TRANSFORMATION OF SOME ORGANIC MANURES AS AFFECTED BY DIFFERENT SOIL CONDITIONS IN EGYPT

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ABSTRACT

Laboratory incubation experiment was conducted to evaluate the effect of three types of soils different in characteristics i.e., clay, silt and sandy soils, on the transformation of six organic manures (filter mud, filter mud compost, banana residues compost, maize residues compost, poultry manure and farmyard manure) studied. Pot experiments were filled with the mixture each type of soil and organic manure treatment, at a rate of 2 kg and 30 g (15 ton/fed), respectively. The control treatment was soil without organic manures. To achieve the aim of this experiment incubation experiments were conducted, each treatment was incubated for 90 days at room temperature. Samples were taken at 0, 10, 20, 30, 40, 50, 60, 70, 80 and 90 days. The Laboratory incubation experiment showed that, generally increasing the incubation period due to increase the release of available nutrients (N, P, K) and CO_2 Evolution, on the other hand reduced organic carbon content, compared with control (zero time) treatment. Degradation rates of six organic manures depending on the soil type, organic manure type and period of incubation. Where, the degradation rates of organic manure in clay soil was more affacted compared with the silt and sandy soisl and the degradation of organic manures was observed after 20 days up to 60 days of the incubation period compared with the control treatment (zero time) . The tested organic manure could be arranged according to their ability to release N, P and K in the order of: filter mud cake compost> poultry manure> maize residues compost> banana residues compost > filter mud cake >farmyard manure > control.

Key words: Organic amendments, soil type, transformation, N, P, K**,** CO_2 Evolution.

INTRODUCTION

In the recent decade researchers in the Egyptian agricultural field become suffering from three main problems. The first is that a great part of Egyptian soil is classified as arid and semi-arid soils. It is usually deficient in organic matter, nitrogen and micronutrients. The level of organic matter in Egyptian soils is considered very poor (less than 2%). Intensive using of chemical fertilizers led to increase soil, water and food pollution besides high cost. All that directed the researchers to use alternative sources such as the natural sources of fertilizers via using the organic manures and bio fertilizers. Thus the composting of plant residues is considered to be the essential alternative source of organic matter in such arid conditions **(El-Sisi., 2001).** The second problem is hazardous impacts on the environment due to the large amounts of plant residues and animal wastes which produced each year. As an example, it was reported that the total amount of agricultural wastes in Egypt amounted 40 million tones a year. The hazardous impact due to mismanagement of these organic wastes on public health and the quality of the environment has become a real fact **(Moustafa., 2001).** Sugar industry based on sugarcane crop produces some by-products and wastes, which might be used as a raw material for other industries (Bagasse and Molasses) or as final wastes (Vinasse, Trashes, Bagasse ash, and Filter mud cake). In a country like Egypt where sugar industry depends upon an area of about 50,000 fedans of cane; huge quantities of these by products are produced annually. These by-products should be wisely used or recycled in order to avoid any contaminations or hazardous effects for the environment **(Mohamed and Ahmed., 2002)**. The third problem is lack of knowledge of organic manure transformations and the estimate the liberation of the different elements of different types of soil amendments, because of the different organic matter, and a different degree of decomposition, and differences in the chemical composition. Recently, on the way of clean agriculture, the world trend goes toward using and recycling plant and organic residues to produce the organic fertilizer which is very important for increasing the agricultural production, reducing the application rates of chemical fertilizers and therefore, the prevention of environmental pollution which affect public health.

The influence of soil texture on organic matter decomposition has been widely studied and results indicate that the rate of decomposition and net mineralization depend on the accessibility of organic substrates to soil organisms. Although organic matter decomposition studies are numerous, few have addressed the relative importance of direct and indirect mechanisms of soil texture control on organic matter stabilization. In general, the quantity and nature of the soil clay affect the amount of C stabilized in soil. Fine textured soils (clays) often contain higher amounts of organic matter than sandy soils. The soil pore size distribution is one of the factors determining the microbial habitat since it is assumed that microorganisms mainly live in pores of a certain size. Considering the size of bacterial cells, pores of a neck diameter of 2-6 mm are favorable microhabitats for soil bacteria **(Mtambanengwe *et al*., 2003)**. The rate of decomposition and net mineralization of organic manures depends on the soil type, which is primarily related to clay content and then influenced by different soil properties, such as density, porosity, structure, consistency and resistivity, texture and the accessibility of organic substrates to soil organisms is perhaps the most important influence **(Anetta and Joanna. 2014)**. The present at this study aimed to evaluate the effect of soil conditions on the transformation of different organic manures such as: (filter mud, filter mud compost, banana residues compost, maize residues compost, poultry manure, and farmyard manure).

MATERIALS AND METHODS

An incubation experiment was designed at a factorial arrangement of treatment was used in randomized complete block design with three replications. The experiment was carried out in the laboratory of Soils, Water and Environment Research Institute, Agricultural Research Center., Egypt, and laboratory of soil and water, faculty of agriculture , sohag university for 90 days to evaluate the effect of three types of soils different in characteristics i.e, clay, sailt and sandy soils, on the transformation of six organic manures (filter mud, filter mud compost, banana residues compost, maize residues compost, poultry manure and farmyard manure)were studied.

Organic manures

Six organic materials were used in this study as follows:

1. Filter mud: - It was obtained from the sugar factory in Qus province, Qena governorate.
2. Filter mud compost:- It was obtained from the farm in El-Marashda province, Qena governorate. where filter mud was exposed to sulphitation processed.
3. Banana residues compost:- were obtained from the farm in Qeft province, Qena governorate. The compost prepared using banana trees residues, chopped to small pieces and add moulas and urea then composted for 120 days.
4. Maize residues compost:- It was obtained from the farm in Qeft province, Qena governorate. The compost prepared using maize residues chopped to small pieces and add urea and farmyard manure then composted for 120 day.
5. Poultry manure:- Air dried samples of (PM) were obtained from the eggs production farm, El-Marashda province, Qena governorate.
6. Farmyard manure:- Air dried FYM were obtained from the big animal breeding farm in El-Marashda province, Qena governorate.

Each organic manure used were taken to determine some of characteristics as shown in **Table (1)**.

Table (1): Some Characteristics of the studied organic manures used

Organic Characteristics	Filter mud	Filter mud compost	Banana residues compost	Maize residues compost	Poultry manure	Farmyard manure
pH (1:10)	6.7	6	8.2	8	7.7	8.4
EC dSm^{-1}(1:10)	4.6	5.83	4.01	4.53	6.4	6
B.D Kgm^{-3}	288	408	365	197	421	205
SP %	300	190	95	400	90	390
O.M %	55.87	47.88	25.94	28.93	26.94	31.92
O.C%	32.48	27.84	15.08	16.82	15.66	18.56
T.N %	1.64	2.4	1.18	1.12	1.89	1.13
T.P %	2.3	2.9	1.3	1.15	1.9	1.5
T.K %	5.3	9	7	7.8	15	12.1
NH^{+} (ppm)	414	502	318	337	530	463
NO_3^{-} (ppm)	43	61	34	29	70	54
Extractable P(ppm)	452	630	194	219	614	520
Available K (ppm)	325	430	410	397	480	291
C/N ratio	19.8	11.57	12.75	14.98	8.27	16.39
ASH	44.13	52.12	74.06	71.07	73.06	68.08

Soil analysis

Three soils were used in this study as follows: The first was clay soil from located of Qena province, Al-Humaydat village which latitudes at 26o 09' 39.4"n, 32o 42' 14.1"e. The second was a loamy soil from the located of west Qena, El-Marashda province, which latitudes at 26o 05' 39.4"n, 32o 28' 57.2"e. The third was a sandy soil from the East Qena, Red sea road, which located latitudes at 26o 12' 12.3"n, 32o 43' 59.4"e. The physical and chemical properties of the three studied soil were determinted as shown in **Table (2)**.

Table (2): Some physco-chemical properties of the three studied soils.

	Characteristics		Soil 1	Soil 2	Soil 3
Chemical properties	**pH 1-5**		7.7	7.95	8.08
	EC dSm^{-1} (1:5)		2.1	3.56	3.01
	T.N %		0.08	0.05	0.02
	C/N ratio		9.07	6.49	4.64
	O.M%		1.25	0.56	0.16
	O.C%		0.72	0.32	0.09
	T.P %		0.43	0.18	0.24
	T.K %		0.36	0.29	0.16
	NH_4^+ (Ppm)		2.9	2.4	1.7
	NO_3- (Ppm)		2.13	1.6	1.11
	Na-HCO_3extractable P(ppm)		8	2.3	9.4
	Available .k (ppm)		73	68	43
	Soluble Anions (meq/l)	**So_4^{--}**	4.9	35.2	17.9
		Cl^-	5.15	61.9	30.6
		Hco_3^-	0.360	0.340	0.820
	Soluble Cations (meq/l)	**k^+**	1.1	2.1	0.88
		Na^+	3.3	59.7	30.2
		Mg^{++}	2.8	7.1	6.2
		Ca^{++}	3.3	28.7	12.0
Physical	**Sp%**		58	33	30
	$CaCO_3$%		2.84	11.80	12.55
	Particle size distribution	**Sand%**	2.4	40.5	81.3
		Silt%	31.6	32.5	12.7
		Clay%	66	27	6
		Texture	Clay	Loamy	Sandy

In this experiment representative soil sample (0-30 cm layer) was selected from each location. The soil samples were air dried ground and sieved to pass through a sieve (2mm), to finally use in experiment work. A sample of both soil and organic manure was taken to estimate field capacity.

Experimental design and analysis :

To achieve the aim of this experiment 63 plastic pots (3 soil types * 7 (6 organic manures + control without organic manure) * 3 replicates) (30 cm diameter and 35 cm in height) were prepared. Each plastic pots was filled with the mixture each type of soil and organic manure treatment, at a rate of 2 kg and 30 g (15 ton/fed) , respectively. The control treatment was soil without organic manures. After that, the pots were irrigated up to the soil field capacity, weighted and their weights were recorded. Soil moisture was checked/adjusted after every 2 days by weighing the pots and adding the required amount of water **.** Each treatment was incubated for 90 days at room temperature. Samples were taken at 0, 10, 20, 30, 40, 50, 60, 70,80 and 90^{th} day from incubation period, at the end of each incubation period the samples were taken from each treatment and dried rapidly in an oven at 50^0C according to (**jackson., (1973)** , ground sieved to pass through a 2mm . Chemically analysis were determined such as, organic carbon (OC) , ammoniacal and nitrate-N, available phosphorus, available potassium and CO_2-evolution. The pH values were directly measured in the 1:5 soil-water suspensions and in 1:10 compost–water mixture using a pH glass electrode of orion expandable ion analyzer EA920 according to **Jodice *et. al*., (1982).** Electrical conductivity measurements were run in a suspension of (1: 5) soil: water or (1:10) compost : water **Richards , (1954)** using EC meter, ICM model 71150. Organic matter content of organic manure and compost materials were determined by growing the dried samples at 550°C to a constant weight as recommended in **APHA., (1995).** Organic carbon in soil samples was determined by **Walkley** and **Black** method **(Black *et. al*., 1965).** Organic matter percentages were calculated by multiplying organic carbon values by 1.724. Nitrogen forms in organic manure were determined according to the methods outlined by **Page *et. al*., (1982)** as follows: soluble nitrogen forms i.e. ammonia and nitrate were extracted from the soil or organic manure samples in KCl solutions and distilled in presence of Mg O for extracting NH_4^+, meanwhile, No_3- were extracted by running the distillation process another time in Mg O and devarda alloy. in both steps , the evolved ammonia was collected in 4 % H_3BO_3 using a mixed indicator of methyl red and promo-cresol green and determined and titrated against 0.05N H_2SO_4 solution. Soil available P was obtained by the method introduced by **Olsen *et al*. ., (1954)**. Ten grams of soil samples was extracted with 100 ml o.5 M $NaHCO_3$ (pH 8.5) and 5 ml aliquot of the extract was analyzed for available phosphorus. The concentration of P in soil was determined calorimetrically according to **Hesse., (1971)** at a wavelength of 660 nm and calculated as ppm. For available potassium soil was extracted with a normal solution of ammonium acetate (PH 7) in ratio 1: 2.5 (soil /solution, w/v) and filtered **Allen., (1989)**. soluble potassium concentration in the filtrate was estimated using flame photometer 410 corning .CO_2 evolution Was determined in small vials containing 10 ml of 1 M NaOH solution with 100g of samples for trapping CO_2 having the moisture content at the field capacity tightly. These vessels were closed, incubated under controlled conditions, at 30°C. This temperature was chosen, because the optimal temperature for microbial activity ranges from 20 to 35°C **(Scheffer, and Schachtschabel, 2002).** NaOH solution in the vials was taken after incubation periods of 0, 10, 20, 30, 40, 50, 60, 70, 80 and 90 days. For 0 day period, the NaOH solution in the vials was taken after 1 h. The CO_2 evolved during each incubation period was trapped in 1M NaOH and the excess of NaOH was titrated with 0.1 M HCl after adding $BaCl_2$, Mineralized C was calculated as cumulative CO_2-evolution (g kg^{-1}) according to **Leifeld *et. al*., (2002).** All data were subjected to the proper statistical analysis of variance according to the procedures outlined by **Gomez and Gomez., (1984)**. The differences between means of the different treatments were compared using the least significant difference (LSD) test at 5 % probability.

RESULTS AND DISCUSSION

The effect of different soil type on transformation of organic carbon :-

The effected of three soil types i.e, clay , silt and sandy soil on organic carbon contents for six organic manure treatments during different incubation periods are presented in **Table (3)**, and illustrated in **figures (1)** . From these data , it can be noticed that generally increasing the incubation period significalntly decreased the organic matter content compared with control treatment (zero time) under six organic manures treated with clay, silt and sandy soils. Also, the degredation of organic manure was more affacted with clay soil treatment compared with the silt and sandy soil treatments. These results are in agreement with those stated by **Amit *et. al*., (2016)** who stated that, in the initial lag phase when mineralization was either very low or displayed negative values, on average only 8% of the initial SOM had been utilized (7–21 days). The SOM utilization during days 28–80 when mineralization was rapid was 31% of the initial amount, while 43% of initial SOM was utilized in the later part of incubation (between days 100 and 120) when mineralization start showing a declining trend. The rate of decrease in the end of the incubation period (90 day) as follows:- In clay soil at the control treatment a decreased by about 28.00%, where a decreased were 37.95% , 49.75%, 41.60%, 38.40% and 45.40 %, 33.85%, with application of filter mud, filter mud compost, banana residues compost, maize residues compost, poultry manure and farmyard manure, respectively .This decrase in clay soil in the average of 40.29%..

In silt soil at the control treatment a decreased by about 20.90%, where a decreased were 26.75% , 41.30%, 30.35%, 27.80%, 33.10% and 23.60%, with application of filter mud, filter mud compost, banana residues compost ,maize residues compost , poultry manure and farmyard manure, respectively .This decrase in silt soil in the average of 29.99%. In Sandy soil at the control treatment a decreased by about 16.60%, where a decreased were 22.45% ,37.75% ,27.50% ,26.85% ,30.45% and 19.60% with application of filter mud, filter mud compost, banana residues compost ,maize residues compost , poultry manure and farmyard manure, respectively .This decrase in sandy soil in the average of 27.11%. Similar result were observed by **Mouhamad *et. al*., (2015)** and **Mtambanengwe *et. al*., (2003).** Under similar climate conditions, the organic matter content in fine textured (clayey) soils is two to four times that of coarse textured (sandy) soils **(Hartley *et. al*., 2008).** This reduce of organic carbon related to the rate of organic manure decomposition , where as the organic carbon content decreased in the first period of incubation and it continues to decreased, but this rate of decrased differs by different the soil type, type of organic manure and incubation period. The results are in agreement with those stated by **Burger and Venterea., (2007)**. The patterns of organic manure content reduce from different organic manure as affected by three soil treatments were on order of: filter mud cake compost> poultry manure> maize residues compost> banana residues compost > filter mud cake >farmyard manure > control.

Table (3): Effect of soil type and organic manures treatments on transformation of organic carbon content (%) during incubation periods

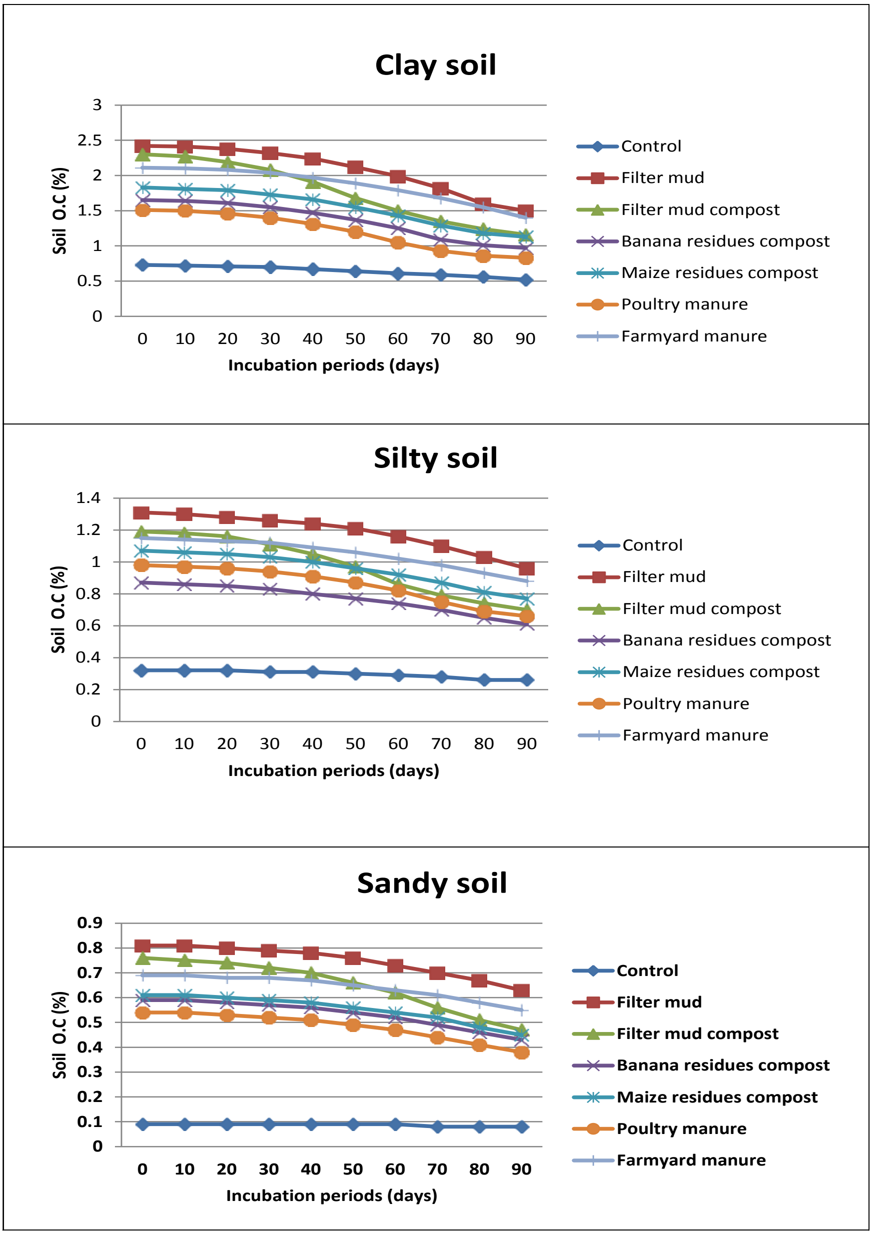
Soil types treatments	organic manures treatments	organic carbon content (%) Incubation periods treatments										MEAN	R.D*
		0	10	20	30	40	50	60	70	80	90		
Clay soil	Control	0.73	0.72	0.71	0.70	0.67	0.64	0.61	0.59	0.56	0.52	0.65	28.00
	Filter mud	2.42	2.41	2.38	2.32	2.24	2.12	1.99	1.82	1.60	1.50	2.08	37.95
	Filter mud compost	2.30	2.27	2.19	2.08	1.91	1.68	1.50	1.35	1.24	1.16	1.77	49.75
	Banana residues compost	1.65	1.64	1.61	1.55	1.47	1.37	1.25	1.09	1.01	0.97	1.36	41.60
	Maize residues compost	1.83	1.81	1.79	1.73	1.66	1.55	1.43	1.29	1.18	1.13	1.54	38.40
	Poultry manure	1.51	1.50	1.46	1.40	1.31	1.20	1.05	0.93	0.86	0.83	1.21	45.40
	Farmyard manure	2.11	2.10	2.08	2.04	1.97	1.89	1.79	1.68	1.55	1.40	1.86	33.85
	MEAN	1.79	1.78	1.75	1.69	1.61	1.50	1.38	1.25	1.14	1.07	1.49	40.29
Silt soil	Control	0.32	0.32	0.32	0.31	0.31	0.30	0.29	0.28	0.26	0.26	0.30	20.90
	Filter mud	1.31	1.30	1.28	1.26	1.24	1.21	1.16	1.10	1.03	0.96	1.19	26.75
	Filter mud compost	1.19	1.18	1.16	1.11	1.05	0.97	0.86	0.79	0.74	0.70	0.98	41.30
	Banana residues compost	0.87	0.86	0.85	0.83	0.80	0.77	0.74	0.70	0.65	0.61	0.77	30.35
	Maize residues compost	1.07	1.06	1.05	1.03	1.00	0.96	0.92	0.87	0.81	0.77	0.95	27.80
	Poultry manure	0.98	0.97	0.96	0.94	0.91	0.87	0.82	0.75	0.69	0.66	0.85	33.10
	Farmyard manure	1.15	1.14	1.13	1.12	1.09	1.06	1.02	0.98	0.93	0.88	1.05	23.60
	MEAN	0.98	0.98	0.96	0.94	0.91	0.88	0.83	0.78	0.73	0.69	0.87	29.99
Sandy soil	Control	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.09	16.60
	Filter mud	0.81	0.81	0.80	0.79	0.78	0.76	0.73	0.70	0.67	0.63	0.75	22.45
	Filter mud compost	0.76	0.75	0.74	0.72	0.70	0.66	0.62	0.56	0.51	0.47	0.65	37.75
	Banana residues compost	0.59	0.59	0.58	0.57	0.56	0.54	0.52	0.49	0.46	0.43	0.53	27.50
	Maize residues compost	0.61	0.61	0.60	0.59	0.58	0.56	0.54	0.52	0.48	0.45	0.55	26.85
	Poultry manure	0.54	0.54	0.53	0.52	0.51	0.49	0.47	0.44	0.41	0.38	0.48	30.45
	Farmyard manure	0.69	0.69	0.68	0.68	0.67	0.65	0.63	0.61	0.58	0.55	0.64	19.60
	MEAN	0.58	0.58	0.57	0.57	0.55	0.54	0.51	0.49	0.46	0.43	0.53	27.11

$LSD_{0.05}$ A 0.1525 B 0.1444 C 0.1280

A: Organic manures **B**: Soil types **C:** Incubation periods

-Each value in this table is the mean of 3 replicates.

* (R.D%) Relative Decrease = (control (zero time)-treatment) * 100 / Control (zero time)



Figures (1) :The effect of soil type treatments and the studied organic manures treatments on transformation of organic carbon content (%) during incubation periods

Effect of different soil type on transformation of nutrients (N, P and K):-

When organic manure are added to the soil, various organic compounds undergo decomposition. Decomposition is a biological process that includes the physical breakdown and biochemical transformation of complex organic molecules of dead material into simpler organic and inorganic molecules **Dioumaeva *et. al*., (2002).** Decomposition occurs when microbes breakdown oranig matter in organic manure to inorganic or mineral forms and release (N, P and K) which are available for plant use. Soil type influence the release of nutrients for organic manure , where the properties of the soil such as density, porosity, structure, texture and soil enzymes affect on microbial activity **Preusch *et. al*., (2002).**

Nitrogen (NH_4- N and NO_3 –N):-

Organic forms (plant or animal residues) are the source of N which under the biological processes , can be transformed into inorganic forms as follows:

$$NH_4^+ \rightarrow NH_2OH \rightarrow NOH \rightarrow NO_2^- \rightarrow NO_3^-$$

The effected of three soil type treatments i.e, clay , silt and sandy soil on available nitrogen content (NH_4- N and NO_3 –N) for six organic manure treatments during different Incubation period are presented in **Table (4)**, and illustrated in **figures (2)** . Data showed that In general, the total N released from six organic manure treatments treated with clay , silt and sandy soil treatment at each incubation periods was a significantly($P<0.05$) higer than that of the control treatment (zero time). The release of nitrogen from the organic matter application tends to increase with the time of incubation. **Anetta and Joanna., (2014)** Suggesting increased nutrition for the decomposing microorganisms. Genarally,the net nitrogen mineralization of six organic manure treatments with clay soil treatment more affacted compared with the silty and sandy soil treatments during different incubation periods ,whereas ,The relative rate of increase of available N (NH_4- N and NO_3 –N) release were 62.9%, 60.6% and 59,4% for clay, silt and sandy soil treatments,respectively.This trend can be explained on the basis of the decomposition of soil's native organic matter **Vanhala *et. al*., (2007)**. The investigated organic manure varied in their N ability releasing depending on the soil type , organic manure type and period of incubation **Janssen., (2002)**. The mineralization of soil organic N begins with ammonification **Guntiñas *et. al*., (2013). Zubair *et al*. (2012)** reported that manures and fertilizers significantly increased the concentration of mineral nitrogen (NH^{+}_{4} + NO^{-}_{3} nitrogen) in the soil due to the net mineralization during the incubation period.

Result also indicate that net available levels of N was significantly (P<0.05) difered among the manures types {filter mud cake compost, poultry manure,(maize residues compost and banana residues compost), (filter mud cake and farmyard manure) }during the incubation periods. However, there was no significant difference in available N content among maize residues compost and banana residues compost and also among filter mud cake and farmyard manure. The tested organic manure could be arranged according to their ability to release N in the order of filter mud cake compost> poultry manure> maize residues compost> banana residues compost > filter mud cake >farmyard manure > control. Where the avarge relative rate of increase of available N (NH_4- N and NO_3 –N) release in three soil type treatments was 24.45, 55.02, 68.00, 74.08, 62.01, 66.52 and 43.43 for control, filter mud, filter mud compost, banana residues compost, maize residues compost, poultry manure and farmyard manure, respectively. These results are in harmony with these obtained by **Hadas *et. al*., (2004)** who observed that approximately 50% of the total N in poultry manure is in the form of simple organic compounds such as urea and uric acid which decompose very easily during the fist few days after application in the soil. This is also consistent with the findings by **Yasin *et. al*., (2011)** who observed higher available N when poultry manure was applied compared to farmyard manure.

Analysis of the result of the treatments of the control over the 90 days period indicated that net N increased gradually for the first period and then decreased for the remaining incubation periods.The significant (p<0.05) increase in nitrogen mineralization was observed after 20 days, up to 60 days of incubation in comparison to initial day. However , the organic manure treatments showed their lowest mineralization rates at the beginning of the incubation followed by maximum concentration on days 50,40,50,50,40,90 for filter mud, filter mud compost, banana residues compost, maize residues compost, poultry manur and farmyard manure, respectively in clay soil. Also the same trend was observed at the beginning of the incubation followed by maximum concentration on days 60, 50, 60, 60, 50 and 90 for filter mud, filter mud compost, banana residues compost, maize residues compost, poultry manur and farmyard manure, respectively in silt and sandy soil treatments . **Hadas *et. al*., (2004)** similar result understanding mineralization features of organic N from different types of manures under the same conditions is essential for manure-specific fertilizer recommendations in terms of source-related rates, time and placement. After that , the mineralization continued until 70 day for organic manure treatments and then decreased , except for filter mud that decrased after 80 day and farmyard manure which continued to increase until the end of the incubations in clay soil , while in silt and sandy soil , the mineralization continued until 80 day for organic manure treatments and then decreased , except for filter mud compost that decrased after 70 day and farmyard manure which continued to increase until the end of the incubation. Similar results were obtained by Ali **Adeiran *et. al*., (2003)** who revealed that N mineralization increased with increase in incubation period up to a certain stage and then decreased**. Sinclair (2000)** indicated that after 8 weeks from sandy soil incubation with different organic manures, nitrate(NO_3) and ammonium (NH_4+) contents of the sandy soil were significantly decreased than those of the clayey soil. This was suggested to be due to ammonia volatilization process in the sandy soil compared to clayey.

Table (4) :The effect of soil type treatments and the studied organic manures treatments on the release of available N (NH_4-H + NO_3-N) (ppm) during incubation periods

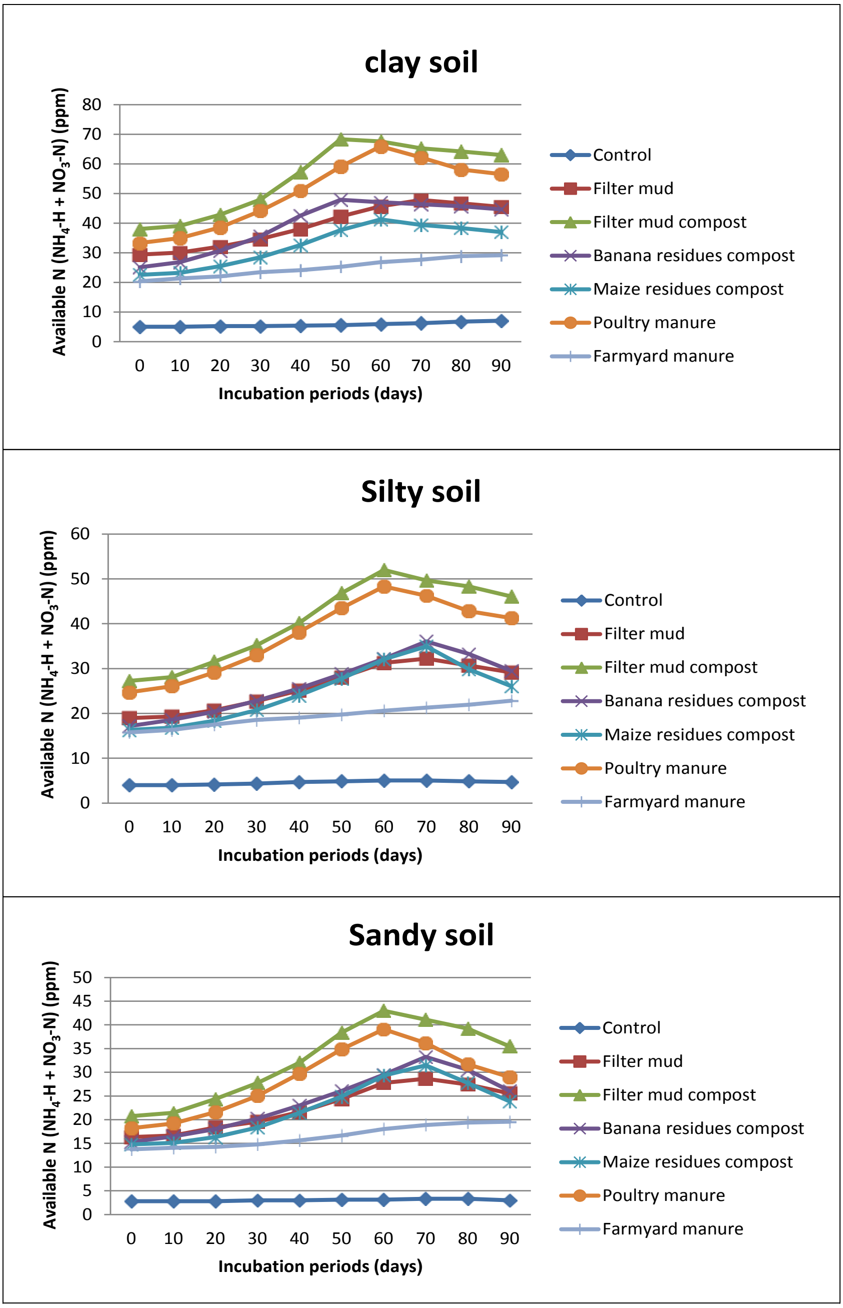
Soil types treatments	organic manures treatments	Available N (NH_4-H+NO_3-N) (ppm)										MEAN	R.I*
		Incubation periods treatments											
		0	10	20	30	40	50	60	70	80	90		
Clay soil	Control	5.03	5.03	5.20	5.20	5.37	5.54	5.88	6.22	6.73	7.07	5.73	40.56
	Filter mud	29.34	30.02	32.06	34.61	38.01	42.26	45.66	47.79	46.68	45.49	39.19	55.04
	Filter mud compost	38.01	39.03	42.86	47.96	57.31	68.36	67.59	65.21	64.19	63.00	55.35	65.75
	Banana residues compost	25.09	26.79	30.62	35.55	42.52	47.87	47.02	46.34	45.66	44.64	39.21	77.92
	Maize residues compost	22.54	23.22	25.43	28.49	32.57	37.67	41.24	39.37	38.35	36.99	32.59	64.11
	Poultry manure	33.25	34.95	38.52	44.13	50.93	59.09	65.89	62.15	58.07	56.54	50.35	70.05
	Farmyard manure	20.33	21.35	22.03	23.39	24.07	25.26	26.79	27.64	28.83	29.17	24.89	43.48
	MEAN	24.80	25.77	28.10	31.33	35.82	40.86	42.87	42.10	41.22	40.41	35.33	62.97
Silt soil	Control	4.00	4.00	4.18	4.35	4.69	4.86	5.03	5.03	4.86	4.69	4.57	17.08
	Filter mud	18.97	19.31	20.68	22.73	25.12	28.03	31.28	32.22	30.68	29.14	25.82	53.64
	Filter mud compost	27.26	28.12	31.54	35.21	40.17	46.84	51.97	49.66	48.29	46.07	40.51	69.00
	Banana residues compost	17.17	18.54	20.42	22.81	25.55	28.80	32.22	36.07	33.25	29.48	26.43	71.70
	Maize residues compost	16.32	16.83	18.37	20.76	24.01	27.77	32.05	34.96	29.83	26.06	24.70	59.74
	Poultry manure	24.70	26.06	29.14	32.99	38.12	43.51	48.29	46.24	42.82	41.28	37.31	67.17
	Farmyard manure	15.80	16.32	17.51	18.54	19.05	19.74	20.59	21.28	21.96	22.81	19.36	44.36
	MEAN	17.75	18.45	20.26	22.48	25.24	28.51	31.63	32.21	30.24	28.51	25.53	60.64
Sandy soil	Control	2.81	2.81	2.81	2.98	2.98	3.15	3.15	3.32	3.32	2.98	3.03	6.09
	Filter mud	16.32	16.66	18.37	19.57	21.62	24.35	27.77	28.63	27.43	25.55	22.63	56.59
	Filter mud compost	20.76	21.45	24.35	27.77	32.05	38.38	42.99	41.11	39.23	35.47	32.36	70.83
	Banana residues compost	15.29	16.49	18.03	20.25	22.99	26.06	29.48	33.25	30.51	26.06	23.84	70.46
	Maize residues compost	14.78	15.12	16.32	18.37	21.45	24.87	29.31	31.45	27.77	23.84	22.33	61.33
	Poultry manure	18.20	19.22	21.62	25.04	29.74	34.87	39.06	36.15	31.71	28.97	28.46	59.20
	Farmyard manure	13.75	14.09	14.26	14.78	15.63	16.66	18.03	18.88	19.39	19.57	16.50	42.28
	MEAN	14.56	15.12	16.54	18.39	20.92	24.05	27.11	27.54	25.62	23.20	21.31	59.41

$LSD_{0.05}$
A 1.692 **B** . 9293 **C** .959

A: Organic manures **B**: Soil types **C:** Incubation periods

-Each value in this table is the mean of 3 replicates.

* (R.I%) Relative Increase = (treatment - control (zero time)) * 100 / control (zero time)



Figures (2) : The effect of soil type treatments and the studied organic manures treatments on the release of available N (NH4-H + NO3-N) (ppm) during incubation periods

Phosphorus:-

The effected of three soil type treatments i.e, clay, silt and sandy soil on Na-HCO_3 extractable P (ppm) for six organic manure treatments during different incubation period are presented in **Table (5)**, and illustrated in **figures (3)** . This data indicate that, generally phosphorus mineralization for the organic manure treatments treated with clay, silt and sandy soil increased with incubation period up to acertain limit then it showed significantly declined trend for remaining incubation period. Similar trend was obtained by **Abeer., (2016)** who stated that the increase in the released phosphorus depends upon the type of the organic waste and the incubation period. Also, **Kumaragamage., (2010)** found that, the increase in the soil available-P induced by the application of organic materials might be due to their decomposition and producing organic acids which increase the phosphorus availability in the soil. It might also be attributed to the release of P after the decomposition of these organic materials. Moreover, organic acids, CO_2 and other products resulting from the microbial decomposition of organic matter may solubilize the insoluble phosphate forms by chelating cations, lowering soil pH and / or the partial occupation of organic anions on the surface of $CaCO_3$ and clay minerals**.**

Genearally, cumulative P mineralization from six organic manure treatments which treated with three soil type differed significantly, the maximum P minerilazation (relative increased to average six organic manures treatment 48.6%) was recerod with clay soil , followed by sand and silty soil , while minimum (relative increased to average six organic manure treatments 39.5%) from silty soil. Similar results were obtained by **Schuchardt *et. al*., (2011)** who observed that p miniralization was faster in sandy loam than in the loamy soils. Also, **Pareek *et. al*., (2003)** reported that, the cumulative percent phosphorus mineralization was also enhanced with incubation time up to a certain period. Thereafter, it decreased. The phosphorus mineralization depended on the phosphorus solubilisation due to production of organic acids by microbial de-composition of wastes, which increased up to 45 DOI only as decomposition of organic wastes slowed down after words.

The interaction effect between organic manure treatments and incubation periods was found significant. The phosphorus mineralization significantly increased after 10 days of incubation from all the manures in clay soil , and 20 day in silt and sandy soils treatments. However, the organic manure treatments showed maximum mineralization (released of avaliaple P) after 80, 60, 30, 50, 50,40 and 70 days of incubation periods for control, filter mud , filter mud compost ,banana residues compost, maize residues compost , poultry manure and farmyard manure ,respectively in clay soil . But in silt and sandy soils the released of avaliaple P reached the maximum levels after 80, 80, 40, 60, 60,50 and 70 days of incubation period for control, filter mud , filter mud compost ,banana residues compost, maize residues compost , poultry manure and farmyard manure ,respectively, Compared to the control treatments (zero time) . Similar results were obtained by **Amit *et. al*., (2016)** who observed that the interaction effect between organic wastes and incubation period was found significant. The phosphorus mineralization significantly increased after 10 days of incubation from all the organic amendments.

Subsequently,organic manure treatments exhibited significant reduction in P mineralization after 70 day of incupation period except conrol and farmyard manure which begin to reduction after 80 day of incupation period in clay soil, but in the silt and sandy soils organic manure treatments exhibited significant reduction in P mineralization after 70 days of incupation period except filter mud compost, conrol and Farmyard manure which begin to reduction after 80 days of incupation periods in clay soil. The patterns of P mineralization from different amendments were in order of: filter mud cake compost> poultry manure> maize residues compost> banana residues compost > filter mud cake >farmyard manure > control.

Table (5) :The effect of soil type treatments and the studied organic manures treatments on Na-HCO_3 extractable P (ppm) during incubation periods

Soil types treatments	organic manures treatments	Na-HCO_3 extractable P(ppm)										MEAN	R.I*
		Incubation periods treatments											
		0	10	20	30	40	50	60	70	80	90		
Clay soil	Control	8.00	8.00	8.40	8.90	9.30	9.80	10.40	11.20	11.90	11.00	9.69	37.50
	Filter mud	42.00	42.50	43.50	45.00	47.50	50.75	54.75	59.25	61.75	60.00	50.70	42.86
	Filter mud compost	55.00	57.00	60.75	66.25	75.25	82.25	88.25	90.25	87.55	85.00	74.76	54.55
	Banana residues compost	37.00	38.00	39.25	41.75	45.00	49.10	54.40	56.90	55.80	55.00	47.22	48.65
	Maize residues compost	40.00	41.00	42.50	43.50	46.25	49.75	54.75	58.75	58.25	58.00	49.28	45.00
	Poultry manure	50.00	52.00	55.50	60.25	66.25	73.25	78.25	77.20	76.40	76.00	66.51	52.00
	Farmyard manure	47.00	48.50	50.50	53.00	56.50	60.00	64.30	68.80	68.50	68.00	58.51	44.68
	MEAN	39.86	41.00	42.91	45.52	49.44	53.56	57.87	60.34	60.02	59.00	50.95	48.03
Silt soil	Control	2.30	2.30	2.40	2.50	2.60	2.80	4.10	4.00	3.50	3.00	2.95	30.43
	Filter mud	27.20	27.70	28.60	29.90	31.40	33.20	35.30	37.80	40.80	36.00	32.79	32.35
	Filter mud compost	41.20	43.30	46.30	51.40	57.70	64.70	67.70	64.10	62.30	60.00	55.87	45.63
	Banana residues compost	19.30	19.80	20.70	22.20	24.30	26.60	29.40	32.40	30.10	27.00	25.18	39.90
	Maize residues compost	22.10	22.60	23.60	24.80	26.50	28.50	30.70	33.20	31.20	30.50	27.37	38.01
	Poultry manure	35.00	36.00	37.50	39.40	41.60	44.70	48.90	52.10	51.40	50.00	43.66	42.86
	Farmyard manure	30.00	30.70	31.80	33.20	35.10	37.30	39.80	42.70	41.30	40.60	36.25	35.33
	MEAN	25.30	26.06	27.27	29.06	31.31	33.97	36.56	38.04	37.23	35.30	32.01	39.53
Sandy soil	Control	9.40	9.60	9.90	10.40	11.10	12.10	13.35	13.00	12.90	12.50	11.43	32.98
	Filter mud	34.30	34.90	36.20	37.90	39.90	42.65	46.15	50.15	49.30	48.00	41.95	39.94
	Filter mud compost	50.10	52.10	55.25	60.25	68.25	74.75	78.75	77.30	76.20	75.00	66.80	49.70
	Banana residues compost	23.20	24.20	25.30	27.30	30.05	33.30	38.30	40.80	36.10	33.50	31.21	44.40
	Maize residues compost	29.10	30.00	31.20	33.20	33.70	34.80	38.80	41.80	41.30	41.00	35.49	40.89
	Poultry manure	41.30	43.30	46.40	51.90	58.80	62.80	64.80	63.20	61.90	61.00	55.54	47.70
	Farmyard manure	36.20	37.30	39.10	41.40	44.40	47.60	51.70	56.30	53.20	51.00	45.82	40.88
	MEAN	31.94	33.06	34.76	37.48	40.89	44.00	47.41	48.94	47.27	46.00	41.17	44.01

$LSD_{0.05}$
A 0.6846 **B** 0. 7331 **C** 0.8792

A: Organic manures **B**: Soil types **C:** Incubation periods
-Each value in this table is the mean of 3 replicates.
* (R.I%) Relative Increase = (treatment - control (zero time)) * 100 / control (zero time)

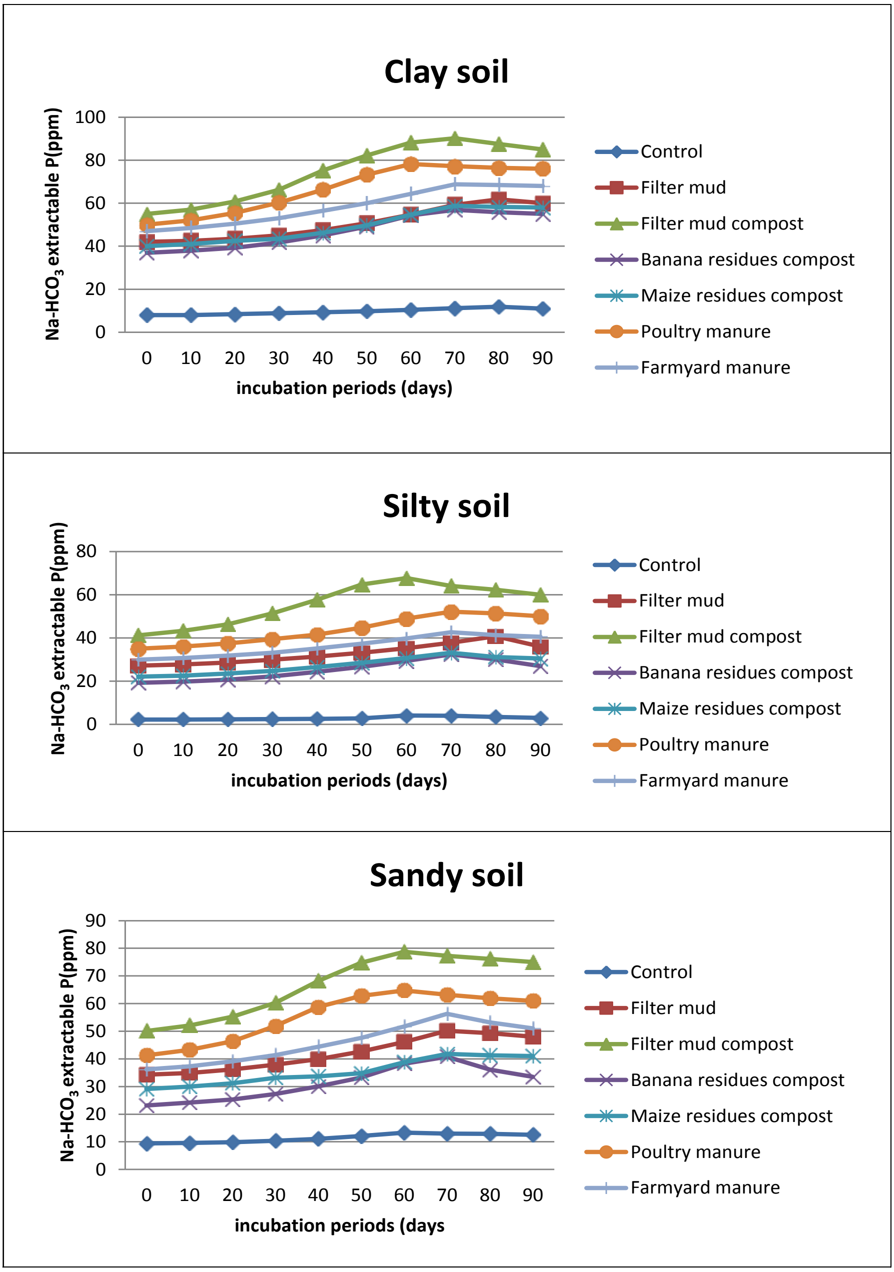


Figure (3) : The effect of soil type treatments and the studied organic manures treatments on Na-HCO3 extractable P (ppm) during incubation periods

Potassium :-

The effected of three soil type treatments i.e, clay , silt and sandy soil on potassium release for six organic manure treatments during different Incubation periods are presented in **Table (6)**, and illustrated in **figures (4)**. This data indicate that, potassium mineralization for the organic manure treatments generally increased with incubation period. These results are in harmony with these obtained by **(Abeer., 2016)** where stated that, the available potassium in organic wastes significantly increased with the addition of the soils alone or in combination with the biofertilizer**.** As it was the case for N minerlazation , K release from clay soil significantly superior for all organic manure treatments, the trend was clay > silt > sandy soil treatments. where, the average rate of increase for six organic maaannnure treatments in the soil treatments as follows:36.1, 31.3 and 27.7% respectively. These results are in an agreement with those obtained by **Eghball *et. al*., (2002)** who found that, clay content in the different soils, the higher the release k content after of 45-90 day of incubation period . On the assumption that bacterial cells were found in pores with a diameter of 0.8-6 mm. The average increase percentages in three soil type treatments of the value of ammonium acetate extractable K in the following peridos up to the end of the incubation period were 19.30, 29.17 , 22.18, 25.32 ,23.73 , 27.25 and 20.94% for control, filter mud , filter mud compost, banana residues compost , maize residues compost, poultry manure and farmyard manure, respectively. These results are in an agreement with those of **Moore *et. al*., (2000)** who found a significant linear relationship between increase the release of potassium and clay contents ranging from 5 to 42%.

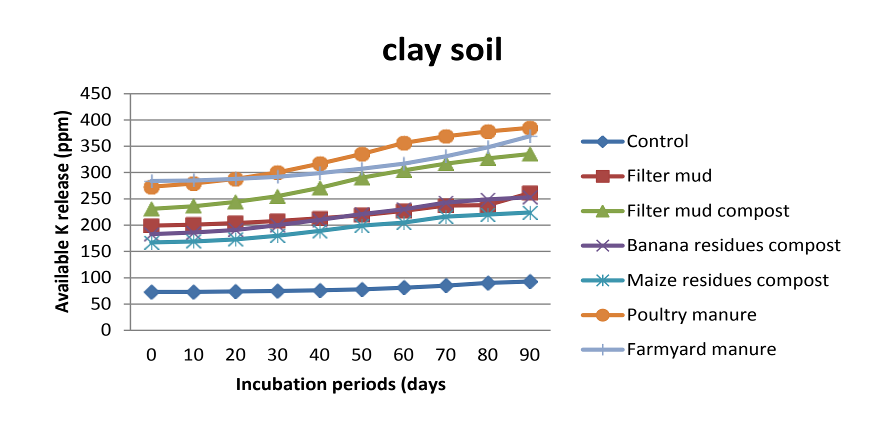
Table (6) :The effect of soil type treatments and the studied organic manures treatments on available K (ppm) during incubation periods

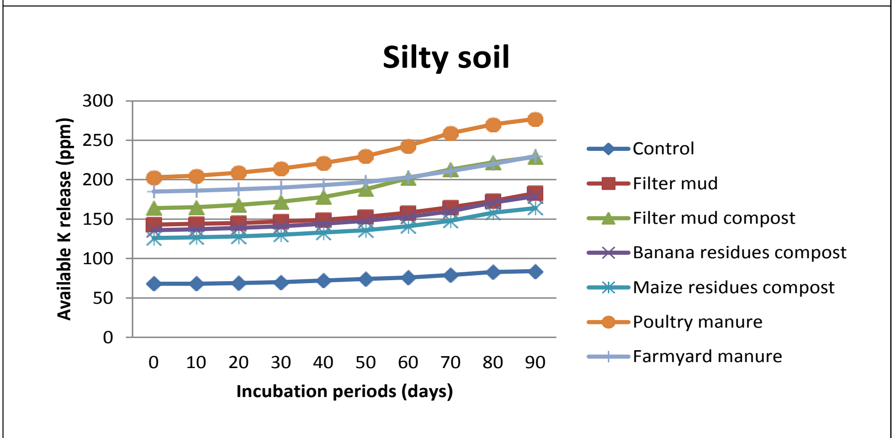
Soil types treatments	organic manures treatments	available K (PPm) Incubation periods treatments										MEAN	R.I*
		0	10	20	30	40	50	60	70	80	90		
Clay soil	Control	73.0	73.0	74.0	75.0	76.0	78.0	81.0	85.0	90.0	93.0	79.8	27.4
	Filter mud	199.0	201.0	204.0	208.0	213.0	219.0	227.0	237.0	238.0	261.0	220.7	31.2
	Filter mud compost	231.0	236.0	244.0	255.0	271.0	290.0	304.0	317.0	327.0	335.0	281.0	45.0
	Banana residues compost	183.0	186.0	191.0	200.0	210.0	221.0	230.0	243.0	249.0	253.0	216.6	38.3
	Maize residues compost	167.0	169.0	173.0	180.0	189.0	199.0	205.0	216.0	220.0	224.0	194.2	34.1
	Poultry manure	273.0	279.0	288.0	300.0	317.0	335.0	356.0	369.0	378.0	385.0	328.0	41.0
	Farmyard manure	284.0	285.0	288.0	292.0	299.0	307.0	317.0	331.0	348.0	369.0	312.0	29.9
	MEAN	201.4	204.1	208.9	215.7	225.0	235.6	245.7	256.9	264.3	274.3	233.2	36.2
Silt soil	Control	68.0	68.0	69.0	70.0	72.0	74.0	76.0	79.0	83.0	84.0	74.3	23.5
	Filter mud	143.0	144.0	145.0	147.0	149.0	153.0	158.0	165.0	173.0	183.0	156.0	28.0
	Filter mud compost	164.0	165.0	168.0	172.0	178.0	188.0	202.0	213.0	222.0	229.0	190.1	39.6
	Banana residues compost	136.0	137.0	139.0	141.0	144.0	148.0	153.0	160.0	171.0	179.0	150.8	31.6
	Maize residues compost	126.0	127.0	128.0	130.0	133.0	136.0	141.0	148.0	158.0	164.0	139.1	30.2
	Poultry manure	203.0	205.0	209.0	214.0	221.0	230.0	243.0	259.0	270.0	277.0	233.1	36.5
	Farmyard manure	185.0	186.0	188.0	190.0	193.0	197.0	203.0	211.0	220.0	230.0	200.3	24.3
	MEAN	146.4	147.4	149.4	152.0	155.7	160.9	168.0	176.4	185.3	192.3	163.4	31.3
Sandy soil	Control	43.0	43.0	43.3	43.8	44.5	45.4	46.5	47.8	49.3	51.0	45.8	18.6
	Filter mud	100.0	100.5	101.3	102.3	103.8	105.8	109.0	113.5	118.5	124.0	107.9	24.0
	Filter mud compost	115.0	116.3	118.9	122.8	127.2	132.2	140.4	146.7	151.9	156.0	132.7	35.7
	Banana residues compost	94.0	95.0	96.5	98.7	101.4	104.5	107.8	111.6	116.7	121.0	104.7	28.7
	Maize residues compost	83.0	83.5	84.3	85.5	87.1	89.4	92.2	95.6	100.7	105.0	90.6	26.5
	Poultry manure	138.0	139.3	141.4	144.7	149.1	153.7	161.2	169.7	176.4	182.0	155.5	31.9
	Farmyard manure	120.0	120.5	121.3	122.5	124.2	126.5	130.0	134.2	139.9	146.0	128.5	21.7
	MEAN	99.0	99.7	101.0	102.9	105.3	108.2	112.4	117.0	121.9	126.4	109.4	27.7
$LSD_{0.05}$	**A** 1.155				**B** .945					**C** 0.859			

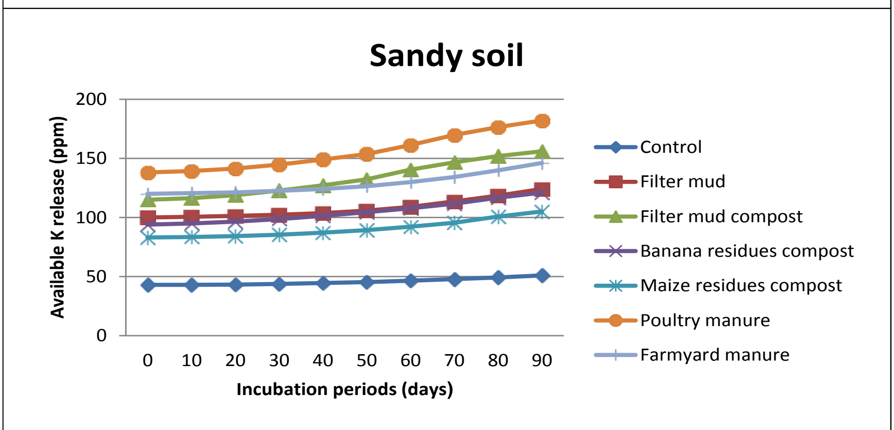
A: Organic manures **B**: Soil types **C:** Incubation periods

-Each value in this table is the mean of 3 replicates.

* (R.I%) Relative Increase = (treatment - control (zero time)) * 100 / control (zero time)







Figures (4) : The effect of soil type treatments and the studied organic manures treatments on available K (ppm) during incubation periods

As a result of the above, the patterns of K mineralization from different organic manure treatments were in order of filter mud cake compost> poultry manure> maize residues compost> banana residues compost > filter mud cake >farmyard manure > control. Similar, results were observed by **(Abeer, 2016)** . Also **Fenner *et. al*., (2005)** reported that the organic residues could be an alternative indigenous source of K because they could improve soil K levels of calcareous soils by increasing its release rate.

The interaction effect between organic manure and incubation period was a significant ($P<0.05$) relationship . The amount of K generated from control soil treatments reached the highest proportion of potassium release of its initial value after 80 days in control treatment, where reached to the highest value after 60, 30, 50, 50,40 and70 days of incubation period for filter mud, filter mud compost, banana residues compost, maize residues compost , poultry manure and farmyard manure ,respectively, while in silt and sandy soils the amounts of K generated from control soil treatment reached the highest proportion of potassium release of its initial value after 80 days in control treatment, where reached to the proportion after 80, 40, 60, 60,50 and70 days of incubation period for filter mud , filter mud compost, banana residues compost, maize residues compost , poultry manure and farmyard manure ,respectively. The gradull increase in K released from the control treatment was due the increase activity of the initial microorganisms presented in the soil (due to the optimum temperature) that helps in to releasing K from feldspare **(Abeer., 2016)**.

CO_2 Evolution:

The balance between C and N is one of the most important aspects for the decomposition process. Organic matter rich in carbon provides a large source of energy to soil microorganisms. Consequently, it brings population expansion of microorganism and higher consumption of mineralized N. High populations of microorganisms inhabit the upper soil surface and have an access to the soil N sources. As decomposition proceeds, carbon is released as CO_2 and the C/N ratio of the substrate falls. Conversion of carbon in crop residue and other organic materials applied to the soil into humus requires nutrients **(Lal., 2004**). The cumulative amount of CO_2 evolution that is evolvwd from the organic manure treatments is referred by the amount of dissolved O.C (DOC) in soil **Chang *et. al*., (2007).**

The effected of three soil type treatments i.e, clay , silt and sandy soils on the cumulative CO_2 evolution for six organic manure treatments under different incubation periods are presented in **Table (5)**, and illustrated in **figures (7)**. Data noticed that, increasing the incubation periods siginifical increase the CO_2 evolution compared with intial treatment (zero time) for the organic manure treatments. As well as, the cumulative CO_2 evolution for six organic manure treatments was faster in clay soil treatment compared to silt and sandy soil treatments. Where, the average rate of increase for six organic manure treatments at the end of the incubation periods were recorded in clay , silty and sandy soil treatments 41.82, 32.66 and 28.80% respecativaly. Similar results were obtained by **Anetta and Joanna (2014)** who observed that, the soil type and application rate significantly affected the cumulative CO2 emission ($p < 0.001$) . Also, **Kerstiens., (2005)** reported that, statistically significant difference ($p<0.05$) in different soil microbial respiration was observed. Soil microbial respiration rate was higher in clay soil . The lowest soil microbial respiration was in sandy soils. At week ten , soil microbial respiration rate was decreased in all soils at varying rates. Soils which had higher total soil organic carbon also had higher soil microbial respiration rates.

The CO_2 evolution throughout the incubation period was greatest in filter mud cake compost followed by poultry manure, maize residues compost, banana residues compost, filter mud cake, farmyard manure and control. The same trend was obtained by (**Roy and Kashem., 2014**) who stated that, at the beginning and at the end of the incubation period, the highest concentrations of the dissolved organic carbon (DOC) were found in the soil treated with poultry manure and the lowest occurred in the compost treated soil. In an incubation experiment maintained for 60 days. The percentage change in dissolved organic carbon (DOC) contents of the soil was higer in 40, 50 and 50 day in clay , silty and sandy treatments respecativaly. In general, the obtained results and given explanations are in a close agreement with those obtained by **Hadad *et. al*., (2015) .**

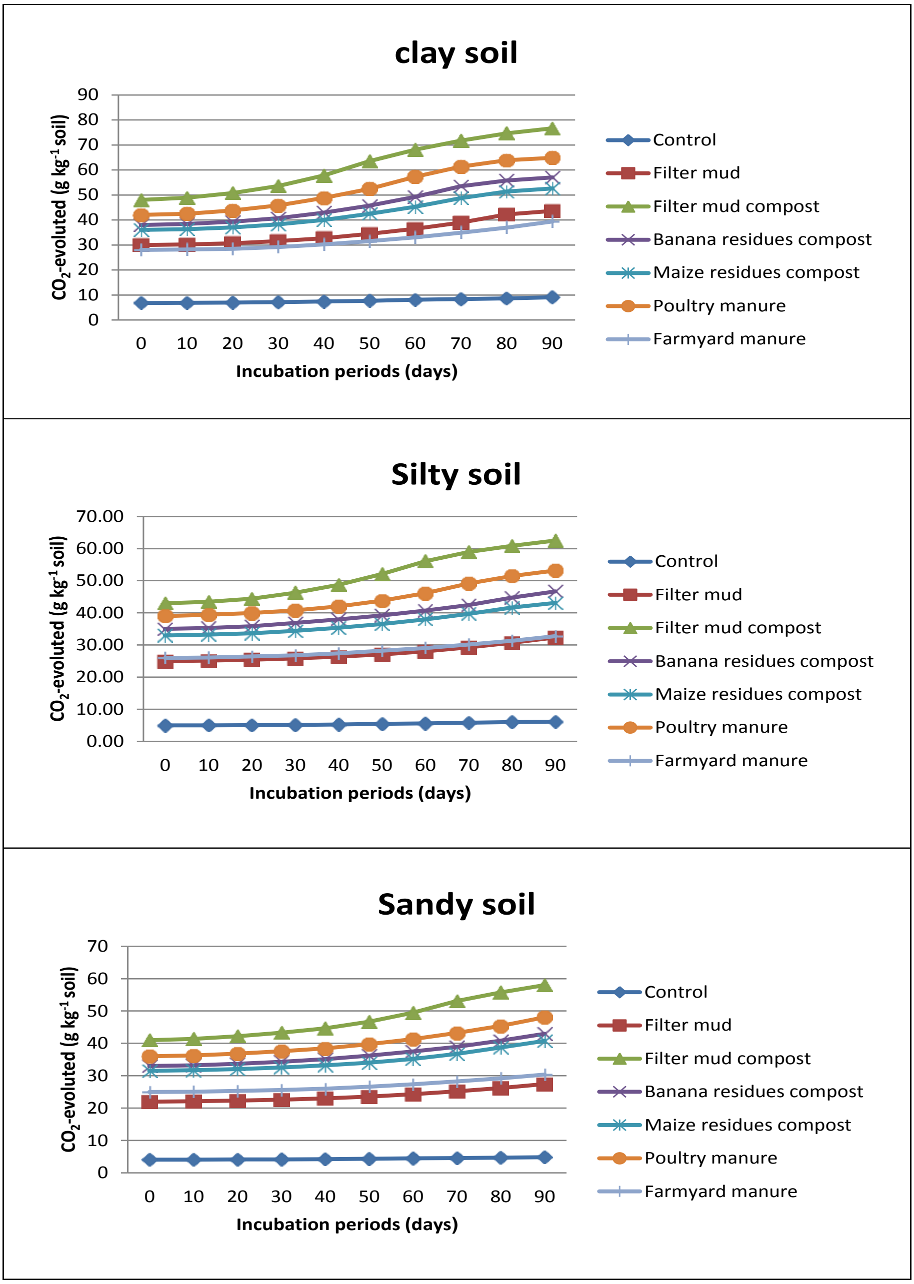
Table (5) :The effect of soil type treatments and the studied organic manures treatments on CO_2-evoluted (g kg^{-1}) during incubation periods

Soil types treatments	organic manures treatments	CO_2-evoluted (g kg^{-1} soil) Incubation periods treatments										MEAN	R.I*
		0	10	20	30	40	50	60	70	80	90		
Clay soil	Control	6.80	6.83	6.92	7.08	7.28	7.55	7.86	8.09	8.43	8.77	7.56	29.00
	Filter mud	30.00	30.18	30.56	31.31	32.28	33.71	35.39	37.49	40.35	41.70	34.29	39.00
	Filter mud compost	48.00	48.72	50.31	52.68	56.16	60.96	64.80	67.80	70.20	72.48	59.21	51.00
	Banana residues compost	38.00	38.38	39.06	40.28	42.10	44.42	47.35	50.92	52.82	54.34	44.77	43.00
	Maize residues compost	36.00	36.27	36.82	37.89	39.60	41.40	43.74	46.62	48.78	50.04	41.72	39.00
	Poultry manure	42.00	42.42	43.48	45.15	47.67	50.69	54.77	58.13	60.23	60.48	50.5	44.00
	Farmyard manure	28.00	28.14	28.42	28.98	29.82	30.94	32.20	33.77	35.45	36.68	31.24	31.00
	MEAN	32.69	32.99	33.65	34.77	36.42	38.52	40.87	43.26	45.18	46.36	38.47	41.82
Silt soil	Control	5.00	5.02	5.07	5.16	5.27	5.42	5.59	5.76	5.96	6.15	5.44	23.00
	Filter mud	25.00	25.13	25.40	25.78	26.25	26.88	27.75	28.88	30.19	32.00	27.32	28.00
	Filter mud compost	43.00	43.43	44.26	45.97	48.22	51.23	54.89	57.47	59.25	61.92	50.96	44.00
	Banana residues compost	35.00	35.28	35.78	36.68	37.73	38.83	40.20	41.77	43.87	46.20	39.13	32.00
	Maize residues compost	33.00	33.20	33.56	34.25	35.15	36.30	37.52	39.11	40.85	42.24	36.52	28.00
	Poultry manure	39.00	39.35	39.87	40.95	41.77	43.33	45.47	48.20	50.35	52.26	44.06	34.00
	Farmyard manure	26.00	26.10	26.39	26.75	27.30	28.03	28.81	29.80	30.84	32.50	28.25	25.00
	MEAN	29.43	29.64	30.05	30.79	31.67	32.86	34.32	35.85	37.33	39.04	33.09	32.66
Sandy soil	Control	4.10	4.10	4.12	4.17	4.24	4.33	4.44	4.56	4.67	4.84	4.36	18.00
	Filter mud	22.00	22.11	22.31	22.55	22.95	23.44	24.10	24.92	25.84	27.08	23.73	23.10
	Filter mud compost	41.00	41.37	42.12	43.09	44.32	46.17	48.69	52.07	54.43	56.58	46.98	38.00
	Banana residues compost	33.00	33.23	33.63	34.22	34.96	35.92	37.08	38.40	40.13	42.08	36.26	27.50
	Maize residues compost	31.50	31.69	32.04	32.48	33.08	33.96	34.89	36.30	38.07	40.08	34.41	27.25
	Poultry manure	36.00	36.32	36.73	37.40	38.21	39.40	40.84	42.84	44.55	47.16	39.95	31.00
	Farmyard manure	25.00	25.08	25.28	25.60	25.90	26.48	27.15	27.98	28.85	30.25	26.76	21.00
	MEAN	27.51	27.70	28.03	28.50	29.09	29.96	31.03	32.44	33.79	35.44	30.35	28.80
LSD0.05 **A** 0.984 **B** 0.8823 **C** 0.898													

A: Organic manures **B**: Soil types **C:** Incubation periods

-Each value in this table is the mean of 3 replicates.

* (R.I%) Relative Increase = (treatment - control (zero time)) * 100 / control (zero time)



Figures (7): The effect of soil type treatments and the studied organic manures treatments on CO2-evoluted (g kg-1) during incubation periods

Conclusion

The effect of three types of soils different in characteristics i.e, clay, sailt and sandy soils, on the transformation of six organic manures (filter mud, filter mud compost, banana residues compost, maize residues compost, poultry manure and farmyard manure) studied were increasing the incubation period due to increase the release of available nutrients (N, P, K) and CO_2 Evolution, on the other hand reduced organic carbon content, compared with control (zero time) treatment. Degradation rate of six organic manures depending on the soil type , organic manure type and period of incubation. Where, the degradation rate of organic manure in clay soil was more affacted compared with the silt and sandy soil and the degradation of organic manures was observed after 20 day up to 60 days of the incubation period compared with control (zero time) treatment . The highest concentrations of dissolved organic carbon (DOC) and release (N, p and K) were observed in the three soil treatment with poultry manure and filter mud compost , The lowest cumulative amounts occurred in the Farmyard manure. These effects should be taken into consideration during crop production. A need for more prolonged incubation and field studies conditions to cover complete growth duration of the crops is required to provide some useful sights on the long-term changes in soil properties and dynamics of nutrient mineralization/release in the soil.

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تأثير الظروف البيئية والأرضية على تحولات الأسمدة العضوية المختلفه.

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قسم الأراضى والمياه - كلية الزراعة – جامعة سوهاج [1] ، معهد بحوث الاراضى والمياه والبيئة ، مركز البحوث الزراعية.

أجريت تجربة معملية لتقييم تأثير ثلاثة أنواع من التربة المختلفة في الخصائص (طينية ، سلتية ، والرملية (كأحد العوامل الأرضية التى تؤثر على التغييرات التى تحدث لستة أنواع مختلفة من السماد العضوي (طينة مرشحات ، كمبوست طينة مرشحات ، كمبوست موز ، كمبوست ذرة ، سماد الدواجن ، سماد بلدى)، ولتحقيق الهدف صممت تجربة فى نظام تام العشوائية حيث تم تحضير 63 أصيص (3 نوع من التربة * 7 (6 سماد عضوي + كنترول) * 3 تكرارات). وتم تعبئة الأصص بمعدل 30 جم من السماد العضوى مخلوط مع 2كجم تربة ، بعد ملء الأصص ، تم ري جميع الأصص عند السعة الحقلية ، وسجلت أوزانها ، تم ضبط رطوبة التربة بعد كل يومين. تم تحضين المعاملات لمدة 90 يوم في

درجة حرارة الغرفة ، و أخذ العينات في 0 و 10 و 20 و 30 و 40 و 50 و 60 و 80،70 و 90 يومًا من فترة التحضين ,وكانت أهم النتائج المتحصل عليها هى : بزيادة فترة التحضين حدث زيادة معنوية فى تحرر النيتروجين الامونيومى والنتراتى ، الفسفور والبوتاسيوم الميسر وأيضا زيادة فى كمية الكربون العضوى الذائب ومن الناحية الأخرى حدث انخفاض معنوى في محتوى الكربون العضوى للمعاملات مقارنة بالكنترول (بداية االتحضين) ،حيث انة حدث انحلال للمادة العضوية ، واختلف معدل الانحلال باختلاف نوع التربة وفترة التحضين ونوع السماد العضوى ، وكان معدل الانحلال التربة الطينية اكبر و اسرع من التربة السلتية والرملية ، كان معدل الانحلال معنويا ($p < o.o5$) بعد 20 يومًا حتى 60 يومًا من فترة الحضانة مقارنة بالكنترول (بداية االتحضين.(

معدل زيادة العناصر المتاحة من النيتروجين الامونيومى والنتراتى ، الفسفور والبوتاسيوم من الاسمدة العضوية كان حسب الترتيب الأتى :كمبوست طينة المرشحات >سماد الدواجن >كمبوست الموز >كمبوست الذرة >طينة المرشحات >السماد البلدى.