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Response of organic and inorganic sources of nutrients on chickpea on growth and yield of chickpea (*Cicer arietinum* L.)

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Abstract
Pulses are important source of vegetable protein, essential adjunct to predominantly cereal based diet and increase biology value of protein-consumed.in pulses Chickpea (*Cicer arietinum* L.) is an important grain legume crop grown throughout the world. It contains 25% proteins, which is the maximum provided by any pulse and 60% carbohydrates so can help people improve the nutritional quality of their diets, also Its produces a maximum return of nourishment for minimum expenditure of money or effort. Integrated nutrient supply or management systems involve efficient and really appropriate supply of all of the most important components of plant nutrients sources. Growth and yield attributes were the highest under the treatment combination 100% NPK along with Rhizobium (1.5 kg/ha) + 3.75 t/ha Vermicompost+ PSB (5 Kg/ha).

Keywords: Integrated nutrient management, NPK, organic, rhizobium, vermicompost

1. Introduction
Pulse the 'wizard of the health' owe a strategic position in agricultural economy of India. Pulse is indeed a superb energy umbrella for people as dietary proteins, for livestock as green nutritious fodder and feed, for soil as mini nitrogen plant and green manure (Ali, 1988) [1]. They contain vitamin B, especially thiamine and folic acid and mineral too, which are so essential for maintaining health. Ho wonder, that pulses because of their specific quality, are called as 'Unique Jewels' of Indian crop husbandry (Swaminathan, 1981) [5]. In addition, these crops economize fertilizer cost by utilizing nitrogen from the air through symbiotic nitrogen fixation, instead of depleting it from the soil ad trop. The valuable resource like moisture from the soil more /efficiently than many other crops (Mandal et al., 1987) [2]. Chemical fertilizers are playing a crucial role to meet the nutrient requirement of the crop, continuous use of fertilizers affect the soil health adversely on the physical, chemical and biological properties of soil. So, there is an urgent need to reduce the usage of chemical fertilizers and in turn increase in the usage of rhizobium which needed to check the yield and quality levels. Use of rhizobium alone does not result in spectacular increase in crop yields, due to their low nutrient status (Subba Rao and Tilak, 1977) [4]. Chickpea is grown in India either in admixture with cereals and other crop or as pure stand. It produces a maximum return of nourishment for minimum expenditure of money or effort (Singh and Auckland, 1975) [3]. Integrated nutrient supply or management systems involve efficient and really appropriate supply of all of the most important components of plant nutrients sources. A significant improvement in yield and organic nitrogen fixation because of Rhizobium inoculation has been reported in chickpea (Khurana and Dudeja, 1981) [6].

2. Material and Methods
The experiment was conducted at the Research Farm (Agronomy), Career Point University, Kota situated in Southeast part of Rajasthan at an altitude of 579.5metre above mean sea level and at 24º35' N latitude and 73º42' E longitude. The region falls under agro- climatic zone V (humid Southeastern Plain) of Rajasthan.
The experiment was laid out in split plot design with three replications. Main plot treatments comprised of three field layouts *viz.*

Factor "A"
Main plot (RDF)
F1- 100%NPK

F2- 75%NPK
F3- 50% NPK through inorganic
F4- Control

Factor "B"
Sub Plot (bio fertilizer)
BF1- FYM (7.5t ha-1) + Azospirillum (5 kg ha-1) + PSB (5 kg ha-1)
BF2- Rhizobium (1.5 kg/ha + FYM (7.5 t/hac) +PSB (5 kg ha-1)
BF3- Rhizobium (1.5 kg/ha) + 3.75t/ha Vermicompost+ PSB (5Kg/ha**)**

The recommended dose of fertilizer for chickpea (25:50:0 N: P_2O_5:K_2O kg ha^{-1}) was applied through inorganic fertilizers (urea, single super phosphate and muriate of potash), whereas farm yard manure and vermicompost were used as organic manures. The details of composition of organic manures. The details of composition of organic manures are given in Table. The gross and net plot sizes were 6.00 m x5.40 m and 5.5 m x 3.0 m, respectively. The treatments were allotted randomly to each plot in every replication by using random number.

3. Results and Discussion

3.1. Response of organic and inorganic sources of nutrients on chickpea on growth attributes of chickpea (*Cicer arietinum* L.)"

Observations of Plant height, Branches per plant, Chlorophyll Content, No. of Root Nodules, No. of Pods per Plant, No. of Seeds per Plant as influenced by different treatments presented in Table 1. Maximum Plant height, Branches per plant, Chlorophyll Content, No. of Root Nodules, No. of Pods per Plant, No. of Seeds per Plant at were recorded with F1 and it was significantly superior over F4 while statistically on par with F2 and F3. Hence both treatments were not significantly different. Under biofertilizer treatment maximum Plant height, Branches per plant, Chlorophyll Content, No. of Root Nodules, No. of Pods per Plant, No. of Seeds per Plant were recorded with BF3 which was statistically at par with BF2 but significantly superior over BF1.

Table 1: Plant height, Branches per plant, Chlorophyll Content, No. of Root Nodules, No. of Pods per Plant, No. of Seeds per Plant influenced by Fertilizer and Bio Fertilizer (Pooled)

Factors	Treatments	Plant height	Branches per Plant	Chlorophyll Content	No. of Root Nodules	No. of Pods per Plant	No. of Seeds per Pod
A	**Fertilizers**						
	F1	55.80	6.54	1.80	43.67	92.44	2.17
	F2	54.03	6.36	1.75	38.85	88.11	2.16
	F3	47.21	6.32	1.74	37.72	77.78	1.94
	F4	42.74	6.24	1.73	31.93	71.01	1.92
	S.Em±	0.62	0.03	0.01	0.45	0.92	0.03
	C.D. at 0.05	1.84	0.10	0.03	1.34	2.73	0.08
	CV: F (%)	6.07	2.56	2.59	5.80	5.46	6.48
B	**Biofertilizers**						
	BF1	48.11	6.30	1.74	37.37	79.46	2.00
	BF2	48.80	6.35	1.75	37.78	80.19	2.02
	BF3	52.92	6.44	1.78	38.97	87.35	2.12
	S.Em±	0.23	0.02	0.01	0.30	0.45	0.02
	C.D. at 0.05	0.65	0.07	0.02	0.84	1.29	0.04
	CV: BF (%)	2.59	2.16	2.36	4.39	3.11	4.17

3.2. Response of organic and inorganic sources of nutrients on chickpea on yield Attributes of chickpea (*Cicer Arietinum* L.)"

Observations of Grain Yield (Kg./ha.), Haulm Yield (Kg./ha.), Biological Yield (Kg./ha.) and Harvest Index (%) as influenced by different treatments presented in Table 2. Maximum Grain Yield (Kg./ha.), Haulm Yield (Kg./ha.), Biological Yield (Kg./ha.) and Harvest Index (%) at were recorded with F1 and it was significantly superior over F4 while statistically on par with F2 and F3. Hence both treatments were not significantly different. Under biofertilizer treatment maximum Grain Yield (Kg./ha.), Haulm Yield (Kg./ha.), Biological Yield (Kg./ha.) and Harvest Index (%) were recorded with BF3 which was statistically at par with BF2 but significantly superior over BF1.

Table 2: Grain Yield (Kg./ha.), Haulm Yield (Kg./ha.), Biological Yield (Kg./ha.) and Harvest Index (%) Fertilizer and Bio Fertilizer (Pooled)

Factors	Treatments	Grain Yield (Kg/ha)	Haulm Yield (Kg/ha)	Biological Yield (Kg/ha)	Harvest Index (%)
A	**Fertilizers**				
	F1	2046.22	3404.13	5450.35	37.52
	F2	1985.65	3365.23	5350.88	37.07
	F3	1639.53	3159.97	4799.50	34.29
	F4	1317.63	2312.85	3630.48	36.18
	S.Em±	23.98	39.40	54.04	0.36
	C.D. at 0.05	71.24	117.06	160.57	1.08
	CV: F (%)	6.72	6.31	5.51	4.92
B	**Biofertilizers**				
	BF1	1681.29	2984.34	4665.63	35.97
	BF2	1718.14	3022.47	4740.61	36.13
	BF3	1842.35	3174.81	5017.16	36.69
	S.Em±	20.61	32.87	39.46	0.38

	C.D. at 0.05	58.60	93.46	112.19	1.13
	CV: BF (%)	6.67	6.08	4.64	5.85

4. Conclusion

On the basis of present investigation, it may be concluded that: In gram the application of 100% NPK (F1) and FYM (7.5t ha^{-1}) + Azospirillum (5 kg ha^{-1}) + PSB (5 kg ha^{-1}) (BF1) in maximum plant height, dry weight including all growth characters, the maximum percentage of nitrogen, phosphorus and potassium content, maximum yield and yield attributes with maximum net return and benefit cost ratio.

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