

## Influence of different of N P K and Organic Manures on Soil Health, Growth and Yield of Green gram (*Vignaradiata* L.) Cv. Samrat

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### ABSTRACT

An experiment was conducted on Influence of different level of NPK and organic manures on soil health, growth and yield of green gram (*Vignaradiata* L.) Cv. Samrat at research farm of soil Science and Agricultural Chemistry, design laid out in randomized block design (RBD) with three replications. Green gram was taken for study with recommended doses of fertilizers (N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O @ 20, 40 and 20 kg ha<sup>-1</sup>) was applied with organic manure (FYM, and Vermicompost). The variety of green gram samrat was taken for research trial. Bulk density (Mg m<sup>-3</sup>) and Particle density (Mg m<sup>-3</sup>) was maximum in T<sub>1</sub> (NPK@0% + FYM@0% + VC@0%). Pore space (%), Water holding capacity (%), pH (1:2) w/v, EC (dS m<sup>-1</sup>), Organic carbon (%), Nitrogen (kg<sup>-1</sup>), Phosphorus (kg<sup>-1</sup>) and Potassium (kg<sup>-1</sup>) was maximum in T<sub>9</sub> (NPK @ 100% + FYM @ 100% + VC @ 100%). In treatment T<sub>9</sub> the highest grain yield (15.58 q ha<sup>-1</sup>) was obtained with C:B ratio of 1:3.26.

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**Keywords:** Soil properties, FYM, Vermicompost, Green gram, Yield, etc.

### INTRODUCTION

Soil is a medium for plant growth. Crop production is largely based on soils. Some of the soil properties affecting plant growth include: soil texture (coarse fine), aggregate size, porosity, aeration (permeability), and water holding capacity, pH, bulk density, particle density. The rate of water movement into the soil (infiltration) is influenced by its texture, physical condition (soil structure and tillage), and the amount of vegetative cover on the soil surface.

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Organic matter tends to increase the ability of all soils to retain water, and also increases infiltration rates of fine textured soils (Singh *et al.*, 2008). Green gram is an important pulse crop having high nutritive value. It is not only playing an important role in human diet but also in improving the soil fertility by fixing the atmospheric nitrogen. The grain (whole or split) is used as dal or to make flour. It is an excellent source of high-quality protein, the grain contains protein 24.5 %, iron 8.5 mg, mineral 3.5 %, fat 0.5 - 4.33, fibers 4.0 % and carbohydrates 59.9 %. Nutrient management is one of the most important factors that

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greatly affect the growth, development and yield of green gram. It is one of the popular short duration grain legumes in India and occupies third place after the green gram to assess the influence of Sulphur and Phosphorus on yield attributes, yield and nutrient uptake by green gram (Kumar *et al.*, 2014). Nitrogen is an important nutrient for all crops. It increases yield nutrition also increases the protein content. Deficient plants may have stunted growth and develop yellow-green colour. It accelerates photosynthetic behavior of green plants as well as growth and development of living tissues specially tiller count in cereals (Azadi *et al.*, 2013). Phosphorus is the second most important nutrient that must be added to the soil to maintain plant growth and sustain crop yield. It stimulates early root development and growth and there by helps to establish seedlings quickly. Large quantities of Phosphorus are found in seed and fruit and it is considered essential for seed formation. It enhances the activity of rhizobia and increased the formation of root nodules. Thus, it helps in fixing more of atmosphere nitrogen in root nodules (Patil *et al.*, 2011). Potassium is one of the seventeen elements which are essential for growth and development of plants. Potassium is required for improving the yield and quality of different crops because of its effect on photosynthesis, water use efficiency and plant tolerance to diseases, drought and cold as well for making the balance between protein and carbohydrates (Singh *et al.*, 2003). Farm yard manure from cattle and other livestock is an important source of nutrient in the livestock intensive regions. Farmyard manures are major source of nutrient supply also on small farm holdings. Manure has long been considered a desirable soil amendment, and reports of its effects on soil properties are numerous. Different animal manure have been used as a source of nutrients for crops cultivated (Sharma *et al.*, 2011). Vermicompost is an environmentally friendly technique that is used for organic solid waste management. Waste crop pulp blended with a cow dung and office paper was vermicompost over 30 days to produce vermicompost which is a solid bio with peas at the planting phase for every four weeks. The impacts of vermicompost on the soil was quantified. Application of vermicompost resulted in a 33%, 40%, and 67% increase in the soil nitrogen potassium content respectively. The intensive cropping coupled with imbalanced nutritional supplementation has resulted in to deficiency of certain essential nutrients elements in the soil. To improve the productivity, balanced plant nutrition has an imminent role for which use of organic source of nutrition can be an option (Todawat *et al.*, 2017).

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## MATERIALS AND METHODS

The exploratory led at the Soil Science Research Farm of SHUATS, Prayagraj, U.P., which is situated at 25°24'46.14" N scope, 81°50'49.95" E longitude and 98 m over the mean ocean level. The soil of **test** region falls arranged by Inceptisol and in exploratory plots is alluvial soil in nature. The dirt examples haphazardly gather from five distinct locales in the trial plot before culturing activity from a profundity of 0-15 cm and 15-30 cm. The size of **soil** test diminishes by conning and quartering the composites the composites soil test is air dry and **pass** through a 2mm strainer via setting up the example for physical and synthetic analysis. Agro climatically, Prayagraj addresses the subtropical belt of the **south East of Uttar Pradesh, and** is supplied with Tincredibly blistering summer and genuinely cool winter. The Maximum temperature of the area comes to up to 46°c-49°c and only occasionally falls as low as 4° c-5°c. The general moistness ranges between 20-94%. The midpoints precipitation of this area is around 1100mm annually. It goes under **subtropical** environment getting **the mean** yearly precipitation of around 1100mm, **significant** precipitation from March to **end May**. Be that as it may, intermittent precipitation was additionally normal during winter. The cold weather months were cold while **late** spring months were extremely sweltering and dry. The base temperature during the harvest season was to be 21.38°C and the greatest is to be 37.82°C. The base moistness was to be 46.42% and **most** extreme was to be 96.85%.

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## RESULTAND DISCUSSION

### Physical and Chemical properties

The non-critical varieties were seen in the event of Bulk thickness ( $Mg\ m^{-3}$ ). The most extreme Bulk thickness ( $Mgm^{-3}$ ) was kept in  $T_1$  (NPK @ 0 % + FYM @ 0 % + VC @ 0 %) and least was found in  $T_9$  (NPK @ 100 % + FYM @ 100 % + VC @ 100 %) separately. The non-critical varieties were seen in the event of Particle thickness ( $Mgm^{-3}$ ). The most extreme Particle thickness ( $Mgm^{-3}$ ) was kept in  $T_1$  (NPK @ 0 % + FYM @ 0 % + VC @ 0 %) and least was found in  $T_9$  (NPK @ 100 % + FYM @ 100 % + VC @ 100 %) respectively. The critical varieties were seen in the event of pore space (%). The greatest (%) pore space of soil was found in  $T_9$  (NPK @ 100 % + FYM @ 100 % + VC @ 100 %) and least was found in  $T_1$  (NPK @ 0 % + FYM @ 0 % + VC @ 0 %) separately. The huge varieties were seen in the event of Water holding capacity (%). The most extreme water holding capacity (%) limit of soil was found in  $T_9$  (NPK @ 100 % + FYM @ 100 % + VC @ 100 %) and **least** was found in  $T_1$  (NPK @ 0 % + FYM @ 0 % + VC @ 0 %) separately. The huge varieties were seen in the event of pH. The greatest pH was kept in  $T_9$  (NPK @ 100 % + FYM @ 100 % + VC @ 100 %) and least was found in  $T_1$  (NPK @ 0 % + FYM @ 0 % + VC @ 0 %) separately. The

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critical varieties were seen in the event of EC (dS m<sup>-1</sup>). The most extreme EC (dS m<sup>-1</sup>) was kept in T<sub>9</sub> (NPK @ 100 % + FYM @ 100 % + VC @ 100 %) and least was found in T<sub>1</sub> (NPK @ 0 % + FYM @ 0 % + VC @ 0 %) separately. In the event of soil properties, we see that there was tremendous distinction between % Organic carbon. The greatest % Organic carbon was kept in T<sub>9</sub> (NPK @ 100 % + FYM @ 100 % + VC @ 100 %) and least was found in T<sub>1</sub> (NPK @ 0 % + FYM @ 0 % + VC @ 0 %) separately. In the event of soil properties, we see that there was critical difference between Nitrogen(kg ha<sup>-1</sup>) and Phosphorus(kg ha<sup>-1</sup>). The greatest Nitrogen(kg ha<sup>-1</sup>) and Phosphorus(kg ha<sup>-1</sup>) was kept in T<sub>9</sub> (NPK @ 100 % + FYM @ 100 % + VC @ 100 %) and least was found in T<sub>1</sub> (NPK @ 0 % + FYM @ 0 % + VC @ 0 %) separately. In the event of soil properties, we see that there was massive contrast between Potassium (kg ha<sup>-1</sup>). The greatest Potassium (kg ha<sup>-1</sup>) was kept in T<sub>9</sub> (NPK @ 100 % + FYM @ 100 % + VC @ 100 %) and least was found in T<sub>1</sub> (NPK @ 0 % + FYM @ 0 % + VC @ 0 %) separately.

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**Table 1. Influence of N,P,K and organic manures on physical-chemical properties of**

Soil											
Treatments	Depth (cm)	BD (Mgm <sup>-3</sup> )	PD (Mg m <sup>-3</sup> )	Pore Space (%)	WHC (%)	pH	EC (dSm <sup>-1</sup> )	OC (%)	N (kg/ha-l)	P (kg/ha-l)	K (kg/ha-l)
T <sub>1</sub>	0-15	1.323	2.507	46.29	43.30	7.15	0.30	0.39	251.50	21.08	181.50
	15-30	1.389	2.514	44.29	41.64	7.20	0.32	0.29	230.84	17.72	151.50
T <sub>2</sub>	0-15	1.321	2.503	47.22	43.88	7.20	0.32	0.46	273.88	22.65	189.50
	15-30	1.347	2.508	45.22	41.55	7.21	0.34	0.35	239.88	20.98	164.50
T <sub>3</sub>	0-15	1.315	2.444	47.40	42.22	7.21	0.36	0.48	274.65	23.76	190.33
	15-30	1.316	2.500	45.40	41.42	7.24	0.37	0.38	235.55	20.74	168.67
T <sub>4</sub>	0-15	1.312	2.446	47.19	43.40	7.19	0.35	0.45	279.19	24.44	196.11
	15-30	1.362	2.490	45.11	41.06	7.21	0.33	0.34	258.92	21.88	169.11
T <sub>5</sub>	0-15	1.306	2.438	47.40	45.46	7.22	0.34	0.49	281.32	26.18	202.17
	15-30	1.315	2.484	45.41	42.51	7.22	0.36	0.39	261.33	22.01	171.17
T <sub>6</sub>	0-15	1.314	2.430	47.82	45.47	7.24	0.37	0.53	283.85	27.84	206.22
	15-30	1.308	2.477	45.80	42.45	7.27	0.38	0.43	265.88	22.47	176.15
T <sub>7</sub>	0-15	1.317	2.442	47.19	44.22	7.23	0.35	0.47	291.19	29.17	209.67
	15-30	1.335	2.463	45.20	44.22	7.47	0.35	0.37	276.84	24.12	178.84
T <sub>8</sub>	0-15	1.309	2.434	47.50	45.42	7.26	0.38	0.51	293.41	31.65	214.87
	15-30	1.311	2.457	45.50	42.39	7.49	0.39	0.41	280.92	25.77	188.87
T <sub>9</sub>	0-15	1.294	2.428	47.90	46.10	7.28	0.40	0.54	298.00	33.65	218.31
	15-30	1.301	2.443	45.90	43.60	7.59	0.42	0.44	282.88	26.41	198.31
F-Test		NS	NS	S	S	NS	NS	S	S	S	S
		NS	NS	S	S	NS	NS	S	S	S	S
S.Em. (±)		-	-	0.23	0.47	-	-	0.01	5.53	0.75	3.40
C.D. at 5%		-	-	0.23	0.09	-	-	0.01	9.75	0.98	3.53
		-	-	0.68	1.40	-	-	0.04	16.57	2.26	10.19

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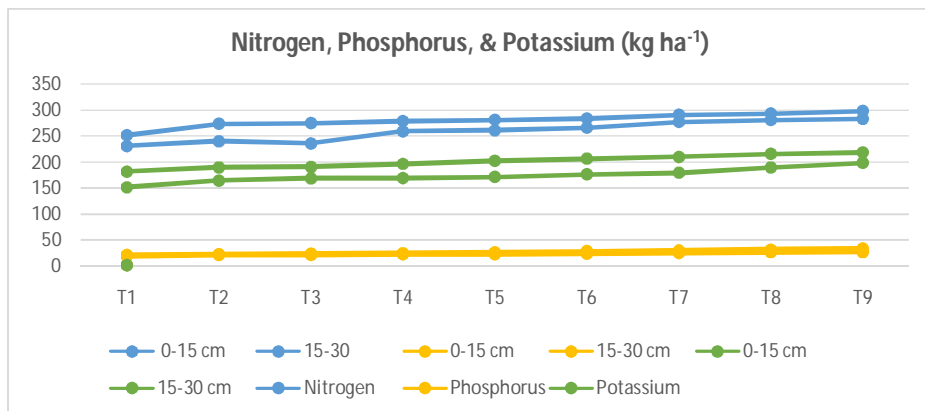
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- - 0.68 0.28 - 0.02 29.22 2.94 10.59

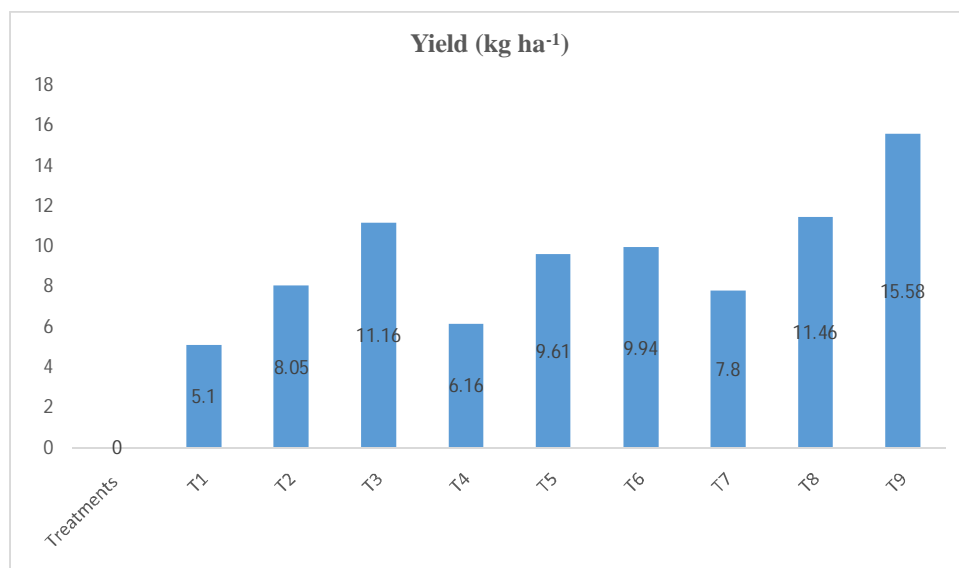


**Fig 1. Influence of N,P,K and Organic manures on different treatments on post-harvest soil properties**

**Table 2. Influence of N,P,K and organic manures on growth and yield parameter of green gram**

Treatments	Plant height (cm)			Number of Branches		Pods plant <sup>-1</sup>	Seeds pod <sup>-1</sup>	Yield (kg ha <sup>-1</sup> )
	20 DAS	40 DAS	60 DAS	30 DAS	60 DAS			
T <sub>1</sub>	15.5	22.1	30.0	2.9	6.7	11.03	6.20	5.10
T <sub>2</sub>	16.5	23.6	31.9	3.2	6.8	14.98	7.09	8.05
T <sup>3</sup>	18.2	26.4	35.2	3.6	6.9	14.77	7.15	11.16
T <sub>4</sub>	16.5	23.4	31.5	3.2	6.9	14.93	7.03	6.16
T <sub>5</sub>	19.3	29.6	39.6	3.5	7.0	15.80	7.16	9.61
T <sub>6</sub>	19.6	33.4	44.5	3.8	7.4	16.20	7.90	9.94
T <sub>7</sub>	18.5	25.7	35.7	3.5	6.8	15.01	7.10	7.80
T <sup>8</sup>	19.2	30.5	40.4	3.7	7.2	16.68	8.01	11.46
T <sub>9</sub>	25.5	38.1	48.2	3.9	7.5	20.40	8.80	15.58

<b>F-Test</b>	S	S	S	S	S	S	S	S
<b>S. Em. (±)</b>	1.01	1.28	1.11	0.32	0.04	0.55	0.26	36.23
<b>C.D. at 5%</b>	3.03	3.83	3.34	0.96	0.13	1.66	0.77	108.61



**Fig 2.**Influence of N,P,K and Organic manures on yield (kg ha<sup>-1</sup>) of green gram

## CONCLUSION

It is revealed from **trial** that treatment T<sub>9</sub> [NPK @ 100 % + FYM @ 100 % + VC @ 100 %] was best for all soil health parameters, significantly highest vegetative growth as well as yield attributes and positive effect on **net** return up to ₹86,511.07 ha<sup>-1</sup> with **C:B** ratio of 1:3.26 of green gram has **positive** effect with inorganic fertilizers and manures to obtain higher yield and economic of the farmers.

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## Reference

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UNDER PEER REVIEW

