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RESEARCH ARTICLE :

Effect of different levels of NPK and vermicompost on physico-chemical properties of soil in greengram [*Vigna radiata* L.)] cv. samrat

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SUMMARY : In order to investigate the influence of different levels of NPK and vermicompost on physico-chemical properties of soil, growth and yield parameters of greengram, an experiment based on randomized blocks design with 9 treatments, 3 replications and 27 plots was carried out at research farm department of Soil Science, Sam Higginbottom Institute of Agriculture, Technology and Sciences (Deemed-to-be-University), Allahabad. Treatments were included witness (control), 2 and 4 t/ha vermicompost and NPK fertilizers. Results showed that all agronomic traits were significantly affected by combination of vermicompost and chemical fertilizers compared to the control. The maximum physical and chemical properties were recorded in the treatment T_8 (N, P and K @ 100 % + vermicompost @ 100 %). Bulk density (1.28 Mg m^{-3}), Particle density (2.74 Mg m^{-3}), %Pore space (51.07 %), pH of soil (7.53), Electrical conductivity (0.25 dS m^{-1}), Organic carbon (0.77 %), Available nitrogen (334.0 Kg ha^{-1}), Available phosphorus (34.71 Kg ha^{-1}), Available potassium (206.35 Kg ha^{-1}), Where as minimum Physico-chemical properties of soil characters was recorded with the treatment T_0 (control).

KEY WORDS :
Physico- Chemical properties, Greengram, NPK, Vermicompost content

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BACKGROUND AND OBJECTIVES

Mungbean (*Vigna radiata* L.) is important short duration, draught tolerant pulse crop which also commonly known as "green gram". It is an important source of inexpensive protein and iron, and is a good substitute for meat in most Asian diets and a significant component of various cropping systems (Rudy *et al.*, 2006; Srinives *et al.*, 2000). Mungbean is considered as a substitute of animal protein and forms a balanced diet when used with cereals (Khan and Malik, 2001; Anjum *et al.*, 2006; Mansoor, 2007; Delice *et al.*, 2011). Mungbean yield and quality can be improved by the balanced use of fertilizers and also by managing the organic manures properly. The low yield of mungbean besides other factors may partially be due to lack of knowledge about nutrition and modern production technology (Hassan, 1997). Moreover, lack of attention on fertilizer use is also instrumental in lowering mungbean yields (Mansoor, 2007). Current trends in agriculture are centered on reducing the use of inorganic fertilizers by biofertilizers such as vermicompost (Haj Seyed Hadi *et al.,* 2011). The management practices with organic materials influence agricultural sustainability by improving physical, chemical and biological properties of soils (Saha *et al.*, 2008).

RESOURCES AND METHODS

A field Experiment was conducted on research farm of department of Soil Science, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture**,** Technology and Sciences (Deemed-to-be-University) Allahabad, (U.P.) India. The soil of experimental area falls in order Inceptisol and the experimental field is alluvial in nature. The design applied for statistical analysis was carried out with randomized block design having with 9 treatments, 3 replications and 27 plots. Treatments were T_{0-} ($L_0 V_0$) @0 % NPK ha^{-1} + 0% Vermicompost ha^{-1}, T_1 – (L_0V_1) @ 0% NPK ha^{-1} + 50% Vermicompost ha^{-1}, T_2 – ($L_0 V_2$) @ 0% NPK ha^{-1} + 100% Vermicompost ha^{-1}, T_{3-} (L_1V_0) @ 50% NPK ha^{-1} + 0% Vermicompost ha^{-1}, T_4- ($L_1 V_1$) @ 50% NPK ha^{-1} + 50% Vermicompost ha^{-1}, T_5- ($L_1 V_2$) @ 50 % NPK ha^{-1} +100 % Vermicompost ha^{-1}, T_6 – ($L_2 V_0$) @ 100% NPK ha^{-1} + 0 % Vermicompost ha^{-1}, T_7 – ($L_2 V_1$) @ 100% NPK ha^{-1} + 50% Vermicompost ha^{-1}, T_8- ($L_2 V_2$) @ 100 % NPK ha^{-1}+ 100 % Vermicompost ha^{-1}.having the treatments was replicated thrice. The source of inorganic nutrients sources as Urea, SSP, MOP, and organic nutrients sources as Vermicompost, respectively. Basal dose of fertilizer was applied in respective plots according to treatment allocation unifurrows opened by about 5cm. depth before sowing seeds in soil at the same time sowing of seeds was shown on well prepared beds in shallow furrows, at the depth of 5cm, row to row distance was maintained at 30 cm and plant to plant distance was 10 cm, during the course of experiment, observations were recorded as mean values of the data.

OBSERVATIONS AND ANALYSIS

The results showed that the treatment T_8- ($L_2 V_2$) @ 100% NPK ha^{-1} + 100% Vermicompost ha^{-1} was recorded maximum for the physico-chemical characters such as bulk density (1.28 Mgm^{-3}), particle density (2.74 Mgm^{-3}), % pore space (51.07 %), pH of soil (7.53), electrical conductivity (0.25 dSm^{-1}), organic carbon(0.77 %), available nitrogen (334.00 $Kgha^{-1}$), available phosphorous (34.71 $Kgha^{-1}$), available potassium (206.35 $Kgha^{-1}$). Whereas the treatment T_0- ($L_0 V_0$) @0 % NPK ha^{-1} + 0% Vermicompost ha^{-1} was recorded minimum for the physic-chemical characters such as bulk density (1.06 Mgm^{-3}), particle density (1.53 Mgm^{-3}), pore space per cent (45.99 %), pH of soil (6.97), electrical conductivity (0.15 dSm^{-1}), organic carbon(0.56 %), available nitrogen (296.27 $Kgha^{-1}$), available phosphorous (25.13 $Kgha^{-1}$), available potassium (131.50 $Kgha^{-1}$).

Table 1 : Physico-chemical parameters of greengram due to NPK and Vermicompost

Treatment combination	Bulk density (Mgm^{-3})	Particle density (Mgm^{-3})	Pore space %	pH of soil	Electrical conductivity (dSm^{-1})	Organic carbon (%)	Available nitrogen (Kg ha^{-1})	Available phosphorus (Kg ha^{-1})	Available potassium (Kg ha^{-1})
T_0=L_0V_0	1.06	1.53	45.99	6.97	0.15	0.56	296.27	25.13	131.5
T_1=L_0V_1	1.08	1.54	46.09	7.15	0.17	0.6	303.6	26.32	146.47
T_2=L_0V_2	1.13	1.58	47.2	7.29	0.19	0.62	304.65	27.07	153.95
T_3=L_1V_0	1.15	1.62	47.32	7.3	0.19	0.66	311.99	28.94	157.7
T_4=L_1V_1	1.16	1.89	48.45	7.32	0.21	0.66	314.08	29.02	168.92
T_5=L_1V_2	1.18	1.97	49.16	7.33	0.22	0.69	320.37	30.51	172.66
T_6=L_2V_0	1.24	1.97	49.29	7.36	0.24	0.71	321.42	31.71	191.38
T_7=L_2V_1	1.26	2.63	50.27	7.5	0.25	0.75	327.7	33.81	197.79
T_8=L_2V_2	1.28	2.74	51.07	7.53	0.25	0.77	334.0	34.71	206.35
F- test	S	S	S	S	S	S	S	S	S
S.E. ±	0.05	0.25	0.42	0.09	0.02	0.04	2.02	0.72	1.82
C.D. (P=0.05)	0.14	0.75	1.24	0.28	0.07	0.11	6.06	2.17	5.45

S: Significant

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