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Effect of organic manure and inorganic fertilizers on growth and yield of Chickpea (*Cicer arietinum*)

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Abstract
A field experiment was conducted at Agronomy Research Farm of Mewar University, Gangrar, Chittorgarh, Rajasthan, during Summer seasons of 2022- 2023 to study the "Effect of organic manure and inorganic fertilizers on growth and yield of chickpea "(*Cicer arietinum*)*"* The treatments consisted of Twelve varies combination of T_1 Control, T_2 Rhizobium 20 kg, T_3 FYM @ 5 tonnes ha^{-1},T_4 FYM @ 5 tonnes ha^{-1} + Rhizobium 10 kg + PSB 10 kg, T_5 FYM @ 2 tonnes ha^{-1}+ Castor cake @ 0.5 tonnes ha^{-1}, T_6 Conc. neem cake organic manure @0.5 tonnes ha^{-1} + vermicompost @0.5 tonnes ha^{-1}, T_7 100% of RDF, T_8 50%phosphorous + 25% Nitrogen +25% Potash, T_9 50% of nitrogen+ 25% phosphorous+ 25% sulphur T_{10} 50% RDN + 50% RDP T_{11} 50% RDN + 25% RDP, T_{12} 25% RDP + 50% Potash, With three Replicated and laid out in randomized block design. The result indicated that among the maximum plant height (39.40 cm) was recorded at harvest, maximum number of branches (23.44) was recorded at harvest, with T_6 (Conc. neem cake organic manure @0.5 tonnes ha^{-1} + vermicompost @0.5 tonnes ha^{-1}), The maximum number of pod^{-1} (44.25), significantly maximum number of seed per pod^{-1} (2.74) of chickpea, recorded significantly higher seed yield (4568.42 kg/ha), biological yield of chickpea significantly influenced higher stover yield (14275.93 kg/ha), significantly of chickpea maximum stover yield was (9707.50 kg/ha, Maximum fetched value in term of net return (162888 ₹ /ha) and highest B:C ratio was recorded (5.62) with concentrate neem cake organic manure @0.5 tonnes ha^{-1} + vermicompost @ 0.5 tonnes ha^{-1}.

Keywords: Chickpea organic manure and inorganic fertilizers

Introduction
Chickpea (*Cicer arietinum* L.) is an important crop for vegetarian people as primary source of protein, it is third most important pulse crop grown in the world after dry beans and peas (Kaur and parsa, 2021) [7]. India ranks first in area and production of chickpea followed by Australia, Pakistan and Turkey. As per 4th advance estimates, it accounts an acreage of 10.17 million hectares contributing 11.35 million tonnes of production with an average productivity of 1,116 kg/ha during 2023 in India. Among states, Rajasthan, Madhya Pradesh, Maharashtra, Karnataka, Bihar, Andhra Pradesh, Tamil Nadu and Gujarat are primarily growing states of chickpea. Moreover, it has occupied on 2.46 million hectares with a production of 2.66 million tonnes and productivity of 1,080 kg/ha in Rajasthan (DES, 2023). In Rajasthan, it is primarily cultivated in arid and semi-arid districts of Rajasthan including Nagaur, Jaipur, Jodhpur, Sikar, Pali, Jhunjhunu and Ajmer. This crop is tolerant to drought, can be grown successfully on well drained loamy to sandy loam soils under residual moisture (Yadav *et al*., 2019) [11]. Organic and inorganic is an age old concept practiced in traditional agriculture because of the low nutrient turn over in soil plant system (Bhattacharyya *et al*., 2008) [3]. It has assumed greater significance in the recent past mainly because of two reasons. First, the need for continuous increase in agricultural production with shrinking land resources requires increased level of fertilizer nutrients and the present level of fertilizer production in India is not enough to meet the total plant nutrients requirement. The gap between demand and supply of fertilizers was about 9-10 million tonnes in 2000. Secondly, the results of large number of experiments on manures and fertilizers conducted in the country revealed that neither the chemical fertilizers nor organic sources alone exclusively can achieve the production sustain ability of soil as well as crops under high intensive

cropping systems even the so called balanced use of chemical fertilizers will not be able to sustain high productivity due to the emerging deficiency of one or more of secondary and micronutrients (Hedge and Sarkar, 1990) [6].

Materials and Methods

The field experiment was conducted at Agriculture Research Farm, Mewar University Gangrar, Chittorgarh, Rajasthan during 2022-23, which is situated at South- East part of Rajasthan at an elevation of 582.17m above mean sea level at 24°35' N latitude and 73 ° 42' E longitude. It falls under the agro- climatic zone IV A i.e. Sub humid Southern Plain and the Aravalli hills of Rajasthan. The experiment consisted of 12 treatment combinations involving different levels of organic manure and inorganic fertilizers with use of King ganesh variety planting at 30 cm X 10 cm. spacing.

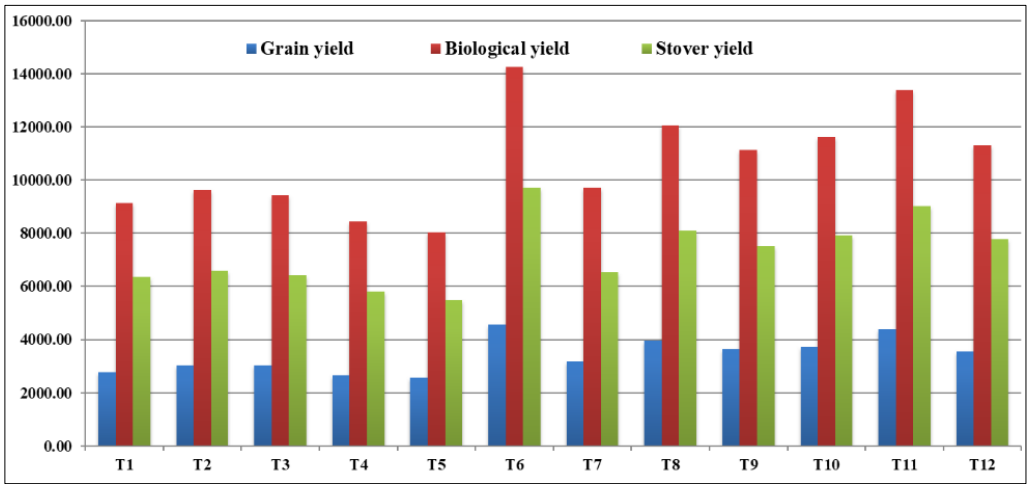

Fig 1: Effect of organic manure and inorganic fertilizers on yield attributes of chickpea

Table 1: Effect of organic manure and inorganic fertilizers on growth of height (cm) and number of branches Chickpea

Sr. No.	Treatments	Plant height	Number of branches
T1	Control	24.15	18.32
T2	Rhizobium 20 Kg	27.43	19.33
T3	FYM @ 5 tonnes ha^{-1}	27.74	21.54
T4	FYM @ 5 tonnes ha^{-1} + Rhizobium 10 kg + PSB 10 kg	33.65	20.00
T5	FYM @ 2 tonnes ha^{-1}+ Castor cake @ 0.5 tonnes ha^{-1}	33.34	20.56
T6	Conc. Neem cake organic manure @ 0.5 tonnes ha^{-1} + vermicompost @ 0.5 tonnes ha^{-1}	39.40	23.44
T7	100% of RDF	34.17	21.29
T8	50% Phosphorous + 25% Nitrogen +25% Potash	29.74	22.54
T9	50% of Nitrogen+ 25% Phosphorous	28.55	22.32
T10	50% RDN + 50% RDP	33.00	23.22
T11	50% RDN + 25% RDP	37.04	21.67
T12	25% RDP + 50% Potash	34.67	21.05
	S.Em.±	1.92	0.93
	C.D.(P=0.05)	5.62	1.73
	CV %	9.87	8.78

Table 2: Effect of organic manure and inorganic fertilizers on Number of pods and Number of seed per pod of Chickpea

Sr. No.	Treatments	Number of pods	Number of seed per pod
T1	Control	33.21	1.67
T2	Rhizobium 20 Kg	38.00	1.81
T3	FYM @ 5 tonnes ha^{-1}	40.92	1.81
T4	FYM @ 5 tonnes ha^{-1} + Rhizobium 10 kg + PSB 10 kg	40.06	1.59
T5	FYM @ 2 tonnes ha^{-1}+ Castor cake @ 0.5 tonnes ha^{-1}	44.25	1.54
T6	Conc. Neem cake organic manure @ 0.5 tonnes ha^{-1} + vermicompost @ 0.5 tonnes ha^{-1}	44.51	2.74
T7	100% of RDF	40.69	1.91
T8	50% Phosphorous + 25% Nitrogen +25% Potash	41.77	2.37
T9	50% of Nitrogen+ 25% Phosphorous	40.18	2.18
T10	50% RDN + 50% RDP	42.14	2.24
T11	50% RDN + 25% RDP	41.18	2.63
T12	25% RDP + 50% Potash	41.88	2.13
	S.Em.±	1.43	0.20
	C.D.(P=0.05)	4.21	0.60
	CV %	8.98	9.87

Table 3: Effect of organic manure and inorganic fertilizers on yield attributes of Chickpea

Sr. No.	Treatments	Yield			Harvesting index (%)
		Grain yield (kg/ha)	Stover yield (kg/ha)	Biological yield (kg/ha)	
T1	Control	2784.30	6360.74	9145.04	30.45
T2	Rhizobium 20 Kg	3023.68	6597.87	9621.55	31.43
T3	FYM @ 5 tonnes ha-1	3017.76	6411.13	9428.89	32.01
T4	FYM @ 5 tonnes ha-1 + Rhizobium 10 kg + PSB 10 kg	2648.77	5798.33	8447.10	31.36
T5	FYM @ 2 tonnes ha-1+ Castor cake @ 0.5 tonnes ha-1	2569.92	5484.71	8054.63	31.91
T6	Conc. Neem cake organic manure @ 0.5 tonnes ha-1 + vermicompost @ 0.5 tonnes ha-1	4568.42	9707.50	14275.93	32.00
T7	100% of RDF	3181.60	6540.24	9721.84	32.73
T8	50% Phosphorous + 25% Nitrogen +25% Potash	3946.63	8106.90	12053.53	32.74
T9	50% of Nitrogen+ 25% Phosphorous	3633.12	7516.48	11149.61	32.59
T10	50% RDN + 50% RDP	3726.54	7918.96	11645.50	32.00
T11	50% RDN + 25% RDP	4388.61	9016.26	13404.88	32.74
T12	25% RDP + 50% Potash	3543.93	7775.20	11319.12	31.31
	S.Em.±	36.20	96.47	169.30	0.44
	C.D.(P=0.05)	106.19	282.96	495.79	NS
	C V %	9.76	8.67	8.45	9.54

Table 4: Effect of organic manure and inorganic fertilizers on Economics of Chickpea

Sr. No.	Treatments	Net return	B:C Ratio
T1	Control	87475	3.19
T2	Rhizobium 20 Kg	101218	3.93
T3	FYM @ 5 tonnes ha^{-1}	100203	3.78
T4	FYM @ 5 tonnes ha^{-1} + Rhizobium 10 kg + PSB 10 kg	85116	3.26
T5	FYM @ 2 tonnes ha^{-1}+ Castor cake @ 0.5 tonnes ha^{-1}	82173	3.66
T6	Conc. Neem cake organic manure @ 0.5 tonnes ha^{-1} + vermicompost @ 0.5 tonnes ha^{-1}	162888	5.62
T7	100% of RDF	105731	3.79
T8	50% Phosphorous + 25% Nitrogen +25% Potash	135994	4.57
T9	50% of Nitrogen+ 25% Phosphorous	124726	4.48
T10	50% RDN + 50% RDP	127750	4.44
T11	50% RDN + 25% RDP	156679	5.67
T12	25% RDP + 50% Potash	120080	4.17
	S.Em.±	1640.135	0.06
	C.D.(P=0.05)	4810.647	0.20
	CV %	9.77	9.54

Results and Discussion

Growth parameters

The data pertaining to of growth as influenced by different treatments are presented in Table 1 and 2. The significant differences in growth were recorded to different organic manure and inorganic fertilizer treatments. The maximum plant height (39.40 cm) was recorded at harvest and number of branches (23.44) was recorded at harvest with T_6 (Conc. neem cake organic manure @0.5 tonnes ha^{-1} + vermicompost @0.5 tonnes ha^{-1}), which is statistically at par to T_{11}, T_{10}, T_9, and T_8 at harvest. In generally, the results indicate that integrated use of organic and inorganic nutrient sources significantly improved the overall condition of the soil as well as agricultural productivity as previously indicated. The vermicompost contained high concentrations of organic material, silt and clay and was also rich in many soil nutrients such as, nitrogen, Sulphur, potash, phosphorus, calcium, magnesium, etc. This could be attributed to the high cell turgidity and increased cell number, cell turgidity is responsible for the elongation of cell. In nutrient deficit treatments the turgidity of the cell is supposed to reduction in cell elongation and cell number. As have been reported by various scientists, nutrient supply causes a significant improvement in the vegetative growth. In this study the fact was further elucidated as more number of green leaves $plant^{-1}$, more dry matter accumulation plant-1 and increased dry weight of leaves was recorded in all those fertilizer treatments. Vermicompost was also rich in growth hormones and vitamins and thus acts as a powerful biocide against diseases and nematodes. Earthworm castings contain abundant essential elements that plants need for healthy growth research findings show that analysis of earthworm castings reveal that they are richer in nutrients than surrounding soils, often having 3 times more calcium, and several times more nitrogen, phosphorus, and potassium. There is a close relationship between the nutrient status of soil and organic matter content. vermicompost contained plant nutrients in addition to its action as soil conditioners Atiyeh *et al*., (2002) [1]. Vegetative growth was vigorous with high number of trifoliate in fertilized plots. Thus the straw yield which might be outcome because of enhancement of vegetative growth under organic sources application in T_6. Sutaria *et al.* (2010) reported the response of chemical fertilizer and vermicompost for legume crops. Application of vermicompost @ 2 ton ha^{-1} and 100% RDF affected the straw yield, significantly. Kumawat *et al.* (2009).

Yield attributes and yield

The significantly effect of organic manure and inorganic fertilizer on yield data presented in Table 3 and 4 and Fig 1. The maximum number of pod^{-1} (44.25), maximum number

of seed per pod^{-1} (2.74), significantly higher seed yield (4568.42 kg/ha), stover yield of chickpea maximum stover yield was (9707.50 kg/ha), higher biological yield (14275.93 kg/ha) were recorded with Conc. neem cake organic manure @0.5 tonnes ha^{-1} + vermicompost @ 0.5 tonnes ha^{-1}

The highest mean biomass yield and grain yield of chick pea were recorded in cropping season Applications of inorganic and organic nutrient sources either alone or in combination had a significant (p). Higher yield and yield components were found after the treatments with vermicompost, which is consistent with previous research showing that crop plants had increased height after vermicompost was applied in our case, the application of different concentration of vermicompost showed increased accumulation of N, P, and K, which intern, resulted in increased yields and yield components and soil quality parameters as well. The observed changes in plant growth and yields could be as a result of buffering activities of vermicompost and improved nutrition Bwamiki *et al*., (1998) [4]. The obtained results from the present study indicated that the application of the used vermicompost led to better growth and development of vermicompost treated plants as they were shown with higher yield and yield components of tomato. Level of significance could result from the improved nutrition, stimulated rooting, and induced changes of metabolic process and achievement of neutral pH at 100% of the recommended nitrogen from vermicompost treated planting media. This might be due to the favourable effect of biocompost on chemical physical and biological properties of soil leads to easy availability of nutrients might have reflected in higher growth parameter and yield attributes. Data revealed that the harvest index was not influenced by different organic manures. Similar results was find Patel *et al*. (2018) and Barkha *et al*. (2020) [9, 2].

Economics

Data pertaining to net return are summarized in Table 4.4. Maximum fetched value in term of net return (162888 ₹/ha) and B:C ratio was recorded (5.62) with concentrate neem cake organic manure @ 0.5 tonnes ha^{-1} + vermicompost @ 0.5 tonnes ha-^{1}

Conclusion

On the basis of present investigation, it can be concluded that for getting higher growth and yield of chickpea crop should be nourished with T_6 (concentrate organic manure @0.5 tonnes ha^{-1} + vermicompost @ 0.5 tonnes ha-^{1}). We can suggest to farmer according to found that result.

The observations are based on one season data, to get more precise information, it is suggested that the experiment.

References

1. Atiyeh RM, Edwards CA, Subler S, Metzger JD. Earthworm-processed organic wastes as components of horticultural potting media for growing marigolds and vegetable seedlings. Compost Sci Util. 2000;8:215-23.
2. Barkha MK, Joshi N, Vaghela TD. Effect of integrated nutrient management on growth, yield, nutrient uptake and soil nutrient status of summer green gram (Vigna radiata L.) under south Gujarat conditions. Int J Chem Stud. 2020;8(5):2675-8.
3. Bhattacharyya R, Kundu S, Prakash V, Gupta HS. Sustainability under combined application of mineral and organic fertilizers in a rainfed soybean-wheat system of the Indian Himalayas. Eur J Agron. 2008;28(1):33-46.
4. Bwamiki DP, Zake JYK, Bekunda MA, Woomer PL, Bergstrom LH, Kirchman H. Use of coffee husks as an organic amendment to improve soil fertility in Ugandan banana production. In: Carbon and nitrogen dynamics in natural and agricultural tropical ecosystems. 1998. p. 113-27.
5. Agegnehu G, Tsigie A, Tesfaye A. Evaluation of crop residue retention, compost and inorganic fertilizer application on barley productivity and soil chemical properties in the central Ethiopia highland. Ethiop J Agric Sci. 2012;22:45-61.
6. Hedge DM, Sarkar A. Yields trends in rice-wheat systems in different agroecological regions. In: Proceedings of the Rice-Wheat Workshop; 1990 Oct 15-16; Modipuram, India. 1990.
7. Kaur R, Prasad K. Technological, processing and nutritional aspects of chickpea (Cicer arietinum) - A review. Trends Food Sci Technol. 2021;109:448-63.
8. Kumawat N, Sharma OP, Kumar R. Effect of organic manure, PSB and phosphorus fertilization on yield and economics of mungbean. Environ Ecol. 2009;27(1):5-7.
9. Patel DM, Patel IM, Patel BT, Singh NK, Patel CK. Effect of Panchgavya and jivamrut on yield, chemical and biological properties of soil and nutrients uptake by kharif groundnut (Arachis hypogaea L.). Int J Chem Stud. 2018;6(3):804-9.
10. Sutaria GS, Akbari KN, Vora VD, Hirpara DS, Padmani DR. Response of legume crops to enriched compost and vermicompost on vertic ustrocherpt under rainfed agriculture. Legume Res. 2010;33:128-30. Available from: http://nhm.nic.in/JIT_Reports/JIT_Gujarat2015.pdf
11. Yadav VL, Shukla UN, Raiger PR, Mandiwal M. Efficacy of pre-emergence and post-emergence herbicides on weed control in chickpea (Cicer arietinum L.). Indian J Agric Res. 2019;53(1):112-5.