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INFLUENCE OF SOME NATURAL SOIL CONDITIONERS UNDER DIFFERENT LEVELS OF MINERAL NITROGEN ON SANDY SOIL PROPERTIES AND MAIZE PRODUCTIVITY

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ABSTRACT: ***A field experiment was carried out on a sandy soil of the Experimental Station of Agric. Rese. Center (ARC), Ismailia Governorate, Egypt to study the effects of using some crop residues as a natural soil conditioners on some physical properties i.e., bulk density, hydraulic conductivity, field capacity, wilting point and available water and chemical properties (pH, EC and the content of O.M) and available N, P and K as well as the productivity of (Zea mays L. c.v., Triple hybrid 324).The experiment was designed in a randomized complete block design with three replicates. The three sources of soil conditioners were: sawdust (S), rice straw (RS) and maize stalks (MS) at rate of 2.5 g O.C/ kg soil. Also of two rates of nitrogen mineral 5 % and 10% over the N Recommended dose (300 kg/fed which added as ammonium sulfate (21% N). Obtained results can be summarized as follows:***

In compare with non conditioned soil (control), the studied physical properties of the sandy soil were improved significantly with the application of all conditioners (S, RS and MS) as a resulted in a decreases in both bulk density and hydraulic conductivity where caused an increase of field capacity, wilting point and available water content.

The values of pH and EC were decreased with addition of organic soil conditioners and also, the content of available N, P and K increased significantly with the use of organic conditioners (S, RS and MS) especially, with high rate of mineral nitrogen N (10%) over recommended dose. Moreover sawdust treatment had more effect on the soil content of available N, P and K compared with the other soil conditioners.

Plant height of maize and its straw and grains yields increased significantly with the application of soil conditioners (S, RS and MS) with N fertilizer at rates of 5% and 10% compared with the control treatments.

Key words: ***Physical and Chemical properties, Sand soil, Soil conditioners, Nitrogen fertilizer, Macronutrients availability, and Zea maize.***

INTRODUCTION

The rapid growing population in Egypt leads to increases the demand on food and maize is one of the most important summer cereal crops grown in Egypt. It is grown in 1.04 Million hectares with a production of 8.06 Million tons at an average productivity of 7.76 tons hectares. Therefore, increasing maize production is very important concern to face the gap between production and consumption. Most of the newly reclaimed soils in Egypt usually have poor in organic content, weak soil structure, low water use in crop production, poor physical, chemical and biological properties and then lead to low productivity. Sandy soils utilization for agricultural purposes depends mainly on improving their properties to the maximize efficiency of use water and nutrient in these soils (FAO, 2016).

Soil conditioners are usually used in arid and semi arid regions for conserving water content and retention, improve properties and increase plant production

in these soil, Rice straw has become a very serious problem in Egypt due to the huge production of straw of about 20 million tons year^{-1} (Toufiq, 2016 and Ahmed, 2018). Plant wastes may be beneficial due to its rich carbonaceous nature, but it may also affect nitrogen availability for the same reason. The application of plant waste to soil is a current environmental and agricultural practice for maintaining soil organic matter, reclaiming degraded soils and supplying plant nutrients. The application of plant waste with different rates of nitrogen fertilizers to soil affected positively in maize planted in sandy soil. The presence of conditioner is useful for the enhancement of soil chemical properties of the sandy soils have several major problems e.g. small volume changes; low water retention capacities; and limited moisture range during which. Agricultural wastes of S, RS, and MS have unprofitable uses till now. A continuous removal of such wastes from the production sites has very necessary to be transformed into effective and low price soil amendments (Toufiq, 2016).

These materials have the capability to improve the physical-chemical properties of soil. Noble *et al.* (2000) mentioned that, the important step in the process of improving soil physic-chemical characteristics of these degraded soils is to address the problem not only nutrient but also water holding capacity associated with a reduction in soil organic matter.

However, contrary the rate of decomposition of organic matter added to the soil depends largely on the C: N of the materials.The ratio of (C/N) of plant wastes needs to add of nitrogen of plant wastes badge to facilitate decomposition (Hassan, 1998). Mineralization of organic N in compost is dependent on many factors including C/N ratio of raw material, composting conditions, compost maturity, time of application, and compost quality (i.e., C/N ratio or C- and N-fractions) (Amlinger *et al.,* 2003) they, found that addition of natural conditioners to sandy soils reveals improvement of their hydro physical characteristics. However, in spite of these disadvantages, the benefits that are being derived from the use of these agricultural wastes in improving the hydro-physical properties of the soil for certain plants cannot be overlooked. Manukaji (2013) stated that applying plant west to sandy soils may be a good way to help in solving the hydro-physical problems, but limited research has been done to quantify the beneficial effect of applying fresh fine sawdust to sandy soils. Adding plant waste may help to maintain or increase the level of organic matter. Soil organic C is important determinants of soil quality. Mahadi *et al.* (2005) declared that because they positively affect water retention and plant root growth, it is well can be achieved by implementing soil.Abdel-Hai (2005) revealed that the addition of organic materials decreased hydraulic conductivity in sandy soil. Awadalla *et al.* (2002) revealed that application of organic amendments to a newly cultivated sandy soil at El-Khatara gave a highly significant increase in available moisture. El-Kharbotly and Hokam (2016) showed that affecting moisture storage in soil, consequently, will affect water saving indicated that, rice straw could be the suitable practice to conserve soil moisture and obtain a higher crop yield. Dahiya *et al.* (2007) concluded that, due to the evaporation property of the surface placed straw layer, mulching treatment reduced soil water loss compared to that from non- mulched soil during the study period. Tomasz *et al.* (2018) concluded that, the increase in soil moisture due to use soil conditioner but the lowest value of available water was

obtained from soil with maize straw compos in sandy soil.

Ahmed *et al.* (2015) indicated that there are reduction in soil pH and salinity as a result of the different applied soil conditioner sawdust compared to control. Shaban, *et al.* (2011) found that added organic materials combination with different rates from N- fertilizer were positive effect on pH and EC of soil. Ahmed *et al.* (2014) found that the application of compost led to significant a lower degree of pH and EC of the soil compared with other treatments and improving in soil physical.

Mohamed (2007) found that, the application of cotton stalks or rice straw composts significantly increased the chemically extractable N, P and K in the cultivated sandy soil, whereas rice straw compost was better than cotton stalks one. Awad *et al.* (2003) found that the soil available content of N, P and K were increased by the application of organic wastes. El-Sharawy *et al.* (2003) reported that the application of both cotton stalks and rice straw significantly improved available N, P and K. Abdel-Hai (2005) revealed that the addition of organic materials increased the availability of N, P and K in sandy soil.

This field study was carried out to evaluate the efficiency of some plant residues as natural conditioners in the sandy soil and their effect on physical and chemical properties of sandy soil and its content of some available macronutrients as well as its productivity of maize plant.

MATERIALS AND METHODS

Experimental site and treatments:

A field experiment was conducted at the Experimental Station of the Agric. Res. Center (ARC), Ismailia Governorate (Latitude, 30°37'7.04" N and longitude, 32°14'32.12" E) during the tow summer seasons of 2016 and 2017. Maize (Zea mays L. c.v., Triple hybrid 324) grains were sown at spacing of 60 cm x 25 cm on 18 May, in the one season by line sowing cultivated in sandy soil at the rate of 14 kg grains fed.$^{-1}$ (fedan = 4200 m^2). Maize grains supplied by Maize Depart. Filed Crop Res. Inst. (ARC). Treatments consisted of factorial of four natural conditioners (rice straw “RS”, maize stalks “MS”, sawdust “S” and control “C”) and two levels of 5% and 10% mineral nitrogen over recommended dose (T1 and T2 respectively) arranged in a randomized complete block design with three replicates. The studied field (7.8×42.6m) divided into 24 plots to receive the treatments and each plot (3.0 × 3.6 m) while a row (with wide 0.6 m) was used as border line between two plots and sprinkler irrigation system was used.

The studied treatments were arranged within the experimental units as a randomized complete block design with three replicates. Before planting, soil samples were collated from the surface layer (0-30 cm depth) of experimental soil and analyzed for some physical and chemical properties according to the standard methods described by Cottenie *et al.,* (1982), and Kiute (1986) and the obtained date are tabulated in Table (1).

The used three plant residues i.e. sawdust, rice straw and maize stalks as source as an organic matter were obtained from Agric station of ARC, Ismailia Governorate. Before the used three materials were crashed up to 2-4 cm. Different soil conditioners were mixed in the top layer (0-15 cm) of soil at a uniform of rate 2.5 g O C/ kg soil baser or their content of total O.C % as shown in Table (2) Data in this Table also show the chemical composition of these soil conditioners which determined according to Page *et al.* (1982).

Table (1). Some physical and chemical properties of experimental soil at depth of 0-30 cm

Physical properties								
Sand %	Silt %	Clay %	Texture	B.D Mg m^{-3}	H.C Cm h^{-1}	F.C %	W. p %	A. w %
84.60	8.30	7.10	Sand	1.62	24.40	7.20	4.50	2.70

Chemical properties				Available macronutrients (mg kg^{-1} soil)		
EC dm^{-1} (saturated past extract)	pH (Suspens ion 1: 2.5)	O. M %	Ca CO_3 %	N	P	K
0.57	7.59	0.19	1.18	63.54	13.60	25.35

B.D Bulk density, H.C Hydraulic conductivity, F.C field capacity, W. p wilting point and A. w available water O. M organic matter

Table (2). Some properties of the application natural conditioners and their application rates.

a – Property	Sawdust (S)	Rice straw (RS)	Maize stalks (MS)
Quantities (g O.C / kg soil)	6.41	4.9	5.08
EC (dS m^{-1}) 1:5 extract	0.2	3.26	0.54
pH (H_2O) 1:5 extract	4.11	5.85	6.67
Organic carbon (%)	39	51	49.25
Total Nitrogen (%)	0.17	0.58	0.56
C:N ratio	229:1	88:1	88:1
Total Phosphorus (%)	2.21	0.1	0.31
Total potassium (%)	2.5	1.38	1.11
Bulk density (kg m^{-3})	204	120	155
Moisture contents (%)	4.27	15	50
b- application rates			
Dose	2.5 g O.C. / kg soil		
Quantities ton fed^{-1} soil conditioner	6.41	4.9	5.08

In addition (T1 and T2) Mineral nitrogen as 300 kg /fed to improve C/N ratios of soil recited the tested natural conditioners ammonium sulfate (21% N), at five equal doses applied, at 5% and 10% over the recommended dose which was 15 and 30 kg N fed All experimental units were fertilized, ordinary super phosphate (15.5 % P_2O_5) as a rate of 150 kg /fed before planting with soil preparation. Potassium fertilized (K_2SO_4), (48% K_2O) was added at a rate of 100 kg /fed in two equal doses before planting and after 20 days of planting. Also, added mineral nitrogen (T1 and T2) was added in equal dose after 15 and 30 days of planting.

Maize plants were harvested at maturity on 13rd September 2017. Sample plant taken from the center two rows of each plot and the yield (straw and grains) were recorded, Before harvesting, plant height was measured on 10 plants of each plot which selected randomly.

Surface soil samples was taken from each plot at a depth of 0-30 cm after harvested and air dried, crushed and sieved through a 2 mm screen and analyzed for some soil physical, chemical properties were determined according to Kiute (1986), Cottine *et al.* (1982) and Page *et al.* (1982).

Plant samples of straw and grains of each plat have been oven dried at 70 C for 48 hr, up to constant dry weight 0.2g of oven dray plants samples was digested using 5 ml of mixture H_2SO_4 and H_2O_2 for N, P and K determinations as described by Cottenie *et al.* (1982).

Statistical analysis:

Data were exposed to statistical analyzed as complete randomized block design with (7) treatments and (3) replicates according to Snedecor and Cochran (1982).

RESULTS AND DISCUSSION

Soil physical properties.

In general data in Table (3) showed non- significant effects of both soil conditioners and mineral N application individually and in together on bulk density"BD" (Mg $m.^{-3}$), where its values ranged from 1.58 to 1.61 (Mg $m.^{-3}$) affected by soil conditioners addition and from 1.60 to 1.59 (Mg $m.^{-3}$) withT1 of N-fertilizer application. These results are in coinciding with Ahmed (2018).

The results also revealed that, the application of soil conditioners had significant effects on decreasing hydraulic conductivity (H.C) values compare with the control one soil (H.C), where H.C values was 24.10 cm $h.^{-1}$ for the control treatment which relative decrease by 1.95 %, 1.45 % and 1.20 % for the treatments of S, SR and MS, with T1 of mineral N application respectively. The treatments of these results clear that the decreases in H. C in the studied sandy soil may be due to the rote of soil organic conditioners added to the soil therefore, the low H. C value for treatments the of S, RS and MS may be due to the mechanical action for their sizes (Manukaji, 2013).

In general, the effect of applied conditioners on H. C might be attributed to their effect on soil aggregation and modification in pore size distribution, i.e., decrease in bulk density. The highest decreases of hydraulic conductivity was found with the S conditioner be attributed to the role of S that would have changed the soil matrix (i.e., facilitated the cohesive interaction of soil/sawdust or sawdust/sawdust particles) resulted in decrease the coefficient of permeability.

Data also revealed that, addition of 5% and 10%N- fertilizer over R.D caused mean deceasing in H C, where its values 23.82 with the control treatment was 23.75 cm h^{-1}, 23.63 cm $h^{-1}$with T1 and T2 respectively. This trend was found with al treatments of soil conditioners. The soil H.C mean values as a result of soil conditioners application were arranged as follows: control> MS > RS> S. This may be due to modification in pore size distribution, i.e., increase the drainable pores, reducing in bulk density. Therefore, the increase in HC values for the treatments of MS, RS and S than the control treatment may be due to the mechanical action for their sizes. These results agree with those obtained by Eusufzai and Fujii (2012) and Manukaji (2013).

Table (3). Effects of the studied treatments on soil physical and chemical properties after plant harvesting.

Treatments		B. D Mg m^{-3}	H C	Soil moisture Retention			E C	pH	O.M %
Conditioner (C)	Mineral nitrogen (N)		cm/h	FC %	Wp %	Aw %	dS m^{-1}		
Control	T1	1.62	24.10	7.3o	3.35	3.95	0.57	7.59	0.19
	T2	1.62	24.10	7.30	3.30	4.00	0.55	7.57	0.19
	Mean	1.62	24.10	7.30	3.33	3.98	0.56	7.58	0.19
Sawdust (S)	T1	1.57	23.57	8.40	3.75	4.65	0.49	7.56	0.22
	T2	1.58	23.70	8.55	3.85	4.70	0.51	7.55	0.22
	mean	1.58	23.64	8.48	3.80	4.68	0.50	7.56	0.22
Rice	T1	1.58	23.65	7.57	3.43	4.14	0.52	7.55	0.21
Straw	T2	1.58	23.85	7.53	3.40	4.13	0.53	7.54	0.21
RS	mean	1.58	23.75	7.55	3.42	4.14	0.53	7.55	0.21
Maize	T1	1.60	23.73	7.43	3.39	4.04	0.54	7.54	0.20
Stalks	T2	1.61	23.90	7.53	3.42	4.11	0.55	7.53	0.20
M S	Mean	1.61	23.82	7.48	3.41	4.08	0.55	7.54	0.20
LSD at 5%									
Con. 5%		N.S	0.01	N.S	0.01	N.S	N.S	N.S	N.S
N. at 5%		N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
C.N 5%		N.S	N.S	N.S	N.S	N.S	0.01	N.S	N.S

B.D Bulk density, H.C Hydraulic conductivity, F.C Field capacity, W. p Wilting point and A. w Available water O. M Organic matter T1= Recomanded dose of N + 5% N T2= Recomanded dose of N + 10% N

Data presented in Table (3) showed the application effect of three soil conditioners on soil field capacity (FC), wilting point (WP) and the content of available water (AW) in the studied sandy soil. The values of FC, WP and AW in testing soils positively affected responded to the application of different soil conditioners as comparatively observed with the control treatment. Whereas, the values of FC, WP and AW values increased from 7.30, 3.35 and 3.95% in the control treatment to (8.48, 3.80 and 4.68) under sawdust addition, 7.55, 3.42 and 4.14 with rice straw values and (7.48, 3.41 and 4.07%) with addition of maize stalk respectively. The highest increase percentages of retained at field capacity, wilting point and available water were noticed in plots treated with sawdust. So, the capability of the amending materials to absorb and retain moisture at field capacity and wilting point recorded after maize harvesting can be arranged as follows: S >RS> MS. Particularly application of sawdust S

caused raised of water retained at either field capacity or wilting point. These results are in similar with these obtained by (Islam *et al.,* 2017). The increase in water availability could be ascribed to the beneficial effect of such materials on soil aggregation. On the other hand, the lowest values of field capacity, wilting point and available water were recorded in the plots treated by with maize stalke in compared with the other two soil conditioners. Also, these results may be attributed to the addition of soil organic conditioners either addition increased the specific surface area and the water holding pores area which increased water field capacity, wilting point and available water (Zhao *et al.,* 2009). Similar finding was observed by Negm *et al.* (2005) and Ahmed *et al. (*2015). Also this can be attributed to the inferiority in the composition and stability of soil aggregates, (Surajit *et al.,* 2015). The increases in available water, hence, lead to a feasible route conditions and plant growth. In general, the aforementioned sequence illustrates the superiority of Sawdust at its higher which is a logic result because of its relatively which indicates that decomposition of the Sawdust would take longer time than the other used composites and hence its conditioning effect would still remain for longer periods.

The sawdust potential to facilitate cohesive interaction of soil/sawdust particles was indicated by Rajor *et al.* (1996). Also, sawdust potential to increase soil flocculation and consequently, soil aggregation was indicated by Eusufzai and Fujii (2012).

With regard to the effects of over N- fertilizer doses, data in Table (3) showed that all FC%, WP % and AW% values increased with 10% over dose N- fertilizer (T2) than 5% (T1). Whereas their mean values (%) were (7.80, 3.52 and 4.20) under (5% and 7.87, 3.56 and 4.31 with 10%) for FC, WP and AW respectively with significant trend for FC% only.

Soil chemical properties.

Data presented in Table (3) indicated that, the values of soil pH were slightly decreased with addition the different soil conditioners i.e., S, RS and MS compared to the control. On the other hand, the effects of N- fertilizer over does showed non significant effect on soil pH. These results may be due to contain low plant residual which base forming cautions so cause decreasing pH (Ann *et al.,* 2017) and might be attributed to organic acids produced during the decomposition of the organic fraction of the soil organic conditioner's production of organic acids, which formed as a result of organic matter decomposition (Ahmed *et al.,* 2015).

The data in Table (3) showed that the soil EC was decreased with addition of S, RS and MS with non significant differences between all the experimental treatments. Based on the fund decreases of soil EC as a result of soil conditioners applications, these conditioners takes the order: control > MS> RS> S. The decrease in EC may be related to the salt leaching of salts outside the root zone (Lehrsch *et al.,* 1993).

In addition, data presented in Table (3) indicated that values of soil O.M contents showed non- significant increases as a result of application of different soil conditioners or N- fertilizer doses when compared to the control treatment. Also, application of different conditioners caused appreciable accumulation of OM, as compared to the control, e. Results also show that the magnitudes of increase were dependent upon the type and rate of the applied soil conditioners. Generally, results obtained indicated that increments of organic matter (OM) after maize harvesting. This may be due to the effect of the applied conditioners on

increasing the organic matter content of the soil is attributed to either enriching the organic matter content itself or the enhancement of the root system. Hence, the recycling of the wheat crop residues seemed to enhance organic matter accumulation after sorghum (El-Etr *et al.,* 2004). The application of organic amendments to sandy soil, gave a highly significant increase in organic matter content under cereal crop yield (Awadalla *et al,.* 2002 and Mohamedien, 2001) the applications of organic conditioners to the sandy soils increased its organic matter content (Beheiry *et al.,* 1997).

Basyouny (2002) reported that, increasing the rate of applied organic manure to sandy soils, in general, increased the soil organic matter content. Khater *et al.* (2002) showed that the application of organic amendments increased the content of organic matter. Also, Negm *et al.* (2003) found that an organic compost of sawdust with cattle dung application increased organic matter content.

Soil content of available N, P and K

Concerning macronutrient availability in soil, data in Table (4) indicated that adding the natural conditioners and over dose of N fertilizer increased available N, P and K in soil as compared to the control treatments. Also, results showed that available N, P and K increased significantly by adding the conditioners of S, R S and MS. The same obtained results had recorded by Wong *et al.* (1999) and Toufiq (2016). Moreover, Sawdust treatment under the two application rates of N was superior in increasing available N as compared to RS and MS or control. This is due to the application of organic conditioners to sandy soil, which resulted in reducing pH values and increasing the total soluble salts and soluble ions Seddik (2006). As for added of over dose of N data revealed that 10% over dose of N (T2) applied with all soil conditioners were increased significantly available N, P and K in soil. This may be due to the indirect effect of organic conditioners on soil availability of micronutrients (Islam *et al.,* 2017).

Plant height.

Data in Table (5) showed the plant height of maize was increased significantly as affected by different application of soil conditioner individually and in combination with N fertilizer as compared to the control treatment, Maximum values of plant height (2.79 m), was recorded with the treatment of sawdust and T_2 N- fertilizer over R.D. Whereas the minimum (2.59 m) were recorded with the combined treatments MS and T_1. The plant height (m), increased from 2.54 m in the control treatment to 2.79, 2.60 and 2.59 m with treatments of S, RS and MS respectively. Based of the fund increases of plant high the used soil conditioners tokes the order S >R S> MS. This trend may be due to their relative higher content of organic matter which plays an important role in keep water and nutrients (Islam *et al.,* 2017).

The increase in plant height (cm), could be ascribed to the beneficial effect of such materials adding, these results may be attributed to the addition of soil organic conditioners either addition increased the keep water and nutrients observed by Ahmed *et al.,* (2015). Also this can be attributed to the inferiority in the composition, (Surajit *et al.,* 2015).

The highest mean values plant height (cm), reveled with N- fertilizer, under N- fertilizer treatments were (169, 164 and 159 cm) for S, RS and MS, respectively. N- fertilizer important for plant growth and performs other functions like metabolic activities, particularly in synthesis of protein.

Straw, grain and biological yields of maize plant.

With respect to maize straw and grain yields, data in Table (5) showed a significant increases of straw, grain and biological yields of maize with the application of soil conditioners with over doses of N- fertilizer individually and combination as compared to the control treatment. These results are in good agreement with those obtained by Seddik *et al.* (2006). Also, results indicated that yield of maize increased by increasing the rates of over dose of N- fertilizer from 5%to 10%. Moreover the treatment of sawdust with 10% (T^2) resulted in highest values of straw and grain yields as compared to any ether treatment. These results are in similar with those recorded by Wong *et al.* (1999) and Gouda (1984).

The differences in yield over the control were due to the improved water retention ability of the amended soils and increase in organic matter with added the soil conditioner and similar results were obtained by Noble *et al.* (2000).

Table (4). Interaction effects of the experimental treatments on soil content available N, P and K in the tested sandy soil.

Treatments		Available (mg Kg^{-1})		
Conditioner (C)	Mineral nitrogen (N)	N	P	K
Control	T1	63.54	13.6	25.35
	T2	63.66	13.5	25.35
	Mean	63.6	13.55	25.35
Sawdust (S)	T1	67.4	13.75	25.65
	T2	68.55	13.85	25.7
	mean	67.98	13.8	25.68
Rice Straw RS	T1	67.51	13.3	25.5
	T2	68.49	13.65	25.55
	mean	68	13.48	25.53
Maize Stalks M S	T1	67.15	13.5	25.5
	T2	68.5	13.3	25.5
	Mean	67.83	13.4	25.5
C LSD at 5%		0.01	0.01	0.01
N LSD at 5%		0.01	NS	0.01
C.N LSD at 5%		0.03	NS	0.01

Table (5): Interaction effects of the experimental treatments on plant high andstraw, grain and biological yields of maize plants.

Treatments		Plant height	Straw	Grains	Biological
Conditioner (C)	Mineral nitrogen (N)	m	Ton fed.$^{-1}$	Ton fed.$^{-1}$	Ton fed.$^{-1}$
Control	T1	2.53	3.77	3.06	6.83
	T2	2.55	5.02	3.16	8.18
	mean	2.54	4.40	3.11	7.51
Sawdust (S)	T1	2.65	7.07	3.97	11.04
	T2	2.93	7.43	4.09	11.52
	mean	2.79	7.25	4.03	11.28
Rice Straw R S	T1	2.50	7.25	3.80	11.05
	T2	2.70	7.05	3.53	10.58
	mean	2.60	7.15	3.67	10.82
Maize Stalks M S	T1	2.57	7.10	3.57	10.67
	T2	2.60	7.13	3.47	10.60
	mean	2.59	7.12	3.52	10.64
C LSD at 5%		0.01	0.01	0.11	0.01
N LSD at 5%		0.02	0.22	0.88	0.52
C.N LSD at 5%		NS	0.17	0.94	0.42

Conclusion

The obtained data in this study concluded that the sandy soil physical and chemical properties and its content of available macronutrient as well as its productivity of maize plants (straw and grains) were improved as a result of some organic materials (S, RS and MS) applications. Application of such organic materials appeared high efficiency when applied in together with mineral fertilizers speedily nitrogen fertilizer to improve soil C/N ratio.

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تأثير بعض المحسنات الطبيعية تحت مستويات مختلفة من النيتروجين المعدنى على خواص التربة الرملية وإنتاجية الذرة

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المخلص العربى

تم إجراء تجربة حقلية على أرض رملية فى محطة مركز البحوث الزراعية – محافظة الإسماعيلية لدراسة تأثير إستخدام بعض مخلفات المحاصيل كمحسنات طبيعية للأرض على الخواص الطبيعية (الكثافة الظاهرية ، التوصيل الهيدروليكى، السعة الحقلية، نقطة الذبول ، الماء الميسر) والخواص الكيميائية (pH, EC، محتوى المادة العضوية والمحتوى الميسر من النتروجين والفوسفور والبوتاسيوم) بالإضافة إلى إنتاجية نبات الذرة.

صممت التجربة فى قطاعات تامة العشوائية مع ثلاث مكررات . وأستخدمت فى الدراسة ثلاث مصادر من المحسنات الأرضية (نشارة الخشب ، قش الأرز ، حطب الذرة) بمعدل ٢,٥ جرام كربون عضوى / كجم مع نيتروجين معدنى بمعدل (٥٪ ، ١٠٪) فوق المعدل الموصى به (٣٠٠ ك/ فدان) فى صورة سلفات آمونيوم (N ٢١٪) وكانت النتائج المتحصل عليها كالتالى: الخصائص الطبيعية للأرض تحت الدراسة قد تحسنت بشكل معنوى مع اضافة كل المحسنات السابق ذكرها مقارنة بالكنترول كنتيجة للإنخفاض فى الكثافة الظاهرية والتوصيل الهيدروليكى وزيادة السعة الحقلية ومحتوى الماء الميسر.

أيضا قيم pH, EC إنخفضت نتيجة إضافة المحسنات السابق ذكرها أما المحتوى الميسر للنتروجين والفوسفور والبوتاسيوم فقد ذاد معنوياً مع إستخدام المحسنات العضوية خاصة مع المعدل العالى من النتروجين المعدنى (N ١٠٪) فوق الموصى به وكانت معاملة نشارة الخشب الأعلى تأثير وكانت هناك زيادة معنوية فى إرتفاع النبات ومحتواه من القش والحبوب نتيجة إضافة المحسنات مع النتروجين المعدنى مقارنة بالكنترول.

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