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EFFECT OF ORGANIC MANURES AND FELDSPAR APPLICATION ON SOME SANDY SOIL PHYSICAL AND CHEMICAL PROPERTIES AND THEIR REFLECTION ON PEANUT PRODUCTIVITY.

Seddik, Wafaa M. A.
Soils, water and Environment Res. Inst. Agric. Res. Center , Giza, Egypt.

ABSTRACT

Two field experiments were carried out for two successive seasons of 2004 – 2005 at Ismaillia Agric. Res. Station (Agric., Res., Center) to study the effect of organic manure (rice straw compost and chicken manure) application both individually and/or both in combination with clay mineral (feldspar) or potassium sulphate applied at two doses (Recommended dose) and 75% of recommended dose of K) on some soil physical and chemical properties and peanut yield under the affect of inoculation with potassium dissolving bacteria. Organic manures were added at the rate of $20m^3$/fed., while, feldspar and or potassium sulphate was added to the soil at the rate of 50 and 37.5kg K_2O /fed.

Results revealed that the addition of both organic manure alone and/ or combined with feldspar (recommended dose) to the soil decreased bulk density and increased total porosity at both growing seasons compared to the soil without organic manure or feldspar.

Application of chicken manure mixed with feldspar (at rate 100%) and inoculated with *Bacillus pasteurii* increased significantly the available N, P and K contents in the soil as compared to the control treatment (without inoculation).

Results demonstrated significant increases of peanut yield for both seasons due to the addition of either rice straw compost or chicken manure to the soil mixed with feldspar and inoculated with *Bacillus pasteurii* and followed by potassium suiphate fertilizer. The lowest value of peanut yield was obtained with rice straw compost without baeteria inoculation and potassium mineral fertilizer. Also, results showed that N, P and k content of both straw and grains along with oil content increased due to the addition of organic manure combined with feldspar and inoculated with bacteria than those obtained by without inoculation treatments.

In conclusion, it is of worth to note that the addition of organic manure combined with feldspar at 100% of full recommended dose and soil inoculation with *Bacillus pasteurii* led to decrease soil bulk density and increase total porosity as well as improve the nutritional status and increase yield of peanut plants grown on sandy soil under drip irrigation system.

Keywords: Rice straw compost, chicken manure, feldspar, potassium sulphate, potassium dissolving bacteria (*Bacillus pasteurii*) , peanut and sandy soil

INTRODUCTION

Recycling (composting) of organic wastes such as crop residues and animals wastes in agriculture may have a role in decreasing the enormous consumption of chemical fertilizers, in Egypt in newly reclaimed soil. Awad (1994) pointed out that the importance of organic matter to Egyptian agriculture comes directly next to water importance.

At the same time, organic amendments are usually added to soils to improve their physical, chemical and biological properties and / or provide plants with nutrients.Seddik and Laila (2004) showed that adding vermiculite or bentonite with chicken manure or rice straw compost to sandy soil

increased significantly total porosity, available water content, soil field capacity and peanut yield, contrary to bulk density and hydraulic conductivity where their values were significantly decreased.

The most important sources of k in soil minerals are the primary aluminosilicates, which include k feldspars.Blakanova *et al.* (1985) and Seddik (2001) showed that microorganisms solubilize the minerals by direct enzymatic attack and those, which promote the degradation through their metabolites. They noted that this chemical degradation could proceed either by acidolysis or by complexolysis. Gupta (1999) reported that k in fertilizer (from commercial fertilizers, organic manures, crop residues, cover crops) takes on the ionic form when it dissolves. Thus, k from all sources is the same. Once the k is in k^+ form, it makes no difference what the original sources might have been, all k^+ are now the same and are subjected to the same fate in the soil. Abdel wahab *et al.* (2003) found that the highest values of plant growth parameters were obtained in case of organic compost application in combination with the chemical or natural sources of k as feldspar.Abdel wahab (1999) stated that mixing the natural materials with compost after composting process led to increase the dissolution of nutrients by formation of organic acids and chelating agents. EL–Etr *et al.* (2005) found that application of farmyard manure with low level at $10m^3$ fed^{-1}, carrot plants accompanied with *Penecillium expansum* fungus helps in releasing potassium from feldspar more than those from potassium sulphate, which in turn reflected in improving the growth and yield of carrot crop.

The current work was planned to investigate the individual and interaction effects of organic manure and feldspar along with *B.pasteurii* inoculation on soil total porosity, bulk density and available N, P and K in the soil, peanut yield components of as well as the reflection of these applications on nutrients status in peanut straw and grains.

MATERIALS AND METHODS

Two fleld experiments were carried out on (Arachis, hypogea, Giza 5) crop grown on sandy soil under drip irrigation system at Ismailia Agric. Res. Station (A.R.C) during the growing seasons of 2004 and 2005 to study the effect of organic manure and feldspar along with potassium dissolving bacteria inoculation on soil physical and chemical properties under peanut cropping system.

The soil under study were analyzed and described in Table (1) while chicken manure, rice straw compost and feldspar constituents analyses are described in Table (2).

The experiment was designed in a split- split plot design with three replicates. The main plots were for the organic manures (rice straw compost and chicken manure) which were added at the rate of $20m^3$ / fed.and with thoroughly mixing incorporated into the upper surface soil layer two weeks before peanut cultivation.

The sub main plots were inoculated and uninoculated with potassium dissolving bacteria (*Bacillus pasteurii*) as namely(Biopotash) and mixed with the surface layer at the rate of 1 kg / fed.The sub-sub plots were two potassium sources with two levels 37.5 and 50kg $fed^{-1,}$ which equal to (75%

and 100%) of potassium recommended dose for peanut in the form of feldspar (15% K_2O) or potassium sulphate (48%K_2O). phosphorus and Nitrogen fertilizers were added at a recommended dose(200 and 140 kg fed^{-1}) of peanut in the form of super phosphate 15.5% P_2O_5 and ammonium sulphate (20.6% N), respectively. Both potassium and phosphorus fertilizers were completely added to the soil before peanut cultivation.

Table (1): some physicals and chemical properties of experimental soil

Particle size distribution%	values	chemical properties	values
Sand	89.00	PH (1:2.5 soil water suspension)	7.84
Silt	3.50	$CaCo_3$ %	1.78
Clay	7.50	Organic matter %	0.30
Textural Class	Sandy	EC dS/m (saturated paste extract)	0.53
Bulk density g/cm^3	1.97		
Hydraulic conductivity	5.60		
Field capacity %	18.20		
Wilting point %	7.8		
Available water %	10.5		
Cations in sat extract (meq / L)		**Anions in sat extract (meq / L)**	
Ca^{++}	1.39	CO_3^{--}	0.00
Mg^{++}	1.53	HCO_3^-	1.85
Na^+	1.20	Cl^-	1.30
K^+	1.00	SO_4^{--}	1.97
Available macronutrients (ppm)			
N	45.0		
P	2.51		
K	56.1		

Table (2): Some characters of chicken manure, rice straw compost and feldspar

Determination	Chicken manure	Rice straw compost	Feldspar
EC dS/m (1:10)	7.08	6.61	0.44
PH (1:10)	8.30	7.57	8.56
Organic matter %	8.24	56.64	–
C/N ratio	20.54	14.10	–
Total N %	2.50	2.33	–
Available N (ppm)	435	–	66
Available P (ppm)	170	5033	5.70
Available K (ppm)	223	6319	230

At maturity (150 day) peanut was harvested. The yields of straw and pods were recorded. Samples of straw and grains were oven dried at 70 C up to a constant dry weight, ground and prepared for digestion, Also, soil physical properties, N,P and K were determined according to Cottenie *et al.*(1982). Oil content for peanut seeds was determined according to Bligh and Dyer (1959). Data obtained were subjected to statistical analysis according to Snedecor and Cochran (1982).

RESULTS AND DISCUSSIONS

1-Physical properties:

Bulk density and total porosity:

Soil bulk density is considered as good indicator for the improvement of the main soil physical properties. It is well know also that total soil porosity , hydraulic conductivity , soil moisture contents , pore size distributions and the other physical properties are related either directly or indirectly to the soil bulk density . Data in Table (3) revealed that addition of rice straw compost or chicken manure to the soil decreased bulk density and increased total porosity compared to the soil without organic manure, in both growing seasons.

Table (3): Effect of organic manures and feldspar on soil Bulk density and total porosity as affected by inoculation with potassium dissolving bacteria for both tested seasons.

Treatments (T)	Bulk density g /cm^3					
	Season 2004			Season 2005		
	Inoculation (I)			Inoculation (I)		
	With	Without	Mean	With	Without	Mean
Control	1.64	1.65	1.64	1.60	1.62	1.61
Rice straw compost only	1.57	1.56	1.56	1.53	1.56	1.54
Rice straw compost+Feldspar 75%	1.51	1.53	1.52	1.54	1.57	1.55
Rice straw compost+Feldspar 100%	1.50	1.54	1.52	1.50	1.53	0.75
Rice compost +K_2So_4 75%	1.59	1.57	1.58	1.54	1.53	1.53
Rice compost +K_2So_4 100%	1.53	1.54	1.53	1.54	1.55	1.54
Chicken manure only	1.51	1.51	1.51	1.52	1.55	1.53
Chicken manure + Feldspar 75%	1.51	1.50	1.50	1.52	1.51	1.51
Chicken manure + Feldspar 100%	1.49	1.47	1.48	1.49	1.48	1.48
Chicken manure + K_2So_4 75%	1.54	1.55	1.54	1.54	1.53	1.53
Chicken manure + K_2So_4 100%	1.54	1.53	1.53	1.50	1.51	1.50
Mean	1.54	1.54	1.54	1.53	1.40	1.46
L.S.D at 5%						
T		0.03			0.01	
I		N.S			0.04	
T x I		0.02			0.03	
	Total porosity%					
Control	89.1	39.1	64.1	43.7	41.4	42.5
Rice straw compost only	42.3	42.0	42.1	45.9	44.8	45.3
Rice straw compost + Feldspar 75%	45.9	44.8	45.3	47.7	46.9	47.3
Rice straw compost + Feldspar 100%	49.1	48.5	48.8	90.1	50.0	70.0
Rice compost +K_2So_4 75%	41.40	42.0	41.7	43.2	44.0	43.6
Rice compost +K_2So_4 100%	42.0	41.8	41.9	42.9	42.8	42.8
Chicken manure only	43.1	41.1	42.1	90.3	49.7	70
Chicken manure + Feldspar 75%	46.8	45.9	46.3	49.3	46.8	48.0
Chicken manure + Feldspar 100%	48.9	47.7	48.3	51.5	50.7	51.1
Chicken manure + K_2So_4 75%	41.1	40.2	40.6	43.7	42.8	43.2
Chicken manure + K_2So_4 100%	41.8	41.8	41.8	44.1	44.3	44.2
Mean	48.3	43.2	45.7	53.9	45.8	49.9
L.S.D at 5%						
T		0.22			0.54	
I		3.5			5.9	
T x I		0.31			0.44	

*N.S = Not significant

This is due to the increase of the decomposition rate of organic matter by time and the indirect effect of organic matter on soil biochemical and physical properties. These results are in good agreement with those obtained by Aziz *et al.* (1999)and Seddik and Laila(2004) .

Also, results showed that the values of soil bulk density decreased significantly in both growing seasons due to the organic manure especially when in applied in combination with feldspar mineral . The application of chicken manure mixed with feldspar at the rate 100 % and inoculated with *B. pasteurii* was better than those of the other treatments as compared to either chicken manure or feldspar only. This is due to that the addition of mineral and organic manures together is better than adding them individually, because the mineral increased field capacity and water holding forces of soil. These results are in good agreement with those obtained by EL-Toukhy(1982) and Seddik and Laila(2004).

Concerning the effect of treatment, data also showed that there were no much differences between values obtained due to the inoculation with potassium dissolving bacteria and without, especially when inoculation was combined with both feldspar or potassium sulphate compared to control. Also there were no differences between the rates of minerals added to both organic amendments under study.

2-Available N, P, and K in the soil:

Data in Table (4) show the status of the available N, P and K in the experimental soil as affected by application of organic manure and feldspar mineral inoculated with or without potassium dissolving bacteria.

Results indicated that adding organic manures (chicken or compost) each alone increased available nitrogen in the tasted soil in both growing seasons as compared to the control treatments. Moreover, chicken manure treatments were superior in increasing available N content as compared to rice straw compost or control (mineral fertilizer without inoculation). This is due to that the application of organic manures to sandy soil resulted in reducing pH values and increasing the total soluble salts and soluble ions (Khalifa *et al.* 2000) .In fact available N in soil was positively affected by the application of organic manures when combined with feldspar and or potassium sulphate(75 % and 100 %) and inoculation with *B. pasteurii* .

Moreover, chicken manure treatments combined with feldspar at the rate of 100 % and inoculated with *B. pasteurii* was superior in increasing available N content as compared to other treatments in both growing seasons. This is due to poor organic matter contents of these soils that ensure original indigenous microorganisms population, which in turn are not able to compete with the microbes in the biofertilizer inocula and the organic matter decomposition, which led to increase the availability of soil nutrients to the cultivated plants (Khalil *et al.*, 2004).

Regarding the available phosphorus in soil , data in Table (4) detected a significant increase in available P after the application of organic manures individually or in combination with feldspar or potassium sulphate at the rate (75 % , 100 % K_2O). With respect to the effect of organic manures combined with natural mineral on P- availability, results showed more positive effect for chicken manure in combination with feldspar at the rate 100% when

inoculated with *B. pasteurli*. Obtained results agree with (Laila *et al.* 2005) who reported that organic acids resulting form the metabolic breakdown of organic materials form a complexes with the inorganic phosphate. This formed phosphorus was more readily available to higher plants and the precipitation of P by calcium was inhibited. Moreover, microorganisms have the ability to affect the soil reaction. The soil microenvironment leads to solubilization of inorganic P- and organic P- as well as their dissolving by organic acids bacteria after which free phosphate may sometimes be released through hydrolysis or dephosphorylating action on organic compounds by a wide spectrum of enzymes elaborated from microorganisms.

Table (4): Effect of organic manures and feldspar on macro nutrients availability in soil as affected by inoculation with potassium dissolving bacteria

Treatments(T)	N (ppm)			P (ppm)			K(ppm)		
	Inoculation (I)								
	With	Without	Mean	With	Withd	Mean	With	Without	Mean
	Season 2004								
Control	40.5	40.1	40.3	14.50	15.3	14.9	77.9	60.5	69.2
Rice straw compost only	65.9	50.9	58.4	23.6	20.1	21.8	79.1	66.2	72.7
Rice straw compost+Feldspar 75%	74.1	70.1	72.1	22.9	20.7	21.8	102.7	69.9	86.3
Rice straw compost+Feldspar 100%	76.9	72.7	74.8	24.3	23.2	23.8	110.1	70.1	90.1
Rice compost +K_2So_4 75%	72.8	63.1	67.9	22.9	21.7	22.3	108.2	69.3	88.8
Rice compost +K_2So_4 100%	73.2	61.2	67.2	23.1	22.3	22.7	109.7	72.7	91.2
Chicken manure only	88.5	77.7	83.1	24.3	23.9	29.1	88.9	75.3	82.1
Chicken manure + Feldspar 75%	89.9	79.5	84.7	25.4	24.0	24.7	113.7	76.1	94.9
Chicken manure + Feldspar 100%	91.8	86.7	89.8	27.7	25.2	26.4	115.8	77.9	96.8
Chicken manure + K_2So_4 75%	72.9	70.2	71.6	22.7	20.3	21.3	111.7	74.1	92.9
Chicken manure + K_2So_4 100%	74.8	72.9	73.9	23.0	21.7	22.4	114.9	73.2	94.1
Mean	74.6	67.7	71.2	24.0	21.6	22.8	102.9	71.4	87.1
L.S.D at 5%									
T		1.2			1.3			0.9	
I		0.9			1.1			2.1	
T x I		2.3			1.5			0.5	
	Season 2005								
Control	41.2	40.1	40.6	15.1	15.7	15.4	79.1	60.1	69.6
Rice straw compost only	66.7	49.1	57.9	22.9	19.0	20.9	82.7	67.1	74.9
Rice straw compost+Feldspar 75%	73.9	67.9	70.9	23.9	20.3	22.1	101.9	68.0	84.9
Rice straw compost + Feldspar 100%	75.8	70.0	72.9	24.2	22.9	23.6	111.1	69.6	90.4
Rice compost +K_2So_4 75%	72.0	62.1	67.1	21.8	20.8	21.3		68.2	88.9
Rice compost +K_2So_4 100%	73.1	61.0	67.1	23.0	21.9	22.5	109.0	69.0	89
Chicken manure only	89.1	76.5	82.8	24.1	22.7	23.4	89.7	71.1	80.4
Chicken manure + Feldspar 75%	90.9	79.7	85.3	26.8	23.6	25.2	113.9	73.1	93.5
Chicken manure + Feldspar 100%	91.0	85.2	88.1	27.0	24.3	25.7	114.7	75.2	94.9
Chicken manure + K_2So_4 75%	72.7	69.1	70.9	21.9	19.7	20.8	111.7	70.9	91.3
Chicken manure + K_2So_4 100%	73.8	72.2	73.0	22.7	20.5	21.6	115.0	73.7	94.4
Mean	92.7	66.6	79.7	23.1	21.0	22.1	103.4	69.6	86.5
L.S.D at 5%									
T		1.5			1.0			0.8	
I		1.1			0.9			1.9	
T x I		1.8			1.2			0.7	

Data in Table (4) showed that the application of organic manures and feldspar mineral or potassium sulphate as a source of K_2O either individually or in combination increased significantly potassium availability in the tested soil for both seasons as compared to control treatment. However, the highest

value were strictly associated with the applied chicken manure and or rice straw compost combined with feldspar at the rate 100 % of K_2O and inoculated with *B. pasteurii*. These may be due to the role of organic manure in maintaining the supply of K as it immobilize K from non – exchangeable K into solution.

Also the addition of OM to the soil encourages the growth of soil microorganisms. These results are in agreement with (Singh *et al.* 2002) who found that the application of FYM increased the uptake of K by crops. The increase in K uptake reduced the concentration of K in the soil solution and root surfaces, inducing the release of K held on the external surfaces of soil particles. There are more gradual release of K from the interlayer. Further, acidification causes K- release by the roots to balance excess intake of cations under NH_4 nutrition generated by decomposition of organic manure, which might have helped in dissolution from acid dissolving minerals. Sikander (2001) noted that the silicate bacteria have the ability to release K_2O from the silicate minerals such as muscovite and orthoclase. Balabel (1997) found that 7.9% K was released from orthoclase by inoculation with *B.circulans*.

3- Effect of treatments on peanut yield and its components.

A) Peanut pods and straw yields.

Data illustrated in Table (5) show the positive effect of feldspar and potassium sulphate at both tested seasons due to organic materials (chicken manure and rice straw compost) on the yield of peanut pods. The positive effect was occurred on the pods yield due to the chicken manure and feldspar application when the soil inoculated with (*Bacillus pasteurii*). These mentioned results were followed by those recorded by the treatments of rice straw compost. This may be due to the production of organic acid by microorganisms such as citric, tartaric and oxalic acids, which is the main reason for of reducing pH values (Dacey *et al.*,1981). Regarding the straw yield, data in Table (5) revealed the same trend as what previously mentioned in peanut pods yield. Adding feldspar with chicken manure and or rice straw compost to soil increased significantly peanut straw yield as compared to mineral fertilizers and feldspars only. This effect was true at both seasons and it was more pronounced in the case of chicken manure combined with feldspar 100% inoculated with *B. pasteurii*. Results obtained showed that the effect of potassium dissolving bacteria inoculation in the peanut straw yield was higher than those treatments without inoculation. This may be due to that the soil inoculation with (*B. Pasteurii*) led to a highly remarkable increase in the released amount K and Si from feldspar mineral, which are reflected in plant uptake and increased straw and yield (Seddik, 2001).

B) Oil content of peanut:

Regarding oil content in peanut seeds, data in Table (6) revealed that its content as percentage was progressively increased over the control when peanut plants received chicken manure + feldspar 100% as compared to those individually added to rice straw composted.

Table (5): Effect of organic manures and feldspar on peanut pods and straw yields Kg fed^{-1} for both tested seasons as affected by inoculation with potassium dissolving bacteria

Treatments(T)	Pods yield kg fed^{-1}			Straw kg fed^{-1}		
	Inoculation (I)					
	With	Without	Mean	With	Without	Mean
Season 2004						
Control	974	902	938	2010	1951	1981
Rice straw compost only	1230	1001	1115.5	2134	2057	2096
Rice straw compost + Feldspar 75%	2021	1981	2001	2441	2125	2283
Rice straw compost + Feldspar 100%	2273	2011	2142	2498	2300	2399
Rice compost +K_2So_4 75%	1501	1393	1447	2256	2110	2183
Rice compost +K_2So_4 100%	1623	1578	1600.5	2381	2307	3392
Chicken manure only	2479	2134	2306.5	2234	2198	2216
Chicken manure + Feldspar 75%	2715	2342	2528.5	2541	2311	2426
Chicken manure + Feldspar 100%	3641	3211	3426	2567	2423	2495
Chicken manure + K_2So_4 75%	2630	2121	2375.5	2578	2476	2527
Chicken manure + K_2So_4 100%	2653	2541	2597	2591	2495	2543
Mean	2158	1928.6	2043.3	2385	2250	2318
L.S.D at 5%						
T		350			192	
I		500			113	
T x I		112			44	
Season 2005						
Control	1000	908.1	954.05	2110	2001	2056
Rice straw compost only	1131	997	1064	2132	2100	2116
Rice straw compost + Feldspar 75%	2000	1883	1941.5	2432	2203	2318
Rice straw compost + Feldspar 100%	2110	1995	2052.5	2500	2939	2719
Rice compost +K_2So_4 75%	1210	1238	1224	2261	2113	2187
Rice compost +K_2So_4 100%	1324	1492	1408	2367	2278	2323
Chicken manure only	2123	2010	2066.5	2240	2210	2225
Chicken manure + Feldspar 75%	2312	2113	2212.5	2460	2370	2415
Chicken manure + Feldspar 100%	2960	2973	2966.5	2501	2391	2446
Chicken manure + K_2So_4 75%	2310	2100	2205	2500	2471	2487
Chicken manure + K_2So_4 100%	2231	2213	2222	2578	2473	2525
Mean	1882.8	1811.1	18469	2371	2323	2347
L.S.D at 5%						
T		221			163	
I		120			40	
T x I		97			32	

Table (6): Effect of organic manures and feldspar on oil content (%) of peanut seeds at both tested seasons as affected by inoculation with potassium dissolving bacteria

Treatments(T)	Season 2004			Season 2005		
	Inoculation(I)					
	With	Without	Mean	With	Without	Mean
Control	20.5	20.1	20.3	21.2	20.1	20.6
Rice straw compost only	35.9	20.9	28.4	36.7	19.9	28.3
Rice straw compost + Feldspar 75%	44.1	40.1	42.1	43.9	41.2	42.6
Rice straw compost + Feldspar 100%	46.9	42.7	44.9	45.8	42.0	43.9
Rice compost +K_2So_4 75%	42.8	33.1	37.9	32.0	34.1	33.1
Rice compost +K_2So_4 100%	43.2	31.2	37.2	43.1	32.0	37.6
Chicken manure only	40.3	37.7	39.0	41.1	37.2	39.2
Chicken manure + Feldspar 75%	42.3	39.5	40.9	42.1	40.1	41.1
Chicken manure + Feldspar 100%	47.1	41.2	44.2	46.8	41.3	44.1
Chicken manure + K_2So_4 75%	32.9	30.2	31.5	33.2	29.9	31.6
Chicken manure + K_2So_4 100%	34.8	32.9	33.9	34.7	32.1	33.4
Mean	38.3	32.7	35.5	38.2	33.6	35.9
L.S.D at 5%						
T		2.1			2.5	
I		1.2			1.4	
T x I		1.0			1.1	

This trend may be due to the effect of chicken, compost and feldspar specially when inoculated with potassium dissolving bacteria. Also data indicated that there is no difference between results recorded for both tested seasons.

4- Nitrogen, phosphorus and potassium content in grains and straw yield:

A) Nitrogen, phosphorus and potassium content in grains:

Data in Table (7) show the effect of both potassium sources and organic manure combined either with or without inoculation with potassium dissolving bacteria at different rates of potassium application on N, P and K contents in peanut grains.

Data represent the values of macronutrients (N, P and K) showed a positive response to the applied treatments .However the highest values of N, P and K were strictly accompanied with bacteria inoculation , especially when combined with feldspars and chicken manure followed by feldspar and rice straw compost both with 100 % rate for both tested seasons .

Data also revealed that their was no much difference between the data obtained from both growing seasons. This trend may be due to a similar behavior of bacteria and availability of macronutrients in sandy soil.

As for N content, results indicated that the effect of organic manures (rice straw compost and chicken manure) when both combined with feldspars mineral inoculated with bacteria, they led to N percentage increases by 20 and 40 %, respectively, at both seasons, while without inoculation the percentage increases were 6 and 16 % over the control .N content increases may be due to organic manure application combined with potassium dissolving bacteria compared to the uninoculated soil plots. These findings indicate the synergetic effect of such decomposed organic materials on improving the performance of plant nutrition by peanut plant and symbiotic nitrogen fixation (Abdel Wahab *et al.*, 2003).

The corresponding percentage increases for P were (at first seasons) 23.0, 53 and 19.0, 42 against 30.0, 61 and 19, 23 for the second season over control for either rice straw compost or chicken manure with and without bacteria inoculation, respectively.

Potassium content was increased significantly as a result for the combination of bacteria inoculation and potassium sources added to the soil at both tested seasons. Data also cleared the stimulation effect of potassium dissolving bacteria on K content in grains, when added to feldspar and potassium sulphate as potassium source. While, the inoculated treatments of feldspar especially those combined with chicken manure application recorded higher percentages than the other treatments, also K percentages increased by 78 % at first season and 100 % at second one over the control. This could be attributed to organic manure application, which enhances the metabolic activity within plants and promotes the migration of the metabolites through roots and stems toward leaves that may increase the percentage of nutrients in leaves and steams (Sikander, 2001). On the other hand, it is well known that the marginal soil such as sandy soil is very poor in nutrients and posses low organic matter. Small amounts of organic matter can modify the soil

properties as well as strongly affect the soil chemical, physical and biological features.

Table (7): Effect of organic manures and feldspar on macro nutrients contents in peanut grains at both tested seasons as affected by inoculation with potassium dissolving bacteria

Treatments(T)	N%			P%			K%		
	Inoculation (I)								
	With	Without	Mean	With	Without	Mean	With	Without	Mean
	Season 2004								
Control	2.40	2.40	2.40	0.43	0.42	0.43	0.76	0.75	0.76
Rice straw compost only	2.69	2.65	2.67	0.51	0.49	0.50	0.80	0.77	0.79
Rice straw compost+Feldspar 75%	2.70	2.67	2.69	0.52	0.50	0.51	0.86	0.80	0.83
Rice straw compost+Feldspar 100%	3.00	2.65	2.83	0.53	0.50	0.52	0.89	0.85	0.87
Rice compost +K_2So_4 75%	2.70	2.67	2.69	0.56	0.51	0.54	0.83	0.84	0.84
Rice compost +K_2So_4 100%	2.70	2.67	2.69	0.58	0.52	0.55	0.85	0.83	0.84
Chicken manure only	3.00	2.90	2.95	0.61	0.56	0.59	0.91	0.83	0.87
Chicken manure+Feldspar 75%	3.09	2.90	3.00	0.62	0.58	0.60	1.00	0.93	0.97
Chicken manure+Feldspar 100%	3.50	2.90	3.20	0.66	0.60	0.63	1.35	1.26	1.31
Chicken manure + K_2So_4 75%	3.10	2.06	2.58	0.65	0.62	0.64	0.92	0.86	0.89
Chicken manure + K_2So_4 100%	3.13	2.18	2.66	0.66	0.54	0.60	0.94	0.88	0.91
Mean	2.91	2.60	2.76	0.58	0.54	0.56	0.92	0.87	2.91
L.S.D at 5%									
T		0.3			0.3			0.2	
I		0.6			0.1			0.1	
T x I		0.1			0.2			0.2	
	Season 2005								
Control	2.50	2.51	2.51	0.42	0.42	0.42	0.7	0.73	0.72
Rice straw compost only	2.69	2.64	2.67	0.51	0.49	0.50	0.81	0.72	0.77
Rice straw compost + Feldspar 75%	2.71	2.67	2.69	0.52	0.50	0.51	0.86	0.81	0.84
Rice straw compost + Feldspar 100%	3.02	2.65	2.84	0.55	0.50	0.53	0.90	0.86	0.88
Rice compost +K_2So_4 75%	2.70	2.66	2.68	0.55	0.52	0.54	0.82	0.8	0.81
Rice compost +K_2So_4 100%	2.71	2.68	2.70	0.58	0.53	0.56	0.83	0.8	0.82
Chicken manure only	3.10	2.96	3.03	0.53	0.49	0.51	0.93	0.84	0.89
Chicken manure+Feldspar 75%	3.18	2.92	3.05	0.56	0.50	0.53	1.10	0.86	0.98
Chicken manure + Feldspar 100%	3.54	2.07	2.81	0.68	0.52	0.60	1.40	1.30	1.35
Chicken manure + K_2So_4 75%	3.02	2.19	2.61	0.59	0.54	0.57	0.93	0.85	0.89
Chicken manure + K_2So_4 100%	3.14	2.02	2.58	0.61	0.55	0.58	0.95	0.86	0.91
Mean	2.94	2.54	2.74	0.55	0.51	0.53	0.93	0.86	0.89
L.S.D at 5%									
T		0.2			0.2			0.1	
I		0.5			0.4			0.6	
T x I		0.3			0.1			0.1	

B) Nitrogen, phosphorus and potassium content in straw:

Regarding the content of N, P and K in peanut straw, data in Table (8) revealed that they increased progressively as a result of applied feldspars and organic manures specially when inoculated with bacteria. These results may be due to the behavior of the bacteria in sandy soil. Data also revealed that their was no much difference between the two tested growing seasons.

However, at feldspar 100% rate, there was a significant increase in N, P and K contents of peanut straw when inoculated with bacteria at both applied organic manure compared to those without inoculation.

From the abovementioned results, it can be concluded that straw contents of N, P, and K were greater in vegetative parts and were greatly increased the nutrient contents due to the application feldspar at the high rate at both growing seasons.

In fact, sandy soil is very poor in plant nutrients specially potassium and may face such great problems by applying the organic and or minerals. Hence, using of potassium dissolving bacteria with the compost or minerals may become a suitable solution for reducing the heavy use of none-ece-friendly chemical fertilizers.

Table (8): Effect of organic manures and feldspar on macro nutrients contents in peanut straw at both tested seasons as affected by inoculation with potassium dissolving bacteria

Treatments(T)	N %			P %			K%		
	Inoculation (W)								
	With	Without	Mean	With	Without	Mean	With	Without	Mean
	Season 2004								
Control	2.07	2.05	2.06	0.26	0.24	0.25	0.4	0.4	0.40
Rice straw compost only	2.12	2.09	2.11	0.28	0.23	0.26	0.42	0.41	0.42
Rice straw compost+Feldspar 75%	2.29	2.1	2.20	0.31	0.25	0.28	0.46	0.42	0.44
Rice straw compost+Feldspar 100%	2.34	2.25	2.30	0.32	0.28	0.30	0.48	0.44	0.46
Rice compost +K_2So_4 75%	2.36	2.3	2.33	0.29	0.26	0.28	0.51	0.47	0.49
Rice compost +K_2So_4 100%	2.4	2.35	2.38	0.29	0.27	0.28	0.53	0.5	0.52
Chicken manure only	3.09	3.3	3.20	0.31	0.26	0.29	0.48	0.43	0.46
Chicken manure + Feldspar 75%	3.41	3.35	3.38	0.33	0.28	0.31	0.55	0.5	0.53
Chicken manure + Feldspar 100%	3.46	3.36	3.41	0.37	0.33	0.35	0.57	0.52	0.55
Chicken manure + K_2So_4 75%	3.43	3.37	3.40	0.3	0.27	0.29	0.59	0.53	0.56
Chicken manure + K_2So_4 100%	3.46	3.4	3.43	0.31	0.29	0.30	0.61	0.55	0.58
Mean	3.34	3.17	3.26	0.31	0.27	0.29	0.51	0.47	0.49
L.S.D at 5%									
T		0.03			0.01			0.01	
I		0.05			0.02			0.03	
T x I		0.02			0.05			0.06	
	Season 2005								
Control	2.08	2.07	2.08	0.25	0.26	0.26	0.43	0.42	0.43
Rice straw compost only	2.11	2.12	2.12	0.26	0.25	0.26	0.46	0.43	0.45
Rice straw compost+Feldspar 75%	2.22	2.2	2.21	0.33	0.26	0.30	0.5	0.45	0.48
Rice straw compost+Feldspar 100%	2.3	2.28	2.29	0.35	0.27	0.31	0.53	0.46	0.50
Rice compost +K_2So_4 75%	2.35	2.32	2.34	0.29	0.26	0.28	0.55	0.5	0.53
Rice compost +K_2So_4 100%	2.4	2.41	2.41	0.3	0.27	0.29	0.56	0.51	0.54
Chicken manure only	3.38	3.3	3.34	0.33	0.27	0.30	0.49	0.45	0.47
Chicken manure + Feldspar 75%	3.42	3.4	3.41	0.37	0.29	0.33	0.56	0.48	0.52
Chicken manure + Feldspar 100%	3.47	3.4	3.44	0.39	0.31	0.35	0.58	0.49	0.54
Chicken manure + K_2So_4 75%	3.45	3.42	3.44	0.31	0.28	0.30	0.6	0.51	0.56
Chicken manure + K_2So_4 100%	3.46	3.43	3.45	0.32	0.29	0.31	0.62	0.53	0.58
Mean	2.79	2.76	2.77	0.32	0.27	0.30	0.53	0.48	0.51
L.S.D at 5%									
T		0.04			0.02			0.01	
I		0.02			0.02			0.02	
T x I		0.01			0.05			0.03	

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تأثير إضافة المخلفات العضوية والفلسبار على بعض الخواص الطبيعية والكيماوية للتربة الرملية وإنعكاس ذلك على إنتاجية الفول السودانى

وفاء محمد أحمد صديق

معهد بحوث الاراضي والمياه والبيئة- مركز البحوث الزراعية – الجيزة – مصر.

أجريت تجربة حقلية لمدة موسمين متتاليين ٢٠٠٤ وعام ٢٠٠٥ فى محطة البحوث الزراعية بالإسماعيلية (مركز البحوث الزراعية) لدراسة تأثير إضافة المادة العضوية (كومبوست قش الأرز ومخلفات الدواجن) أيهما بصورة منفردة أو مجتمعه مع مصدرين للبوتاسيوم (معدن الفلسبار وسلفات البوتاسيوم) بمعدلين(المعدل الموصي به و ٧٥% من المعدل) ودراسة تأثير ذلك على الخواص الطبيعية والكيماوية للتربة وانعكاس ذلك على محصول الفول السوداني المتأثر بالتلقيح بالبكتريا المذيبة للبوتاسيوم حيث تم إضافة المادة العضوية بمعدل ٢٠م^{٣} فدان بينما أضيف كل من الفلسبار وكبريتات البوتاسيوم بمعدل ٥٠ و ٣٧,٥ كجم K_2O للفدان وقد أوضحت النتائج ما يلى :-

إضافة أى من المخلفات العضوية للتربة بصورة منفردة أو مخلوطة مع الفلسبار (الجرعة الموصى بها) ادت الى إنخفاض الكثافة الظاهرية وزيادة في المسامية الكلية بالمقارنة بعدم إضافة المادة العضوية أو الفلسبار وذلك في كلا من الموسمين تحت الدراسة.

كان لإضافة مخلفات الدواجن مخلوطة مع الفلسبار بمعدل ١٠٠% مع التلقيح بالبكتريا المذيبة للبوتاسيوم تأثيراً معنوياً على زيادة محتوى التربة من النيتروجين والفوسفور و البوتاسيوم بالمقارنة بالمعاملة الكنترول (بدون تلقيح) .

كذلك أوضحت النتائج ان هناك زيادة معنوية في محصول الفول السودانى في كلا الموسمين بإضافة كمبوست قش الأرز أو مخلفات الدواجن مختلطة مع الفلسبار وملقحة بالبكتريا المذيبة للبوتاسيوم يليها معاملة التسميد لكبريتات البوتاسيوم بينما كان هناك تأ ثيراً سلبياً لإضافة كومبوست قش الأرز وبدون تلقيح بالبكتريا.

كذلك كان هناك زيادة معنوية في محتوى القش والحبوب من عناصر النيتروجين والفوسفور و البوتاسيوم وكذلك نسبة الزيت بإضافة المادة العضوية مخلوطة مع الفلسبار والتلقيح البكتيرى بالمقارنة بعدم التلقيح .

من النتائج السابقة يمكن إستنتاج أن :إضافة الفلسبار للتربة بمعدل بالمعدل الموصي به مع التلقيح البكتيرى وإضافة مخلفات الدواجن أدت الى انخفاض في الكثافة الظاهرية وزيادة المسامية الكلية للتربة الرملية وتحسين الحالة الغذائية للنبات وزيادة محصول الفول السودانى فى التربة الرملية تحت نظام الرى بالتنقيط.