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RESIDUAL EFFECT OF SOME SOIL AMENDMENTS ON SOME SOIL PROPERTIES AND PEANUT YIELD IN SANDY SOIL UNDER SOUTH- QANTARA SHARK CONDITION, NORTH SINAI.

E.A. EL-Eweddy
Soil Conservation Dept., Desert Research Center, El-Matareya. Cairo, Egypt

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ABSTRACT: *Field experiment was conducted in a sandy soil, El-Qantara Shark North Sinai, to investigate the residual effect of some mixtures soil amendments at different rates of either refuse ash and cotton gin trash (as soil amendments)which added at rate 20 ton/fed, either separately or combined to gothere, at various ratios 0:0, 1:0, 3:1, 1:1, 1:3, and 0:1 with effective microorganisms (EM) at rate 0, 20, and 40 liter/fed, some on chemical and physical properties of sandy soil as well as peanut kernel yield.*

The obtained data emphasized the role residual effect of the studied organic wastes and effective microorganisms in reducing the values of soil pH, soil salinity, bulk density, hydraulic conductivity and penetration resistance of sandy soil in all treatments of refuse ash and cotton gin trash with or without EM.

The highest decrease in pH was found with the high rate of cotton gin trash treatments, while, the highest decrease in EC, bulk density, hydraulic conductivity and penetration resistance were associated the high rate of refuse ash 20 ton/fed, with 40liter/fed, of EM. Moreover, applied mixtures from refuse ash and cotton gin trash with the application of effective microorganisms significantly decreased the values of soil pH, EC, bulk density, hydraulic conductivity and penetration resistance. In contrast, the soil organic carbon content and maximum water holding capacity significantly increased with increasing the application rate of refuse ash in the soil amendment mixtures with effective microorganism treatments.

The peanut kernel yield significantly increased with either soil amendments mixtures application or effective microorganism treatments comparing with the control treatment. On the other hand, the highest investment ratio was obtained with the combination of 20 ton/fed, refuse ash +40 liter/fed, of effective microorganisms.

Key words: *Cotton gin trash, refuse ash, sandy soil, soil salinity, bulk density, hydraulic conductivity, penetration resistance, organic carbon and peanut kernel yield.*

INTRODUCTION

Increasing waste production in Egypt has increased the problem of low to get rid of it without causing undesirable impact on the environment and human health. The disposal of organic wastes such as refuse ash and vinasse has become a serious problem facing all communities, in Egypt. The refuse ash is the most significant by-product from municipal solid waste incineration which accounts for 85-95% of the solid product. Municipal solid waste incineration reduces the in come volume of waste and its mass by about 70%. In this respect, Abou Yuossef and Abou Hashem (2005) pointed out that large amounts of refuse ash are generted reaching 21000 ton per year which is currently produced in Ismailia town; their potential value is almost ignored. However, such wastes may have favorable effects on decreasing soil bulk density, penetration resistance, and hydraulic conductivity as well as enhancing the maximum water holding capacity of the soil. On the other hand, the land application of wood ashes has been shown to increase the growth and yield of agricultural crops in both the greenhouse and field, Vance, 1996. Etiegni *et al.* (1991) found that the application of ash in amounts equivalent to 40 Mg/ha significantly increased wheat growth by 25 to 69%. Ali and El-Eweddy (2012) showed that application refuse ash or cotton gin with different rates of an effective microorganisms significantly decreased the soil pH, EC, bulk density and hydraulic conductivity. In contrast, the maximum water holding capacity as well as the available water content significantly increased with increasing the application rate of refuse ash of soil amendment mixtures under effective microorganism treatments.

Mixing fly ash with topsoil could be enhanced soil physical properties; especially those in the clayey or sandy rang. In essence, this strategy could be applied to severely eroded areas, Adriano and Weber, 2001. Also, Fly ash application to sandy soil could permanently alter soil texture, increase microporosity and improve the water- holding capacity (Ghodrati 1995); Zhao and Tangze 2009 and Prem 2010) concluded that addition of fly- ash up to 46% reduced the dry density of the soil in the order of 15-20% due to the low specific

while, the values of soil EC, bulk density, penetration resistance, and hydraulic conductivity were decreased with increasing application rates of ash refuse in combination with EM.

Bulluck and Ristaino (2002) and Bulluck *et al.* (2002) found that the soil plots receiving cotton gin trash or rye-vetch had significantly higher level of potassium than soil in plots amended with synthetic fertilizers or swine manure. Also, they found that the soil plots receiving cotton gin trash, rye-vetch or swine manure retained a greater percentage of water content. Soil bulk densities were highest in plots amended with synthetic fertilizers and lowest in plots amended with cotton gin trash. Liu et al. (2007) found that the soils amended with cotton gin trash had higher soil water content, lower bulk density, higher humic matter content, higher porosity and higher levels of mineralized N, than soils with other fertility amendments. Moreover, Abou Yuossef and El-Eweddy (2011) indicated that the values of soil EC, bulk density, penetration resistance, and hydraulic conductivity were decreased with increasing application rates of cotton gin trash, while, organic carbon content and maximum water holding capacity were increased. They added that corn grain yield was increased with increasing cotton gin trash rates up to

gravity and unit wight of soil. A gradual increase in fly-ash concentration in the normal field soil (0, 10, 20 up to 100%,v/v) was reported to increase the porosity and water- holding capacity (Khan and Khan, 1996). This improvement in water-holding capacity is beneficial for the growth of plants especially under rainfed agriculture. Amendment with fly ash up to 40% also increased soil porosity from 43 to 53% and water holding capacity from 39 to 55%. Also, fly ash had been shown to increase the amount of plant available water in sandy soils (Singh 1997).

Abou Yuossef and Abou Hashem (2010) showed that application ash refuse in combination of effective microorganisms (EM) increased the organic carbon content and maximum water holding capacity, 80 ton fed^{-1} under different tillage treatments. El-Eweddy,(2011) found that addition of wastes (vinasse and cotton gin) in sandy soil decreased bulk density, while, total soil porosity, macroporsity, saturated hydraulic conductivity, soil available water as well as the organic matter contents of the soils were increased.

On the other hand the application of effective microorganisms (EM) may have a beneficial impact through enhancing biological soil activity, which accelerates the decomposition of fresh or immature organic wastes and hence sustained soil productivity and agriculture production. In this respect, Paschoal *et. al.,*(1998) indicated that the EM when combined and fermented with FYM and poultry manure, and applied to soil significantly increased the soil microbial biomass, cation exchange capacity, the content of soil organic matter and the plant-availability of N-P-K while decreased the soil bulk density. Also, Sangakkara and Higa (2000) reported that the EM enhanced crop yields of *phaseolus vulgaris* and *capsicum annum* and improved soil properties. According to Hussain (2000) the growth and yields of rice, wheat and banana were improved with application of EM. Also, Valarini (2003) reported that EM and activator of soil microorganism populations and an ameliorator of physical and chemical soil properties.

The objective of this study is to investigate the effects of residual of cotton grin trash and refuse ash, separately and combined with effective microorganisms (EM) on some chemical and physical properties of sandy soil South El-Qantara Shark, North Sinai.

MATERIALS AND METHODS

A field experiment was conducted on a sandy soil at Galbana, South El-Qantara Shark, North Sinai (30º 55¯ 14⁼ N, 32º 23¯ 31⁼ E) to study the effect of soil amendment mixtures (refuse ash: cotton gin trash) and effective microorganisms (EM) on some physical and chemical properties of the sandy soil and yield of peanut. The experimental treatments were arranged in completely randomized blocks design with 4 replicates. The soil amendments and the effective microorganisms were added either individually or together in a total amount of amendments equal to 20 ton /fed. The indicating 18 treatments were as follows:

(T1): Control (without soil amendments).
(T2): Refuse ash (RA) at rate of 20 ton/fed.
(T3): A mixture of 15 ton RA /fed with 5 ton CGT /fed.
(T4): A mixture of 10 ton RA /fed. with 10 ton CGT/fed.
(T5): A mixture of 5 ton RA /fed with 15 ton CGT/fed.
(T6): Cotton gin trash (CGT) at the rate of 20 ton/fed.

While effective microorganism (EM) treatments were as follow:

(EM_1): Control(Without effective microorganisms).
(EM_2): Effective microorganisms at rate of 20 liter/fed.
(EM_3): Effective microorganisms at rate of 40 liter/fed.

The rest of treatments showed the combination of the soil amendments and the effective microorganisms. Table (1) depicts some characteristics of the used RA ,CGT and some properties of the soil

The cotton gin trash and refuse ash treatments were incorporated with the surface soil layer (0-30 cm), four weeks prior to cultivation, while the effective microorganism solution was applied with water irrigation. Sprinkler Irrigation system was used in this investigation and irrigated by El-Salam canal having of EC 1.07 dsm^{-1} and pH 7.68.

Table (1): Some physicochemical properties of studied soil, refuse ash, and cotton gin trash.

Characteristics	Soil	Refuse ash	Cotton gin trash
pH (extract 1:2.5)	7.84	7.84	7.1
EC, dS/m	2.77	0.16	1.5
O.C, %	0.33	1.47	30.97
Bulk density, g/cm^3	1.62	1.10	0.56
$CaCO_3$, %	1.65	2.22	-
Sandy, %	91	10.8	-
Silt, %	5.5	73.2	-
Clay, %	3.5	16	-
Total P, %	2.1	0.10	0.89
Total K, %	1.01	0.12	1.88
Total Fe, $mgkg^{-1}$	2.12	100	450
Total Mn, $mgkg^{-1}$	1.44	20	82
Total Zn , $mgkg^{-1}$	1.1	12	180
Total Cu , $m.kg^{-1}$	0.4	1	59

Peanut *(Arachis hypogaea L.)* (Giza 5) cultivar was sown at first week of May 2012 and harvested at second week of September. All plots were fertilized as commonly practiced Super phosphate (15.5% P_2O_5) was added at rate of 140 kg/fed, it banded adjacent to seed hills at planting, potassium sulphate was applied after thinning at rate of 48kg K_2O /fed, and nitrogen fertilizer was applied as ammonium nitrate (33.5% N) at a rate of 90 kg/fed, in a three equal does. The first was at sowing, the second was at thinning ,and the third was applied after thinning two weeks Cultivation practices were followed as recommended by ministry of Agricultural and Land Reclamation.

Soil bulk density was determined using undisturbed soil cores at 0-30 cm soil depth according to Black and Hartge, (1986).Saturated soil hydraulic conductivity was determined using undisturbed soil cores at the some soil depth under constant head in laboratory according to Klute and dirksen,(1986). Maximum water holding capacity (MWHC) was determined accordingly by Stolte *et al*. (1992).

For the measurement of soil penetration, standard cone penetrometer was used. Soil penetration resistance measurements were repeated six times in each plot, ASAF,1993.

The salinity (ECe) as total soluble salts was determined in the soil saturation extract, Richards (1954). Soil reaction (pH) was determined in the soil past, according to Richards (1954).Organic matter was determined by the modified Weakley and Black method, Jackson (1973).

Plants were harvested at maturity and the yield of kernel kg/fed were recorded and statistically analyzed according to Snedecor and Cochran (1982).

Some characteristics of the studied soil amendments i.e. pH, EC. OC. Total P, K, Fe, Mn, Zn and Cu as well as bulk density were determined according to Black (1965).

RESULTS AND DISCUSSION

Effect of organic wastes residual on some soil properties .

Soil reaction

Data presented in Table (2) and Fig. (1) show the effect of ash refuse and cotton gin trash in combination with EM rates on soil pH. The obtained values were slightly decreased from 7.94 to 7.46. However the respective soil pH values were significantly decreased in the plots treated either with refuse ash and cotton gin trash in combination with effective microorganisms. Also, the soil pH values decreased with increasing ratio of cotton gin trash and deceasing ratio of refuse ash in amendment mixtures with EM or without EM treatments.

The positive effect of cotton gin trash on reducing soil pH values may be referred to the organic acids formed during the decomposition of such organic wastes, as the applied microorganisms may accelerated the decomposition process. Such results are in agreement with those obtained by Abou Youssf and El-Eweddy (2011).

Soil salinity

Soil salinity (EC_e) was decreased from 2.89 to 1.21 dS/m with refuse ash and /or cotton gin trash in combination with EM. The lowest ECe value was obtained with T_2 treatment (20 ton/fed refuse ash), in combination with 40 l/fed EM (Table 2 and Fig. 2). The EC_e values were decreased by 3.48, 15.12, 27.71,32.56 and 39.38% relative to the control (T1)for the T_6, T_5,T_4,T_3 and T_2 treatments, respectively. Likewise, the soil salinity values were decreased by 16.72 and 24.9 % for the application of effective microorganisms (EM) at the rates of 20 and 40 l/fed respectively. The interaction effect between soil amendments and the ffective microorganisms emphasized the role of soil amendments and EM was increased the ability of sandy soil to hold water. Therefore more soluble salts may have the chance to be leached out to the deeper soil layers by following irrigation.

The decrease in soil salinity values were observed dependent on the ratio of amendment mixtures and application rate of EM. The highest reduction in EC_e values was associated with T_2 treatment (20 ton/fed refuse ash) and T_3 treatment (15 ton/fed refuse ash +5 ton/fed of cotton gin) with EM rate of 40 l/fed. Similar results were obtained by Tejada *et al.* (2006).

Table (2): Effect residual effect of studied soil amendments and effective microorganisms on some soil properties and peanut production..

Treatments		pH	EC dS/m	Organic carbon %	Bulk density g/cm^3	Hydraulic Conductivity cm/h	Max. water holding capacity %	Penetration resistance KP_a	Kernel yield Kg/fed
Soil amend ments	Organis ms L/fed	(soil : water) 1:5 Supp.							
Control, (T1)	0	7.94	2.89	0.33	1.63	28	13.9	18.09	801.00
	20 L/fed	7.94	2.88	0.34	1.62	28.01	14	18.06	819.00
	40L/fed	7.93	2.89	0.35	1.62	28.03	14.04	18.06	843.00
T2	0	7.89	2.44	0.66	1.36	16.5	28	17.13	1371.00
	20 L/fed	7.83	1.60	0.86	1.21	15.01	32	16.71	1433.00
	40L/fed	7.82	1.21	1.06	1.18	14.69	34.01	16.21	1700.00
T3	0	7.85	2.58	0.62	1.4	17.29	27	17.42	1283.00
	20 L/fed	7.70	1.86	0.80	1.26	16	30.5	17.11	1363.00
	40L/fed	7.69	1.40	0.93	1.2	15.68	31.92	17.00	1449.00
T4	0	7.83	2.64	0.49	1.43	19.8	26.5	17.69	1210.00
	20 L/fed	7.66	1.94	0.53	1.3	17.65	28.79	17.50	1293.00
	40L/fed	7.61	1.68	0.69	1.28	16.3	31	17.33	1380.00
T5	0	7.81	2.75	0.43	1.47	24.03	20.09	17.90	1189.00
	20 L/fed	7.62	2.38	0.49	1.39	23	28.5	17.72	1200.00
	40L/fed	7.54	2.22	0.53	1.31	20.88	30.69	17.50	1298.00
T6	0	7.78	2.84	0.51	1.56	26.11	19.23	18.00	1103.00
	20 L/fed	7.50	2.79	0.67	1.54	26	28	17.89	1138.00
	40L/fed	7.46	2.73	0.78	1.53	24.09	29.36	17.63	1195.00
LSD at 5%									
Soil amend ments		0.013	0.012	0.013	0.012	0.032	0.636	0.116	0.016
EM		0.009	0.008	0.009	0.008	0.022	0.449	0.082	0.011
Soil amend ments x EM		0.023	0.068	0.022	0.022	0-055	1.099	0.20	0.027

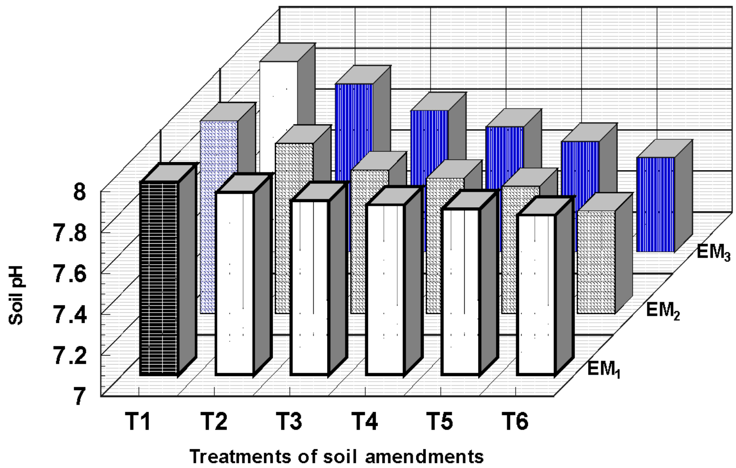

Fig (1). Effect of different ratios of studied soil amendments and effective microorganisms on soil pH.

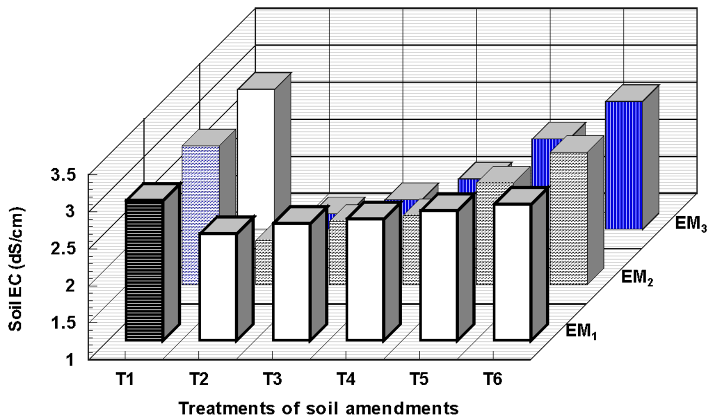

Fig. (2). Effect of different ratios of studied soil amendments and effective microorganisms on soil salinity.

Soil organic carbon

The organic carbon (OC) percentage of the control treatment was low compared with the soil treated with different applications of refuse ash, cotton gin trash and EM, Table (2) and Fig.(3). The soil OC % gradually increased as the refuse ash rate increases. The increase percentages were 22.06,67.64, 92.06, 130.39 and 152.94 % relative to the control (T1) due to the T5, T4, T6, T3 and T2, respectively. Furthermore, the soil OC % content were also increased by 18.03 and 30.55% for the application of the EM at the rates of 20 and 40 l/fed, respectively. These results are in agreement with those obtained by Bulluck, *et al.* (2002), Tejada and Gon zalez (2007) and Tejada (2010)

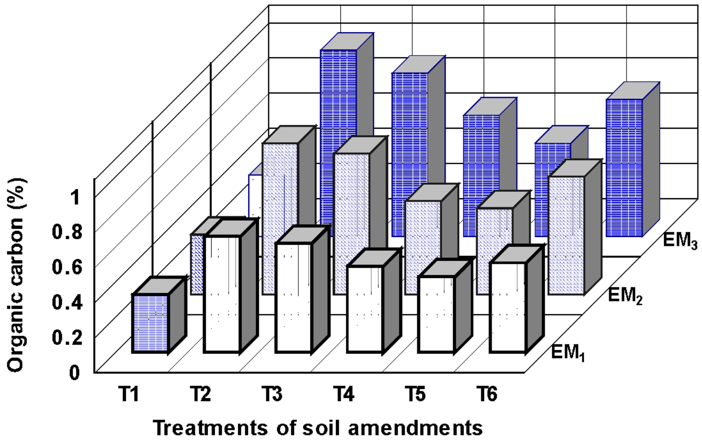

Fig.(3). Effect of different ratios of studied soil amendments and effective microorganisms on soil organic carbon percentage.

Bulk Density

Results in Table (2) and Fig. (4) show that soil bulk density values in the treatments of organic wastes are lower than the control treatment, where the treatments T6,T5, T4, T3 and T2 decreased values of the soil bulk density relative to the control by 4.93, 14.46, 17.62, 22.98 and 22.8%, respectively. Furthermore, the respective bulk density values were also decreased by 6.1 and 8.1% for the application of EM at the rates 20 and 40 l/fed, respectively. The highest reductions in soil bulk density occurred with soil amendment mixtures with application EM treatment at the rate 40 l/fed. These results ore agreement with those obtained by Bulluck (2002) and Abou Yuossef and El-Eweddy (2011).

Saturated soil hydraulic conductivity

The saturated soil hydraulic conductivity (HC) of the studied sandy soil decreased significantly a result of adding the used amendments Table (2) and Fig. (5). The saturated soil hydraulic conductivity decreased relative to the control (T1) by 9.31, 19.20,36.05 ,41.73 and 45.01% for the T6,T5, T4, T3 and T2 treatments, respectively. The values of soil hydraulic conductivity were also, decreased by 4.6 and 9.15 % for the application of the EM at the rates of 20 and 40 l/fed, respectively. Abou Yussof and El-Eweddy (2011) and Abou Yussof and Abou Hashem (2005) achieved similar results by adding cotton compost and refuse ash to sandy soil.

Soil maximum water holding capacity

The soil available water content was also affected by treating the studied sandy soil by the different rates from refuse ash and cotton gin trash in combination with different rates of effective microorganisms Table, (2) and Fig. (6). It is clear that the soil maximum water holding capacity content increased with increasing the application rate of refuse ash than cotton trash in soil amendment mixtures. This may be referred to the relatively higher clay content of refuse ash. The highest value of the soil maximum water holding capacity (MWHC) was associated with T2 treatment 20 ton /fed of refuse ash with 40 l/fed, of EM could be arranged in the following order : T2 > T3 > T4 >T5 > T6 > control treatment. In this respect, Adriano and Weber (2001) found on increase in maximum water holding capacity with increasing rate of fly ash application. The large surface are of spherical-shaped silt-size of fly ash particles is associated by an increase in microporosity of soil, thereby enhancing soil air space which is tantamount to soil water holding capacity

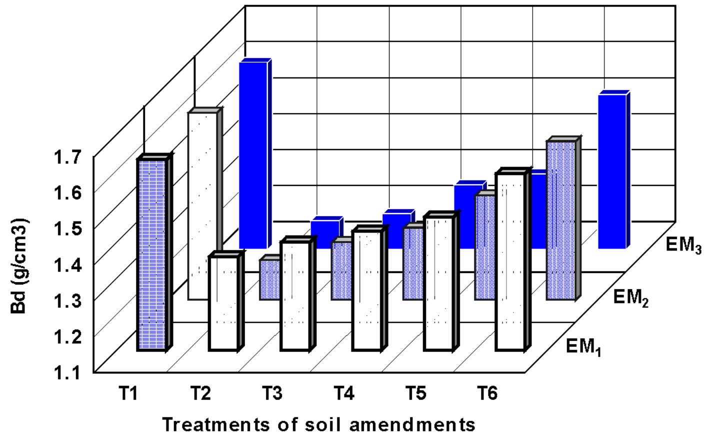

Fig. (4). Effect of different ratios of studied soil amendments and effective microorganisms on soil bulk density

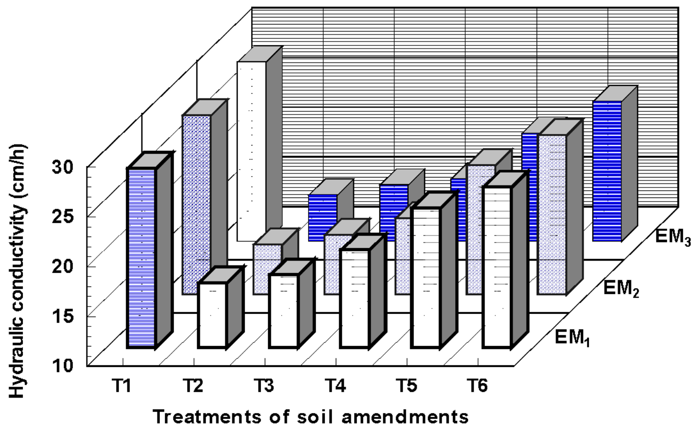

Fig. (5). Effect of different ratios of studied soil amendments and effective microorganisms on soil hydraulic conductivity.

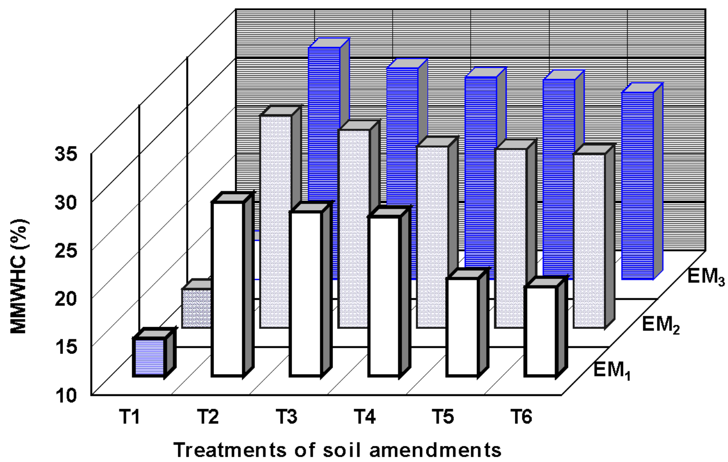

Fig. (6). Effect of different ratios of studied soil amendments and effective microorganisms on soil maximum water holding capacity.

Penetration resistance

The soil penetration resistance,KPa, is a good indicator for the soil physical properties, the decrease in penetration resistance allows the plant roots for easy penetration in the soil. As shown in Table (2) and Fig. (7) a decrease in soil penetration resistance is accompanied by an increase in the rates refuse ash with T2 treatment (20 ton /fed of refuse ash with 40 l/fed EM). Significant differences in soil penetration resistance are obtained between refuse ash and cotton gin trash.

Effect of organic wastes residual on peanut production.

The dada in Table (2) and Fig.(8) represent that the peanut production under different ratios residues mixtures with effective microorganisms treatments. Apparently, the application of either the residues (refuse ash and cotton gin trash) or EM treatments, caused a significant increase in peanut kernel yield when comparing with the control treatment(T1).The kernel yield increased by 38, 48, 56, 65 and 81% relative to control as a result of T6 ,T5 ,T4 ,T3 and T2 treatments, respectively. The maximum peanut kernel yield was achieved when 20 ton/fed of refuse ash (T_2). The favorable effect of RA on increasing the kernel yield of peanut may be rendered to its positive effect on reducing soil properties (Table 2).These results are in agreement with those obtained by Krejsl and Scanlon (1996) who found that the bean biomass was 49% for the 40 M/ha ash treatment, and 64% for the 50 M/ha ash treatment. Also, Abou Yuossef and Abou Hashem (2005) found an increased seed yield with increasing refuse ash rates up to the 80 ton/fed.

Respecting role of the effective microorganisms treatments, data in Table (2) and Fig.(8) show that the kernel yield values were significantly increased with increasing rate of the effective microorganisms treatment. The kernel yield as affected by microorganisms is higher than without EM. The relative increase in the values of kernel yield reached 4.2 and 12.4% for EM_2 and EM_3 treatment EM_1 relative to the without treatment, respectively.

These results are in agreement with those obtained by, Abou Yuossef and Abou Hashem (2010) found that peach fruit yield was increased with increasing ash refuse rates up to 40 liter/fed with different EM treatments

Economical study

Economical assessment for any research consider is an important parameter which is determined by the ratio of cost output and input as investment ratio. Table (3) illustrates the investment ratios for peanut kernel yield. The residual effect of soil amendment resulted with rates combination successed treatments the highest one is 20 ton/fed RA+40 liter/fed EM which had IR 2.45 comparing to the other treatments. In general, the highest net income values were increased as shown in the descending order : 20 ton/fed RA + 40 liter/fed EM > 20 ton/fed RA + 20 liter/fed EM > 20 ton/fed RA+ 5 ton/fed CGT + 40 liter/fed EM > 15 ton/fed RA.

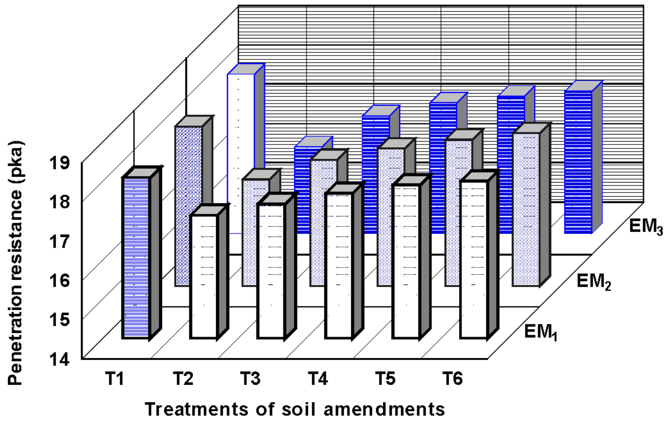

Fig.(7). Effect of different ratios of studied soil amendments and effective microorganisms on soil penetration resistance.

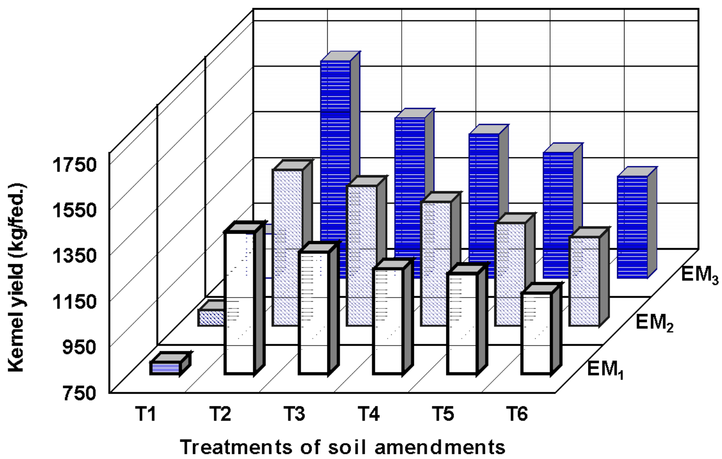

Fig. (8). Effect of different ratios of studied soil amendments and effective microorganisms on kernel yield of peanut.

Table (3). Economical evaluation for peanut kernal yield on residual effect of Studied organic wastes and effective microorganisms.

Treatment NO	Soil amendment		EM	Kernal yield kg/fed	Yield increase over control kg/fed	Cost, LE		Investment Ratio IR
	R.A	CGT				Inputs	Output	
T_1	0	0	0	801		-	-	-
	0	0	20	819	18	100	108	1.08
	0	0	40	843	42	200	252	1.26
T_2	20	0	0	1371	570	2000	3420	1.71
	20	0	20	1433	632	2100	3792	1.8
	20	0	40	1700	899	2200	5394	2.45
T_3	15	5	0	1283	482	2350	2892	1.23
	15	5	20	1363	562	2450	3372	1.37
	15	5	40	1449	648	2550	3888	1.52
T_4	10	10	0	1210	409	2700	2454	0.9
	10	10	20	1293	492	2800	2952	1.05
	10	10	40	1380	579	2900	3474	1.19
T_5	5	15	0	1189	388	3050	2328	0.76
	5	15	20	1200	399	3150	2394	0.76
	5	15	40	1298	497	3250	2984	0.91
T_6	0	20	0	1103	302	3400	1012	0.29
	0	20	20	1138	337	3500	2022	0.57
	0	20	40	1195	394	3600	2364	0.65

Cost 1Ton (refase ash) = 100 L.E
Cost 1Ton (cotton gin trash) = 170 .LE
Cost 1kg peanut kernel = 6 L.E
20 liter EM = 100 LE

REFERENCES

Abou Yuossef, M. F. and A. A. Abou Hashem (2010).Effects of the interaction between effective microorganisms and ash refuse on productivity of sandy soil. Egypt. J. Appl. Sci., 25(2A): 74-88.

Abou Yuossef, M. F. and A. A. Abou Hashem (2005). Effect of coal refuse and refuse ash applications on some soil properties and yield of sesame. Egypt. J. Appl. Sci; 20(4B): 768-785.

Abou Yuossef M. F. and E. A. El-Eweddy (2011). Use of cotton gin trash for improving properties and productivity of sandy soils. Minufiya J. Agric. Res. 36(1): 159-176.

Adriano, D. C. and J. T. Weber (2001). Influence of fly ash on soil physical Properties and turfgrass Establishment. J. of Environ. Quality, 30 : 596-601.

Ali, M. H. and E. A. El-Eweddy (2012). Evaluation of some mixture amendments on soil properties and its productivity in South El-Qantara Shark Area. Egypt. J. Appl. Sci. 27(7): 389-406.

ASAF Standards, (1993). S313.2 Soil Cone Penetromater, 40th edition ASAE, St. Joseph, MI. Author, Dept. of Soils, Univ. of Wisc. Madison, Wisc., U.S.A.

Black, C. A.(ed) (1965). Methods of Soil Analysis. Part 2, Soil Sci. Soc. Agron.Inc. Pub. Madison, Wis., U.S.A.

Blacke, G. R. and Hartge (1986). Bulk density. P.374-390. In "Klut.A.A." (ed.). Methods of Soil Analysis, Part I. Physical and Mineralogical Methods, Am. Soc. Agron. Inc. Medison.Wis.U.S.A.

Bulluck, L. R. and J. B. Ristaino (2002). Effect of synthetic and organic soil fertility amendments on southern Blight, soil microbial communities, and yield of processing tomatoes. Phytopathological Sci. 92 (2): 181-189.

Bulluck, L. R., M. Brosius, G.K. Evanylo and J. B. Ristaino (2002). Organic and synthetic fertility amendments influence soil microbial, physical and chemical properties on organic and conventional farms. Appl. Soil Ecol. 19: 147-160.

Carlson, C. L and D.C. Adriano (1993). Environmental impacts of coal combustion residues. J. Environ. Qual. 22: 227-247.

El- Eweddy E. A. (2011). Application of different industrial wastes and its impacts on soil properties and plant productivity. Minufiya J. Agric. Res. 36, 5:1345-1359.

Etiegni, L., A. G. Campbell and R. L. Mahler (1991). evaluation of wood ash disposal on agricultural land: 1. Potential as a soil additive and liming agent. Commun. Soil Sc. Plant Anal., 22 : 243-256.

Ghodrati, M., J. T. Sims and B.L. Vasilas (1995). Evaluation of fly ash as a soil amendment for the Atlantic coastal plain;1. Soil hydraulic properties and elemental leaching. Water, Air, and Soil Pollu. 81: 349-361.

Hussain, T., M. Jilani, A. G. Haq, S. Anjum and M. H. Zia (2000). Effect of EM application on soil properties. In: Proceedings of 13thInternational IFOAM Scientific Conference, 28-31 August, 2000, Basel, Switzerland.

Jakcson, A.L. (1973). Soil Chemical Analysis- Advanced Course. Pub. By Author, dept. of Soils, Univ of Wis. Madison, Wis.,U.S.A.

Khan, R.K. and M. W. Khan (1996). The effect of fly ash on plant growth and yield of tomato. Environ. Pollut. 92:105-111.

Klute, A. and Dirkson (1986). Hydraulic conductivity and diffusivity: Laboratory methods, in Klute A.A.(ed) p.687-733. Methods of Soil Anlysis. Agron. Monogr. q. ASA and SSSA, Medison. WI.

Liu, B., L. Marcia, B. Gumpertz and H. Shuijin (2007). Effect of prior tillage and soil fertility amendments on dispersal of phytophthora capsici and infection of peooer. Eur. J. Plant pathol. 120: 273-287.

Paschoal, A. D., S.K. Homma, A. B. Sanches and M. C. S. Nogueira (1998). Performance of effective microorganisms (EM) in a Brazilian citrus orchard: Effect on soil quality, yield and quality of oranges, and control of citrus rest mite.. Proceeding of the 4thInternational Conference on Kyusei Nature Farming.19-21 June. Paris, France, pp;132-143.

Prem, A.K. Ghosh and Dileep Kumar (2010). Use of fly ash in agriculture: A Way to improve soil fertility and its productivity. Asian J. Agric. Res.4(10) : 1-4.

Richards, L. A. (1954). "Diagnosis and Improvement of Saline and Alkali Soils" .U.S.Dept. Agric. Hand Book, No. 60.

Sangakkara, U. R. and T. Higa (2000). Kyusei nature farming and effective microorganisms for enhanced sustainable production in organic systems. In: Proceedings of 13thInternational IFOAM Scientific Conference, 28-31 August, 2000, Basel, Switzerland.

Singh, S.N., K. Kulshreshtha and K. j. Ahmad (1997). Impact of fly ash soil amendment on seed germination, seedling growth and metal composition of *Vicia faba L.*Ecol. Eng. 9:203-208.

Snedecor, G. W. and W. G. Cochran (1982). Statistical Methods. 7th Edition. IOWA. State Univ. Press Ames., U.S.A: 145 – 166.

Stolte, J., G.J. Veerman and M. C. S. Wopereis (1992). Manual Soil Physical Measurements, version 2.0. Technisch document/ technical document 2, DLO Winand String Centre, Wageningen, The Netherlands.

Tejada, M. (2010). Organic amendment based on vermin compost and compost: differences on soil properties and maize yield . Wates Manag. Res., 20: 219 – 224.

Tejada, M and J. L. Gonzalez (2007). Application of different organic wastes on soil properties and wheat yield. Agron. J.,99:1597- 1606.

Tejada, M., C. Garcia, J. L. Gonzalez and M. T. Hernandez (2006). Organic amendment based on fresh and composted beet vinasse: influence on soil properties and wheat yield . Soil Sci. Am. J.70:900-908.

Valarini, P. J., M. C. Diaz alvarez, J. M Gasco, F. Guerrero and H. Tokeshi

(2003). Assessment of properties by organic matter and EM-microorganism incorporation. R. Bras. Ci. Solo, 27: 519-525.

Vance, E. D. (1996). Land application of wood-fired and combination boiler ashes: An overview. J. Environ. Quality, 25: 937- 944.

Zhao lian and Tangze-jun (2009). Effect of soil physical properties using fly ash as sandy soil amendment. J. Soil and Water Conser. 152:9-14.

الأثر المتبقي لبعض محسنات التربة على بعض خواص التربة وإنتاجية الفول السوداني في التربة الرملية تحت ظروف القنطرة شرق- شمال سيناء

عزت عبد المعبود العويضى

قسم صيانة الاراضى –مركز بحوث الصحراء –المطرية–القاهرة–مصر

الملخص العربي

أقيمت تجربة في ارض رملية بمنطقة القنطرة شرق شمال سيناء حيث تم دراسة التأثير المتبقي من مخاليط محسنات التربة مكونة من رماد حرق القمامة ومخلفات حلج القطن بمعدل ٢٠ طن للفدان كل منها على حدة أو خلط بنسب مختلف وهى كنترول ،١: صفر ، ٣:١ ،١:١ ،١:٣ ،صفر: ١ مع ٣ معدلات من مادة الكائنات الدقيقة المؤثرة (EM) وهى صفر ، ٢٠ ،٤٠ لتر للفدان على بعض الخواص الكيمائية والطبيعية للتربة وإنتاجية محصول قرون الفول السوداني .

أظهرت النتائج دور التأثير المتبقي للمعاملات في انخفاض قيم كل من درجة حموضة وملوحة التربة والكثافة الظاهرية والتوصيل الهيدروليكى ومقاومة الاختراق في كل المعاملات مع إضافة مادة الكائنات الدقيقة المؤثرة (EM) أو بدون إضافتها فنجد إن النقص العالي في قيم درجة الحموضة في المعاملات التي تحتوى على نسبة مرتفعة من مخلفات حلج القطن في حين نجد إن النقص في كل من ملوحة التربة والكثافة الظاهرية والتوصيل الهيدروليكى ومقاومة الاختراق سجلت للمعاملة المكونة من ٢٠ طن للفدان من رماد حرق القمامة تحت مستوى ٤٠ لتر للفدان من محلول الكائنات الدقيقة.

كذلك أظهر التأثير المتبقي لمخاليط المحسنات مع استعمال محلول الكائنات الدقيقة نقصا معنويا في كل من درجة الحموضة وملوحة التربة والكثافة الظاهرية والتوصيل الهيدروليكى ومقاومة الاختراق.وعلى عكس ذلك زاد محتوى التربة من الكربون العضوي ومحتوى التربة من السعة المائية العظمى زيادة معنوية مع زيادة نسبة رماد حرق القمامة في مخاليط محسنات التربة تحت جميع معاملات محلول الكائنات الدقيقة الفعالة .

ومن ناحية أخرى زادت إنتاجية الفول السوداني من القرون زيادة معنوية مع جميع المعاملات المضافة مقارنة بالكنترول.

وقد وجد من التقييم الاقتصادي أن على عائد استثمار (IR) كانت ٤٥, ٢مع خلط معدل ٢٠ طن للفدان رماد حرق القمامة مع ٤٠ لتر للفدان من محلول الكائنات الدقيقة الفعالة.