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

ABSTRACT

An experiment conducted on "Influence of different level of N P K and organic manures on soil health, growth and yield of green gram (*Vigna radiata* L.) Cv. Samrat" design laid out in randomized block design (RBD), the treatment T_9 was treated with RDF (N, P_2O_5 and K_2O @ 100 % + FYM @ 100%, and vermicompost 100 %) was found to be significant than any other treatment. Maximum pore space (47.90 %), water holding capacity (46.10 %), pH (7.58), EC (0.42 dS m^{-1})**,** Organic carbon (0.54%), Nitrogen (298 .00 kg^{-1}), Phosphorus (33.35 kg^{-1}), Potassium (218.31 kg^{-1}), grain yield (15.58 qha^{-1}) was obtained and maximum gross return ₹1,24,640.07, net return ₹86,511.07 and C:B ratio (1:3.26) were recorded in T_9.

Organic manure provides all nutrients that are required by plants. It helps in maintaining

C:N ratio in the soil and also increases the fertility and productivity of soil.

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 tilth), and the amount of vegetative cover on the soil surface. Organic matter tends to increase the ability of all soils to retainwater, 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 is important factors that greatly affect the growth, development and yield of green gram. It is one of the popular

UNDER PEER REVIEW

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).

MATERIALS AND METHODS

UNDER PEER REVIEW

The exploratory led at the Soil Science Research Farm of SHUATS, Prayagraj, U.P., which is situated at 25º24'46.14" N scope, 81º50'49.95" E longitude and 98 m over the mean ocean level. The soil of test region falls arranged by an 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 46ºc-49ºc and only occasionally falls as low as 4º c-5ºc. 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□ and the greatest is to be 37.82□. The base moistness was to be 46.42% and most extreme was to be 96.85%.

RESULT AND DISCUSSION

Physical and chemical properties

The results showed that the treatment T_9 (NPK @ 100 % + FYM @ 100 % + Vermicompost @ 100 %) was recorded maximum physio-chemical characters such as pore space (%), water holding capacity (%), pH, EC (dS m^{-1}), organic carbon (%), available nitrogen (kg ha^{-1}), available Phosphorus (kg ha^{-1}) and available potassium (kg ha^{-1}). While bulk density (Mg m^{-3}) and particle density was recorded maximum in T_1 (NPK @ 0 % + FYM @ 100 % + Vermicompost @ 100 %).

Table 1. Response of N, P, K and organic manures on physical-chemical properties of post-soil

Treatments	Depth (cm)	BD (Mg m-3)	PD (Mg m-3)	Pore Space (%)	WHC (%)	pH	EC (dS m-1)	OC (%)	N (kg/ha-1)	P (kg ha-1)	K (kg ha-1)
T_1	0-15	1.323	2.507	46.29	43.30	7.15	0.30	0.39	251.50	21.08	181.38
	15-30	1.389	2.514	44.29	41.64	7.20	0.32	0.29	230.84	17.72	151.38
T_2	0-15	1.321	2.503	47.22	43.88	7.20	0.32	0.46	273.88	22.65	189.39
	15-30	1.347	2.508	45.22	41.55	7.21	0.34	0.35	239.88	20.98	164.72
T_3	0-15	1.315	2.444	47.40	42.22	7.21	0.36	0.48	274.65	23.76	190.33

UNDER PEER REVIEW

	15-30	1.316	2.500	45.40	41.42	7.24	0.37	0.38	235.55	20.74	168.67
T_4	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_5	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_6	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_7	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_8	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_9	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
				0.23	0.09			0.01	9.75	0.98	3.53
C.D. at 5%		-	-	0.68	1.40	-		0.04	16.57	2.26	10.19
		-	-	0.68	0.28	-		0.02	29.22	2.94	10.59

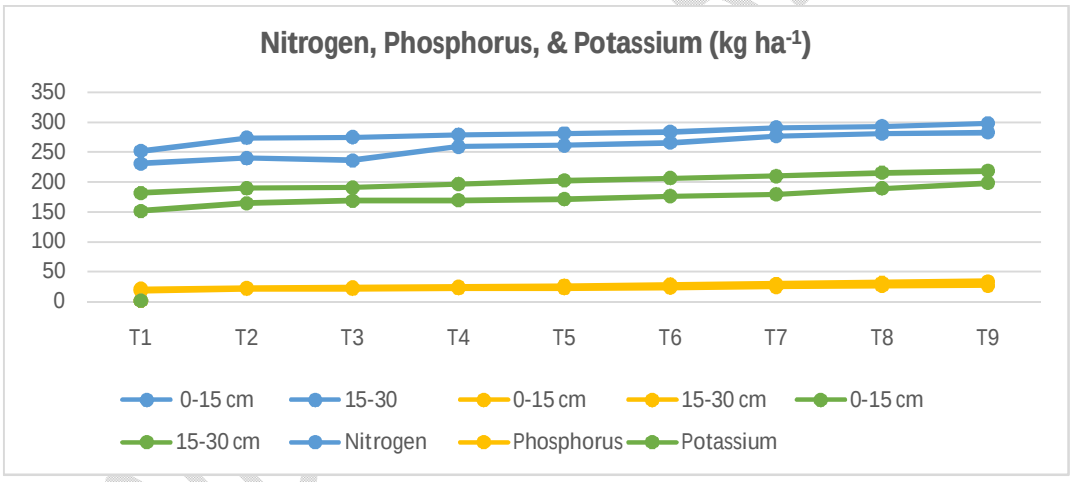

Fig 1. Influence of N, P, K and Organic manures on different treatments on post-harvest soil properties

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^{-1}**	**Seeds pod^{-1}**	**Yield (kg ha^{-1})**
	20 DAS	**40 DAS**	**60 DAS**	**30 DAS**	**60 DAS**			

T_1	15.5	22.1	30.0	2.9	6.7	11.03	6.20	5.10
T_2	16.5	23.6	31.9	3.2	6.8	14.98	7.09	8.05
T^3	18.2	26.4	35.2	3.6	6.9	14.77	7.15	11.16
T_4	16.5	23.4	31.5	3.2	6.9	14.93	7.03	6.16
T_5	19.3	29.6	39.6	3.5	7.0	15.80	7.16	9.61
T_6	19.6	33.4	44.5	3.8	7.4	16.20	7.90	9.94
T_7	18.5	25.7	35.7	3.5	6.8	15.01	7.10	7.80
T^8	19.2	30.5	40.4	3.7	7.2	16.68	8.01	11.46
T_9	25.5	38.1	48.2	3.9	7.5	20.40	8.80	15.58
F-Test	S	S	S	S	S	S	S	S
S. Em. (±)	1.01	1.28	1.11	0.32	0.04	0.55	0.26	36.23
C.D. at 5%	3.03	3.83	3.34	0.96	0.13	1.66	0.77	108.61

PEER REVIEW

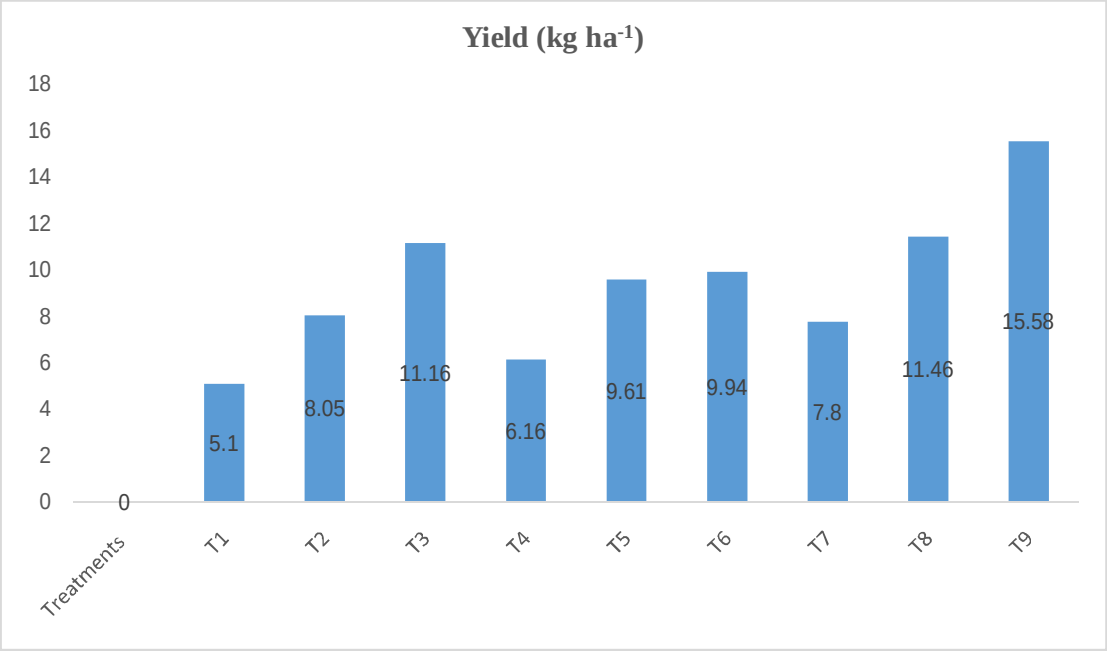

Fig 2. Influence of N, P, K and Organic manures on yield (kg ha^{-1}) of green gram

CONCLUSION

It is revealed from trail that treatment T_9 [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^{-1} 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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UNDER PEER REVIEW

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