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## Effect of incubation duration of incorporated organic manures on chemical properties of Inceptisol

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**Abstract**

A laboratory incubation experiment of 60 days was carried out at Department of Soil Science and Agricultural Chemistry, Post Graduate Institute, MPKV, Rahuri, during 2020-21 to observe the effect of incubation duration of organic manures on chemical properties viz. pH, electrical conductivity (EC), soil organic carbon (SOC), available nitrogen, phosphorus and potassium. The experiment was laid out in a complete randomized block design (CRD) with three replication and seven treatments. The treatment comprised of (T<sub>1</sub>) soil + FYM @ 10 t ha<sup>-1</sup>, (T<sub>2</sub>) soil + Vermicompost @ 5 t ha<sup>-1</sup>, (T<sub>3</sub>) soil + Poultry manure @ 5 t ha<sup>-1</sup>, (T<sub>4</sub>) soil + Press mud compost @ 5 t ha<sup>-1</sup>, (T<sub>5</sub>) soil + Goat manure @ 5 t ha<sup>-1</sup>, (T<sub>6</sub>) soil + Urban compost @ 10 t ha<sup>-1</sup> and (T<sub>7</sub>) absolute control. Results indicated that incorporation of organic manures to soil significantly influenced soil properties. The effects of organic manures on soil varied with manure type and incubation period. The application of FYM @ 10 t ha<sup>-1</sup> recorded significantly lower pH (7.73). However, the treatment vermicompost @ 5 t ha<sup>-1</sup> was at par with treatment FYM @ 10 t ha<sup>-1</sup>. The significantly highest EC was recorded with the application of press mud compost @ 5 t ha<sup>-1</sup> (1.22 dS m<sup>-1</sup>). The application of poultry manure significantly influenced soil available N, P and K content. The organic carbon content significantly increased at 15 days of incubation and further decreased from 30 days of incubation. The highest organic carbon content was observed with application of FYM @ 10 t ha<sup>-1</sup> (0.68% at 15 days of incubation).

**Keywords:** Organic manures, Inceptisol, chemical properties, incubation

**1. Introduction**

Under the present trend of exploitive agriculture in India, nutrient supplying capacity of soil declines steadily under continuous and intensive cropping system. In recent energy crisis, hike in the prices of the inorganic fertilizers and declining soil health and productivity necessitate the use of organic manures compulsorily in agricultural crop production and it is very difficult for marginal farmers to use chemical fertilizers due to their cost and timely availability. Agriculture is facing several critical issues like low fertilizer use efficiencies, decreasing factor productivity, low soil organic carbon (SOC) stock, imbalance between nutrient removal and addition to the soil. Depletion of nutrients in soil has been accelerated by increase of intensive cultivation with increased dependence on inorganic fertilizers and decreasing emphasis on the use of organic manure in addition with use of high yielding varieties.

Recently in agriculture, especially in organic agriculture, the use of organic fertilizers such as manures and compost have been important components of farming practices (Quintern *et al.* 2006) [9]. Soil organic matter plays a key role in the sustainability of agricultural production, because it possesses many desirable features such as beneficial effects on the soil quality parameters. Organic manures have been proven to enhance efficiency and reduced the need for chemical fertilizers to improve the soil fertility and soil health. Improvement in soil physico-chemical properties is pre-requisite for maintaining soil quality and sustaining agriculture productivity. Organic resources play a dominant role in soil properties through their short-term effects on nutrient supply and longer-term contribution to soil organic matter (SOM) formation. Organics supply nutrients also improve microbial activities, biodiversity and size of the microbial population in the soil, effect soil structure, nutrient turnover and many other soil physico-chemical parameters (Albiach *et al.* 2000) [1]. The application of organic material is fundamentally important which supply various kinds of plant nutrients including micronutrient, improve soil physical and chemical properties and hence maintain nutrient holding and buffering capacity and consequently enhance microbial activity. Soil application of organic amendments is management strategy to counteract the progressive loss of organic matter (Marinari *et al.* 2000; Tejada *et al.* 2008) [7, 12]. The addition of organic amendments

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may improve soil physico-chemical, biochemical and microbiological properties involved in biogeochemical cycles and thus positively influence plant productivity parameters. Among the main benefits attributed to the use of organic amendments are an improved soil aggregation and reduced bulk density, greater water holding capacity, stabilization of pH, increased CEC and organic matter (Tejada *et al.* 2008) [12]. Manures have long been considered a desirable soil amendment and report of its effect on soil properties are numerous (Campbell *et al.* 1986) [4]. To meet crop nutrient requirements, knowledge of soil characteristics following organic manure application is needed. Thus, it is pertinent to observe some changes in soil properties with time due to application of organic material.

Hence, study will be carried out to observe the changes in pH, electrical conductivity, organic carbon content and N, P, K content of soil incorporated with FYM, poultry manure, vermicompost, goat manure, press mud compost and urban compost in laboratory incubation condition.

## 2. Material and methods

### 2.1 Soil

The soil used in this incubation experiment were taken from PG Research Farm, Department of Soil Science and Agricultural Chemistry, MPKV, Rahuri which belongs to *Masala* soil series of Inceptisol order of *Vertic Haplustept*, the soil was moderately alkaline with medium status of organic carbon, low in available nitrogen, medium in available phosphorus and very high in available potassium and deficient in zinc and iron. The data of initial soil analysis is presented in table 1.

### 2.2 Organic manures

The quantity of FYM, vermicompost, poultry manure and goat manure required for experiment were procured from the Division of Animal Husbandry and Dairy Science, PGI, MPKV, Rahuri. The quantity of Press mud compost required for experiment was procured from Dr. Baburao Bapuji

Tanpure Co-operative Sugar Factory Ltd., Shivajinagar, A/P. Rahuri Factory, Tal. Rahuri, Dist. Ahmednagar.

### 2.3 Soil analysis

A bulk soil samples from the depth of 0 to 15 cm was collected. After collection of the soil sample, unwanted roots and debris were removed and dried in air for at least 3 days until constant weight is achieved. After air drying, the sample was ground in wooden mortar and pestle and sieved through 2 mm sieve. For organic carbon soil was sieved from 0.5 mm sieve. In an incubation experiment soil samples were analyzed treatments wise for pH by Potentiometry (1:2.5), EC by Conductometry, organic carbon by wet oxidation method, available N by alkaline permanganate method, available P by 0.5 M NaHCO<sub>3</sub> and available K by neutral N NH<sub>4</sub>OAc method at an interval of 15 days up to 60 days. At each sampling, soil samples were collected through destructive sampling technique where whole soil mass was taken.

**Table 1:** Initial soil analysis

Sr. No.	Parameters	Inceptisol soil (PG Research Farm)
1.	pH (1:2.5)	8.12
2.	EC (dS m <sup>-1</sup> )	1.08
3.	Available nitrogen (kg ha <sup>-1</sup> )	147
4.	Available phosphorus (kg ha <sup>-1</sup> )	19
5.	Available potassium (kg ha <sup>-1</sup> )	361
6.	Organic carbon (%)	0.57

### 2.4 Organic manures analysis

The organic manures i.e. FYM, vermicompost, poultry manure, press mud compost, goat manure and urban compost samples were air dried under shade. The organic manures were gently grounded, passed through 2.0 mm sieve and analyzed for pH by Potentiometry (1:10), EC by Conductometry, total N by Micro-kjeldahl's method, total P by Vanadomolybdate Colorimetric method, total K by Flame photometry and organic carbon by Ignition method. Data is presented in table 2.

**Table 2:** Characterization of organic manures

Sr. No.	Parameters	FYM	Vermi compost	Poultry manure	Press mud compost	Goat manure	Urban compost
1.	pH (1:10)	7.10	7.19	8.02	7.81	7.25	7.92
2.	EC (dS m <sup>-1</sup> )	2.28	2.51	2.24	3.58	1.19	2.04
3.	Nitrogen (%)	0.79	1.20	2.10	1.45	0.99	1.37
4.	Phosphorus (%)	0.25	1.07	1.28	0.59	0.48	0.28
5.	Potassium (%)	0.48	1.17	1.36	0.45	0.85	0.76
6.	Organic carbon (%)	25.49	25.01	19.71	30.10	14.58	16.25

### 2.5 Details of incubation study

The soil sample was collected from PG Research Farm Dept. of Soil Science and Agril. Chemistry, MPKV, Rahuri. There were 07 treatments comprising of FYM, vermicompost, poultry manure, press mud compost, goat manure, urban compost and control, were arranged in complete randomized design (CRD) with 03 replications. An incubation experiment was conducted in plastic bottles (150 g capacity) for 08 weeks. Total 105 plastic bottles were taken for incubation study. (7 treatments × 3 replications × 5 incubation periods). The above organic materials were mixed with soil @ 0.54 g, 0.27 g, 0.27 g, 0.27 g, 0.27 g and 0.54 g per 120 g of soil, respectively on the basis of recommended dose of organic manures. The water was added to each bottle for keeping the soil moisture at its field capacity throughout the study. The observations were recorded at 0, 15, 30, 45 and 60 days of

intervals.

## 3. Results and Discussion

### 3.1 Effect of organic manures on soil pH

The soil pH as influenced by application of different organic manures is presented in table 3. The soil pH was significantly decreased in all the treatments during incubation period. The results indicated significant differences in pH between control and organics amended soils throughout the incubation period. Among all the treatments, the application of treatment T<sub>1</sub> (Soil + FYM @ 10 t ha<sup>-1</sup>) significantly recorded lower pH i.e. 7.87, 7.76, 7.75 and 7.73 at 15, 30, 45 and 60 days of incubation, respectively over the control. The highest decrease in pH was up to 7.73 at 60 days of incubation over the initial pH values of soil i.e. 8.12. However, the treatment T<sub>2</sub> (Soil + Vermicompost @ 5 t ha<sup>-1</sup>) recorded 7.88, 7.79, 7.76

and 7.73 at 15, 30, 45 and 60 days of incubation, respectively which was at par with treatment T<sub>1</sub> (Soil + FYM @ 10 t ha<sup>-1</sup>). The decrease in soil pH might be due to release of organic acids like humic acid, carbonic acid, etc. during mineralization of organic manures. The similar results were shown by Roy and Kashem (2014)<sup>[10]</sup>.

### 3.2 Effect of organic manures on soil EC

The soil EC as influenced by application of different organic manures is presented in table 3. Opposite of soil pH, soil EC gradually increased with incubation time significantly and the magnitude of increase was higher in the manure amended soil than the control soil. Significantly highest EC was recorded with the application of treatment T<sub>4</sub> (Soil + Press mud compost @ 5 t ha<sup>-1</sup>) i.e. 1.14, 1.16, 1.20 and 1.22 dS m<sup>-1</sup> at 15,

30, 45 and 60 days of incubation, respectively over the control. Initially soil EC was 1.08 dS m<sup>-1</sup> which was increased to 1.22 at 60 days of incubation with the application of treatment T<sub>4</sub> (Soil + Press mud compost @ 5 t ha<sup>-1</sup>). However, the treatment T<sub>2</sub> (Soil + Vermicompost @ 5 t ha<sup>-1</sup> and FYM @ 10 t ha<sup>-1</sup>) recorded 1.13, 1.15, 1.19 and 1.21 dS m<sup>-1</sup> at 15, 30, 45 and 60 days of incubation, respectively which was at par with treatment T<sub>4</sub> (Soil + Press mud compost @ 5 t ha<sup>-1</sup>). The increase in EC was might be due to degradation and decomposition of organic manures which liberates basic ions in soil solution and subsequently adsorbed on the surface of clay minerals resulting into increase in soil EC. The similar results were shown by Azeez and Averbek (2012)<sup>[2]</sup> and Roy and Kashem (2014)<sup>[10]</sup>.

**Table 3:** Effect of organics on soil pH and EC (dS m<sup>-1</sup>)

Tr. No.	Treatment details	Soil pH					Soil EC (dS m <sup>-1</sup> )				
		Incubation period					Incubation period				
		Initial	15 Days	30 Days	45 Days	60 Days	Initial	15 Days	30 Days	45 Days	60 Days
T <sub>1</sub>	Soil + FYM @ 10 t ha <sup>-1</sup>	8.10	7.87	7.76	7.75	7.73	1.10	1.12	1.14	1.18	1.20
T <sub>2</sub>	Soil + Vermicompost @ 5 t ha <sup>-1</sup>	8.10	7.88	7.79	7.76	7.73	1.11	1.13	1.15	1.19	1.21
T <sub>3</sub>	Soil + Poultry manure @ 5 t ha <sup>-1</sup>	8.14	8.04	7.97	7.89	7.85	1.10	1.11	1.13	1.16	1.17
T <sub>4</sub>	Soil + Press mud compost @ 5 t ha <sup>-1</sup>	8.12	8.01	7.91	7.80	7.78	1.11	1.14	1.16	1.20	1.22
T <sub>5</sub>	Soil + Goat manure @ 5 t ha <sup>-1</sup>	8.11	7.97	7.90	7.80	7.75	1.08	1.09	1.11	1.13	1.15
T <sub>6</sub>	Soil + Urban compost @ 10 t ha <sup>-1</sup>	8.13	8.03	7.96	7.88	7.85	1.09	1.10	1.12	1.15	1.17
T <sub>7</sub>	Absolute control	8.12	8.10	8.09	8.09	8.08	1.08	1.09	1.10	1.12	1.14
	Initial (Soil)	8.12					1.08				
	S.Em±	-	0.0045	0.0130	0.0042	0.0055	-	0.0033	0.0050	0.0058	0.0038
	C.D. at 5%	-	0.0138	0.0395	0.0127	0.0167	-	0.0101	0.0153	0.0175	0.0115

### 3.3 Effect of organic manures on soil available nitrogen

The nitrogen content in soil as influenced by application of different organic manures is presented in table 4. The application of different organics on soil had significant effect on nitrogen content of soil which was significantly increased with increase in incubation period in all the treatments. Among all the treatments, application of treatment T<sub>3</sub> (Soil + Poultry manure @ 5 t ha<sup>-1</sup>) recorded significantly higher N content i.e. 159, 163, 170 and 173 kg ha<sup>-1</sup> at 15, 30, 45 and 60 days of incubation, respectively over the control. The highest increase was up to 173 kg ha<sup>-1</sup> in treatment T<sub>3</sub> (Soil + Poultry

manure @ 5 t ha<sup>-1</sup>) over the initial N content in soil (147 kg ha<sup>-1</sup>). However, the treatment T<sub>4</sub> (Soil + Press mud compost @ 5 t ha<sup>-1</sup>) showed 158, 162, 168 and 172 kg ha<sup>-1</sup> at 15, 30, 45 and 60 days of incubation, respectively which was at par with treatment T<sub>3</sub> (Soil + Poultry manure @ 5 t ha<sup>-1</sup>). The increased content of available N in soil might be due to increased microbial population which leads to mineralization of organically bound N to inorganic form. This may be attributed to the decrease in pH of soil which increases the availability of nutrients in soil. Bhanwaria and Yadav (2016)<sup>[3]</sup> and Diwale *et al.* (2020)<sup>[5]</sup> found the similar findings.

**Table 4:** Effect of organics on soil available nitrogen (kg ha<sup>-1</sup>)

Tr. No.	Treatment details	Incubation period				
		Initial	15 Days	30 Days	45 Days	60 Days
T <sub>1</sub>	Soil + FYM @ 10 t ha <sup>-1</sup>	147	151	154	157	161
T <sub>2</sub>	Soil + Vermicompost @ 5 t ha <sup>-1</sup>	148	153	157	160	165
T <sub>3</sub>	Soil + Poultry manure @ 5 t ha <sup>-1</sup>	149	159	163	170	173
T <sub>4</sub>	Soil + Press mud compost @ 5 t ha <sup>-1</sup>	148	158	162	168	172
T <sub>5</sub>	Soil + Goat manure @ 5 t ha <sup>-1</sup>	147	152	155	159	163
T <sub>6</sub>	Soil + Urban compost @ 10 t ha <sup>-1</sup>	148	155	159	163	168
T <sub>7</sub>	Absolute control	147	150	152	154	159
	Initial (Soil)	147				
	S.Em±	-	0.2131	0.2548	0.3369	0.2340
	C.D. at 5%	-	0.6465	0.7729	1.0220	0.7099

### 3.4 Effect of organic manures on soil available phosphorus

The phosphorus content in soil as influenced by application of different organic manures is presented in table 5. The application of organic manures significantly increased phosphorus content in soil up to 30 days of incubation and further decreased from 45 days of incubation. The treatment T<sub>3</sub> (Soil + Poultry manure @ 5 t ha<sup>-1</sup>) significantly increased phosphorus content (22 and 29 kg ha<sup>-1</sup> at 15 and 30 days of

incubation, respectively) over the control which showed 19 and 22 kg ha<sup>-1</sup> at 15 and 30 days of incubation, respectively. Initially P content in soil was 19 kg ha<sup>-1</sup> which was increased to 29 and 28 kg ha<sup>-1</sup> at 15 and 30 days of incubation, respectively. Further at 45 and 60 days of incubation phosphorus content was reduced significantly to 26 and 25 kg ha<sup>-1</sup>, respectively in treatment T<sub>3</sub> (Soil + Poultry manure @ 5 t ha<sup>-1</sup>). However, the treatment T<sub>2</sub> (Soil + Vermicompost @ 5 t

ha<sup>-1</sup>) recorded 21, 28, 25 and 24 kg ha<sup>-1</sup> at 15, 30, 45 and 60 days of incubation, respectively which was at par with treatment T<sub>3</sub> (Soil + Poultry manure @ 5 t ha<sup>-1</sup>). The initial increase in P content in soil may be attributed to the increase in microbial activity which releases the nutrients by the decomposition of organic materials which related to organic acids which helps in the solubility of native insoluble

phosphates or this may be attributed to the decrease in pH of soil which increases the availability of nutrients in soil. The decrease in P content after 30 days of incubation in soil may be attributed to the fixation of P in the form of tricalcium phosphate. The similar results were found by Diwale *et al.* (2020)<sup>[5]</sup> and Bhanwaria and Yadav (2016)<sup>[3]</sup>.

**Table 5:** Effect of organics on soil available phosphorus (kg ha<sup>-1</sup>)

Tr. No.	Treatment details	Incubation period				
		Initial	15 Days	30 Days	45 Days	60 Days
T <sub>1</sub>	Soil + FYM @ 10 t ha <sup>-1</sup>	19	20	24	23	21
T <sub>2</sub>	Soil + Vermicompost @ 5 t ha <sup>-1</sup>	20	21	28	25	24
T <sub>3</sub>	Soil + Poultry manure @ 5 t ha <sup>-1</sup>	21	22	29	26	25
T <sub>4</sub>	Soil + Press mud compost @ 5 t ha <sup>-1</sup>	19	21	26	23	21
T <sub>5</sub>	Soil + Goat manure @ 5 t ha <sup>-1</sup>	20	20	25	21	20
T <sub>6</sub>	Soil + Urban compost @ 10 t ha <sup>-1</sup>	19	19	24	21	20
T <sub>7</sub>	Absolute control	19	19	22	20	21
	Initial (Soil)	19				
	S.E.m±	-	0.1668	0.1568	0.1179	0.0399
	C.D. at 5%	-	0.5060	0.4755	0.3577	0.1211

### 3.5 Effect of organic manures on soil available potassium

The potassium content in soil as influenced by application of different organic manures is presented in table 6. The results indicate that potassium content in soil gradually increased with increase in incubation period. Among all the treatments, treatment T<sub>3</sub> (Soil + Poultry manure @ 5 t ha<sup>-1</sup>) recorded the highest K content i.e. 364, 369, 372 and 375 kg ha<sup>-1</sup> at 15, 30, 45 and 60 days of incubation, respectively over the control. The initial K content in soil was 361 kg ha<sup>-1</sup> which was increased to 375 kg ha<sup>-1</sup> in treatment T<sub>3</sub> (Soil + Poultry manure @ 5 t ha<sup>-1</sup>) at 60 days of incubation. However, treatment T<sub>2</sub> (Soil + Vermicompost @ 5 t ha<sup>-1</sup>) recorded 363,

368, 371 and 474 kg ha<sup>-1</sup> at 15, 30, 45 and 60 days of incubation, respectively which was at par with treatment T<sub>3</sub> (Soil + Poultry manure @ 5 t ha<sup>-1</sup>). The higher availability of K in soil may be due to beneficial effect of organic manure on the reduction of K fixation. The organic manure added interacts with K-clay complex to release K from non-exchangeable fractions to the available pool or this may be attributed to the decrease in pH of soil which related to the release of organic acids which increases the availability of nutrients in soil. The similar results were shown by Diwale *et al.* (2020)<sup>[5]</sup> and Bhanwaria and Yadav (2016)<sup>[3]</sup>.

**Table 6:** Effect of organics on soil available potassium (kg ha<sup>-1</sup>)

Tr. No.	Treatment details	Incubation period				
		Initial	15 Days	30 Days	45 Days	60 Days
T <sub>1</sub>	Soil + FYM @ 10 t ha <sup>-1</sup>	361	362	363	366	368
T <sub>2</sub>	Soil + Vermicompost @ 5 t ha <sup>-1</sup>	362	363	368	371	374
T <sub>3</sub>	Soil + Poultry manure @ 5 t ha <sup>-1</sup>	363	364	369	372	375
T <sub>4</sub>	Soil + Press mud compost @ 5 t ha <sup>-1</sup>	360	362	363	366	370
T <sub>5</sub>	Soil + Goat manure @ 5 t ha <sup>-1</sup>	362	363	365	369	373
T <sub>6</sub>	Soil + Urban compost @ 10 t ha <sup>-1</sup>	361	362	365	367	370
T <sub>7</sub>	Absolute control	361	361	362	363	367
	Initial (Soil)	361				
	S.E.m±	-	0.2016	0.0854	0.2082	0.1475
	C.D. at 5%	-	0.6114	0.2592	0.6314	0.4473

### 3.6 Effect of organic manures on soil organic carbon

The organic carbon content in soil as influenced by application of different organic manures is presented in table 7. The results indicate that organic carbon content significantly reached its pick at 15 days of incubation and further decreased from 30 days of incubation. The highest organic carbon content was observed with application of treatment T<sub>1</sub> (Soil + FYM @ 10 t ha<sup>-1</sup>) i.e. 0.68% at 15 days of incubation over the control. Initially OC content in soil was 0.57% which was increased to 0.68% at 15 days of incubation. However, the treatment T<sub>4</sub> (Soil + Press mud compost @ 5 t ha<sup>-1</sup>) recorded 0.67, 0.65, 0.64 and 0.62% OC at 15, 30, 45 and 60 days of incubation, respectively which was at par with treatment T<sub>1</sub> (Soil + FYM @ 10 t ha<sup>-1</sup>). The results showed that the application of press mud compost

decreased organic carbon in soil even though it contains high OC than FYM, this because of higher dose of FYM (10 t ha<sup>-1</sup>) than press mud compost (5 t ha<sup>-1</sup>). The improvement in soil organic carbon was attributed to direct addition of organic matter through organic manures. The highest amount of soil organic carbon at the beginning of the incubation was due to availability of a larger pool of the less resistant fractions that were broken down and recycled, thus resulting in lower contents remaining at the end of incubation, so the organic carbon decreased as the incubation period increased. Mineralization process occurs when organic manures added in soil, thus the OC content in soil decreases with time. The similar results were shown by Roy and Kashem (2014)<sup>[10]</sup>, Follett *et al.* (2007)<sup>[6]</sup>, Sarkar and Bandyopadhyay (2018)<sup>[11]</sup>, Pascual *et al.* (1997)<sup>[8]</sup> and Diwale *et al.* (2020)<sup>[5]</sup>.



**Table 7:** Effect of organics on soil organic carbon (%)

Tr. No.	Treatment details	Incubation period				
		Initial	15 Days	30 Days	45 Days	60 Days
T <sub>1</sub>	Soil + FYM @ 10 t ha <sup>-1</sup>	0.59	0.68	0.66	0.64	0.63
T <sub>2</sub>	Soil + Vermicompost @ 5 t ha <sup>-1</sup>	0.58	0.66	0.64	0.62	0.61
T <sub>3</sub>	Soil + Poultry manure @ 5 t ha <sup>-1</sup>	0.57	0.65	0.63	0.61	0.61
T <sub>4</sub>	Soil + Press mud compost @ 5 t ha <sup>-1</sup>	0.58	0.67	0.65	0.64	0.62
T <sub>5</sub>	Soil + Goat manure @ 5 t ha <sup>-1</sup>	0.57	0.63	0.60	0.57	0.59
T <sub>6</sub>	Soil + Urban compost @ 10 t ha <sup>-1</sup>	0.58	0.64	0.61	0.58	0.60
T <sub>7</sub>	Absolute control	0.57	0.61	0.59	0.59	0.58
	Initial (Soil)	0.57				
	S.Em±	-	0.0015	0.002	0.0018	0.0017
	C.D. at 5%	-	0.0046	0.0059	0.0053	0.0052

#### 4. Conclusions

The analysis of various organic manures revealed that among the all organic manures, poultry manure recorded the highest N, P, K, content, organic carbon was highest in press mud compost. The application of FYM @ 10 t ha<sup>-1</sup> to soil (Inceptisol) was found superior as evident from values of soil pH, organic carbon content. Among all the treatments, the application poultry manure @ 5 t ha<sup>-1</sup> had distinct effect on N, P, and K content in soil, followed by application of press mud compost @ 5 t ha<sup>-1</sup> which had a significant effect on soil properties under 60 days incubation study.

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