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RESEARCH ARTICLE

EFFECT OF ORGANIC MANURES AND DIFFERENT VARIETIES ON GROWTH AND YIELD OF CHICKPEA (*CICER ARIETINUM L.,*)

Emmadi Priyanka[1,*] Vikram Singh[2] and Shruti G. George[3]

[1]M.Sc. Scholar, Department of Agronomy, NAI, SHUATS, Prayagraj, Uttar Pradesh-211007
[2]Associate Professor, Department of Agronomy, NAI, SHUATS, Prayagraj, Uttar Pradesh-211007
[3]Ph.D. Scholar, Department of Agronomy, NAI, SHUATS, Prayagraj, Uttar Pradesh-211007

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**Corresponding author:*
Emmadi Priyanka

ABSTRACT

The experiment was conducted during the period from December to March, 2020-21 at Crop Research Farm, Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj to study the effect of organic manures and different varieties on growth and yield of chickpea. The treatment consists of three organic manures (Farmyard manure-5t/ha, Vermicompost-2t/ha and Poultry manure-2t/ha) and three different chickpea varieties (GNG-2144,GNG-1958and Radhey). The experiment was conducted by following a randomized block design with nine treatments and were replicated thrice. The results revealed that significantly higher plant height(52.25cm), plant dry weight(19.65 g/plant), pods(40.53/plant),seed index(27.37g), seed yield(2.70 t/ha) and stover yield(4.63t/ha) were recorded in a treatment combination with the application of Vermicompost 2t/ ha +Radhey Variety.

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INTRODUCTION

Pulses are an important group of food crops that can play a vital role to address national food and nutritional security and also tackle environmental challenges. The share of pulses to total food grain basket is around 9-10 per cent and is a critical and inexpensive source of plant-based proteins, vitamins and minerals. Pulses are rich source of protein at 20-25 per cent, it is double the protein content of wheat and thrice that of rice and help address obesity, diabetes malnutrition etc. Chickpea constitutes nutrient composition of about 20% protein, respectively (Min. of Agri. & FW (DAC & FW), GOI). In 2018-19, chickpea was cultivated in India in an area of about 9.44 million hectares, with a production of 10.13 million hectares and productivity of 1073 kilograms per hectare. As usual, MP has contributed a significant 36.37% of the total gram area and 45.54% of total gram production in the country, thereby ranking first both in area and production. Uttar Pradesh contributes about 6.06% in area stands 5th in position and 7.18% in production stands 4th in position all over India.

More than 90 per cent of gram production of the country during the period under report has been realized by 10 states of Madhya Pradesh, Rajasthan, Maharashtra, Uttar Pradesh, Karnataka, Chattisgarh, Andhra Pradesh, Gujarat and Jharkhand (Directorate of Economics and Statistics, DAC&FW). The use of organic manures (FYM, vermicompost and poultry manure) or other farm waste to improve the physical, chemical and biological properties of the soil are salient features of efficient rainfed farming. The organic manures management system through efficient use of organic matter besides. Improving soil physical condition and conservation of moisture can substantially enhance crop production. Vermicompost is a rich source of N, P, K and micronutrients. Besides containing a good proportion of exchangeable Ca, Mg, Na, etc. it adds organic carbon to the soil and helps to release the nutrients slowly. In vermicompost, some of the secretions of worms and the associated microbes act as growth promoters. It improves physical, chemical and biological properties of soil. It is also rich in growth hormones, vitamins and acts as powerful biocide against diseases and nematodes.

Poor nutrient economy of light textured soils necessitates the need for supplementing fertilizer with organic manures. Poultry manure is another important source of nutrients which plays direct role in plant growth. Besides major nutrients, poultry manure also contains traces of micronutrients which are generally not supplied by the commercial fertilizers but essential for plant growth. It is well documented that poultry manure is an excellent source of organic matter which increases nutrient uptake of the plants (Balai, 2018).

MATERIALS AND METHODS

The experiment was carried out during *rabi*, 2020-21 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.) which is located at 25^0 24' 42'' N latitude, 81^0 50' 56'' E longitude and 98 m altitude above the mean sea-level. The experiment consisted of nine treatments which were replicated thrice in a randomized block design with three organic manures viz.,(Farmyard Manure 5t/ha, Vermicompost 2t/ha and Poultry Manure 2t/ha) and three different varieties of chickpea viz., (GNG-2144,GNG-1958 and Radhey). The treatment combinations which are T_1: Farmyard manure 5t/ha+ GNG-2144, T_2: Farmyard manure 5 t/ha+GNG-1958, T_3: Farmyard manure 5 t/ha+ Radhey, T_4: Vermicompost 2t/ha+GNG-2144, T_5: Vermicompost 2t/ha+GNG-1958, T_6: Vermicomopst 2 t/ha+Radhey, T_7: Poultry manure 2 t/ha+GNG-2144, T_8: Poultry manure 2 t/ha+GNG-1958, T_9: Poultry manure 2 t/ha+Radhey. Irrigation was based on the necessity and at the time of sowing. Growth attributes viz.,Plant height(cm), Number of nodules, Plant dry weight(g/plant) , Crop growth rate(g/m^2/day), Relative growth rate(g/g/day) and Yield attributes viz., pods/plant, seeds/pod, seed index(g) Yield parameters viz. seed yield(t/ha), stover yield(t/ha) and harvest index (%)were recorded with standard basis of observation. The data was analysed statistically by using analysis of variance as applicable in Randomized Block Design (Gomez and Gomez, 1984)

RESULTS AND DISCUSSION

Growth attributes: Data in Table 1 revealed plant height at harvest recorded a significant difference among treatment combinations. However, significantly higher plant height (52.25 cm) was recorded in Vermicompost 2 t/ha+ Radhey which was followed by the treatment combination of Poultry manure at 2 t/ha+Radhey respectively. Plant height increases because of better balanced nutrient supply due to orgsanics that resulted in better crop growth showed that plant grown in Vermicompost pretreated soil exhibited maximum increase in all morphological parameters. These results are in close conformity with jain.*et.al* 2004 and patil *et al.2011.* Data presented in Table 1 shows that number of nodules/ plant recorded at harvest stage was found non-significant effect among treatments. However, highest number of nodules (10.33/ plant) were recorded in Vermicompost at 2t/ha+Radhey. While lowest number of nodules (9.20/plant) was observed in treatment combination of Farmyard manure at 5t/ha+GNG-2144, respectively. Further, plant dry weight at harvest (19.65g/plant) was recorded significantly higher in Vermicompost at 2t/ha+Radhey. Which was followed by the treatment combination of Poultry manure at 2t/ha+GNG-1958 respectively. Dry matter production increased steadily with advancing growth stages the results are in close conformity with Naidu *et al. 2017and* Rahul *et al.*2009. Similarly, crop growth rate recorded at harvest stage was found non-significant effect among treatments. However, highest crop growth rate(3.96g/m^2/day) were recorded in Vermicompost at 2 t/ha+Radhey. While lowest crop growth rate (1.80g/m^2/day) was observed in Farmyard manure at 5t/ha+Radhey, respectively. Data decipted in table 1 shows that Relative growth rate recorded at harvest stage was found non-significant effect among treatments. However, highest relative growth rate(0.0068g/g/day) were recorded in Vermicompost at 2 t/ha+Radhey. While lowest relative growth rate (0.0037g/g/day) was observed in Farmyard manure at 5t/ha+Radhey, respectively.

Yield attributes and yield: As given in Table 2 Pods per plant recorded a significant difference among treatment combinations. However, pods (40.53/plant) recorded significantly higher in Vermicompost at 2 t/ha + Radhey which was followed by the treatment combinations of Vermicompost at 2 t/ha + GNG 1958 and Poultry manure at 2 t/ha + GNG 2144 (39.73 and 39.13/plant), respectively. This is aslo conforms the results of Sarawgi and Rajput 2005. Further there was no significant difference with respect to seeds per pod among the treatments. Seed per pod was noticed maximum (1.47/pod) in Vermicompost at 2 t/ha + Radhey treatment combination. However, least number of seeds (1.00/pod) was noticed in Farmyard manure at 5 t/ha + GNG 2144 treatment combination, respectively. These results are in close conformity with Bhangre .2010. Data decipted in table 2 shows that Seed index recorded at harvest, was a significant effect among treatments. Significantly higher seed index (27.37 g) were recorded in Vermicompost at 2 t/ha + Radhey which was followed by Vermicompostat 2 t/ha + GNG 1958 and Poultry manure at 2 t/ha + GNG 2144 (26.01 and 25.77 g). these results are in close conformity with Singh and Sekhon 2006., Channabasanagowda *et al.2008* .

Similarly, Seed yield recorded a significant difference among treatment combinations. However, Seed yield (2.70 t/ha) recorded significantly higher in Vermicompost at 2 t/ha + Radhey. Whereas, Vermicompost at 2 t/ha + GNG 1958 and Poultry manure at 2 t/ha + Radhey noticed statistically at par value (2.48 and 2.47 t/ha), respectively The seed yield is the combined effect of different factors contributing towards it. It appears logical to assume that it is the function of yield attributing characters as increase in any one of these will result in increased yield.these results are in close conformity with Mansur *et al.*2009 *and* Ramesh *et al.*2010.and Singh et al. 2015. Data presented in table 2 shows that Significantly higher stover yield was recorded in Vermicompost at 2 t/ha + Radhey (4.63 t/ha) which was followed by Vermicompost at 2 t/ha + GNG 1958 and Poultry manure at 2 t/ha + Radhey (4.31 and 4.28 t/ha) respectively. These results are in close conformity with Choudhary *et al.*2013. and Shukla *et al.*2013. Data in Table 2. revealed that Harvest index obatained on the basis of seed yield and stover yield shown that there was a no significant difference S among treatments.However highest harvest index (37.66%) were recorded in Vermicompost at 2 t/ha + Radhey.

Table 1. Effect of organics manures and different varieties on growth attributes of chickpea

	Treatments	Plant height (cm) at harvest	Nodules/ plant at harvest	Plant dry weight(g/plant) at harvest	CGR(g/m2/day) at harvest	RGR (g/g/day) at harvest
T_1	Farmyard manure at 5 t/ha + GNG 2144	45.00	9.20	15.82	3.05	0.0062
T_2	Farmyard manure at 5 t/ha + GNG 1958	46.65	9.40	15.73	2.51	0.0050
T_3	Farmyard manure at 5 t/ha + Radhey	47.09	9.93	16.00	1.80	0.0037
T_4	Vermicompost at 2 t/ha + GNG 2144	49.41	9.27	16.74	3.27	0.0064
T_5	Vermicompost at 2 t/ha + GNG 1958	49.85	10.20	17.30	3.91	0.0053
T_6	Vermicompost at 2 t/ha + Radhey	52.25	10.33	19.65	3.96	0.0068
T_7	Poultry manure at 2 t/ha + GNG 2144	47.41	9.33	16.16	2.12	0.0041
T_8	Poultry manure2t a +GNG958	49.45	10.00	18.55	2.07	0.0039
T_9	Poultry manure at 2 t/ha + Radhey	51.78	10.13	18.06	2.81	0.0048
	F-Test	S	NS	S	NS	NS
	SEm±	0.69	0.29	0.41	0.65	0.0013
	CD (P=0.05)	2.07	-	1.22	-	-

Table 2. Effect of organic manures and different varieties on yield attributes and yield of chickpea

	Treatments	Pods/plant	Seeds/Pod	Seed index(g)	Seed yield(t/ha)	Stover yield(t/ha)	Harvest index(%)
T_1	Farmyard manure at 5 t/ha + GNG 2144	32.67	1.00	24.01	2.16	3.89	35.75
T_2	Farmyard manure at 5 t/ha + GNG 1958	33.67	1.20	24.32	2.26	4.01	36.79
T_3	Farmyard manure at 5 t/ha + Radhey	34.00	1.27	25.07	2.30	4.05	35.82
T_4	Vermicompost at 2 t/ha + GNG 2144	36.27	1.07	24.43	2.45	4.24	36.04
T_5	Vermicompost at 2 t/ha + GNG 1958	39.73	1.40	26.01	2.48	4.31	36.80
T_6	Vermicompost at 2 t/ha + Radhey	40.53	1.47	27.37	2.70	4.63	37.66
T_7	Poultry manure at 2 t/ha + GNG 2144	39.13	1.13	25.77	2.34	4.01	36.25
T_8	Poultry manure at 2 t/ha + GNG 1958	35.40	1.20	25.29	2.37	4.09	36.35
T_9	Poultry manure at 2 t/ha + Radhey	36.67	1.33	25.45	2.47	4.28	36.76
	F-Test	S	NS	S	S	S	NS
	SEm±	1.24	0.11	0.60	0.07	0.12	0.93
	CD (P=0.05)	3.72	-	1.91	0.24	0.37	-

While, lowest harvest index (35.75%) were observed in Farmyard manure at 5 t/ha + GNG 2144, respectively. Similar findings were aslo considered from Goyal et al. 2010.

CONCLUSION

Based on the findings of experimentation in one season in a year, it is concluded that application of Vermicompost 2t/ha with Radhey was found more helpful for attaining better growth and yields in chickpea under Eastern U.P. climatic condition.

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