1- Control (without compost and/or compost tea) (C_0)
2- Compost tea spraying at 50 days after sowing (20 L/f) (T_1)
3-Compost tea spraying at 70 days after sowing (20 L/f) (T_2)
4- Rice straw compost 2 tons /fed (C_1)
5- Rice straw compost 4 tons /fed (C_2)

6- C_1T_1 7- C_1T_2 8- C_2T_1 9- C_2T_2

Soil properties of the experimental soil before planting are shown in Table (1). The rice straw compost was mixed with the soil surface (0-30 cm) before faba bean sowing. Compost tea and rice straw compost were prepared in Sakha bacterial Lab. by the methods according to El-Gizawy (2005), those analysis are presented in Table (2). Seeds of faba bean were sown on 10th of November in both seasons after inoculation by *Rhizobium leguminosarum* (isolate no. R-102 also from Sakha bacterial lab). The experiments plots were treated with 22.5 kg P_2O_5/fed. as single super phosphate fertilizer (15.5 %P_2O_5) in one dose before sowing. Nitrogen was applied at rate of 15 kg N/fed. (urea 46.5% N) in one dose after thinning whereas potassium fertilizer was added in form of potassium Sulphate (48% K_2O) at rate 24 kg/fed K_2O after one month of planting. The other agricultural practices were carried out as recommended.

Rhizosphere samples of faba bean were collected after 70 days from sowing to determined total bacterial counts (Allen 1959), nodulation, dehydrogenase activity (DHA) according to Thaiman (1965) and nitrogenase activity as described by Hardy et. al (1973).

Table (1): Some characteristics of the studied soil during the two seasons.

Characteristics	Units	Soil	
		2010/2011	2011/2012
Partical size distribution			
Coarse sand	%	2.2	2.4
Fine sand	%	22.1	22.2
Silt	%	24.3	23.8
Clay	%	51.4	51.6
Textural class		**Clayey**	
Organic matter	%	1.77	1.82
pH (1:2.5 soil suspension)		8.8	8.6
EC (soil paste) at 25°C	dSm^{-1}	3.66	2.82
Bulk density	(gm/cm^3)	1.41	1.42
Soluble cations:			
Ca^{++}	meq. L^{-1}	15.9	14.2
Mg^{++}	meq. L^{-1}	8.4	6.2
Na^{+}	meq. L^{-1}	11.1	6.3
K^{+}	meq. L^{-1}	1.2	1.3
Soluble anions:			
CO_3^{--}	meq. L^{-1}	-	-
HCO_3^{-}	meq. L^{-1}	5.2	5.6
Cl^{-}	meq. L^{-1}	11.4	8.2
SO_4^{--}	meq. L^{-1}	20.00	14.2
Available nutrients:			
Nitrogen	mg/kg soil	24.3	28.1
Phosphorus	mg/kg soil	6.2	6.7
Potassium	mg/kg soil	224	321

Faba bean seeds samples were taken at the harvest, oven dried at 60 °C, fine ground and prepared for N, P, K, analysis. Representative surface (0-30 cm) soil samples were collected from the treated plots after faba bean harvesting. The collected soil samples were air dried and prepared for chemical analysis. Chemical properties of soil as well as composts were determined according to the standard methods (Page *et al.,* 1982) and (Jackson 1973). Seed samples were digested by using a mixture of sulphuric

and percloric acids (Jackson 1967). N, P, K, was determined in the digested plant materials according to the stander methods (page et al 1982). Seed yield (ardab/fed.), straw yield (ton/fed.) were determined and representative samples of faba bean Sakha 1were taken at harvesting to determine number of pods /plant.

Table 2: The properties of compost tea and rice straw compost used in this study.

Characteristics	Units	Compost tea
Smell (odor)		Good smell
Color		Dark
pH		5.12
EC	dSm^{-1}	1.63
Total Nitrogen	ppm	4230
Ammonium Nitrogen	ppm	1420
Nitrate Nitrogen	ppm	2740
Available nitrogen	ppm	-
Total phosphorus	ppm	3620
Available phosphorous	ppm	-
Total Potassium	ppm	4900
Total Bacterial Counts	Cell ml^{-1}	88 x 10^{o}
Total actinomycetes Counts	Cell ml^{-1}	84 x 10^{4}
Total Fungus Counts	Cell ml^{-1}	44 x 10^{3}

Characteristics	Compost analysis
Bulk density g/cm^3	0.50
Moisture content %	36
EC (1:10 ds/m)	1.3
pH (1 : 10)	7.24
Organic matter %	40.66
Organic carbon %	25.22
C/N ratio	20.2
Total N %	1.25
Germination test %	98
Available nutrients (mg / kg compost):	
N	475.47
P	504.00
K	4401.54
Fe	10.04
Mn	10.2
Cu	6.90
Pb	6.36
Ni	5.34
Cd	1.60

Experimental Design and Statistical Analysis:

The treatments were arranged in a randomized complete block design with three replicates. The experimental plot size was 10.5 m^2 (1/400 fad.), it consisted of five ridges; each ridge was 3.5 m long and 0.6 m wide. The preceding crop was maize in the two seasons. All data collected were subjected to statistical analysis as described by Gomez and Gomez (1984). The mean values of treatments were compared according to Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Effect of rice straw compost and compost tea application on soil organic matter, pH and ECe of soil:

Data in Table (3) showed that soil organic matter content was significantly increased by increasing compost application in the two seasons, such increase was arranged in the following descending order ; $C_2T_2 > C_2T_1 > C_1T_2 > C_1T_1 > C_2 > C_1 > T_2 > T_1 > C_0$. This may be due to high organic matter content of rice straw compost used in this study (Table 2) which increased

the organic matter in soil. It could be noticed that organic matter of rice straw compost was higher than it in the compost tea, but both of them increased the soil organic matter content in the soil treated by rice straw compost compared with the other treatments.

Data in Table (3) shows a slight decrease in soil pH values after faba bean harvesting in the two seasons. This may be due to organic matter degradation and the soil buffering capacity. These results are in agreement with Khater *et al*., (2004).

Concerning ECe values, the obtained results showed that after faba bean harvesting in the two seasons were decreased in the soil treated by rice straw compost and compost tea as compared with the control. This decrease in ECe values may be due to increasing the aggregate stability of the soil as a result of the addition of interaction between rice straw compost and compost tea which tends modify pore size distribution, bulk density, water percolation and decrease of soluble salts. These results are in agreement with El-Ghamry *et al*. (2004).

Effect of rice straw compost and compost tea application on soil biological properties

**** Number and dry weight of nodules:**

Number and dry weight of faba bean nodules after70 days from sowing as affected by compost and compost tea applications in two successive seasons of (2010-2011) (2011-2012) and presented in Table (4). Obtained results revealed that control plants were poorly nodules as they had 22.6 and 24.4 nodules/ plant with dry weight 0.24 and 0.28 g/ plant in both seasons respectively. The results are in harmony with those obtained by Mekhemer *et al* (2007) and

Table 3: Effect of composted rice straw and compost tea applications on some chemical properties of the studied soil after harvesting of faba bean.

Treatment	2010/2011			2011/2012		
	OM%	EC dS m^{-1}	pH	OM%	EC dS m^{-1}	pH
Control	1.77	3.81	8.72	1.82	2.84	8.70
T_1	1.85	3.75	8.71	1.86	2.81	8.70
T_2	1.85	3.71	8.66	1.8	2.83	8.70
C_1	2.96	3.74	8.59	3.05	2.77	8.55
C_2	3.19	3.67	8. 50	3.45	2.71	8. 45
C_1T_1	3.11	3.71	8.58	3.08	2.76	8.52
C_1T_2	3.10	3.71	8.55	3.23	2.75	8.50
C_2T_1	3.30	3.66	8. 49	3.56	2.71	8. 44
C_2T_2	3.25	3.65	8. 50	3.55	2.70	8. 44

Whereas, Control (without compost and/or compost tea) (C_0), Compost tea spraying at 50 days after sowing (20 L/f) (T_1), Compost tea spraying at 70 days after sowing (20 L/f) (T_2), Rice straw compost 2 ton /fed (C_1) and Rice straw compost 4 ton /fed (C_2) , respectively.

Badawi, *et al*. (2011). Composted rice straw and foliar compost tea applications and interactions recorded high nodule numbers and nodules dry wt. compared to control plants (reached to 124 and 131 nodules /plant with

dry weight 1.23 and 1.24 g/plant in both seasons). Similar trends were also obtained by El-Sawy *et al,* (2006).

**** Total bacterial counts and enzymes activity:**

Data in Table 4 indicated that the soil biological activity for remained 70 days of faba bean seeds sowing in terms of total bacterial counts, dehydrogenase (DHA) and nitrogenase (N_2 – ase) activities in response to both compost and foliar compost tea application treatments compared to control. Due to bacterial counts, the highest values were 210.7 $x10^6$ and 215.6 x 10^6 CFU g-1 soil by C_2T_1 and C_2T_2 treatments in the two seasons 2010/2011 and 2011/201, respectively. However, inoculation with compost and foliar compost tea applications generally enhanced the bacterial counts, dehydrogenase (DHA) and nitrogenase (N2 – ase) activities were over those recorded by the control treatment.

Table 4: Effect of composted rice straw and compost tea applications on nodulations, bacterial total counts, dehydrogenase activity and nitrogenase actevity after 70 dayes of faba bean sowing.

Treatments	Nodules no/plant		Nodules dry wt. (g)/p		T. B. counts CFU x 10^6		Dehydrogenase (DHA) Ug TPF/g soil		N_2-ase ug C_2H_4/g dry wt.hr	
	2010/2011	2011/2012	2010/2011	2011/2012	2010/2011	2011/2012	2010/2011	2011/2012	2010/2011	2011/2012
Control	22.6	24.4	0.24	0.28	6.4	9.4	17.81	20.31	21.23	20.61
T_1	28.1	28.8	0.34	0.35	11.2	20.6	23.67	26.22	28.11	30.61
T_2	26.7	27.2	0.31	0.31	10.8	17.8	27.81	36.71	30.6	32.41
C_1	72.6	71.6	0.89	0.86	83.4	112.3	78.63	81.60	78.30	82.11
C2	104.3	106	1.11	1.08	98.8	140.6	140.21	139.81	110.4	116.3
C_1T_1	118.6	108.2	1.22	1.28	104.6	120.3	80.71	93.66	107.7	99.6
C_1T_2	114.6	117	1.20	1.23	123.5	126.4	89.61	98.71	115.20	107.3
C_2T_1	119.2	122.5	1.23	1.20	180.6	210.2	136.62	146.7	110.7	111.6
C_2T_2	124.3	131	1.15	1.17	210.7	215.6	143.51	150.21	110.10	102.7
LSD	17.8	16.7	0.09	0.66	1.47	1.18	12.3	11.8	6.4	5.9

Whereas, Control (without compost and/or compost tea) (C_0), Compost tea spraying at 50 days after sowing (20 L/f) (T_1), Compost tea spraying at 70 days after sowing (20 L/f) (T_2), Rice straw compost 2 ton /fed (C_1) and Rice straw compost 4 ton /fed (C_2) , respectively.

Effect of rice straw compost and compost tea application on the yield of faba bean plants:

Statistical analysis of data in Table (5) reveal that the seed yield of faba bean was significantly increased with increasing compost application in the two seasons. The respective increase of seed yield of faba bean due to 2 ton compost/fed was 5.9% in 2010/2011season and 13.0% in 2011/2012 season, whereas the significantly increased due to 4 ton compost/fed was 16.4 % in 2010/2011season and 9.4% in 2011/2012 season compared with the control, respectively. Similar results were obtained by Doaa Mohamed (2012). The increase in the seed yield was corresponded with increasing in soil organic matter (Table 3). The relative increase in the seed yield with respect to control may be due to the beneficial effects of increasing organic

matter in soil due to successive application of soil amendments. Organic matter decomposition leading to production of both organic of compounds and biochemical activities which together acted to stimulate plant growth and crop yields. As well as organic matter and available elements originated from compost (Table 2). The presence of plant growth influencing substances, such as plant growth hormones and humic acids in compost and/or compost tea have also been found as a possible factor contributing to increased plant growth and yields, Arancon *et al*. (2003a); Arancon *et al.* (2003b). In addition, with the application of compost, the yield was increased. Increases were attributed the improving action of compost on the soil physical properties as well as nutrients status in the soil, which enhance plant growth, Elsanat, (2003). The respective increase of faba bean seed yield due to 2 tons compost/fed plus compost tea at 50 and 70 DAS (C_1T_1 &$C_1T_{2)}$ was 36.4% and 21.5% in 2010/2011season and 25.2% and 24.5% in 2011/2012 season compared to the same treatments without compost tea (C_1&C_2), respectively. The same trend was to C_2T_1 and C_2T_2 treatments compared to (C_1&C_2) treatments in both seasons. This increase in faba bean seed yield by compost tea application may be due to it contains a set of beneficial aerobic organisms that perform a variety of beneficial functions (direct nutrition) and it contains soluble nutrients that feed the plant, making it healthier and able to make more food to feed the "good guys" that suppress disease-causing organisms. In addition to suppressing disease, the organisms in tea confer other crucial benefits on plants. Similar results were obtained by Ingham Elaine (2003).

Table 5: Effect of compost and compost tea applications on yield and yield component of faba bean crop in 2010/2011 and 2011/2012 seasons.

Treatment	2010/2011			2011/2012		
	Seed yield (ardab/fed)	Straw yield (ton /fed)	No. of pods/plant	Seed yield (ardab/fed)	Straw yield (ton /fed)	No. of pods/plant
Control	10.24 h	2.52 f	15.37 f	10.35 f	2.54 e	15.50 f
T_1	11.59 f	3.73 d	15.88 e	14.65 c	3.60 d	16.15 e
T_2	11.48 f	3.78 d	15.97 e	11.78 d	3.81 c	16.37 d
C_1	10.84 g	3.68 d	16.43 d	11.70 d	3.53 d	16.38 d
C_2	11.92 e	3.48 e	16.58 c	11.32 e	3.64 d	16.10 e
C_1T_1	14.79 b	4.24 b	16.69 c	14.65 c	4.18 ab	16.73 bc
C_1T_2	13.17 d	4.02 c	16.92 b	14.57 c	4.07 b	16.85 a
C_2T_1	15.47 a	4.39 a	17.13 a	15.85 a	4.34 a	16.81ab
C_2T_2	13.60 c	4.00 c	17.03 ab	15.03 b	4.15 b	16.72 c
F-test	**	**	**	**	**	**

**** indicate P<0.01. Means in the same column for each factor designed by the same letter are not significantly different at 5% level according to Duncan's multiple range test. Whereas, control (without compost and/or compost tea) (C_0), compost tea spraying at 50 days after sowing (20 L/f) (T_1), compost tea spraying at 70 days after sowing (20 L/f) (T_2), rice straw compost 2 ton /fed (C_1)and rice straw compost 4 ton /fed (C_2) , respectively.**

Effect of rice straw compost and compost tea application on faba bean seeds content of NPK:

Data presented in Table (6) shows the effect of rice straw compost, compost tea and their interaction in the two seasons (2010/2011 and 2011/2012) on nitrogen content of faba bean seeds (Sakha1*cv*.). Regarding to rice straw compost and compost tea either alone or with others achieve significant increased in all treatments from C_1 to C_2T_2 compared to control treatment (C_0). The highest values were achieved with C_2T_1<C_1T_1< C_1T_2 treatments for all macronutrients seed content (N, P and K) in the two seasons compared to the other treatments. According to nitrogen seed content, the highest treatment value was C_1T_1 (5.01%) and (4.87%) in 2010/2011 and 2011/2012 seasons respectively. Both phosphorus and potassium seeds content had the same results (Table 5). Generally, NPK seeds content in the two seasons were increased with increasing rice straw compost and compost tea application levels as a result of increasing amounts of available nitrogen in the root zone.

Table 6: Faba been seeds content of NPK (percentages) as affected by rice straw compost, compost tea and their interaction application in 2010/2011 and 2011/2012 seasons.

Treatment	2010/2011			2011/2012		
	N%	P%	K%	N%	P%	K%
Control	3.37 e	0.41 h	2.71 h	3.41 d	0.43 g	2.72 d
T_1	3.70 d	0.42 g	2.73 g	3.50 d	0.42 h	2.73 cd
T_2	3.70 d	0.43 f	2.75 e	3.67 c	0.44 f	2.73 cd
C_1	4.51 c	0.44 e	2.74 f	4.44 b	0.46 e	2.75 cd
C_2	4.95 a	0.46 d	2.83 d	4.83 a	0.47 d	2.79 bc
C_1T_1	5.01 a	0.50 a	2.90 a	4.87 a	0.49 b	2.83 ab
C_1T_2	4.97 a	0.49 c	2.88 c	4.83 a	0.50 a	2.87 a
C_2T_1	4.73 b	0.49 c	2.89b	4.75 a	0.46 e	2.77 cd
C_2T_2	4.80 b	0.49 b	2.89 b	4.77 a	0.48 c	2.79 bc
F-test	**	**	**	**	**	**

**** indicate P<0.01. Means in the same column for each factor designed by the same letter are not significantly different at 5% level according to Duncan's multiple range test. Whereas, control (without compost and/or compost tea) (C_0), compost tea spraying at 50 days after sowing (20 L/f) (T_1), compost tea spraying at 70 days after sowing (20 L/f) (T_2), rice straw compost 2 ton /fed (C_1)and rice straw compost 4 ton /fed (C_2) , respectively.**

Data indicated that NPK seed content was increased by rice straw compost and compost tea application due to high yield with rice straw compost and compost tea levels (Table 6). Similar results were obtained by El-Sharawy *et al*., (2003) who found that the concentration of N, P, K, Fe, Mn, Zn and Cu either in leaves or in grains of faba bean was significantly increased due to the application of cotton stalks and rice straw composts. This increase in nutrients availability resulted in higher dry matter and grain yields of faba bean than untreated plants.

Effect of rice straw compost and compost tea application on soil available N, P and K (ppm) in soil after Faba bean crop harvesting.

Data presented in Table (7) shows the effect of rice straw compost, compost tea and their interaction in the two seasons (2010/2011 and 2011/2012) on soil available of nitrogen, phosphorus and potassium. Regarding to rice straw compost and/or compost tea was achieved significant increase in all treatments from C_1 to C_2T_2 compared to control treatment (C_0). The highest value was achieved with C_2T_2 treatment for all soil macronutrients available (N, P and K) in the two seasons compared to the other treatments.

Table 7: Values of soil available N, P and K (ppm) in soil after Faba bean crop harvesting as influenced by compost and compost applications in 2010/2011 and 2011/2012 seasons.

Treatment	2010/2011			2011/2012		
	N	P	K	N	P	K
Control	25.8	6.9	224	27.6	7.2	242
T_1	26.8	8.1	236	28.3	8.3	254
T_2	28.9	8.2	229	28.9	8.1	261
C_1	41.6	12.3	346	39.8	12.6	371
C_2	61.3	16.9	487	65.2	17.4	496
C_1T_1	42.7	12.8	351	44.1	13.1	363
C_1T_2	41.8	12.4	349	43.9	12.8	368
C_2T_1	65.2	15.7	476	66.8	17.0	489
C_2T_2	68.1	17.1	502	69.4	17.3	492

Whereas, Control (without compost and/or compost tea) (C_0), Compost tea spraying at 50 days after sowing (20 L/f) (T_1), Compost tea spraying at 70 days after sowing (20 L/f) (T_2), Rice straw compost 2 ton /fed (C_1)and Rice straw compost 4 ton /fed (C_2) , respectively.

Organic fertilizers establishment significantly increased for all plant parameters measurement because it stimulate beneficial soil microorganisms and improve the structure of the soil. Compost and compost tea microorganisms plays an important role in converting organic fertilizers into soluble nutrients that are available to plants, for this reason, organic fertilizer are best applied. In most cases organic fertilizer and compost will provide all the macronutrients and micronutrients that plants need. In fact applying to much synthetic fertilizers can damage plants. Synthetic fertilizers may give plants a quick boost but does little to improve soil texture, stimulate soil life, or improve soil's long term fertility. Because the synthetic fertilizers are highly water soluble they can also cause problems when the nutrient leaches out into streams and ponds (Frank, et al., 2002).

CONCLUSION

From the results of the present study, it can be concluded that seed yield of faba bean crop was significantly increased with increasing amount of compost fertilizer rates. Soil characteristics and nutrients availability were also increased with compost and compost tea applications. Moreover, different spraying treatments increased the faba bean seed content of

nitrogen, phosphorus and potassium. Compost tea combined with low rate of compost application was the best management system for increasing faba bean yield and soil fertility improvement.

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تأثير إضافة الكومبوست وشاى الكومبوست على إنتاجية محصول الفول البلدى وبعض خواص التربة البيولوجية والكيميائية

عيد سليمان على الجيزاوى* ، عادل أحمد إبراهيم عطوه* ، ناصر إبراهيم طلحة* و رفعت عبد السلام إسماعيل أبومصطفى**

***معهد بحوث الأراضى والمياه والبيئة – مركز البحوث الزراعية – جيزة – مصر**

****معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية – جيزة – مصر**

أجرى هذا البحث خلال الموسمين ٢٠١٠/٢٠١١و٢٠١١/٢٠١٢ بالمزرعة البحثية لمحطة البحوث الزراعية بسخا – محافظة كفرالشيخ وذلك لدراسة تأثير إضافة المواد العضوية (كومبوست قش الأرز) منفردة أو مع شاي الكمبوست على خواص الأرض الحيوية والكيمائية وإنتاجية محصول الفول صنف سخا1 ومحتوى بذور الفول من العناصر الغذائية الكبرى، وقد أكدت النتائج التأثير الإيجابى للمواد العضوية المستخدمة فى الدراسة كما يلى :

١- أدت إضافة المادة العضوية بالمعدل ٢ طن للفدان أو ٤ طن للفدان إلى زيادة محتوى الأرض من المادة العضوية وحدوث إنخفاض ملحوظ فى قيم ملوحة مستخلص عجينة الأرض المشبعة (الـ ECe) بينما كان هناك إنخفاض ضئيلا فى قيم الـ pH للتربة.

٢- كان لإضافة الكومبوست ورش شاى الكومبوست بعد ٧٠ يوم من زراعة الفول البلدى صنف سخا ١ تأثيرات إيجابية على عدد العقد البكتيرية ووزنها الجاف لكل نبان وكذلك زيادة نشاط إنزيمى الديهدروجنيز فى منطقة الرايزوسفير و النيتروجينيز فى العقد البكتيرية

٣- إضافة الكومبوست بمعدل ٤ طن للفدان و الرش بشاى الكومبوست بعد ٥٠ يوم من الزراعة حققت أعلى نتائج فى محصول الحبوب حيث كانت ١٥.٢٨نسبة الزيادة ٥١% و ٥٣% عن الكنترول فى موسمى الزراعة ٢٠١٠/٢٠١١ و ٢٠١١/٢٠١٢ على الترتيب.

٤- إضافة الكومبوست وشاى الكومبوست كنظام تسميد عضوى متكامل أعطى نتائج عالية المعنوية فى محتوى بذور نبات الفول للعناصر الغذائية الكبرى (النيتروجين – الفوسفور و البوتاسيوم).

٥- إضافة المواد العضوية للتربة فى صورة كومبوست قش الأرز بمعدلات ٢ و ٤ طن للفدان حقق زيادة كبيرة فى يسر النيتروجين والفوسفور والبوتاسيوم فى التربة .

قام بتحكيم البحث

أ.د / احمد عبد القادر طه	**كلية الزراعة – جامعة المنصورة**
أ.د / رمضان اسماعيل كنانى	**مركز البحوث الزراعيه**