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Integrated nutrient management through organic sources in green gram (*Vigna radiata*) under Bundelkhand region of Jhansi

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Abstract
A field study was studied on the nutrient managements through integration of different organic sources of manures in order to achieve the maximum growth yield and quality of Green gram (*Vigna radiata*). Amongst the different treatments for the different parameters studied in the present study significantly varied from each other *viz*., The findings of present study indicated that growth attributes of crop such as plant height (cm) and fresh and dry weight of plants in (g) significantly influence by integrated use of manure management treatments during the period. Significantly at 30, 45 and 60 DAS the maximum plant height (cm), fresh and dry weight of plants in (g) was recorded with supplemented dose of (50% Vermicompost + 50% Poultry Manure) in plot T_5. Similarly, the next best treatments with T_4 (50% FYM + 50% Vermi compost). Among different practices of organic manuring, in green gram incorporated at 30,45 and 60 DAS on application with 50% Vermicompost + 50% Poultry manure, 50% FYM + 50% Vermicompost and 100% Vermicompost significantly resulted in higher values of growth and yield attributes as well as pod yields in green gram under Bundelkhand region.

Keywords: Growth, green gram, integrated, manure, nutrients, organic, quality

Introduction
Pulses are the fundamental sources of protein. Pulses in India contribute around 14% of the absolute protein of normal Indian eating routine. Pulses production in India is far underneath the necessity to meet even the base level per capita utilization of Indian (Abraham *et al.*, 2003) [1]. The per capita accessibility of heartbeats in India has been persistently diminishing which is 32.52 g/ day against the base prerequisite of 80 g/day per capita endorsed by Indian Council of Medical Research (ICMR). Subsequently, it is important for researchers to advance techniques to expand production of pulses to meet the protein prerequisites of expanding population of the country. Green gram [*Vigna radiata* (L.) Wilczek] moreover known as 'Mungbean' is a self pollinated leguminous harvest which is developed during kharif (July-October) as well as summer (March-June) seasons in bone-dry and semi bone-dry locales of India (Ali Ma *et al.*, 2010) [2]; (Devi *et al.*, 2013) [6]; It is essentially *Kharif* season crop however with the improvement of early developing varities, it has likewise demonstrated to be an ideal yield for spring and summer season. It is lenient to dry season and can be become effectively on depleted loamy to sandy topsoil soil in areas of flighty precipitation. It is a local of Focal Asia (Haque *et al.*, 2014) [9]; (Kumar *et al.*, 2020) [14].
It is a short span crop, fits well in different different and intercropping frameworks. Subsequent to picking of units, mungbean plants might be utilized as green grain or green compost. Other than these, the yield likewise enhances soil by fixing barometrical nitrogen. In India, it is the third significant crop after chickpea and pigeon pea, mungbean is developed in condition of Rajasthan, Madhya Pradesh, Punjab, Haryana, U.P., Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. It is plentiful in protein and vitamin B. Green gram is an incredibly rich in protein (24.5%) with great of lysine (460 mg/g N) and tryptophan (60 mg/g N). It contains too noteworthy amount of ascorbic corrosive and riboflavin (0.21 mg/100 g). (Badole *et al.*, 2003) [3]. The yield of pulse crops is low because of old traditional farming. The utilization and advancement of further developed innovation especially organic manure execution in Agriculture fields will help in crossing over hole among demand and supply of Agriculture commodity. (Kaswala *et al.*, 2002) [13]; (Yadav *et al.*, 2007) [19]; (Sohu *et al.*, 2015) [17]. To keep up with soil productivity, sustainable agriculture need to decrease consumption on the expense chemical fertilizers. (Chahal *et al.*, 2020) [4]; (Das *et al.*, 2002) [5]; (Haque *et al.*, 2014) [8]; (Joshi *et al.*, 2020) [9].

Materials and Methods

The present investigation conducted at Experiment, Organic Research farm, Kargunwa Ji Jhansi, Institute of Agricultural Sciences, Department of Entomology, Bundelkhand University, Jhansi (Uttar Pradesh) during *Kharif* season of 2021-2022. Jhansi (Uttar Pradesh) which is situated at latitude 25 ^{0}C 27'N'', longitude 78 ^{0}C35' E'' and at an altitude of 271 meters above the mean sea level. The experiment was laid out in randomized block design keeping three replications. The net field size (27.60×14.40) m^2 with net plot size was (3x4) m^2. The soil of the experimental field was silty clay-loam having pH 7.2,"organic carbon 7.6 g kg^{-1}, available N, P and K 226, 10 and 448 kg ha^{-1}, respectively. The eight treatments having different combination were T_0=(RDF 20:40:30, N:P:K Kg/ha) Control; T_1= 100% Farmyard manure; T_2= 100% Vermicompost; T_3=100% Poultry manure; T_4=50% FYM+ 50%Vermicompost; T_5=50% Vermicompost + 50% Poultry manure; T_6=50% FYM + 50% Poultry manure; T_7= 33% FYM + 33% Vermicompost+33% Poultry manure. The green gram variety *Shikha* (410-3) was sown in 10/07/2021 using 500kg seeds ha^{-1}and keeping (15x10) cm spacing. The crop was grown as per recommended package of practices. The crop was harvested during the first week of September. The plant growth, yield parameters were recorded in each treatments. The data from the field experiment were subjected analyzed statistically for comparing treatments following Analysis of Variance techniques (ANOVA) for RBD design and the result were interpreted at 5% level of significance (Gomez and Gomez 1984) [8].

Results and Discussion

Plant height (cm)

The data based on the parameter plant height as depicted in (Table 1) was significant with different days. Significantly at 30 DAS the maximum plant height was recorded (21.993 cm) with supplemented dose of 50% Vermicompost + 50% Poultry Manure in plot T_5. Similarly, the next best treatments was recorded (20.730 cm) with T_4 (50% FYM + 50% Vermicompost) and (19.367 cm) with T_2 (100% Vermicompost). While minimum plant height was recorded (12.607 cm) with control plot in plot T_0. Significantly, the data at 45 DAS the maximum plant height was recorded (29.107 cm) with supplemented dose of 50% Vermicompost + 50% Poultry Manure in plot T_5. Similarly, the next best treatments was recorded (27.997 cm) with T_4 (50% FYM + 50% Vermicompost) and (26.457 cm) with T_2 (100% Vermicompost). While minimum plant height was recorded (21.440 cm) with control plot in plot T_0. Significantly, the data at 60 DAS the maximum plant height was recorded (42.920 cm) with supplemented dose of 50% Vermicompost + 50% Poultry Manure in plot T_5. Similarly, the next best treatments was recorded (39.543 cm) with T_4 (50% FYM + 50% Vermicompost) and (38.570 cm) with T_2 (100% Vermicompost). While minimum plant height was recorded (28.887 cm) with control plot in plot T_0. The results are with partial agreements with the study as per (Badole *et al.,* 1995) [3]; (Chahal *et al.,* 2020) [4]; (Yadav *et al.,* 2007) [18].

Fresh weight of plant (g)

The data based on the parameter fresh weight of plant (g) as depicted in (Table 2) was significant with different days. Significantly, the data at 30 DAS the maximum fresh weight of plant was recorded (7.720 g) with supplemented dose of 50% Vermicompost + 50% Poultry Manure in plot T_5. Similarly, the next best treatments was recorded (7.507 g) with T_4 (50% FYM + 50% Vermicompost) and (7.037 g) with T_2 (100% Vermicompost). While minimum fresh weight of plant was recorded (3.243 g) with control plot in plot T_0. Significantly, the data at 45 DAS the maximum fresh weight of plant was recorded (20.553g) with supplemented dose of 50% Vermicompost + 50% Poultry Manure in plot T_5. Similarly, the next best treatments was recorded (19.213 g) with T_4 (50% FYM + 50% Vermicompost) and (18.330 g) with T_2 (100% Vermicompost). While minimum fresh weight of plant was recorded (9.220 g) with control plot in plot T_0. Similarly, the data at 60 DAS the maximum fresh weight of plant was recorded (29.183 g) with supplemented dose of 50% Vermicompost + 50% Poultry Manure in plot T_5. Similarly, the next best treatments was recorded (27.703 g) with T_4 (50% FYM + 50% Vermicompost) and (25.760 g) with T_2 (100% Vermicompost).While minimum fresh weight of plant was recorded (14.073g) with control plot in plot T_0. The results are with partial agreements with the study as per (Divyavani *et al.,* 2020) [7]; (Kalal *et al.,* 2020) [11]; (Kamble *et al.,* 2016) [12].

Dry weight of plant (g)

The data based on the parameter dry weight of plant (g) as depicted in (Table 3) was significant with different days. Significantly at 30 DAS the maximum fresh weight of plant was recorded (2.010 g) with supplemented dose of 50% Vermicompost + 50% Poultry Manure in plot T_5. Similarly, the next best treatments was recorded (1.870 g) with T_4 (50% FYM + 50% Vermicompost) and (1.647 g) with T_2 (100% Vermicompost). While minimum dry weight of plant was recorded (0.483 g) with control plot in plot T_0. Significantly, the data at 45 DAS, the maximum dry weight of plant was recorded (4.653 g) with supplemented dose of 50% Vermicompost + 50% Poultry Manure in plot T_5. Similarly, the next best treatments was recorded (3.123 g) with T_4 (50% FYM + 50% Vermicompost) and (2.777 g) with T_2 (100% Vermicompost). While minimum dry weight of plant was recorded (1.637 g) with control plot in plot T_0. Similarly, the data at 60 DAS, the maximum dry weight of plant was recorded (8.273 g) with supplemented dose of 50% Vermicompost + 50% Poultry Manure in plot T_5. Similarly, the next best treatments was recorded (7.707 g) with T_4 (50% FYM + 50% Vermicompost) and (7.497 g) with T_2 (100% Vermicompost). While minimum dry weight of plant was recorded (4.020 g) with control plot in plot T_0. The results are with partial agreements with the study as per (Morya *et al.,* 2018) [15]; (Rajkhowa *et al.,* 2003) [16]; (Yadav *et al.,* 2021) [20]; (Vitnor *et al.,* 2015) [18].

Table 1: Effect of integrated nutrients through organic sources on plant height in green gram (*Vigna radiata*)

		Plant height (cm)		
S.no	Treatment	30 DAS	45 DAS	60 DAS
T_0	(RDF 20:40:30, N:P:K Kg/ha) Control	12.607	21.440	28.887
T_1	100% Farmyard manure	17.217	25.777	34.707
T_2	100% Vermicompost	19.367	26.457	38.570
T_3	100% Poultry manure	18.997	25.140	36.773
T_4	50% FYM+ 50%Vermicompost	20.730	27.997	39.543
T_5	50% Vermicompost + 50% Poultry manure	21.993	29.107	42.920
T_6	50% FYM + 50% Poultry manure	18.217	24.773	33.997
T_7	33% FYM + 33% Vermicompost+33% Poultry manure	18.353	25.453	33.443
	SE(m)	2.427	1.432	1.720
	C.D.	0.792	0.468	0.562

Table 2: Effect of integrated nutrients through organic sources on fresh weight of plant in green gram (*Vigna radiata*)

		Fresh weight of plant (g)		
S.no	**Treatment**	**30 DAS**	**45 DAS**	**60 DAS**
T_0	(RDF 20:40:30, N:P:K Kg/ha) Control	3.243	9.220	14.073
T_1	100% Farmyard manure	4.463	13.440	20.667
T_2	100% Vermicompost	7.037	18.330	25.760
T_3	100% Poultry manure	5.350	16.940	23.817
T_4	50% FYM+ 50%Vermicompost	7.507	19.213	27.703
T_5	50% Vermicompost + 50% Poultry manure	7.720	20.553	29.183
T_6	50% FYM + 50% Poultry manure	4.463	14.883	23.683
T_7	33% FYM + 33% Vermicompost+33% Poultry manure	4.410	14.553	20.910
	SE(m)	1.003	2.946	3.418
	C.D.	0.328	0.962	1.116

Table 3: Effect of integrated nutrients through organic sources on dry weight in green gram (*Vigna radiata*)

		Dry weight of plant (g)		
S.no	**Treatment**	**30 DAS**	**45 DAS**	**60 DAS**
T_0	(RDF 20:40:30, N:P:K Kg/ha) Control	0.483	1.637	4.020
T_1	100% Farmyard manure	1.127	2.363	6.473
T_2	100% Vermicompost	1.647	2.777	7.497
T_3	100% Poultry manure	1.400	2.350	7.330
T_4	50% FYM+ 50%Vermicompost	1.870	3.123	7.707
T_5	50% Vermicompost + 50% Poultry manure	2.010	4.653	8.273
T_6	50% FYM + 50% Poultry manure	1.120	2.293	6.837
T_7	33% FYM + 33% Vermicompost+33% Poultry manure	1.020	2.103	6.793
	SE(m)	0.681	0.317	1.694
	C.D.	0.222	0.104	0.553

Conclusion

From the present investigation it may be concluded that for obtaining a higher yields by sustaining soil fertility in terms of available N,P and K green gram variety *Shikha* (410-3) be grown during the summer season under Bundelkhand region. From the present research findings it may be recommended that with the application of (50% FYM +50%Vermicompost); (50%Vermicompost + 50% Poultry manure) and (100% Vermicompost) farmers can be benefitted in terms of better production and productivity year around under the Bundelkhand region of Jhansi.

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