Minufiya J. Agric. Res. Vol.37 No. 4(2): 981 - 994 (2012) **"http://www.mujar.net"**

تقييم كفاءة بعض مخلفات التصنيع الزراعي في تحسين الصفات الإنتاجية للتربة الرملية في شمال سيناء

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الملخص العربي

في تجربة حقلية أجريت في جنوب القنطرة شرق –سيناء الشمالية لدراسة تأثير إضافة بعض مخلفات التصنيع الزراعي (filter mud,bagasse) بمعدل ١٠ طن/فدان كل منها على حدة أو خلط بنسب مختلفة هي كنترول بدون اى إضافات ،١: صفر، ٣ : ١ ، ١ :١ ،١ : ٣ وصفر :١ مع معدلين من مادة الكائنات الدقيقة المؤثرة (EM) صفر، ٣٠ لتر/فدان على خواص التربة وإنتاجية محصول القمح .

أظهرت النتائج إلى انخفاض قيم كل من ال pH ،الكثافة الظاهرية والتوصيل الهيدروليكي في كل المعاملات مع إضافة مادة الكائنات الدقيقة المؤثرة (EM) أو بدون إضافتها فنجد إن النقص العالي من قيم الpH في المعاملات التي تحتوى علىfilter mud ويزداد النقص مع زيادة نسبة filter mud في المعاملة ، في حين نجد أن النقص في كلا من قيم الكثافة والتوصيل الهيدروليكي مع زيادة نسبة bagasse مع EM في المعاملات.من ناحية أخرى نجد إن ال EC تزداد من ٠,٦٣ ديسيمنز/م إلى ١,٤٤ ديسيمنز/م وان الزيادة الأعلى في قيم EC تكون مع معاملةfilter mud بدون إضافة الEM وان اقل زيادة في قيم EC (١,٠١ ديسيمنز/م) مع معاملةbagasse مع EM.

أما من ناحية نسبة محتوى الكربون العضوي فنجد أنها تزداد من٠,٤٢ % إلى ١,٣ % و الزيادة الأعلى في السعة المائية العظمى للتربة ٤٥,٦ % تكون مع معاملة filter mud مع EM أيضا نجد هناك زيادة معنوية لتوسط القطر المكافئ (MWD,mm) لكل المعاملات المستخدمة . ومن ناحية أخرى أظهرت إضافة مخلفات التصنيع الزراعي (filter mud:bagasse) بمعدل ١٠ طن/فدان مع أو بدون الEM زيادة معنوية عالية في حبوب القمح حيث زاد محصول الحبوب من ٠,٩٠٩ طن/فدان إلى ٢,٥٨٢ طن/فدان وكانت اكبر زيادة لهما عند معاملة filter mudمع EM .

وبناء على ذلك من الممكن استخدام مخلفات التصنيع الزراعي بنسب خلط مختلقة مع EM أو منفردا مع EM كمصدر لتحسين إنتاجية التربة الرملية.

EVALUATION OF SOME AGRICULTURAL INDUSTRIAL WASTES EFFICIENCY IN THE IMPROVEMENT PROPERTIES AND PRODUCTIVITY OF SANDY SOIL IN NORTH SINAI

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(Received: Mar. 14, 2012)

ABSTRACT: *Field experiment was conducted at a sandy soil in El- Quntara East, North Sinai, to study the individual and combined at mixed effects of different of some agyicultural industrial (filter mud and bagasse)which added at by rate 10 ton/fed, separately and combined to ge ther,at various ratios 0:0, 1:0, 3:1, 1:1, 1:3 and 0:1 without and with EM (effective microoganisms) at rate 30 Liter/fed respectively,on some soil properties and yield of wheat (Triticum aestivum L.) grains. The obtained data revealed that the soil pH, bulk density and hydraulic conductivity were decreased in all treatments of filter mud and bagasse with or without EM.The highest decrease in pH was found with the high percantage of filter mud treatments,while,the highest decrease in bulk density and hydraulic conductivity were associated the high percantage of bagasse treatments with EM.*

Electrical conductivity of the treated soil increased from 0.62 to 1.44 dS/m,folowed by the soil treated with filter mud and bagasse without or with EM.The highest increase (1.44 dS/m) was recorded in the treaments receiving filter mud separately, without EM,and the lowest (1.01dS/m)for was associated the treatmen of bagasse separately with EM.Organic carbon content of the soil also increased sufficiently from 0.42% to 1.3% with the treaments of for filter mud separately with EM.High increased of maxiimum water holding capacity 45.6%was found with the treatments of percantage filter mud with EM.All treatments under studs significant increased the mean weigth diamater.

Results showed that,combined application of filter mud : bagasse ratios with or without EM gave a significant increase in grain yield.The highest increased in grain yield(2.582 ton/fed) of the soil as a result of treatment with filter mud separately with or without EM compared to the contral treatment.Genaralls application of organic wastes filter mud and bagassa with EM to agricultural soils would be improvement the develoment of soil productivity.

Key words: *Filter mud (FM), Bagasse (Bag), Sandy soil, Physico-Chemical characteristics and Wheat yield.*

INTRODUCTION

The sugar industry produces a number of by-products during the process of sugar production including, mill or filter mud, ash , mill effluent , and trash.

Tow industries that generate large quantities of recyclable organic materials are the sugar industry and municipal wastewater authorities. The sugar industry has a long history of recycling sugar mill by products such as mill mud or filter cake (also known as filter press mud) and boiler ash, primarily as a valuable source of nutrients but also soil ameliorants. The re-use of these by-products has been of mutual benefit to both the farming and milling sectors as well as supporting the industry's endeavour to be viewed as clean, green and responsible. In many industries, the volume of organic waste being generated is increased at such a rate that more efficient and more environmentally acceptable methods of disposal are required, which in turn often necessitates finding new markets for the products (Barry *et al.,* 2000).

The main sources of organic industrial wastes are bio-industries and purification plant, sugar factories and distilleries, fruit and vegetables industries, dairy factories, potato- flower factories and many other wastes rich in organic matter and containing also variable amounts of plant nutrients.

Traditionally, mill by-products (such as mill mud and ash)have been applied more often as a soil ameliorant than as a substitute for commercial fertilizers. These applications have been made to improve the quality of salt-affected soils and soils with other problem. Cane growers use ash as a soil amendment for sodic soils, heavy clay soils, and sub-soils exposed by erosion and land planning . Applying ash improves the structure, water holding capacity, and aeration of soil (Chapman,1996 and Qureshi *et al*., 2000). Kingston (1999) argued that mill by-products contribute towards better yield, productivity ,and profitability by affecting the physical conditions of the soil, such as reducing bulk density in the surface soil.

BSES (1994) reported on the application of mill mud and ash to salt- affected cane land in Pioneer mill area in the Burdekin region and noted its effectiveness. According to this report, mill mud /ash was applied in 1984 and 1991 to this salt-affected cane land at rates of 60 to 65 ton/ha. This application increased plant cane yield and the heavy addition of mill mud and ash altered the texture of the soil, turning it form hard setting to soil which was loose and friable. The moisture holding capacity also increased substantially resulting in more available moisture for the cane plant.By increasing the availability of water to the crop, the mill mud and ash mixtures reduced the effects of salinity on crop growth. The reasons for the yield improvements were described as complex and linked to the dramatic changes in soil physical characteristics due to the mill mud and ash applications (BSES,1994).

Regular additions of organic materials such as sugar industry wastes including press mud, municipal biosolids, animal manures and crop residues are of ulmost importance in maintaining the filth, fertility and productivity of agricultural soils, also protect the soils from wind and water erosion, thus preventing nutrient losses through runoff and leaching. Press mud or filter cake is one of the important organic wastes capable of supplying sufficient amount of plant nutrients to soil due to its favourable effects on soil texture, structure, organic matter contents, the water holding capacity and aeration of soil. The higher amount of NPK in press mud has made it a valuable nutrient resource (Rakkiyappan, *et al*., 2001). Jamilkhan (2011) reported that the present study selected doses of sewage sludge, press mud and boiler ash were positively affected on physico-chemical properties and macro and micronutrients of calcareous soil.

As filter mud contains about 1% by weight of phosphate (P_2O_5),it has been used especially since the turn of the century,as fertilizer. Agricultural researchers have always presumed that the material acted primarily as a source of phosphate and that in addition the nitrogen content (about 1%) could be to some extent of benefit in the growing of cane. Nehra and Hooda (2002) reported that the sugar press residue (SPR) or press mud is a potential source of major minerals (Ca-2.40 %,P-1.27 %,K-1.18%, Mg-1.28%, S-2.62%) as well as trace elements (Cu-22.6 ppm,Fe-2042.0 ppm,Zn-36.5 ppm, Mn-228.0 ppm).Mohamed and Ahmed (2002) applied filter mud cake at 5,7.5 and 10 ton/fed. And they pointed out that these treatments led to a significant increase in plant height, leaves number , plant fresh weight ,nitrogen, phosphorus and potassium contents in sweet fennel bulbs. Similar results were reported by Hassan *et al*. (2010) reported that the combined effect among filter mud cake and potassin treatments on *Anethum graveolens, L.* plants parameters was statistically significant.

The conventional method of building up soil organic matter is through the application of manures such as farmyard manure and various compost preparation. Effective microorganisms (EM) is a mixed microorganism culture which consists of lactic acid bacteriayeast, fermenting fungi, actinomycetes and photosynthetic bacteria Higa (1998). EM is widely used as a beneficial microbial inoculums for making bokashi (biological fertilizer) and the use EM helps to increase crop yield by enhancing soil fertility, conserve the soil productivity, improve biological properties and also physical amelioration of soil structure (Karim, *et al*., 1992 and Vetayasuporn, 2006). Also, Sangakkara and Higa (2000) reported that the EM enhanced crop yield *(Phaseolus vulgaris and capsicum annum)* and improved soil properties. According to Hussain *et al*. (2000) and Abou Yuossef, *et al*. (2009) the growth and yields of rice, wheat and sugar beet improved with application of EM.

The soil application of press mud as organic fertilizer is widely practiced in Pakistan and India. It may be due to the fact that it has got sufficient amount of crop nutrients and improves soil physico-chemical properties. press mud is a good source of organic matter, NPK and important micronutrients and has established its importance in improving fertility, productivity and other physical properties of agricultural soils Kumar and Verma (2002),Kalaivanan and Hattab (2008) and Ghulam, *et al*.(2010).

Kelly (2006) and Srinarong and Panchaban (2003) found that both filter cake and sludge cake significantly improved soil properties and nutrient contents of the saline rice paddy land. Municipalities are faced with disposing of an ever-increasing amount of solid wastes from industrial sources and sludge's from sewage treatment plant. In Egypt, a tremendous mass of filter mud as a by-product obtained from the clarification of can juce in the sugar industries. The economical value of the filter mud is to the used a soil conditioner or a manor, which needs evaluation under our agricultural circumstances.

Rangaraj , *et al.,* (2007), Abou Yuossef, *et al.*, (2008) and Yassen , *et. al.,* (2010) reported that the addition of agro-industrial wastes, like press mud and coir pith,favorably improved soil organic matter, pH, EC, microbial population and enhanced the soil macro- and micronutrient and can be used to improve the soil physical properties of soil.

Disposal of organic wastes such as filter mud and bagasse, has become a serious problem facing all communities, in Egypt. The current investigation was carried out to study the effect of different sources and mixing present of organic residues with or without effective microorganism on some physico–chemical properties of sandy soil and evaluate their effects on yield of grain wheat.

MATERIALS AND METHODS

A field experiment was conducted at a sandy soil at South of El-Quantara East Districts North Sinai, Governate, Egypt to study the effect individualand combined effects of different additions and ratios of sugar cane filter mud (FM) and bagassa (Bag.) and effective Microorganism (EM) on some soil properties and yield of wheat

Before planting,surface soil samples (0-20cm) representing the used soil were takes, air-dried ground,good mixed,sieved through a 2mm sieve and analzed for some physical and chemical properties according to the methods described by Black(1965) and Jackson (1973).The obtained data were recorded in Table (1).

Filter mud and bagassa were obtained from the sugar and integrated industries company Hawamdyia in Hawamdyia,city Giza governorate, Egypt. Some chemical and physcial properties of used FM and Bag in this study were chown in Table (2).

The experimental plots were arranged in completely randomized blocks design with three replicates.This experiment including 36 expermintal unit[2EM x6(FM+Bag)x3 replicates]. The area of each unit was (3.5x3.5m^2). The expermintal unit were divided into two main groups respresenting the treatments of EM i.e 0 and 30 liter/feddan. The units of each main group were divided into six equal sub groups which treated by the following six treatments of both FM and Bag in three replicates.Before cultivation filter mud(FM) and Begasse(Bag) were applied at rate 10 ton/fed,separately or combined together,at various raties and with or without effective microogism(EM) as follows:

T_1 Control (with or without EM and without FM or Bag.).
T_2 Filter mud (FM).
T_3 3 Filter mud(FM)+1Bagasse Bag).
T_4 1 Filter mud(FM)+1Bagasse (Bag).
T_5 1 Filter mud(FM)+3Bagasse(Bag).
T_6 Bagasse (Bag) .

Wheat (*Triticum aestivum L.*), Giza 93, was planted in the mid of November 2009/2010 with seeding rate was 60 kg/fed. All plots were fertilized as commonly practiced. Superphosphate (15.5% P_2O_5) was added at the rate 200 kg/fed., it banded adjacent to seed hills at planting,and potassium sulphate(48%K_2O) was applied after thinning at the rate 48 kg K_2O/fed.Nitrogen fertilizer was applied as ammonium nitrate (33.5%N) at the rate of 80 kg/fed. in a three equal does. The first was added with sewing and the secand was carried out at sowing, at thinning, while the third was applied after of two weeks after thinning. Cultivation practices were conducted as recommended by the Ministry of Agricultural and Land Reclamation. Wheat plant were harvested at mid of May. Grain were straw separated from each plot to separately air-dried,over-dried at70^{0}C to determine its dry matter yield and calculate the effect of the studied treatments on sandy soil productivity of wheat.

After plant harvest undisturbed and distirbed soil sample from each plot was taken from 0-20cm depth to determine the following soil properties.

Bulk density (B_D)g/cm^3, Blake(1986) and saturated hydraulic conductivity (Ks) cm/h, Klute (1986).

Maximum water holding capacity (MWHC)was determined according to the technique described by Stolte *et al*. (1992). The water extract components were determined in the soil as suspension 1:2.5 (soil:water) as ratio electrical conductivity (dS/m), using the standard methods of analysis according to Jackson (1973).The total soluble salts were determined conductimetrically. Soil reaction (pH) was determined in the soil paste, according to Richards (1954). Organic matter was determined by the modified Walkley and Black method, Jackson (1973).

Water stable aggregates were determined according to (Black,1965), and to calculate mea weight diameter (MWD) the following equaation:

$$MWD = \sum_{i=1}^{n} \bar{X}_i W_i$$

the proportion by weight " W_i " of a given size fration of aggregates is multiplied by mean diameter X_i of the same fraction,andthe sum of these products for all size fraction is called the mean weight diameter (MWD).

The results were statistically analyzed using the technique of analysis of variance (ANOVA) and the least significant differenceLSD, between the treatments means were according to Gomez and Gomez (1984).

Table (1): Some chemical and physical properties of the studied soil surface layer .

property	value
pH 1:2.5 (soil:water) susp	7.75
EC,dS/m	0.63

Bulk density (Bd), g/cm^3	1.59
$CaCO_3$, %	1.88
Sand, %	92.16
Silt, %	5.09
Clay, %	2.75

Table (2): Some chemical and physical of the FM and bag used in this study.

characteristics	filter mud	Bagasse
Bulk density, Bd)g/cm^3	1.03	0.36
pH (1:5) (waste:water) susp	6.91	7.16
EC, (dS/m)	2.80	2.31
Organic carbon, %	44	19.03
Total nitrogen, %	1.92	0.71
Total phosphorus, %	1.58	0.44
Total potasium, %	0.26	0.09
Total iron, ppm	2550	232
Total manganese, ppm	282	185
Total zinc, ppm	170	42
Total copper, ppm	89	24

RESULTS AND DISCUSSION
Soil Chemical Properties:
Soil reaction:

The filter mud and bagasse used in this study possessed a clear effect on the detemined soil chemical properties as presented, Table (3) and Fig. (1). Theese data show that,under different treatments of FM and Bag,soil pH$_s$ were ranged from 7.45 to 7.88.So,soil pH under these treatments may be described as a neutnal reaction.Soil pH$_s$ with different application rates of FM and Bag were lower than these found in the control treatment, where the found decreases associated the high added ratios of FM were more than those assaciated the treatmentsof high ratios of Bag. This narrow range and reduced found in the soil pH$_s$ with those condition was resulted from high buffering capacity for the used organic wastes. with the same treatment of FM and Bag,pH values in the soil treated by FM. The found reduction in soil pH associated the treatments of FM was resalted from the decomposition effect of these microorganism on the added organic wastes, where this reaction produced sevoral compounds characterized by acidic effect. These results are in accordance with the findings of More (1994) who reported that all the treatments of organic wastes decreased the pH of the soil. Also, Abou Yuossef *et al*. (2009) reported that the application of filter mud +EM decreaed the soil pH.

Table (3): Effects of the studied treatments of FM, Bag and EM on some physico-chemical properties of sandy, and yiueld grain wheat.

Treatments		pH	EC dS/m	OC %	Bd g/cm3	SMWHC %	MWD mm	K_s cm/h	Grain yield ton/fed
Control	withoutEM	7.88	0.62	0.4	1.6	19.23	0.15	27.09	0.909
	with EM	7.87	0.58	0.42	1.59	19.3	0.153	26.96	0.905
FM	withoutEM	7.5	1.44	1.01	1.54	32.12	0.441	24.1	2.102
	with EM	7.45	1.39	1.3	1.76	33.49	0.564	22.09	2.582

3FM+1Bag	withoutEM	7.6	1.41	0.99	1.46	30.48	0.353	23.67	1.978
	with EM	7.54	1.31	1.25	1.65	31.78	0.471	21.77	2.388
1FM+1Bag	withoutEM	7.71	1.26	0.76	1.33	27.83	0.336	21	1.764
	with EM	7.66	1.22	1.03	1.58	29.23	0.46	18.89	2.12
1FM+3Bag	withoutEM	7.81	1.22	0.62	1.28	21.04	0.258	19.39	1.639
	with EM	7.78	1.16	0.92	1.52	21.52	0.362	17.56	1.902
Bag	withoutEM	7.85	1.16	0.54	1.23	20.88	0.198	19.31	1.555
	with EM	7.83	1.12	0.8	1.43	21.29	0.247	17.18	1.799
T.S.D at 0.05 lavel									
EM		0.029	0.016	0.027	0.022	0.33	0.022	0.254	0.044
Filter mud:Bagasse		0.05	0.027	0.046	0.037	0.572	0.039	0.441	0.077
EM+filter mu:bagasse		n.s	0.038	0.065	0.053	0.798	0.055	n.s	0.107

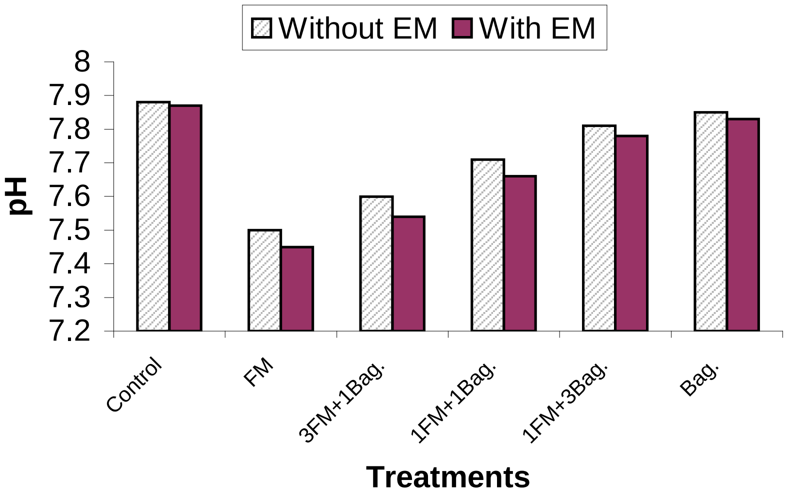

Fig. (1). Effects of the studied treatments of FM and Bag and EM on soil pH.

Soil Salinity (EC):

The effect of filter mud(FM)and bagasse (Bag) dufferent combination ratios with or without EM on electrical conductivity of the saturated soil extract (Ec_s) is shown in Fig. (2) and Table (3). The values of Ec_s (dS/m) with differents under study ranged from 0.58 to 1.44 dS/m.Soil Ec_s were increased followed the soil treated by application of both FM, bagasse and EM The EC was increased with increasing filter mud percentage, but more than the associated the increase of Bag ratio.These results were reulted from the decomposition processes of organic matter favour the accumulation of Co_2 and release of large amount of salts in solution which results in higher EC_s Kalaivanan and Omar Hattab (2008). Mathakiya and Meisheri (2003) also reported that the application of filter mud increased the EC of the soil.

Soil organic carbon (OC):

The organic carbon (OC) content (%) of the unamended soil was low compared with the soil treated with different applliceations of FM,Bag and EM, addition of the organic wastes subtantially increased the organic carbon contents Fig (3) and Table (3). The highest increase of OC% was observed the seperatly FM with EM treatments followed by the 3FM+1Bag with EM treatments, while the lowest increase was from the seperatly Bag without EM treatments. These results are in accordance with the findings of Dee, *et al.* (2002), who reported that the charcoal carbon is considered as biologically inert inactive carbon whilst the carbon from filter mud will provide a substrate for soil microbial activity.

Soil physical:
Bulk Density (Bd):

Result in Table (3) and Fig (4) showed that soil bulk density, g/cm3 values as affected by the studied treatments of filter mud and bagasse at various ratios with or without EM were lower than in the control treatment. This lower be attributed to the effect of low bulk densities of ratio filter mud and bagasse. Also, these treatment were associated with increase in the bulk volume of the studied soil.

Moreover, data showed that the mean of bulk densities is decreased with in creasing application ratio of bagasse.The relative reductions in bulk density reach 6,12,17,20 and 23 for the T2,T3,T4,T5 andT6 without EM treatments respectivety. While ,the relative reductions with EM in soil bulk density reach 17,24,27,29 and 31%, respectively. These realties are in agreement with obtained by Jamilkhan (2011) and Abou Yuossef, *et al.,* (2009).

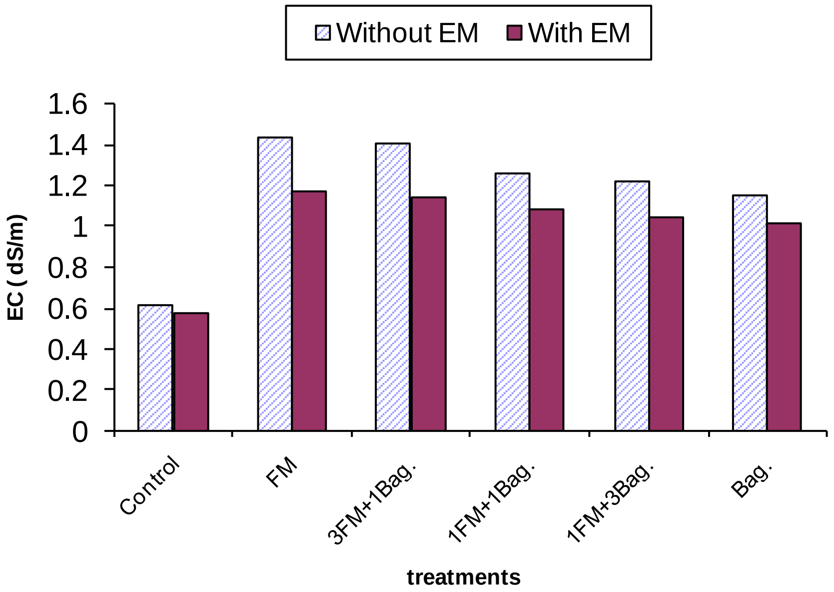

Fig. (2). Effects of the studied treatments of FM and Bag and EM on soil EC.

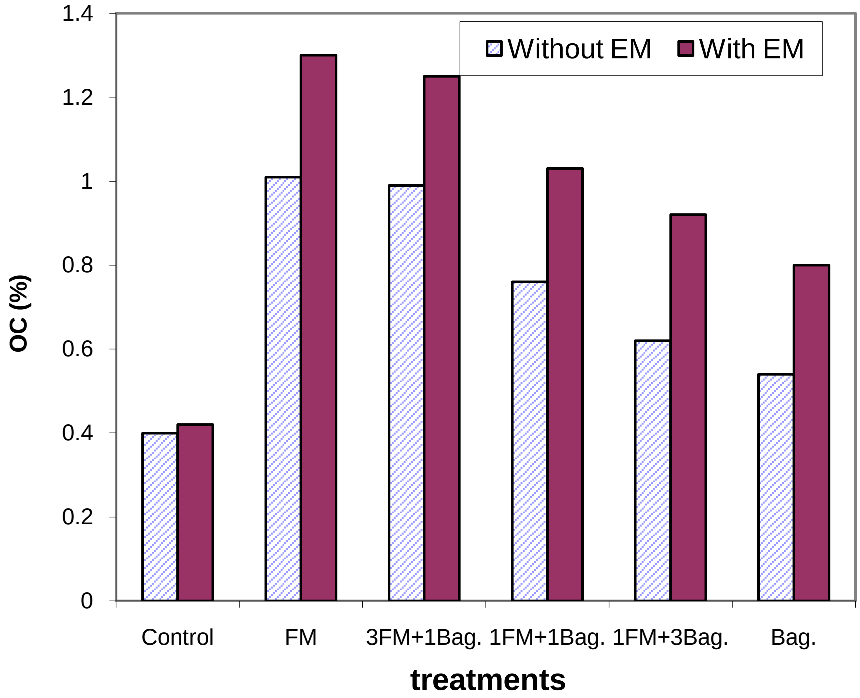

Fig. (3). Effects of the studied treatments of FM and Bag and EM on soil OC.

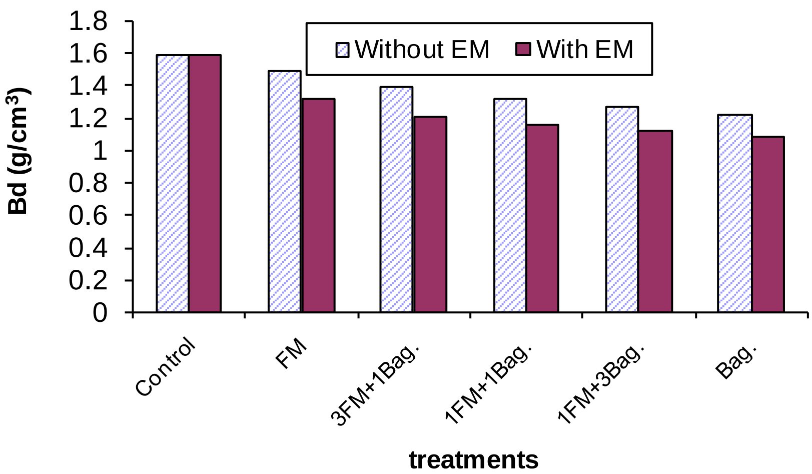

Fig. (4). Effects of the studied treatments of FM and Bag and EM on soil Bulk density.

Soil maximum water holding capacity (MWHC):

Data in Table (3) and Fig. (5) illustrate that the increase effect of the studied treatments offilter mud and Bagasse with or without EM on maximum water holding capacity. Thefound increase were increased with increasing filter mud ratio with EM.

Moreover,a difference is deffict between the maximum water holding capacity under the different ratio of filter mud and bagasse with or without EM additions. The highest percentage of increase reached 45.5% with filter mud with EM because of increases in organic carbon content cause on increase in moisture content ,the net result is that the amount of availble water capacity. While, the lowest percentage of increase reached 3%with separotely bagasse without EM treatments. In this respect, Abou Yuossef, *et al.,* (2009) found the EM with FYM+Filter mud or without EM increased the soil maximum water holding capacity.

Mean weight diameter (MWD):

Data presented in Table (3) and Fig. (6) indicated that, increased the mean weight diameter in the soil treated by FM and Bag at defferent mixing ratio under study with and without EM as commpared with the control treatment. Also, increased continuously with increasing filter mud percentage. The mean weight diameter (MWD) was influenced by both the ratios and type organic waste. All, treatments of the terted organic waste resuleted in a signicant increased of MWD was ant al $p<0.05$. Although the slowly decomposable organic waste probably had little effect on the aggrregate stability. Similar results werereported by Barzegar, *et. al* (2002).

Hydraulic conductivity (K_s):

Concerning the effect of filter mud and Bagasse with or without EM as recorded in Table (3) Fig. (7) show a decease hydraulic conductivity of sandy soil which is the main problem of such kind of soils. It is worthy to notice that the whole addition treatments EM exhibited the highest reduction values of hydraulic conductivity where amounted to 36, 35 and 30% for T6, T5 and T4 with increasing of bagassa ratio, respectively. While the relative decreases in hydraulic conductivity reach 29, 28 and 22 % for T6, T5 and T4, of without EM respectively. On the other side, the two other treatments T_2 and T_3 occupied the second order where the percentage of decrease reached 11 and 13% without EM,18 and 19% with EM with increasing of filter mud ratio, respectively. These realties are in line with the findings of Abou Yuossef, *et al.,* (2009).

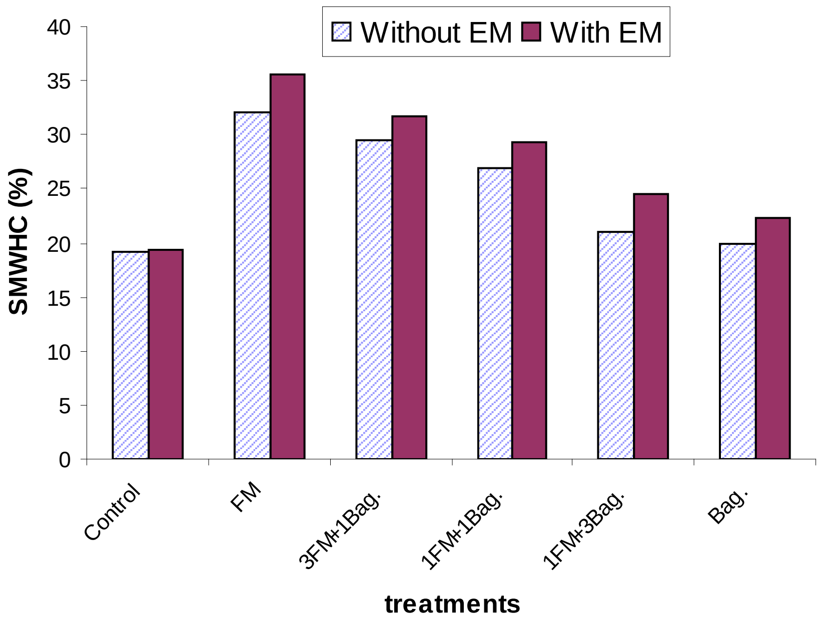

Fig. (5). Effects of the studied treatments of FM and Bag and EM on soil maximum water holding capacity.

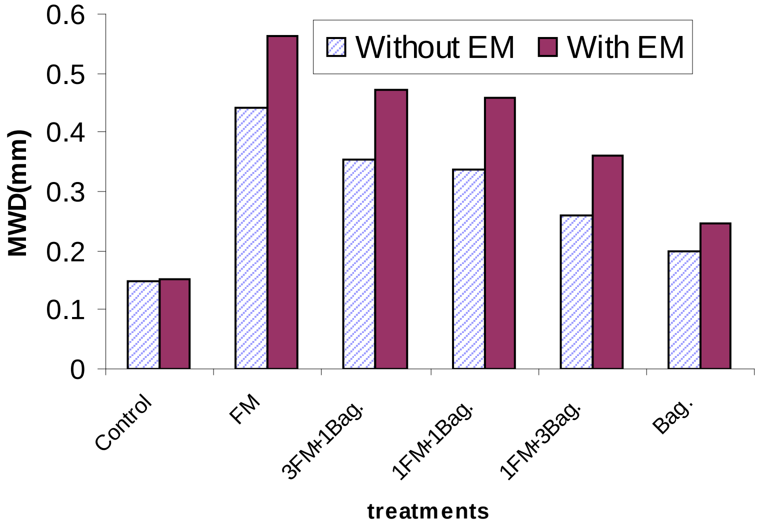

Fig. (6). Effects of the studied treatments of FM and Bag and EM on soil mean weight diameter

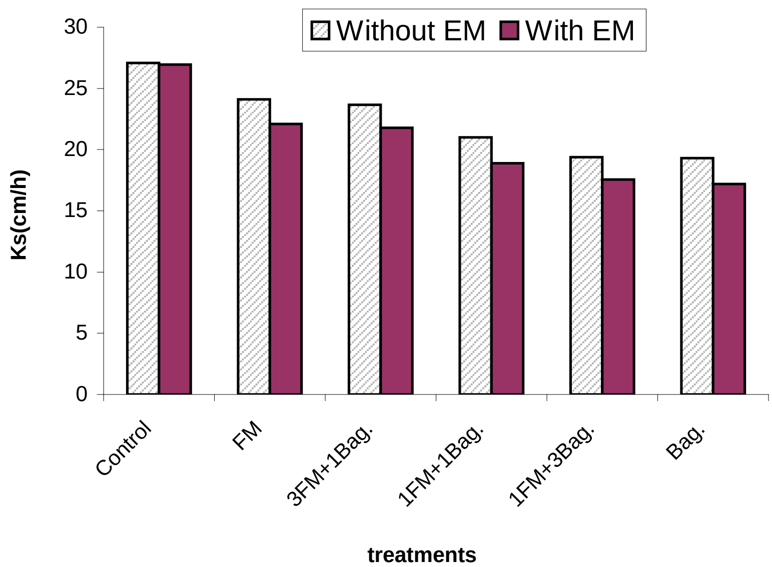

Fig. (7). Effects of the studied treatments of FM and Bag and EM on soil hydraulic conductivity.

Effect of agricultural industrial wastes on wheat production:

The data in Table (3) and Fig. (8) represent that, the wheat production under different ratios of organic residues with the two of EM.The addition of filter mud and Bagasse residue without all tested ratios resulted in a significant increase in grain, compared to the contral treatment .

Data also, indicated that application of filter mud increased the yield of wheat grain production compared to bagasse with or without EM. These results are in agreement with those obtained by AbouYuossef, *et al.,* (2007), and Arafat, *et al.* (1992), under Egyptian condition, they found that the application of filter mud induced significant increase of dry matter yield. This phenomenon may be attributed to better root growth under favourable physical conditions of treated soil and can be to the effect of organic matter (filter mud) containing a considerable amount of nutrient elements for plant growth.

Moerover, Rangaraj, *et al.* (2007) found that the application of press mud increased the grain yield of finger millet during both seasons. This migh be due to improved physical, chemical and microbial properties of soil due to use of agro-industrial wastes.

Ahighly significant correlation was found between yield of wheat grain and either electrical conductivity (r=0.716***),organic carbo (r=0.953***), bulkdensity (r=-0.459**), maximum water holding capacity (r= 0.890***), mean weight diamater (r=0.922***) and hydraulic conductivity (r= -0.472**).

Also, the multiple regression relating the grain yield of wheat to some soil chemical and physical properties of yields the following equation:

Grain yield = 0.862 – 0.0087 pH +0.293 EC + 0.864 O.C – 0.033 B.d + 0.013 MWHC+0.665 MWD- 0.0261 Ks. Also, the calculated multiple correlation was highly significant (r= 0.984**). This means that 96.95% of the variations in wheat grain yield of could be attributed to the variation in pH, electrical conductivity, organic carbon, bulk density,maximum water holding capacity, mean weight diamater and hydraulic conductivity .

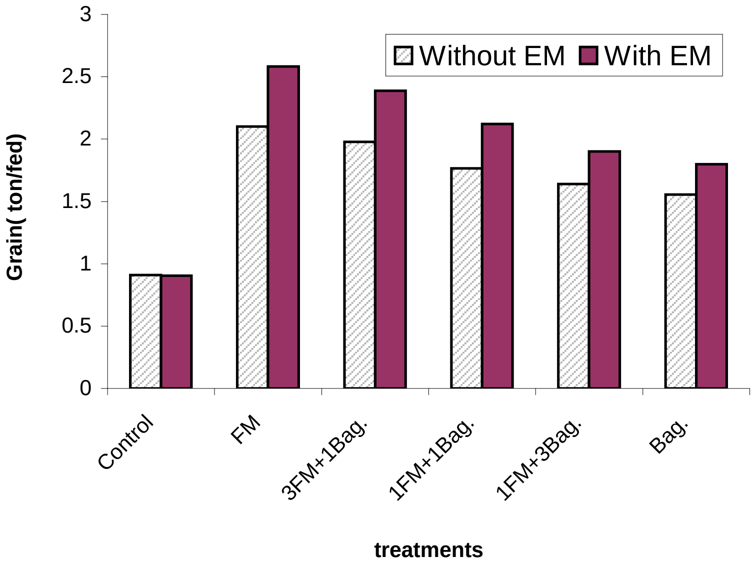

Fig. (8). Effects of the studied treatments of FM and Bag and EM on grain yield (Ton/fed) of wheat plant..

REFERENCES

Abou Yuossef, M.F., M. Hassen and A.S.EL Kot (2007). Evaluation of sugar cane filter mud as a soil conditioner under irrigation with saline water. Annals of Agric. Sci., Moshtohor, Vol. 45(1): 469-484.

Abou Yuossef, M.F., M.H. Ali and A.S.EL Kot (2008). Residual effect study of sugarcane filter mud as soil conditioner under saline water irrigation . Egyptian J. of Applied Sci., Vol 23(8 B): 339 – 352.

Abou Yuossef, M.F., A.A. Abou Hashem and M.H. Ali (2009). Effect of the interaction between effective microorganism and sugar cane filter mud on the productivity of sandy soil. Egyptian J. of Applied Sci., Vol 24(12 B): 773 – 790

Arafat, S.M., M. Abou Seeda, M.A. Shreif and M.A. Rasheed (1992). Beneficial effect of filter mud on agricultural characteristics of sandy soil. Zagazig.J . Agric. Res. ,19:1907-1915.

Barry, G.A., E.A. Gardner, G.E. Rayment and P.M. Bloesch (2000). Recycling organic materials on agricultural lands. Proc. Aust. Soc. Sugar Cane Technol., 22:50- 55.

Barzegar, A.R., A. Yousefi and A. Daryashenas (2002). The effect of addition of different amounts and types of organic materials on soil physical properties and yield of wheat. Plant and soil 247:295-301.

Black, C.A. (1965). Methods of Soil Anlysis (part 1). American Society of Agronomy.In Madison ,Wisconsin ,USA.

Blake, G.R. (1986). Bulk density. p. 374 - 390. In “Klute, *et. al.* (eds.). Methods of Soil Analysis,Part I. Physical and Mineralogical Methods, American Society of Agronomy. Inc. Medison Wisconsin. USA .

BSES (1994). Salting effects reduced by mill mud,BSES Bullenti,No.46,April,pp.0-11.

Chapman, L.S. (1996). “Australian Sugar Industry by -products recycle plant nutrients", in Humter, H.M., Eyles, A.G. and Rayment, G.E.(eds),Downstream Effects of Land Use, Department of Natural Resources, Brisbane.

Dee, B.M., R.J. Haynes and J.H. Meyer (2002). Sugar mill wastes can be improtant soil amendments. Proceedings of the South African Sugar Technologists Association . 76:51-60.

Ghulam, S., M.J. Khan, K. Usman and H. Rehman (2010). Impact of press mud as organic amendment on physico-chemical characteristics of calcareous soil. Sarhad J. Agric. 26 (4): 565-570.

Gomez, K.A. and A.A. Gomez (1984). "Statistical Procedures for Agricultural Research ",2nd ed.,P. 680, John Wiely and Sons.

Hassan, E.A., E.F. Ali and A.F. Ali (2010). The enhancement of plant growth, yield and some chemical constituents of Dill (*Anethum Graveolens,L.*) plant by filter mud cake and potassin treatments. Australian J. of Basic and Applied Sci.4 (5): 948-956.

Higa, T. (1998). Effective Microorganisms for a More Sustainable Agriculture, Environment and Society: Potentail and Prospects.In Parr,J.F. and S.B.Hornick, (Eds).Proceeding of the 4th International Conference on Kyusi Nature Farming. 19-21 June, Paris, France,pp:12-13.

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

Jackson, A.L. (1973). Soil Chemical Analysis -Advanced Course. Pub. by Author, Dept. of Soils, Univ of Wisc. Madison, Wisc. , U.S.A.

Jamilkhan, M. (2011). Impact of selected doses of organic wastes on physico-chemical characteristics of the soil and yield of wheat .International Conference on Environmental Engineering and Applications (IPCBEE)Vol.17:271-275.

Kalaivanan, D. and K.O. Hattab (2008). Influence of enriched press mud compost on soil chemical properties and yield of rice .Research J. of Microbiology,3:254-261.

Karim, A.J.M., A.R. Chowdhry and J. Haider (1992). Effect of manure and effective microorganisms on physio-chemical properties of soil and yield of wheat. Proceeding of 1stAPANA Conference on EM Technology. Institute of Kyusei

Nature Farming .June, 22-25. Saraburi, Thailand , pp:26-41.

Kelly, G. (2006). Recycled organic in mine site rehabilitation .NSW Dept of primary Industries, Parramatta NSW 2124,DEC 2006/184.

Kingston, G. (1999). A role for silicon, nitrogen and reduced bulk density in yield responses to sugar mill ash and filter mud/ash mixtures, Proceedings of the Australian Society of Sugar Cane Technologists Conference, Townville, pp.114-121.

Klute, A. (1986). Laboratory Measurment of Hydraulic Conductivity of Saturated Soil p. 210 -220. In "Klute, *et. al.* (eds.). Methods of Soil Analysis,Part I. Physical and Mineralogical Methods, Am. Soc. Agron. Inc. Medison Wis. USA.

Kumar, V. and S.K. Verma (2002). Influence of use of organic manure in combination with inorganic fertilizers on sugarcane and soil fertility .Ind. Sugar 52(3):177-181.

Mathakiya, H.V. and M.B. Meisheri (2003). Feasibility of using some solid industrial wastes absorption and soil properties . Indian J.Agric.Chem.,36:141-151.

Mohamed, A.A. and M.E. Ahmed (2002). A comparative study on the effect of sugar cane filter mud, sheep and chicken manures used for fertilization of sweet fennel crop (*Foeniclum vulgare,L.*).Minia J .of Agric.Res.& Develop.,22(3): 221-234.

More, S.D. (1994). Effect of farm wastes and organic manures on soil properties, nutrient availability yield on rice- wheat grown on sodic vertisol. J . Indian Soc. Soil Sci.42(2);2253-256.

Nehra, A.S. and I.S. Hooda (2002). Influence of integrated use of organic manures and inorganic fertilizers on lentil & mungbean yields and soil properties . Res .on Crops.3(1):11.16.

Qureshi, M.E., M.K. Wegener and F.M. Mason (2000). Mill mud case study in Mackay:An economic study on recycling sugar by-products for the mackay region. CRC Sugar Occasional publication, Twnsville, ISBN 1876679 166.

Rakkiyappan, P., S. Thangavelu, R. Malathi and R. Radhamani (2001). Effect of biocompost and enriched press mud on sugar cane yield and quality .Sugar Tech.3 (3):92-96.

Rangaraj, T., M.A. Mohamed, V. Thirumygan, S. Ramesh and S. Ravi (2007). Effect of agro-industrial wastes on soil properties and yield of irrigated finger millet (*Eleusine coracona L. Gaertn*) in coastal soil. Res. J.of Agric. and Biological Sci.,3:153-156.

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

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

Srinarong, S. and S. Panchaban (2003). Effect of filter cake, sludge cake and chemical fertilizer on growth and yield of five rice cultivars (*Oryza sative L.*) grown on saline soil .Pakistan J.of Biological Sci., 6(5): 432-436.

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.

Vetayasuporn, S. (2006). Effects of biological and chemical fertilizer on growth and yield of glutinous corn production. J.of Agronomy, 5:1-4.

Yassen, A.A., S.M. Khaled and S.M. Zaghloul (2010). Response of wheat to different rates and ratios of organic residues on yield and chemical composition under two types of soil .J. of Amer.Sci., 6(12):858-864.

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تقييم كفاءة بعض مخلفات التصنيع الزراعي في تحسين الصفات الإنتاجية للتربة الرملية في شمال سيناء

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الملخص العربي

في تجربة حقلية أجريت في جنوب القنطرة شرق –سيناء الشمالية لدراسة تأثير إضافة بعض مخلفات التصنيع الزراعي (filter mud,bagasse) بمعدل ١٠ طن/فدان كل منها على حدة أو خلط بنسب مختلفة هي كنترول بدون اى إضافات ،١: صفر، ٣ : ١ ، ١ :١ ، ١ : ٣ وصفر :١ مع معدلين من مادة الكائنات الدقيقة المؤثرة (EM) صفر، ٣٠ لتر/فدان على خواص التربة وإنتاجية محصول القمح .

أظهرت النتائج إلى انخفاض قيم كل من ال pH ،الكثافة الظاهرية والتوصيل الهيدروليكي في كل المعاملات مع إضافة مادة الكائنات الدقيقة المؤثرة (EM) أو بدون إضافتها فنجد إن النقص العالي من قيم الpH في المعاملات التي تحتوى علىfilter mud ويزداد النقص مع زيادة نسبة filter mud في المعاملة ، في حين نجد أن النقص في كلا من قيم الكثافة والتوصيل الهيدروليكي مع زيادة نسبة bagasse مع EM في المعاملات.من ناحية أخرى نجد إن ال EC تزداد من ٠,٦٣ ديسيمنز/م إلى ١,٤٤ ديسيمنز/م وان الزيادة الأعلى

في قيم EC تكون مع معاملة filter mud بدون إضافة الEM وان اقل زيادة في قيم EC (١,٠١ ديسيمنز/م) مع معاملة bagasse مع EM.

أما من ناحية نسبة محتوى الكربون العضوي فنجد أنها تزداد من٠,٤٢. % إلى ١,٣ % و الزيادة الأعلى في السعة المائية العظمى للتربة ٤٥, ٦ % تكون مع معاملة filter mud مع EM أيضا نجد هناك زيادة معنوية لتوسط القطر المكافئ (MWD,mm) لكل المعاملات المستخدمة . ومن ناحية أخرى أظهرت إضافة مخلفات التصنيع الزراعي (filter mud:bagasse) بمعدل ١٠ طن/فدان مع أو بدون الEM زيادة معنوية عالية في حبوب القمح حيث زاد محصول الحبوب من ٠,٩٠٩. طن/فدان إلى ٢,٥٨٢ طن/فدان وكانت اكبر زيادة لهما عند معاملة filter mud مع EM .

وبناء على ذلك من الممكن استخدام مخلفات التصنيع الزراعي بنسب خلط مختلفة مع EM أو منفردا مع EM كمصدر لتحسين إنتاجية التربة الرملية.