

Effect of Organic Manure and Bonemeal on Chickpea (*Cicer arietinum* L.) - Yield and Yield Attributes

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ABSTRACT

A field experiment was conducted to study the “Effect of organic manure and bonemeal on chickpea (*Cicer arietinum* L.) yield and yield attributes”. The field experiment was conducted during winter season, 2019 at research block of S.G.R.R. University, Pathribagh, Dehradun (Uttarakhand). The experiment was carried out in completely randomize block design with 12 treatments and 3 replications. The investigation revealed that the performance of Chickpea crop was significantly influenced by different combination of application of FYM + Bone Meal + Vermicompost. Among all the treatments, Treatment T12 (FYM 100 % + bone meal 2 t/h + vermicompost 3 t/h) overall was found best for farmer point of view with respect to plant. Treatment T5 (FYM 50 % + bone meal 0 t/h + vermicompost 0 t/h) came out to be the lowest performed treatment in compared to other.

Keywords *Chickpea, organic manures, FYM, Vermicompost, Grain yield, bone meal.*

Pulses play an important role in Indian agriculture for sustainable production, improvement in soil health and environment safety. India is the largest producer and also consumer of pulses in the world and found that it is a cheaper source of protein to overcome malnutrition among human beings. Pulses contain high percentage of quality protein nearly three times as much as cereals (Umadevi and Ganesan, 2007). The crop productivity under organic production system can be enhanced through optimizing the nutrient requirement of crop at different stages. Organic systems rely on management of organic matter to enhance the soil fertility and productivity (Naik *et al.*,

2014). Availability of quality organic sources of nutrients for the cultivation of organic farming is a great challenge, so there should be promotion of organic input production at farm itself. Chickpea being a legume, derives greater nitrogen requirement through biological nitrogen fixation, which can be harnessed by providing nitrogen, medium in available phosphorus and Potassium contents with neutral in reaction and normal in electrical conductivity. The maximum and minimum temperature recorded during the growing season (i.e. from October 2019 to good soil physical and chemical condition. The edhaphic environment under organic production system will be more congenial for good crop growth and application of organics regularly maintains it at optimum level. Earlier studies have shown that legume crop productivity can be enhanced and sustained under organic production system. Therefore, a study was envisaged to find out the effect of different organic manures on growth and yield of chickpea for sustainable production.

MATERIALS AND METHODS

A field experiment was conducted during 2019-20 at the research block of S.G.R.R. university, Pathri Bagh Dehradun (Uttrakahnd) India. The climate of Dehradun is humid subtropical. It was recorded that Dehradun received 1734.1 mm rainfall from the month of July to October in 2019. The soil of the experimental site was clayey in texture, low in available nitrogen, medium in available phosphorus and Potassium contents with neutral in reaction and normal in electrical conductivity. The maximum and minimum temperature recorded during the growing season (i.e. from October

Table 1: Yield attributing parameters of chickpeas influenced by treatments during rabi season 2019-2020

Symbols	Treatments	No. of pod/plant	No. of seed/plant	Weight of seed/plant	Grain yield (q/ha)	Straw yield (q/ha)	Harvest index (%)
T1	Control Plot	36.00	1.76	9.43	3.50	8.99	53.52
T2	FYM 25 % + bone meal 0 t/h + vermicompost 3 t/h	29.40	1.94	6.04	4.65	10.27	49.93
T3	FYM 25 % + bone meal 2 t/h + vermicompost 0 t/h	36.50	1.60	9.20	5.53	11.52	54.50
T4	FYM 25 % + bone meal 2 t/h + vermicompost 3 t/h	35.40	1.62	10.20	6.24	9.21	41.89
T5	FYM 50 % + bone meal 0 t/h + vermicompost 0 t/h	39.40	0.60	20.21	4.60	12.82	39.40
T6	FYM 50 % + bone meal 2 t/h + vermicompost 0 t/h	40.20	1.80	10.10	8.00	12.56	46.54
T7	FYM 50 % + bone meal 0 t/h + vermicompost 3 t/h	32.50	1.54	8.10	7.43	12.21	57.05
T8	FYM 50 % + bone meal 2 t/h + vermicompost 3 t/h	46.00	1.99	15.20	7.34	12.22	40.52
T9	FYM 100 % + bone meal 0 t/h + vermicompost 0 t/h	42.21	1.22	11.25	7.43	11.22	57.03
T10	FYM 100 % + bone meal 0 t/h + vermicompost 3 t/h	47.09	1.25	14.44	7.99	15.55	45.33
T11	FYM 100 % + bone meal 2 t/h + vermicompost 0 t/h	53.22	2.37	16.09	8.09	15.05	55.6
T12	FYM 100 % + bone meal 2 t/h + vermicompost 3 t/h	2.12	1.67	13.77	8.17	14.77	59.8
S.E. (m)±		5.0042.010		1.423.10	4.28	6.39	
C.D.at5%		8.152.020		1.685.29	7.60	11.99	

2019 to March 2020) was 30°C and 6°C. March 2020). The experiment was laid out in RBD with 3 replications. There were 12 treatments consisting two organic manures i.e. FYM and Vermicompost and application of bone meal. The crop chickpea variety Desi (Avrodhi) was sown on 22-10-2019 with a spacing of 30 cm x 25 cm. Seeds were sown by hand maintaining a definite quantity measured for each plot on the basis of recommended seed rate (100 kg/ha). Seed were treated with captan @ 2.5 per kg of seed before sowing against fungal diseases. One pre-sowing irrigation was given at the time of land preparation to provide sufficient moisture for good germination and crop emergence and second light irrigation was provided at 30 DAS. After this mainly rainwater was observed as mode of irrigation. As per treatment, hand

weeding was done at 35, 60, 90 DAS with the help of khurpi. Herbicide pendimethalin was applied before sowing @ 1.5 kg/ha. i.e. 35 % EC. Pendimethalin was sprayed with the help of high volume sprayer as pre-emergence treatment.

RESULTS AND DISCUSSION

Number of pods per plant:

The mean number of pods per plant is affected by different treatments. The statistical analysis had shown that pods per plant were significantly affected due to different treatments. Treatment T11 produced maximum pods per plant i.e 53.22. The lowest number of pods per plant i.e. 29.4 was recorded in treatment T2 shown in (Table.1). These findings are in line of those reported by Reddy *et al.* 1998; Meena *et al.* 2003; Pathak *et al.* 2003.

Number of seeds per pod:

Treatment T12 produced maximum number of seeds per pods i.e, 1.67 which was statistically superior to all the remaining treatments. The lowest number of seeds per pod was recorded in treatment T5 Shown in (Table.1). Similar observation was earlier reported by Jat and Ahlawat 2004; Kumari and Kumari 2002; Singh and Prasad 2008. Gangwar and Singh 1992.

Weight of seeds per plant:

Treatment T11 produced maximum grain yield, which was significantly more than all the remaining treatments. The mean of grain yield per plant was calculated from the yield as recorded after harvest of the crop from five selected tagged plants of each plot. It was statistically analyzed and results were tabulated. The grain yield per plant varied from 15-50g in treatment T₁₁ to 5.99g in treatment T₁ (control) shown in (Table.1). Similar findings were reported by Singh and Prasad 2008; Kumari and Kumari 2002; Rana *et al.* 2007.

Grain yield:

The results presented in (Table.1) indicated that grain yield (8.17 q/ha) was recorded significantly maximum under Treatment T12, whereas the minimum grain yield i.e. (4.60 q/ha) was recorded under Treatment T5. Similar observation was earlier reported by, Chakardhar and Jauhri 2003; Jat and Ahlawat 2004; Devi and Singh 2006. Sinha *et al.* 2010; Tiwari *et al.* 1995.

Straw yield:

From (Table.1) it was also observed under different treatments of organic manure on chickpea, straw yield was significantly maximum under Treatment T10, whereas the minimum grain yield was recorded under Treatment T4, The maximum straw yield per ha was (15.55q) whereas the minimum grain yield per ha was(9.21 q).The results corroborate the findings of Asewar *et al.* 2003; Jadhav *et al.* 2009; Singh and Prasad 2008; Kanwar *et al.* 2002.

Harvest index:

There was a marked influence of different treatments on the harvest index presented in (Table.1). The maximum harvest index (59.8 %) was observed under Treatment T12. Whereas the minimum harvest index (39.40 %) was observed under Treatment T5. Similar findings were reported by Sharma *et al.* 2007 ; Yadav and Tripathi, 2013.

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