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Dynamics of organic inputs on Physico-chemical properties of soil under certified organic farms in Nagpur district

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Abstract
The field investigation in relation to "Effect of organic inputs on physic-chemical properties of soil under certified organic farms in Nagpur district" was carried out during kharif - rabi season of 2018 – 19 at the certified organic farmer's fields of Nagpur district. Soil samples of 0-20 cm depth were collected randomly after the harvest of crops from six locations *viz*., Selu, Kalmeshwar, Gangner, Saoner, Chacher and Chinchbhavan of Nagpur district were selected. The certified organic farmers applying FYM @ 2.5 to 10 t ha^{-1}, Ghanjivamrut 500 kg ha^{-1} and Jivamrut 500 lit ha^{-1} from last 8 to 18 years for different crops. The results revealed regarding physical properties of soil that, the value of bulk density of soil varied from 1.21 to 1.60 Mg m^{-3}. Due to long term effect of organic sources i.e. FYM @ 5-10 t ha^{-1} resulted a decreased in soil bulk density of 1.32 to 1.42 Mg m^{-3} over inorganic fertilizer. Among the organic farming crops, the value of HC of soil ranged between 0.94 to 1.21 cm hr^{-1} whereas HC of soil recorded 0.63 to 0.90 cm hr^{-1} among inorganic farming crops. HC of soil increased numerically due to the application of FYM, jivamrut @ 500 lit. ha^{-1} and ghanjivamrut @ 500 kg ha^{-1}. The value of water holding capacity varied from 53.40 to 66.52 per cent under the application of organic and inorganic inputs. The application of organic inputs from 8 to 18 years resulted increase the water holdind capacity of soil by 2.87 to 18.72 per cent over the application of inorganic fertilizer alone. Regarding chemical properties of soil the results revealed that soil pH was reduced and electrical conductivity of soil (0.215 to 0.316 dS m^{-1}) remained almost unchanged due to incorporation of organic and inorganic sources. The soil organic varied from 3.92 to 9.89 g kg^{-1} in the field treated with various organic sources and chemical fertilizers alone and comes under the categories of medium to moderately high. The soil available N content was observed between 188.19 to 420.74 kg ha^{-1} under the application of organic and inorganic inputs. The application of organic inputs from 8 to 18 years resulted in maximum available N content of soil by 14.61 to 64.57 per cent over the application of inorganic fertilizer alone.The available P of soil were recorded between 12.09 to 25.56 kg ha^{-1} in the present investigation. The available P was recorded less in the organic field than the fertilizer applied field up to 31.65 per cent. The value of available K found very high in range in the present study. The magnitude of available K ranged from 321.56 to 454.45 kg ha^{-1} The available sulphur ranged from 10.64 to 15.38 mg kg^{-1} i.e. marginal to adequate. The use of FYM, manurial liquid and solid organic source was found useful in maintaining the available micro-nutrient status of soil over the continuous use of inorganic fertilizer. The status of DTPA extractable micronutrients Zn, Fe, Mn and Cu (mg kg^{-1}) range from 0.51 to 0.72, 3.57 to 8.71, 3.96 to 7.80 and 2.30 to 4.84, respectively when the use of organic and inorganic sources.

Keywords: Genetic combining ability, specific combining ability, okra, variance, growth, yield and quality

Introduction
Organic farming was practiced in India since thousands of years. In traditional India, the entire agriculture was practiced using organic techniques, where nutrient, pesticides, etc. were obtained from plant and animal products.
Soil organic matter (SOM) has been called "the most complex and least understood component of soils". Simply put, soil organic matter is any soil material that comes from the tissues of organisms (plants, animals, or microorganisms) that are currently or were once living. Soil organic matter is rich in nutrients such as nitrogen (N), phosphorus (P), sulfur (S), and micronutrients, and is comprised of approximately 50% carbon (C) of soil health. Organically rich soil helps to increase availability of nutrients and micro-nutrients.
A large percentage of the earth's active carbon (C) is deposited in soil organic matter (SOM), and its cycling rate is tightly linked to nitrogen availability in natural and managed ecosystems (Gardenas *et al*., 2011) [6]. Addition of organic amendments could represent important strategy to protect agricultural land from excessive soil resources exploitation and to maintain soil

fertility. Soil organic matter is key component because it Influence soil physical, chemical and biological properties that defined soil productivity and quality (Doran and Parkin 1994).

Materials and Methods

The field investigation was conducted during kharif-rabi season of 2018-2019 at the certified farmer's fields (organic field) of Nagpur district. Survey and samples were taken on organic and in the vicinity of organic farms (farmer's field) from Kalmeshwar, Saoner and Mauda tehsil of Nagpur district.

Bulk density was determined by core method technique (Blake and Hartz, 1963). the saturated hydraulic conductivity was measured using constant head method of Richards (1954). Maximum water holding capacity of soil was determined by Keen Raczkowski box method (Piper, 1966).A soil sample of (0-20 cm) depth, the soil samples were dried in shade and gently grind with mortar and pestle and sieved through 2 mm sieve and for determination of organic carbon grind soil samples were passed through 0.5 mm sieve. These samples were stored in polythene bags and were subsequently analyzed for pH, EC (Jackson, 1973) [7], organic carbon (wet oxidation method given by Walkley and Black 1934) [25], available N(alkaline permanganate method given by Subbiah and Asija, 1956) [21], P by Olsen's method using spectrophotometer (Olsen's and Sommer, 1982) [10]., K by neutral ammonium acetate solution and determined using flame photometer (Jackson, 1973) [7], S by turbidimetric method given by Chesnin and Yien (1951) and micronutrients (Fe, Mn, Zn and Cu) DTPA (Diethylene triamine penta acetic acid) (0.005 M) extractable (1:2, soil: DTPA), Fe, Mn, Zn and Cu were determined as per the procedure outlined by Lindsay and Norvell (1978) [9] using Atomic Absorption Spectrophotometer.

Results and Discussion

Bulk density of soil (Mg m^{-3})

The data in respect to bulk density of soil is presented in table-1. Bulk density of soil is an index of soil compactness. The application of organic and inorganic nutrient sources for 8-18 years under the different crops resulted not much variation in bulk density of soil after the harvest of the crops at different locations. The bulk density of surface soil estimated after the harvest of crop resulted the lowest bulk density of soil (1.21 Mg m^{-3}) with the application of ghanjivamrut @ 500 kg^{-1} from 8 years to rice at Gangner location. In the present study, the value of bulk density varied from 1.21 to 1.60 Mg m^{-3}. The soils of all locations comes under the texture clay in nature. The numerical variation in the type of fertilizer application (organic / inorganic sources) did not drastically change the soil bulk density. However, the soil bulk density differed among the addition of ghanjivamrut @ 500 kg ha^{-1} to tomato which is reported 1.28 Mg m^{-3} as compared to cotton 1.43 Mg m^{-3}. Surekha and Rao (2009) reported that, the organic sources applied for long period enhanced the soil physical parameters i.e, bulk density and penetration resistance, soil fertility parameters over inorganic alone. Bhattacharyya *et al.* (2004) reported highest soil bulk density for control which ranged from 1.30 Mg m^{-3} and was observed 1.24 Mg m^{-3} with NPK + FYM treatment at 0-15 cm depth.

Hydraulic conductivity of soil (cm hr^{-1})

The data pertaining to hydraulic conductivity of soil is reflected in table- 1. The HC of soils is one of the important physical property which is associated to flux/movement of water in soil and tendency to measure the permeability of soil. In the present study, the result of hydraulic conductivity of soil exhibited difference between the continuous application of organic sources and chemical fertilizer alone. Increase in hydraulic conductivity of soil is associated with decrease in bulk density and organic sources which influence on the amount of water and also air present in soil.

Hydraulic conductivity of soil increased numerically due to the application of FYM (2.5 t to 10 t ha^{-1}), ghanjivamrut @ 500 kg ha^{-1}andjivamrut @ 500 lit ha^{-1}. Increased in HC of soil is associated with decrease trend in bulk density and increased in pore space reported by Singh (2010) [24]. Thakur *et al.* (2011) [24] also reported that, saturated HC value was maximum under 100% NPK + FYM @ 15 t ha^{-1} (1.11 cm hr^{1}) as compared to 100% NPK (0.69 cm hr^{-1}) indicates the favorable effect of FYM on HC of soil.

Maximum water holding capacity (%)

Maximum water holding capacity is an important physical property of soils, which gives information on how long a crop can sustain well on a soil. Organic matter does tend to increase the total water holding capacity of soil, it's also increases their wilting point. The data in respect to maximum water holding capacity of soil as influenced by various organic source is presented in table-1. The value of water holding capacity varied from 53.40 to 66.52 per cent under the application of organic and inorganic inputs. The application of organic inputs from 8 to 18 years resulted increase the water holding capacity of soil by 2.87 to 18.72 per cent over the application of fertilizer alone. The maximum increase of WHC (18.72%) is recorded in mandarin crop where Ghanjivamrut @ 500 kg ha^{-1} was applied. Rawls *et al*. (2003) [15] reported that, at high organic carbon values, all soils showed an increase in water retention.

Soil pH (Soil reaction)

Result revealed that Soil pH was influenced by the continuous incorporation of various organic nutrients (solid or liquid) sources for various crops presented at different locations since 8 to 18 years. The value of soil pH varied from 7.02 to 8.12 under different sources of organics applied at different locations which indicate the soil of study area was neutral to moderately alkaline in soil reaction (table 2).

Results revealed that the incorporation of organic sources in term of solid and liquid continuously reduced the soil pH in the locations could be ascribed to the acidifying effect of nitrogen and organic acid produced during the decomposition of organic materials. Similar results were coated by Singh *et al.* (2015) [19], that the application of pressmud were found more effective than application of FYM in reducing soil pH in the soil after the harvest of rice and wheat.

Electrical Conductivity (dS m^{-1})

The values of electrical conductivity of soil ranged between 0.215 to 0.316 dS m^{-1} with the use of organic and inorganic fertilizers among the locations. The EC of soil remained almost unchanged by the action of organic sources which is under permissible limit (<1 dSm^{-1}). Similar observations were repeated by Rathod *et at.* (2003) that an organic input in the form of FYM at 5 t ha-1 lowers electrical conductivity of the soil.

Organic carbon (g kg^{-1})

The results obtained of soil organic carbon as influenced by various organic source is presented in table-2. The soil organic varied from 4.92 to 9.06 g kg^{-1} in the field treated with various organic sources and chemical fertilizers alone. When the continuous use of ghanjivamrut @ 500 kg ha^{-1} to tomato crop from 10 years at Selu locations recorded the highest organic carbon content in soil (9.06 g kg^{-1}) which may be attributed to highest contribution of organic carbon to the soil in the form of solid source. Similarly also Chhibba (2010) [5] reported that, the incorporation of crop residues and FYM alone or in combination with green manuring significantly increases the organic carbon content.

Calcium Carbonate (%)

The results of $CaCO_3$ content in soil is presented in table-2. The calcium carbonate is one of the important property of soil which is associated with the nutrient availability, effect of organic carbon, soil reaction and availability of micronutrients of soil and exchangeable cations. The value of calcium carbonate content in soil varied from 2.95 to 4.95 per cent under the application of organic and inorganic inputs. The value of calcium carbonate did not have much more difference in all the locations. The different locations *viz.* Selu, Kalmeshwar, Gangner, Saoner, Chacher and Chinchbhavan recorded the values of calcium carbonate in soil between 3.40 to 4.55, 3.30 to 4.40, 2.95 to 4.05, 3.25 to 4.50, 3.55 to 4.45 and 3.05 to 4.70 per cent, respectively, when the field applied organic or inorganic fertilizer alone. These values of calcium carbonate ranges under the moderately calcareous in nature.

Similar findings were reported by Sleutel *et al.* (2006) [20] that, long-term applications of animal manure increase SOM and decreases calcium carbonate content in two ways by adding OM contained in the manure and by increased OM in crop residues due to higher crop yields. Also Kharche (2013) [8] reported that, the significant reduction in free $CaCO_3$ could be attributed to considerable amount of biomass added to the soil due to long-term cultivation and organic matter applied through conjunctive use treatments. The reduction in $CaCO_3$ might be due to organic acids released during the decomposition of organic materials which react with $CaCO_3$ to release CO_2 thereby reducing $CaCO_3$ content of the soil.

Available nitrogen of soil (kg ha^{-1})

The available nitrogen content in soil after harvest of crop is presented in table-3. The data indicated that, the available nitrogen in soil varied from 188.19 to 420.74 kg ha^{-1}. The application of organic inputs from 8 to 18 years resulted in maximum available N content of soil by 2.08 to 44.18 per cent over the application of inorganic fertilizer alone. The maximum increase of available N (44.18%) is recorded in soybean crop where Jivamrut @ 500 lit ha^{-1} was applied. The increase in available N content of soil might be attributed to the more N fixation in soil on account of higher microbial population, leaving to better mineralization of organic N with other nutrient application. Sharma *et al*., (2013) [17] observed that, available N status in soil increased with application of organic sources along with fertilizers.

Available phosphorus of soil (kg ha^{-1})

The available phosphorus content of soil after harvest of crops varied from 12.09 to 25.56 kg ha^{-1}under the application of organic and inorganic fertilizers. In the present study, there was decreased in available phosphorous content in soil with the use of organic inputs upto 37-43 per cent over the application of chemical fertilizers alone. Balanced inorganic fertilizer and crop residues helps in increasing the phosphorous content in solution and solubelization of native soil phosphorous. Chesti and Ali (2012) [4] revealed that, soil available P recorded an increased between 16 to 24 per cent due to application of 30 to 60 kg P_2O_5 ha^{-1}, respectively.

The build-up of available P with the application of inorganic fertilizer and crop residue was ascribed to the release of organic acid, during decomposition which in turn helped in releasing native phosphorous through solubalizing action of the acids and thus reduces the P fixing capacity of soil which ultimately helps in release of sufficient quantity of plant available phosphorous (Sharma and Subehia, 2014) [18].

Available potassium of soil (kg ha^{-1})

The data on available potassium in soil after harvest of crop is presented in table-3. The magnitude of available K ranged from 321.56 to 454.45 kg ha^{-1}.The data further revealed that, the application of inorganic fertilizers alone (NPK) recorded an increased in available K content in soil by 1.26 to 11.95 per cent. The increasing available K in soil due to addition of organic sources may be ascribed to the reduction of K fixation and released of K due to interaction of organic material with clays besides the direct K addition in the soil (Subehia and Sepehya, 2012) [22].

Available sulphur of soil (kg ha^{-1})

Sulphur is considered as fourth major nutrient for plant growth. The data regarding the available sulphur in the soil is presented in table 3. The variation of available S was observed between the continuous use of organic sources and inorganic inputs applied. The higher amount of available S was recorded due to application of inorganic fertilizer than the use of organic source alone. It may be due to inorganic fertilizer containing sulphur and incorporation of organic carbon content in soil. The increased in available sulphur might be due to addition of 18:18:10 and 18:46 which content about 18 kg N and 46 kg P. Patel and Das (2009) [12] reported that, total S (0.32%) was obtained with sample of FYM.

Micronutrients status in soils as influenced by organic sources

The results revealed that the status of DTPA extractable Zn, Fe, Mn and Cu (mg kg^{-1}) ranged from 0.51 to 0.72, 3.57 to 8.71, 3.96 to 7.80 and 2.30 to 4.84, respectively (table-4) when the application of organic sources and chemical fertilizer alone among the different locations. The Zn status of these locations comes under low to medium in range Wide variation in proportion of Zn deficit soil sample within locations which is related with soil texture, pH, organic matter of soil. It is apparent that availability of Fe increased with increasing in organic matter content in the soils and increased the solubility of Fe. The DTPA extractable iron status of all the locations found medium in range 4.5 to 18.0 mg kg^{-1} as stated by Patil *et al.* 2004 [11]. Kharche (2013) [8] reported that, the application of FYM significantly increased availability of micro-nutrient over rest of treatments probably due to decomposition of FYM.

Table 1: Effect of various organic sources on physical properties of soil after harvest of different crops

Location		Crops	Source	Bulk density (Mg m^{-3})	Hydraulic conductivity (cm hr^{-1})	MWHC (%)
Selu	1)	Mandarin^{e}	Organic	1.44	63.85	1.10
	2)	Mandarin	Fertilizer	1.53	54.62	0.73
	3)	Tomato^{e}	Organic	1.28	61.45	1.18
	4)	Tomato	Fertilizer	1.44	53.40	0.82
	5)	Cotton ^{a}	Organic	1.43	64.10	1.15
	6)	Inorganic	Fertilizer	1.48	57.01	0.81
Kalmeshwar	1)	Fenugreek+ Spinach^{d}	Organic	1.45	64.90	1.20
	2)	Inorganic	Fertilizer	1.58	59.45	0.85
	3)	Mandarin ^{b}	Organic	1.25	59.43	0.94
	4)	Mandarin	Fertilizer	1.60	56.65	0.67
Gangner	1)	Mandarin ^{e}	Organic	1.21	57.59	1.07
	2)	Mandarin	Fertilizer	1.45	55.98	0.83
	3)	Rice ^{b}	Organic	1.34	59.26	0.96
	4)	Rice	Fertilizer	1.55	54.00	0.81
	5)	Soybean^{d}	Organic	1.36	64.20	1.12
	6)	Soybean	Fertilizer	1.60	59.10	0.74
Saoner	1)	Pigeonpea^{c}	Organic	1.42	62.80	1.11
	2)	Pigeonpea	Fertilizer	1.53	58.05	0.89
	3)	Wheat ^{a}	Organic	1.31	61.10	1.05
	4)	Wheat	Fertilizer	1.52	54.37	0.63
	5)	Sweet orange ^{e}	Organic	1.32	63.30	0.98
	6)	Inorganic	Fertilizer	1.49	60.46	0.71
Chacher	1)	Rice ^{b}	Organic	1.42	62.40	1.09
	2)	Rice	Fertilizer	1.52	56.60	0.75
	3)	Mandarin^{e}	Organic	1.34	63.10	1.17
	4)	Inorganic	Fertilizer	1.50	58.10	0.90
Chinchbhavan	1)	Mandarin ^{e}	Organic	1.43	66.52	1.18
	2)	Mandarin	Fertilizer	1.46	56.03	0.72
	3)	Tomato^{a}	Organic	1.36	65.49	1.21
	4)	Inorganic	Fertilizer	1.47	57.30	0.70

a = 10 t FYM ha^{-1}, *b* = 5 t FYM ha^{-1}, *c* = 2.5 t FYM ha^{-1},
d = Jivamrut @ 500 lit ha^{-1}, *e* = Ghanjivamrut @ 500 kg ha^{-1}.

Table 2: Effect of various organic sources on soil pH and EC of soil at harvest of different crops

Location		Crops	Source	Soil pH Soil: water ratio (1:2.5)	EC, dS m^{-1}	OC (g kg^{-1})	$CaCO_3$ (%)
Selu	1)	Mandarin ^{e}	Organic	7.59	0.478	7.65	4.05
	2)	Mandarin	Fertilizer	8.13	0.426	4.92	4.45
	3)	Tomato ^{e}	Organic	7.44	0.389	9.06	4.35
	4)	Tomato	Fertilizer	7.93	0.377	7.48	4.55
Kalmeshwar	1)	Fenugreek+ Spinach ^{d}	Organic	7.32	0.254	7.37	3.40
	2)	Inorganic	Fertilizer	7.45	0.342	6.68	3.80
Gangner	1)	Mandarin ^{e}	Organic	7.41	0.497	8.89	3.95
	2)	Mandarin	Fertilizer	7.67	0.480	6.29	4.40
	3)	Rice ^{b}	Organic	7.75	0.474	7.29	3.30
	4)	Soybean ^{d}	Organic	7.96	0.453	6.50	3.75
	5)	Inorganic	Fertilizer	7.99	0.464	5.48	3.65
Saoner	1)	Pigeonpea ^{c}	Organic	8.35	0.404	3.92	3.95
	2)	Pigeonpea	Fertilizer	6.80	0.430	6.07	2.95
	3)	Wheat ^{a}	Organic	6.85	0.414	5.66	3.60
	4)	Sweet orange ^{e}	Organic	7.65	0.490	8.63	3.50
	5)	Inorganic	Fertilizer	7.81	0.470	5.93	4.05
Chacher	1)	Rice ^{b}	Organic	7.97	0.442	8.55	3.55
	2)	Rice	Fertilizer	8.15	0.418	7.38	3.65
	3)	Mandarin ^{e}	Organic	8.08	0.409	8.06	3.25
	4)	Soybean ^{c}	Organic	8.32	0.367	7.63	3.60
	5)	Inorganic	Fertilizer	7.63	0.380	8.85	3.90
Chinchbhavan	1)	Mandarin ^{e}	Organic	7.98	0.358	6.31	4.50
	2)	Sorghum (Maldandi) ^{b}	Organic	7.01	0.327	6.68	4.25
	3)	Onion ^{a}	Organic	7.15	0.312	5.46	4.40
	4)	Inorganic	Fertilizer	7.47	0.417	7.93	3.55

a = 10 t FYM ha^{-1}, *b* = 5 t FYM ha^{-1}, *c* = 2.5 t FYM ha^{-1},
d = Jivamrut @ 500 lit ha^{-1}, *e* = Ghanjivamrut @ 500 kg ha^{-1}

Table 3: Effect of organic sources on fertility status of soil after harvest of different crops

Location		Crops	Source	Available N (kg ha^{-1})	Available P (kg ha^{-1})	Available K (kg ha^{-1})	Available S (mg kg^{-1})
Selu	1)	Mandarin [e]	Organic	375.91	15.12	422.06	14.75
	2)	Mandarin	Fertilizer	243.04	17.47	365.80	11.37
	3)	Tomato [e]	Organic	238.38	19.26	454.45	15.25
	4)	Tomato	Fertilizer	188.19	24.19	408.37	12.50
Kalmeshwar	1)	Fenugreek+ Spinach [d]	Organic	313.65	12.09	358.43	14.25
	2)	Inorganic	Fertilizer	235.43	17.69	339.68	13.12
Gangner	1)	Mandarin [e]	Organic	388.54	14.56	416.81	15.37
	2)	Mandarin	Fertilizer	275.72	18.66	370.41	13.19
	3)	Rice [b]	Organic	351.23	20.83	376.27	14.85
	4)	Soybean [d]	Organic	295.71	23.87	358.93	11.32
	5)	Inorganic	Fertilizer	323.76	16.80	333.68	12.87
Saoner	1)	Pigeonpea [c]	Organic	243.28	22.96	321.56	10.75
	2)	Pigeonpea	Fertilizer	286.51	20.38	384.89	12.99
	3)	Wheat [a]	Organic	223.47	24.25	369.58	11.45
	4)	Sweet orange [e]	Organic	350.80	17.92	427.24	13.62
	5)	Inorganic	Fertilizer	293.03	21.02	394.83	11.75
Chacher	1)	Rice [b]	Organic	401.43	22.64	415.52	12.25
	2)	Rice	Fertilizer	290.89	24.72	404.94	11.78
	3)	Mandarin [e]	Organic	351.22	20.60	425.63	13.57
	4)	Soybean [c]	Organic	288.14	22.76	411.69	12.52
	5)	Inorganic	Fertilizer	383.67	12.32	358.48	14.37
Chinchbhavan	1)	Mandarin [e]	Organic	303.69	16.04	342.47	12.24
	2)	Sorghum (Maldandi) [b]	Organic	386.83	21.17	396.82	11.25
	3)	Onion [a]	Organic	337.50	25.56	389.61	10.64
	4)	Inorganic	Fertilizer	263.09	15.44	384.46	13.36

a = 10 t FYM ha^{-1}, *b* = 5 t FYM ha^{-1}, *c* = 2.5 t FYM ha^{-1},
d = Jivamrut @ 500 lit ha^{-1}, *e* = Ghanjivamrut @ 500 kg ha^{-1}

Table 4: Effect of various organic sources on micronutrients status of soil at harvest of different crops

Location		Crops	Source	Zn (mg kg^{-1})	Fe (mg kg^{-1})	Mn (mg kg^{-1})	Cu (mg kg^{-1})
Selu	1)	Mandarin [e]	Organic	0.59	4.79	6.12	3.98
	2)	Mandarin	Fertilizer	0.56	3.57	5.31	4.76
	3)	Tomato [e]	Organic	0.72	6.89	7.80	3.72
	4)	Tomato	Fertilizer	0.64	5.90	7.25	4.44
Kalmeshwar	1)	Fenugreek+ Spinach [d]	Organic	0.63	6.77	7.01	2.74
	2)	Inorganic	Fertilizer	0.57	5.29	6.97	3.01
Gangner	1)	Mandarin [e]	Organic	0.58	4.12	6.61	2.52
	2)	Mandarin	Fertilizer	0.55	3.89	4.96	2.84
	3)	Rice [b]	Organic	0.65	8.71	5.91	4.08
	4)	Soybean [d]	Organic	0.61	7.99	4.95	4.84
	5)	Inorganic	Fertilizer	0.67	4.05	7.08	2.46
Saoner	1)	Pigeonpea [c]	Organic	0.64	3.74	6.36	3.87
	2)	Pigeonpea	Fertilizer	0.64	5.83	7.01	4.08
	3)	Wheat [a]	Organic	0.59	4.85	5.92	4.47
	4)	Sweet orange [e]	Organic	0.69	8.18	5.50	3.65
	5)	Inorganic	Fertilizer	0.64	7.90	5.29	4.24
Chacher	1)	Rice [b]	Organic	0.57	6.04	7.11	3.32
	2)	Rice	Fertilizer	0.53	5.18	6.08	3.58
	3)	Mandarin [e]	Organic	0.63	8.00	5.47	3.85
	4)	Soybean [c]	Organic	0.55	7.92	4.28	4.10
	5)	Inorganic	Fertilizer	0.55	4.50	4.89	2.30
Chinchbhavan	1)	Mandarin [e]	Organic	0.51	4.26	3.96	3.23
	2)	Sorghum (Maldandi) [b]	Organic	0.60	5.99	7.52	3.78
	3)	Onion [a]	Organic	0.56	4.68	7.09	4.48
	4)	Inorganic	Fertilizer	0.64	7.66	6.50	2.79

a = 10 t FYM ha^{-1}, *b* = 5 t FYM ha^{-1}, *c* = 2.5 t FYM ha^{-1},
d = Jivamrut @ 500 lit ha^{-1}, *e* = Ghanjivamrut @ 500 kg ha^{-1}

Conclusion

From the study it can be concluded that, the application of organic inputs improve the physic-chemical properties and fertility status of soil.

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