Effect of integrated nutrient management on quality and nutrientuptake by chickpea(*Cicer Arietinum* L.)

Abstract

Chickpea (Cicer arietinum) is the most dominant pulse (Grain Legume crop)having a share of around 40 per cent in the general production .It is predominantly a crop of low rainfall areas but gives good yield under irrigated conditions also. Excessive rain soon after sowing or at flowering can harm the crop. It is a highly nutritious pulse and places third in the importance list of the food legumes . It contains 25% proteins, which is the maximum provided by any pulse. In chickpea, symbiotic nitrogen fixation, crop meets up to 80% of the soil's nitrogen needs, so farmers have to apply less nitrogen fertilizer than they do for other non-legume crops.The experiment was laid out in split plot design with three replications and by taking four treatments of RDF i.e. F1- 100%NPK, F2-75%NPK, F3- 50% NPK through inorganic and F4- Control as factor 1 in main plot and three treatments of biofertilizer i.e. 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) and BF3- PSB + 3.75t/ha Vermicompost+ PSB (5Kg/ha). Highest grain yield is of F1 (2046.22 kg/ha) and BF3(1842.35 kg/ha)in RDF and biofertilizer treatment respectively. The maximum percentage of nitrogen, phosphorus and potassium content was found in F1 and BF3 respectively in the grain. The maximum protein content was recorded by F1 (23.80%) and BF3(22.89%) in the grain.

Key Words - Integrated nutrient management,Rhizobium,Pulses,chemical fertilizers,organic manures

Introduction

Pulses are important source of vegetable protein, essential adjunct to predominantly cereal based diet and increase biology value of protein-consumed. Pulse supplies the building material for body and aids in the wear and tear tissues, which is a constant feature in the processes of life. 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).** Chemical fertilizers are playing a crucial role to meet the nutrient requirement of the crop, So there is need to change the trend of dependency on chemical fertilizer for high yield. Hence integrated nutrient management is applied to get better yield with minimum use of chemical fertilizers. Chickpea is grown in India either in admiture with cereals and other crop or as pure stand. It is cultivated as a winter crop in the tropics and spring or summer crop in temperate climates. The chickpea responds well to one to two irrigation only, applied at seedling and flowering stages of the crops growth, while yield reduction occures with more than two irrigation (Yusuf ct al., 1980). 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). 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).

2.Material and Methods

The experiment was conducted at the Research Farm(Agronomy), Career Point University, Kota situatedinSoutheastpartofRajasthanataltitudeof579.5metre above mean sea level and at 24º35' Nlatitudeand73º42'Elongitude.Theregionfallsunderagro-climaticzoneV(humidSoutheasternPlain)ofRajasthan.

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"

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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 inorganicfertilizers (urea, single super phosphate and muriate of potash),whereas farm yard manure and vermicompost were used asorganic manures. The details of composition of organic manures . The details of composition of organic manuresare given in Table 1. The gross and net plot sizes were 6.00 m x5.40 m and 5.5 m x 3.0 m, respectively. The treatments wereallotted randomly to each plot in every replication by using random number.

3.RESULTSANDDISCUSSION

3.1. **Total N.P.K. and protein content ingrain (%)**

The data pertaining to average value of Nitrogen , Phosphorus , Potasium and Protein Content in Grain have been given in Table 1. The maximum nitrogen ,Potasium and Protein Content in Grain were recorded by F1 and it was significantly superior over F4 Under biofertilizer treatment maximum nitrogen Potasium and Protein Content in Grain recorded with BF3 which was statistically at par with BF2 but significantly superior over BF1.

Table 1: **Nitrogen (%), Phosphorus (%), Potasium (%) and Protein (%) Content in Grain** (Pooled)

Facters	Treatments	**N content (%) in grain**	**P content (%) in grain**	**K content (%) in grain**	**Protein content (%) in grain**
A	Fertilizers				
	F1	3.81	0.47	0.80	23.80
	F2	3.76	0.46	0.80	23.50
	F3	3.30	0.41	0.68	20.60
	F4	3.08	0.36	0.61	19.25
	SEm±	**0.02**	**0.00**	**0.00**	**0.11**
	C.D. at 0.05	**0.05**	**0.01**	**0.01**	**0.33**
	CV: F (%)	**2.47**	**3.63**	**2.49**	**2.47**
B	Biofertilizers				
	BF1	3.35	0.41	0.71	20.97
	BF2	3.44	0.41	0.71	21.50
	BF3	3.66	0.46	0.75	22.89
	SEm±	**0.01**	**0.00**	**0.00**	**0.06**
	C.D. at 0.05	**0.03**	**0.01**	**0.01**	**0.16**
	CV: BF (%)	**1.46**	**2.56**	**1.55**	**1.46**

3.2.**Total NPK Uptake and Protein yield by grain (kg/ha)**

The data pertaining to average value of nitrogen uptake have been given in Table2..A cursory glance over the Table 2 obviously revealed that the nitrogen uptake was significantly influenced by RDF and bio-fertilizer treatment during 2019-20 and 2020-21. The maximum nitrogen ,Phosphorus,Potassium uptake and Protein yield in grain were recorded by F1 and it were significantly superior over F4 while statistically on par with F2 and F3 ,Hence both treatments were not significantly different. Under biofertilizer treatment maximum nitrogen, Phosphorus,Potassium uptake(kg/ha) and Protein yield in grainrecorded with BF3 whichwas statistically at par with BF2 but significantly superior over BF1.

Table 2: **Nitrogen (Kg./ha), Phosphorus (Kg./ha), Potasium (Kg./ha) Content Uptake and Protein Yield (Kg./ha) by Grain(Pooled)**

Facters	Treatments	**N content (Kg./ha)**	**P content (Kg./ha)**	**K content (Kg./ha)**	**Protein Yield (Kg./ha)**
A	Fertilizers				
	F1	78.29	9.69	16.46	489.32
	F2	74.71	9.21	15.82	466.93
	F3	54.08	6.74	11.23	338.02
	F4	40.67	4.78	8.05	254.22
	SEm±	**0.98**	**0.14**	**0.19**	**6.09**
	C.D. at 0.05	**2.90**	**0.43**	**0.57**	**18.11**
	CV: F (%)	**7.71**	**9.33**	**7.23**	**7.71**
B	Biofertilizers				
	BF1	57.04	6.95	12.03	356.51
	BF2	59.93	7.10	12.50	374.57
	BF3	68.85	8.76	14.14	430.29
	SEm±	**0.72**	**0.09**	**0.15**	**4.48**
	C.D. at 0.05	**2.04**	**0.25**	**0.44**	**12.73**
	CV: BF (%)	**6.54**	**6.61**	**6.77**	**6.54**

Conclusion

On the basis of present investigation, it may be concluded that: the application of 100%NPK (F1) and FYM (7.5t ha^{-1}) + Azospirillum (5 kg ha^{-1}) + PSB (5 kg ha^{-1})

givenmaximum percentage of nitrogen, phosphorus , potassium and Protein content in grain , as well as maximum Nitrogen, Phosphorus , Potasium Uptake and Protein Yield by grain.

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