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Effect of integrated nutrient managements on Physico-chemical properties of soil, growth and yield attributes of black gram (*Vigna mungo* L.) in an inceptisol of Prayagraj

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Abstract
The field investigate was finished at soil science research farm of Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during kharif season (2021-22). Soil present in the district was sandy soil in surface. The arrangement was fanned out in randomized block plan with three levels of Organic fertilizers (0%, 50%, 100%) and three levels of Inorganic manures (0%, 50%, 100%) separately. The results sought with treatment T9 (NPK 100%+Rhizobium 100%+ Neem Cake 100%) showed that the slight reducing in pH, and Bulk thickness, Particle thickness there is basic extension in pore space, water holding limit, EC, regular carbon, Available Nitrogen, Phosphorus, Potassium and plant improvement and yield credits T9 (NPK 100% Rhizobium 100% + Neem Cake 100%) gave best results in regards to establish level, no of branches, no of cases plants, no of seeds unit 1, seed weight, outright unit yield. No enormous was found in yield and advancement of chickpea dealt with and full NPK compost treatment. Use of Organic manures well as it blend with full NPK consider extension being developed and complete yield credits of chickpea. Rather than any excess medications, joint use of 100% Rhizobium +100% NPK shows the primary impact on dark gram improvement.

Keywords: Integrated, managements, physico-chemical, black gram, *Vigna mungo* L.

Introduction
Dark gram is the fourth significant heartbeats crop filled in our nation covering an area of around 3.45 million hectares, representing the creation of 1.55 million tons with an efficiency of 512 kg ha^{-1} (The Hindu, 2012). Dark gram (Urd) positions third as far as tons normal creation after chick (Pea and Pigeon pea). A leguminous plant species, *Vigna mongo* L This harvest has been developed for quite a while in the Indian subcontinent and is known in a wild state. A dry season safe harvest, it is developed both as a mid-year and winter crop; frequently in revolution with rice. In any case, at times in blended development it is generally sowed on an unpleasant seed bed as an excess of slant energizes vegetative development to the detriment of the seed. Time of development of vegetable crops are 70-120 days. It is developed in around 161,000 sections of land of land in Bangladesh and absolute yearly creation is around 50,000 million tonnes. India is one of the antiquated nation's n t world becoming wide of heartbeat crops as prime wellspring of protein. Further, India is the main nation in beat development region and 25-27% of the world creation and utilization separately yet in addition the biggest merchant of heartbeats with the commitment of 34% of the worldwide food (FAO 2012).
Beat is the fundamental wellspring of Protein especially for vegans and contribute around 14% of the absolute protein of normal Indian eating routine. Creation of heartbeats in the nation is far beneath the prerequisite to meet even the base level per capita utilization. The per capita accessibility of heartbeats in India has been constantly diminishing which is 32.52g each day against the base necessity of 80g each day per capita endorsed by Indian board of clinical Research (ICMR) (Anonymous, 2009). In this way, it is essential for rural researchers to advance methodology to expanding creation of heartbeats to meet the protein necessities of clinical Research (ICMR) (Anonymous, 2009). In this manner, it is important for horticultural researchers to advance procedure to expanding creation of heartbeats to meet the protein necessities of expanding populace of the country.

Legumes including dark gram are generally developed without Nitrogen composts on the grounds that the Nitrogen need of the yield is ventured to be produced using engineered obsession of Nitrogen obsession by even 40-70%.

Neem Cake has shown extraordinary commitment as a potential compost Neem Cakes and neem leaves can be utilized for this reason. The Neem Cake appear to have an extraordinary commitment as a manure. The double movement of Neem Cake as compost and irritation repellent, has made it a leaned toward Neem Cake is a likely wellspring of natural fertilizer. Neem has shown extensive potential as a compost. Our Neem Cake likewise diminish alkalinity in soil, as it produces natural corrosive on decay, being absolutely regular, the Neem Cake we offer thus guarantee fruitfulness of the dirt, it additionally further develop the natural matter contain of the dirt, helping improvement in soil surface, water holding limit, soil air circulation for better root advancement. The expansion of Neem Cake additionally decidedly impacted the accessible soil natural carbon, N P K and Mn content of soil coming about better development and grain yield of mung bean (*Vigna emanate* L.) other than stifling soil borne patogens (Murugan, 2011). The structure of Neem Cake is 5.2% N, 1.0% P, 1.4% K. Neem Cake go about as a Nitrogen inhibitor implies diminish the nitrification. It supplies the accessible Nitrogen for quite a while in the dirt.

Phosphorus assumes an imperative part in photosynthesis, breath, energy capacity, cell elongation and works on the nature of yields. Lacking plants might have meager, erect and spindly stems and leaves transform into pale blue green tone. Phosphorus is a fundamental constituent of larger part of proteins, which are critical in the change of energy, in sugar digestion, in fat digestion and furthermore in breath of plants. It improves the movement of Rhizobium and expanded the development of root knobs. In this manner, it helps in fixing a greater amount of environment Nitrogen in root knobs.

Potassium (K) is the most plentiful inorganic cation, and it is significant for guaranteeing ideal plant development (White and Karley, 2010) [14]. K is an activator of many significant chemicals, for example, protein union, sugar transport, N and and C digestion, and photosynthesis. It assumes a significant part in the development of yield and quality improvement. K is likewise vital for cell development, which is a significant interaction for the capability and improvement of plants.

Materials and Method

The examination on "Impact of various degrees of NPK, Rhizobium and Neem Cake on physico-compound Properties of soil, development and yield of Black gram (*Vigna mungo* L.) in an Inceptisol of Prayagraj Comprise of a field probe Soil Science Research Farm, Naini Agriculture Institute SHUATS, Prayagaraj during Kharif season (July - October) 2021. The detail of the trial site, and environment is depicted in this part along with the exploratory plan, Plan design, social practice and strategies utilized for development studies. The try was directed at the Soil Science Research Farm. 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 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 T incredibly blistering summer and genuinely cool winter. The Maximum temperature of the area comes to up to 46 ºC-48 ºC and only occasionally falls as low as 4 ºC-5 ºC. The general moistness ranges between 20-94%. The midpoints precipitation of this area is around 1100 mm annually. It goes under subtropical environment getting the mean yearly precipitation of around 1100 mm, significant precipitation from July to end September. 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 properties and chemical properties

The non-critical varieties were seen in the event of Bulk thickness (Mg m3). The most extreme Bulk thickness (Mg m3) was kept in T9 (NPK100%kg ha-1, R100%+NC 100% Kg ha-1) and least was found in T1 (NPK0% Kg ha-1+R 0% +NC0% ha-1) separately. The non-critical varieties were seen in the event of Particle thickness (Mg m3). The most extreme Particle thickness (Mg m3) was kept in T9 (NPK100%kg ha-1, R-100%+NC 100% Kg ha-1) and least was found in T1 (NPK0% Kg ha-1+R 0%+NC0% ha-1) respectively. The critical varieties were seen in the event of% pore space. The greatest (%) pore space of soil was found in T9 (NPK100%kg ha-1, R100%+ NC 100% Kg ha-1) and least was found in T1 (NPK0% Kg ha-1+R 0% +NC0% ha-1) separately. The huge varieties were seen in the event of% pore space. The most extreme (%) water holding limit of soil was found in T9 (NPK100%kg ha-1, R100%+NC 100% Kg ha-1) and least was found in T1 (NPK0% Kg ha-1+R 0% +NC0% ha-1 separately. The huge varieties were seen in the event of pH. The greatest pH was kept in T9 (NPK100%kg ha-1, R100%+ NC 100% Kg ha-1) and least was found in T1 (NPK0% Kg ha-1+R 0% +NC0% ha-1) separately.

The critical varieties were seen in the event of EC (dSm-1). The most extreme EC (dSm-1) was kept in T9 (NPK100%kg ha-1, R100%+ NC 100% Kg ha-1) and least was found in T1 (NPK0% Kg ha-1+R 0% +NC0% ha-1) separately. In the event of soil properties, we see that there was tremendous distinction between% Organic carbons. The greatest% Organic carbon was kept in T9 (NPK100%kg ha-1, R100%+ NC 100% Kg ha-1) and least was found in T1 (NPK0% Kg ha-1+R 0%+NC0% ha-1) separately. In the event of soil properties, we see that there was critical difference between Nitrogen (kg ha-1) and Phosphorus (kg ha-1). The greatest Nitrogen (kg ha-1) and Phosphorus (kg ha-1) was kept in T9 (NPK100%kg ha-1, R100%+NC 100% Kg ha-1) and least was found in T1 (NPK0% Kg ha-1+R 0% +NC0% ha-1) separately **I**n the event of soil properties, we see that there was non-massive contrast between Potassium (kg ha-1). The greatest Potassium (kg ha-1) was kept in T9 (NPK100%kg ha-1, R100%+ NC 100% Kg ha-1) and least was found in T1 (NPK0% Kg ha-1+R 0% +NC0% ha-1) separately.

Table 1: Response of Organic manure and Inorganic Fertilizer on Physical Properties of Soil

Treatments	Depth (cm)	BD (Mg m-3)	PD (Mg m-3)	Pore space (%)	WHC (%)
T1	0-15	1.170	2.310	48.00	41.03
	15-30	1.171	2.311	46.89	44.72
T2	0-15	1.173	2.313	48.33	43.00
	15-30	1.174	2.314	47.00	45.00
T3	0-15	1.171	2.315	47.33	42.73
	15-30	1.173	2.316	46.57	45.80
T4	0-15	1.170	2.313	47.33	42.00
	15-30	1.172	2.314	45.34	43.46
T5	0-15	1.174	2.314	49.00	43.78
	15-30	1.175	2.315	48.05	44.16
T6	0-15	1.177	2.311	48.67	42.92
	15-30	1.178	2.312	47.43	43.96
T7	0-15	1.173	2.311	47.33	43.25
	15-30	1.174	2.312	45.19	45.57
T8	0-15	1.174	2.313	48.67	44.26
	15-30	1.175	2.314	46.67	45.32
T9	0-15	1.178	2.316	52.00	45.10
	15-30	1.179	2.317	50.90	46.40
F-Test		NS	NS	S	S
		NS	NS	S	S
S.Em(5+)		-	-	0.393	0.36
				0.390	0.39
C.D at 5%		-	-	0.833	1.98
		-	-	0.829	2.01

Table 2: Response of Organic manure and Inorganic Fertilizer on Chemical Properties of Soil

Treatment	PH	EC DSm-1	OC (%)	N (Kg/ ha-1)	P (Kg /ha-1)	K (kg/ha-1)
T1	7.33	0.746	0.250	232.33	12.46	277.33
	7.34	0.747	0.251	234.71	15.13	278.45
T2	7.36	0.830	0.253	239.33	15.70	279.33
	7.39	0.833	0.254	241.00	17.90	281.98
T3	7.36	0.813	0.270	253.66	21.10	294.16
	7.37	0.814	0.271	257.06	24.98	296.02
T4	7.34	0.806	0.276	240.33	22.26	291.00
	7.38	0.808	0.277	243.65	25.05	293.89
T5	7.59	0.823	0.253	246.33	17.10	287.00
	7.62	0.826	0.254	249.08	18.67	291.65
T6	7.60	0.756	0.280	258.33	19.73	290.33
	7.63	0.758	0.281	260.81	21.00	292.56
T7	7.73	0.790	0.263	261.33	17.66	290.37
	7.75	0.793	0.264	264.73	19.73	293.05
T8	7.66	0.850	0.250	265.66	19.13	283.00
	7.69	0.853	0.251	268.04	22.78	285.45
T9	7.80	0.856	0.281	271.00	22.66	295.33
	7.83	0.859	0.282	274.60	25.45	296.73
F-Test	NS	S	S	S	S	S
	NS	S	S	S	S	S
S.Em(5+)	-	0.003	0.041	6.58	1.12	1.558
		0.004	0.042	6.61	1.16	1.560
C.D at 5%	-	0.047	0.145	4.06	2.90	3.543

Conclusion

Based on above finding, it is presumed that use of Nitrogen at 20 kg ha-1, phosphrous at 40 kg ha - 1, Rhizobium and Neem Cake in treatment T9 was seen as best. As it is aftereffect of only one year study, further trial and error is expected for its proposal which will assist in upgrading with yielding per unit region for supporting efficiency and ripeness of soil, growth of the harvest and yield. The economy of various treatment concerned the treatment T9 (NPK100%) provides most noteworthy net benefit of Rs.81, 280 with money saving advantage proportion is 3.079.

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