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Maximum Utilization of Organic Wastes as Soil Amendments and its Effect on Physical and Chemical Properties of Sandy Soil

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ABSTRACT

This study was conducted at Ismailia Agric. Res. Station, ARC during two consecutive seasons. Wheat (*Triticum aestivum* L., CV. Giza 168) and peanut (*Arachis hypogaea* L., CV. Giza 6) were grown in the winter and summer seasons 2015,2016 in a sandy soil under sprinkler irrigation system. The purpose of this study is to evaluate the effect of processed organic fertilizer with some methods and additions to raise its efficiency which reflected on physical and chemical properties of sandy soil and crop productivity. Three forms of organic wastes (farmyard manure, compost and green waste biochar) were used.Obtained results revealed that, decreases in pH values in soil of processed farm yard manure, compost and biochar from waste plant compared to control (no added amendments).On the other hand, EC and organic matter along with nutrients availability (N,P and K) increased with applied soil amendments especially in FYM4 and biochar P2 treatments. Moreover, results indicated that value of bulk density (BD) decreased, but both total porosity (TP) and available water (AW) increased by application of soil amendments treated compared to control treatment at both studied seasons. Finally, FYM4 and biochar P2 treatments had recorded the highest values of macronutrients total content along with yield components of wheat and peanut crops as compared to other treatments.From the present study, it could be obtained maximum beneficial from farmyard manure, compost and green waste biochar treated by some ways and addition of materials which lead to the best integrated product. This actually, may be helpful to improve soil chemical and physical properties and reflected that on soil fertility along with plant productivity.
Keywords: FYM; compost; biochar; soil properties; wheat crop; peanut crop.

INTRODUCTION

Since ancient times, organic fertilizer has been used in agriculture because of its many benefits in agriculture. But there are some caveats from the use of some organic fertilizers, especially the Farm yard manure, including the presence of grass seeds and pathogenic bacteria along with the smell of harmful plant. In addition, provide the time required for fermentation and decomposition of the FYM so that it is not possible to add before analysis for what is known reasons. In this research we resort to several methods and different treatments to increase the efficiency of organic fertilizer to collect the greatest benefit, which is reflected on the fertility of the soil and thus improve the crop productivity.

The organic matter content of composted soil amendments is high, Composts provide a stabilized form of organic matter that improves the physical properties of soils by increasing nutrient and water holding capacity, total pore space, aggregate stability, erosion resistance, temperature insulation, and decreasing apparent soil density (Shiralipour *et al*., 1992). Also, addition of organic amendments, such as yard waste compost, straw, manure, tree leaf mulch, wood products, chipped wood from twigs, have been found to increase soil organic matter. The addition of organic waste, specifically to agricultural soils, is a practice that has been carried out for centuries, due to its fertilizer properties and contribution to the physicochemical and biological properties of the soil (Cooperband, 2002) which is a common agricultural practice in diverse countries (Said *et al*., 2004)

Furthermore, Martínez *et al*. (2018) added that, use of compost as organic amendment improved the biological soil quality, favored the increased of humic and fulvic acids content and had a positive effect on root promotion in comparison with humic extract treatments and control.

Biochar is defined as charred organic wastes created by pyrolysis under limited or oxygen-free conditions (Verheijen *et al*., 2010). Carbon sequestration for mitigating climatic change and agricultural utilization of wastes as soil conditioner and plant growth promoter which reflected on soil fertility alterations (Atkinson *et al*., 2010). Biochar incorporation into soil can have many benefits, such as C sequestration (Woolf *et al*., 2010). In addition, Chan *et al*. (2007) found that biochar improvements in crop water and nutrient use efficiency also, can increase soil pH. As well as it's increased the nutrient retention and bioavailability to plants (Mc Cormack *et al*., 2013); as could be expected, impacts of biochar differ in acidic and alkaline soils (Farrell *et al*., 2014). There are many reports that biochar is a potential liming material (Glaser *et al*., 2002; Yuan and Xu, 2011). In contrast, however, there are only a few reports of decreased or unaffected pH in calcareous soils with biochar application (Van Zwieten *et al*., 2010; Liu and Zhang, 2012).

Moreover, applied biochar can be modify electrical conductivity (EC) and cation exchange capacity (CEC) and add nutrients such as N, P and S (Atkinson *et al*., 2010; Sohi *et al*., 2010). Farrell *et al*. (2014) reported that significant effects of biochar application on P availability in a calcareous soil. Increased colonization of wheat roots by mycorrhiza (Solaiman *et al*., 2010). Indicate that, biochar application improves nutrient and water use efficiency. Moreover, the production of biochar from the crop residues may enhance soil fertility on the other hand may act as an eco-sustainable management approach for recycling the organic materials and reduce CO2 emissions (Akhtar *et al*., 2014). Biochars are rich in organic carbon concentration (30 to 70%), and characterized with high mineral contents, high values of pH and EC, and a low concentration of ash (Batool *et al*., 2015, Qayyum *et al*., 2015). Applications of biochar have recently received a significant attention due to the improving the soil physicochemical properties and enhancing the soil fertility including cation exchange capacity, soil pH, water holding capacity, water and fertilizer use efficiency, soil microbial interactions, and immobilization of both organic and inorganic pollutants under normal and a biotic-stress conditions (Abel *et al*., 2013). Recently, Riad *et al*. (2018) suggested that, application of biochar along with superabsorbent polymer might be a novel strategy to improve the soil characteristics in the water-stressed regions and enhance the growth and productivity of crops.

A goal of this study was raising the efficiency of organic fertilizer or organic manure and waste plant green by treated with burn or addition of N, P and K from untraditional sources such as urea formaldehyde, feldspar and rock phosphate. Along with some procedure on FYM and waste plant to the best integrated product. This reflected on soil physical and chemical properties.

MATERIALS AND METHODS

This study was conducted at Ismailia Agric. Res. Station, ARC during two consecutive seasons. Wheat (*Triticum aestivum* L., CV. Giza 168) and peanut (*Arachis hypogaea* L., CV. Giza 6) were grown in the winter and summer seasons 2015,2016 in a sandy soil under sprinkler irrigation system. To test the effect of organic fertilizer treated with some methods to raise its efficiency on soil fertility which reflected on crop productivity. The institute farm is located at 30° 35´41.9" N Latitude and 32° 16´ 45.8" E longitude. Some physical and chemical properties of study soil are shown in Table (1). The experiment was designed in a randomized complete block design with three replications. Some analyses of organic fertilizer are presented in Table (2).

Table 1. some physical and chemical properties of the studied soil

parameters	Value
Particle size distribution %	
Coarse Sand	50.4
Fine Sand	40.4
Silt	3.20
Clay	6.00
Texture class	Sandy
Chemical properties	
$CaCO_3$ %	1.40
pH suspension (1: 2.5)	7.92
EC dS/m^{-1} saturated past extract	0.37
Organic matter %	0.40
Soluble cations and anions (meq L^{-1})	
Ca^{++}	0.95
Mg^{++}	0.89
Na^{+}	1.51
K^{+}	0.45
CO_3^{--}	-
HCO_3-	1.42
Cl-	1.02
SO_4^{--}	1.36
Available nutrients (mg kg^{-1})	
N	66.0
P	12.0
K	45.6

Table 2. Basic chemical properties of organic fertilizer which used in this study

Determination	Compost	FYM	FYM burn	Biochar P
pH(1:2.5)	7.51	8.90	9.31	7.82
EC dSm^{-1}	5.20	8.24	5.13	1.82
Organic carbon %	13.5	14.3	7.90	22.1
Organic matter %	23.2	24.6	13.6	38.01
Total Nitrogen %	1.75	1.47	1.05	0.65
Total phosphorus %	0.21	0.13	0.11	0.15
Total potassium %	1.53	0.99	0.76	1.42
C/N Ratio	1: 8	1:10	1: 7	1:34
Available nutrients mg kg^{-1}				
N	5180	6020	3640	2510
P	600	530	760	340
K	6900	8600	6500	7560

Treatments include:

1- Control treatment include recommended dose of nitrogen, phosphorus and potassium. Ammonium nitrate 33% N, was added at 360 kg fed^{-1} and 40 kg fed^{-1} for wheat and peanut crops. Phosphorus and potassium were added before cultivation as superphosphate 15 % P_2O_5 at a rate of 200 kg fed^{-1}; and potassium sulfate 48 % K_2O at 50 Kg fed^{-1} respectively. Nitrogen was applied at 30 and 60 days from sowing.

2- Farm Yard Manure (FYM1) was added at rate of 6 ton fed^{-1} + recommended dose from nitrogen, phosphorus and potassium.

3- Farm Yard Manure (FYM2) was added at rate of 6 ton fed^{-1} + feldspar at rate of 800 kg fed^{-1} + rock phosphate at 200 kg fed^{-1} + urea formaldehyde at rate of 250 kg fed^{-1} were mixed will and then applied to soil before cultivation.

4- Farm Yard Manure was partially burn at 100 °C approximately (FYMb). Then added rate of 6 ton fed^{-1} + feldspar at 800 kg fed^{-1} + rock phosphate at 200 kg fed^{-1} + urea formaldehyde at 250 kg fed^{-1} .All of them were mixed will and then applied to soil this is dry method (FYM3)

5- Added rate of 6 ton fed^{-1} from (FYMb) treated with KOH 0.5 N was added in dilution1:100 water in order to prevent physicochemical instability and avoid the damage of plant (Ortega and Fernandez, 2007) + urea formaldehyde at 250 kg fed^{-1} + phosphoric acid concentration to determination the alkalinity until pH arrive to 7 approximately, as (extracted and residual) this is wet method (FYM4)

6- Compost was added at 5 ton fed^{-1} + nitrogen; phosphorus and potassium were added as 360 kg fed-1 and 40 kg fed^{-1} from ammonium nitrate (33%N) for wheat and peanut crops respectively. Phosphorus was added as superphosphate 15 % P_2O_5 at 200 kg fed^{-1}; potassium was applied from potassium sulfate (48 % K_{2O}) at 50 Kg fed^{-1} as a recommended dose (Compost 1).

7- Compost was added at 5 ton fed^{-1} +feldspar at 800 kg fed^{-1}+ rock phosphate at 200 kg fed^{-1} + urea formaldehyde at 250 kg fed^{-1} were mixed will and then apply to soil (Compost 2)

8- Green waste plant was burned in a barrel of iron at a temperature of 300 °C until it reached the degree of thermal decomposition (biochar P). then treated with the same treatment in step (4) (Biochar P1)

9- Added at 6 ton fed^{-1} from (biochar P) treated with the same treatment in step (5) (Biochar P2)

Soil samples were analyses to evaluate chemical characteristic after harvest according to Cottenie *et al.* (1982). Samples of both crops along with soil physical characteristic were determination according to Page *et al.* (1982). Results were subjected to statistical analysis according to Snedecor and Cochran (1980) and the treatments were compared by using L.S.D. at 0.05 level of probability.

RESULTS AND DISCUSSION

Effect of organic amendments on soil chemical properties

Effect of application organic amendments on soil reaction (pH), electrical conductivity (EC) and availability of N, P and K are shown in table 3.

Soil pH.

Concerning pH values, processed farmyard manure, compost and biochar caused, generally, decreases soil pH values compared to control (no added amendments).This may be attributed to acidic functional groups released during the oxidation process of organic manure and biochar can be responsible for the pH decrease in soil (Liu and Zhang, 2012). Addition to, organic waste to soil contributes to the enhancement of active humified components, such as humic acid (HA) and fulvic acid (FA) which caused a decrease pH in soil (Plaza *et al*., 2003) .This study confirmed that, the processed biochar and organic fertilizer with treatments including phosphoric acid can be reduce pH values. This agree with resultant by Van Zwieten *et al*. (2010) who found in sand soils, pH was lower with biochar application compared with control treatment. The variation of pH values from acidic or alkaline when apply biochar in soil due to the variation of temperature used in pyrolysis. This explained by Vithanage *et al*. (2014b) who found that, the lowest pH value (6.71) was recorded for (biochar 300), which is produced at 300 C. However, the pH sharply increased and reached to 9.27 for (biochar 500).The increase in pH with increasing pyrolysis temperature is mainly due to concentration of alkali salts and the loss of acidic functional groups at high pyrolysis temperatures. It is speculated that biochars-induced pH will greatly influence the mobility of metals (Ahmad, 2016a).

Electrical conductivity (EC)

Regarding electric conductivity (EC), data in Table 3 revealed that, modify and change in EC values in soil as resultant of effect soil amendment compared to control treatment. The great effect was observed with FMY4 and biochar2 in two seasons. This agrees with resultant by Atkinson *et al*. (2010) who found that application of biochar can be increased the EC. This may be due to accretion of ashes containing soluble salts (Usman *et al*. 2016). Concerning the increase in EC values by effect of organic fertilizer may be due to the salt in FYM or compost this confirmed in two seasons.

Nutrients availability (N, P and K)

With respect to, the effect of treatments (soil amendments) on nitrogen, phosphors and potassium availability in soil, result showed that positive responses under impact of these treatments compared to control treatment (no amendments). The superior treatment observed in FYM4 especially with nitrogen and potassium compared to other treatments of FYM and biochar, but phosphorus seems to be not significant effect among treatments and control especially in first season. Maerere *et al*. (2001) found that, applying different manures increased availability of soil nitrogen and phosphors. Also, Biederman and Harpole (2013) reported that, application biochar to soil led to the increase soil phosphorus (P), soil potassium (K), total soil nitrogen (N). Although, biochar from agricultural livestock waste such as cow manure and poultry litter has the added benefit of providing higher levels of essential nutrients N, P, and K (Shackley *et al*. 2013). In our study, treated of organic fertilizer with the previously mentioned led to great benefits which reflected on soil nutrients available. As expected, the low pH by treated organic fertilizer attributed the availability of nutrients elements. As well as, the manure acts as a nutrient source, increases in nutrients availability would be expected (Lentz and Ippolito, 2012). In addition to the release humic and fulvic acid from soil amendments which treated with KOH and phosphoric acid can be improve the status of nutrients elements in soil by chelating of them with carboxylic and phenol groups (Suntari *et al*., 2013).

Table 3. Effect of different soil amendments on some chemical soil parameters

Treatments	Wheat crop					Peanut crop				
	pH	EC	Macronutrients availability (mg kg^{-1})			pH	EC	Macronutrients availability (mg kg^{-1})		
		dSm^{-1}	N	P	K		dSm^{-1}	N	P	K
Control NPK	7.44	0.62	182	23	61	7.52	0.73	152	20	47
FYM1	7.17	0.87	266	26	64	7.20	1.14	190	33	59
FYM2	7.39	0.74	260	25	67	7.32	1.08	238	23	55
FYM3	7.41	0.87	263	25	72	7.30	0.83	252	38	53
FYM4	7.42	1.13	274	25	108	7.36	1.36	280	41	74
Compost 1	7.49	1.05	246	25	90	7.24	0.99	280	37	59
Compost 2	7.27	0.62	270	24	98	6.96	1.04	270	24	60
Biochar P1	7.42	0.97	252	26	86	7.41	0.87	231	27	53
Biochar P2	7.44	1.25	263	25	65	7.44	1.31	242	34	57
LSD 0.05	0.110	0.038	7.694	4.711	2.991	0.098	0.088	4.512	5.662	3.717

Organic matter (OM)

Finally, the effect of soil amendments on organic matter was shown in Fig. 1. As expected, there are positive responses in OM under influences the all treatments compared with control treatment. Again the superior treatments were observed in FYM4 and biochar2 in two seasons. Batool *et al*. (2015) found that, biochar are rich in organic carbon concentration (30 to 70%), and characterized with high mineral contents. Also, the essential of use organic fertilizer in sandy soil for obtained the organic matter which is important for improving soil physical and chemical prosperities. On the other word, addition of biochar to soil can be increase the organic matter may be due to biochar additions have been found to have a priming effect and accelerate decomposition of soil organic matter (Cross and Sohi, 2011).

Effect of organic amendments on physical soil properties

Bulk density, total porosity and available water

Bulk density (BD), total porosity (TP) and available water (AW) are considered as a good indicator for the improvement of the main soil physical properties. Data in Table 5 and Fig.2 show the modified of some soil physical properties under impact of soil amendments, farmyard manures (FYM1,FYM2,FYM3 and FYM4),compost (compost1and compost2) and green waste biochar (P1and P2) amendments at the two studied seasons. Results indicated that application of farmyard manures, compost and green waste biochar amendments to the soil had general positive effects on (BD), (TP) and (AW) values possibly due to organic matter which acts a cementing factor, necessary for forming stable aggregates. (Tejada *et al*., 2009).

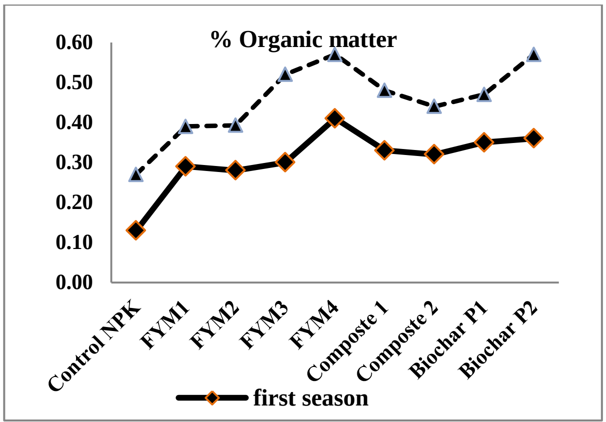

Fig. 1. Effect of different soil amendments on organic matter

Concerning the effect of farmyard manures (FYM1, FYM2, FYM3, and FYM4), results indicated significantly decreased (BD) values but increased both (TP) and (AW) values as compared to control at both studied seasons. These results are similar to those of (Seddik, 2011) who found that-application of farmyard manures to soil improved their physical and chemical properties. Also data demonstrated that FYM4 treatment was recorded the best values of total porosity (TP), available water (AW) and bulk density (BD) followed by FYM3 treatments. This may be due to high content of organic carbon, humic and fulvic acids for FYM4 which treated with KOH and phosphoric acid. However, the least values were recorded in case of FYM1treatment. Treatments of farmyard manures arranged as follows: FYM4>FYM3>FYM2 > FYM1) for (BD), (TP) and (AW) values.

Regarding the applied compost forms, results revealed that significantly decreased (BD) but increased both (TP) and (AW) values, compost 2 being superior as compared to compost 1 and control treatment. Probably, due to compost 2 contains natural minerals that improve soil physical properties. This agreement with resultent by Seddik, (2011) who reported that addition of natural minerals significantly increased both (TP) and (AW) values of the studied soil as compared with control. Also, Tejada *et al.* (2009) who reported that compost had positive effect of soil physical (structural stability increased 10.5% and bulk density decreased 13.5% in respect to the control. As for the effect of green waste biochar (P1and P2) significantly decreased (BD) values but increased both (TP) and (AW) values, biochar p2 being superior as compared toeither biochar p1 or control treatment at both studied seasons. Because porosity of biochar is very high and when it used in soil it significantly decrease bulk density by increasing the pore volume (Mukherjee and Lai, 2013). Soil bulk density decrease but increasewater holding capacity of soil by application of biochar at 1-2 %(W/W). The possible mechanisms behind these improvements in soil physical properties by biochar application are high porosity, adsorptive nature of biochar, provision of habitat to microorganisms and increase in total soil organic carbon contents(Aslam *et al*., 2014).. Also, Page-Dumroese (2018) found that application of biochar to soil improved nutrient availability and soil moisture content. There are other reason for the explain the improve of available water because found hydrophilic functional groups present on the surface of the graphene sheet of the biochar and also on the pores.(Uzoma *et al*., (2011)

Table 4. Effect of different soil amendments on some physical soil properties

Treatments	First season		Second season	
	Total porosity%	Available water %	Total porosity%	Available water %
Control NPK	39.2	5.12	40	5.16
FYM1	40.3	6.00	41	6.15
FYM2	41.5	6.31	42	6.5
FYM3	43.0	7.30	44	7.53
FYM4	46.4	8.40	47.8	8.6
Compost 1	40.0	5.76	40.8	5.9
Compost 2	42.0	6.61	43.2	6.8
Biochar P1	41.0	6.04	42.6	6.22
BiocharP2	44.6	7.60	46	7.74
L.S.D at 5%	0.21	0.12	0.24	0.15

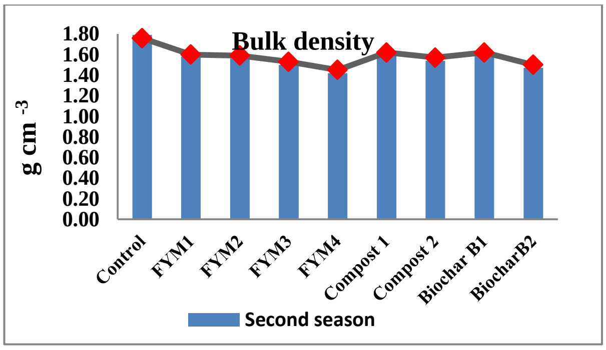

Fig. 2. Effect of different soil amendments on bulk density

Effect of organic amendments on plant behavior.

Total content, biological yield, grains, seeds and straw of crops

Data in Tables (5 and 6) revealed that increase in total contents of nitrogen, phosphorus and potassium along with yield components (biological yield, grains, seeds and straw) in both wheat and peanut crop compared to control treatment (without amendment). The best treatments observed with FYM4 and biocharP 2.

In order to explain this effect, all the added treatments, which represent the organic amendments that have been treated in the above methods, which led to maximizing of their benefit, and reflected in the physical and chemical properties of soil. Therefore, it is reflected on the growing plant and the increase of absorbed elements which appear enhanced in total content and plant growth. That means good health of the plant. This indicates for the organic manure fertilizer which treated with partial burn and the addition of fertilizer elements from non-traditional sources to the transformation into an integrated combination of high-efficiency optimizer. This agree with resultant by Inal *et al.*(2015) who found that processed poultry manure and biochar increased nitrogen, phosphorus and potassium concentrations of both maize and bean plants and enhanced growth of plants across the manure application can be attributable to increased macronutrient availability, which is a key factor in soil fertility.

Also, this amendment can be producer of nutrients and organic acids such as humic and fulvic as well as increase the content of organic matter in the soil which obtained a lot of benefits to soil and plant. As reported by many authors benefits of organic enhancers in this field. (Wang *et al*., 2012; Sahin *et al*., 2014). Also, Agegnehua *et al*. (2015) revealed that, the application of organic amendments in soil had a significantly positive effect on growth and yield of peanut this may be attributed to improved nutrient and water retention capacity of the organic amendments and associated nutrient input relative to that in fertilizer- only treated soil. This agree with resultant of Martínez *et al*. (2018) who found That application of different organic matter sources as soil amendments is improve soil quality and crop yield.

As for the use of biochar from the green plant waste, it also showed an increase in the absorption of elements, especially the treatment of biochar P2. This may be due to increase in ash ratio in this product, elements and total organic carbon. Addition to increasing CEC and increase the negative charge, (Farrell *et al*., 2014). Also, when apply it to soil can promote the growth of root hairs to reach nutrients this by increased colonization of wheat roots by mycorrhiza which has a beneficial effect on the absorption of nutrients and reflected on total content and improve growth. (Solaiman *et al*., 2010).

Finally, the effects of compost also have the same characteristics of the manure, whereas, compost was very rich in NPK contents this could explain the increase of these elements in the plants (Ahmed *et al*., 2011). But the preference is given to the improved treatment. Improving physical properties such as water availability and ventilation also improves soil quality and improves element uptake efficiency (Akhtar *et al*., 2014). All of the above was reflected in increasing the productivity of the crop for both wheat and peanuts (biological yield, grains, seeds and straw) and improved nutrient uptake.

Table 5. Effect of different soil amendments on total content (N, P and K) in straw, grain and seeds of both wheat and peanut crops

Treat.	Total content kg fed^{-1}											
	Wheat crop						Peanut crop					
	Straw			Grains			Straw			Seeds		
	N	P	K	N	P	K	N	P	K	N	P	K
Control NPK	10.0	5.09	5.76	13.6	1.39	3.00	15.7	2.21	13.6	11.9	1.14	1.60
FYM1	12.4	7.10	6.60	14.4	1.55	3.17	16.6	2.90	14.4	12.9	1.10	1.77
FYM2	13.0	8.02	8.40	16.0	2.00	4.87	19.1	3.80	16.4	14.0	1.44	1.50
FYM3	15.4	10.0	11.2	18.8	3.00	5.20	21.5	4.95	20.3	15.0	2.01	1.70
FYM4	16.5	10.5	18.7	21.4	3.43	8.12	27.1	6.25	25.8	19.3	3.83	2.12
Compost 1	10.4	9.02	14.3	18.0	3.06	5.57	29.1	6.41	21.6	18.1	2.79	1.91
Compost 2	14.0	9.06	9.74	17.0	2.35	5.00	20.5	4.20	18.0	15.7	1.79	1.63
Biochar P1	12.7	6.88	7.01	15.2	1.71	3.50	17.2	3.12	15.8	13.3	1.33	1.40
Biochar P2	15.7	10.3	15.5	18.2	3.05	6.27	24.0	5.01	23.6	16.7	2.48	1.96
LSD 0.05	4.11	3.64	4.33	3.69	1.88	1.63	3.77	2.12	2.28	2.23	1.28	0.97

Table 6. Effect of different soil amendments on biological yield, grains, seeds and straw of both wheat and peanut crops

Treat.	Wheat crop			Peanut crop		
	Ton fed^{-1}					
	Biological yield	Straw	Grains	Biological yield	Straw	Seeds
Control NPK	2.42	1.23	1.19	2.80	2.29	0.51
FYM1	2.99	2.20	0.79	2.87	2.36	0.51
FYM2	3.26	1.81	1.45	3.16	2.61	0.55
FYM3	3.34	1.85	1.49	3.57	3.04	0.53
FYM4	4.07	2.29	1.78	5.34	4.68	0.66
Compost 1	2.52	1.32	1.20	2.87	2.35	0.52
Compost 2	3.31	2.02	1.29	3.41	2.88	0.53
Biochar p1	2.89	1.77	1.12	3.43	2.91	0.52
Biochar p2	3.47	1.84	1.63	4.46	3.89	0.57
LSD 0.05	1.03	0.72	0.51	1.45	0.47	0.32

CONCLUSION

From the above mentioned, we can concluded that, the treatments carried out on the farmyard manure, green waste biochar and compost led to maximizing their utilization. This is improving the physical and chemical properties and to get a good product integrated rich in nutrients and organic matter. Such as pH values , changes in EC values, increased organic matter and available nutrients. As well as decrease the bulk density of the soil and improve the available water and total porosity, which increased the ability of the growing plant to absorb nutrients and a good environment of growth also, the use of alternative natural fertilizer from sources of mineral. The best treatments were observed in biochar produce from green plant wastes, where a higher efficiency was shown for the use of biochar produce from plant and farmyard manure. This is reflected on the increase of crop productivity, in addition to the fact that this method is inexpensive and useful for the environment to get rid of the residues that may harm them.

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الاستفادة العظمي من المخلفات العضوية كمحسنات للتربة وتأثيرها علي الخواص الطبيعية والكميائية للاراضي الرملية

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أجريت هذه الدراسة في محطة البحوث الزراعية بالاسماعيلية ، مركز البحوث الزراعية خلال موسمين متتاليين. تمت زراعة القمح (*Triticum aestivum* L. CV. Giza 168) في الموسم الشتوى (2015) وزراعة الفول السوداني(*Arachis hypogaea* L. CV. Giza 6) في الموسم الصيفى (2016) في التربة الرملية تحت نظام الري بالرش. الغرض من هذه الدراسة هو تقييم تأثير السماد العضوي المعالج ببعض الطرق والاضافات لزيادة كفاءته والتي تنعكس على الخواص الطبيعية والكميائية للارض وكذلك إنتاجية المحاصيل. أظهرت النتائج التي تم الحصول عليها انخفاض فى قيم pH وعلى الجانب الاخر وجدت زيادة فى قيم EC والمادة العضوية وتيسرالعناصر الغذائية النيتروجين والفوسفور والبوتاسيوم خصوصا مع معاملة biochar P2 , FYM4 . ايضاً أشارت النتائج الى زيادة قيم الماء الميسر والمسامية الكلية وانخفاض الكثافة الظاهرية نتيجة اضافة هذة المحسنات المعاملة بالمقارنة بمعاملة الكنترول وذلك في كل من الموسمين تحت الدراسة.اخيراً , معاملتي FYM4 ومعاملة biochar P2 سجلت اعلي قيم للمحتوي الكلي للمغذيات الكبري بالاضافة لقيم مكونات محصولي القمح والفول السوداني بالمقارنة بالكنترول والمعاملات الاخري. من هذه الدراسة ، يمكن الحصول على أقصى استفادة من مخلفات السماد العضوي ، والأسمدة العضوية ومخلفات النباتات ببعض الطرق وإضافة المواد التي تؤدي إلى أفضل منتج متكامل. هذا في الواقع ، ينعكس على الخواص الكيميائية والفيزيائية للتربة وبالتالى على خصوبة التربة التى تعطى انتاجية جيدة للنبات النامى.