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Effect of integrated nutrient management on growth, yield and seed quality of chickpea (*Cicer arietinum* L.) under rainfed condition

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Abstract
A field experiment was conducted at the Kargua Agricultural Research Farm Institute of Agricultural Sciences, Bundelkhand University, Jhansi during Rabi 2015-16, to study the effect of integrated nutrient management on growth, yield and seed quality of chickpea (*Cicer arietinum* L.) under rainfed condition. Experimental results revealed that the treatment combination T_7 showed significantly highest plant height (87.50cm.), number of pods plant^{-1} (49.30), number of seeds pod^{-1} (1.57), number of seeds plant^{-1} (55.60), seed yield plant^{-1} (9.45 g.), seed yield (22.01 kg ha^{-1}), 100 seed weight (19.30), germination percentage (93.50%), root length (10.97cm), shoot length (4.78cm.) and seed vigour index (1472.63), respectively over rest of the treatments combination, while treatment T_1 showed poor performance in this regard.

Keywords: Chickpea, PSB, FYM, organic sources, RDF

Introduction
Chickpea (*Cicer arietinum* L.) is an important pulse crop grown in tropical, subtropical and temperate regions of the world. It is world's third most important pulse crop after beans and peas with India accounting for approximately 65% of area and 64% of production of the world (F.A.O 1993, F.A.O. 2008) [5, 6]. It is the main source of dietary protein for the majority of Indians. The basic concept of integrated nutrient management is the supply of the required plant nutrients for sustaining the desired crop productivity with minimum deleterious effect on soil health environment (Balasubramanian, 1999) [3]. Organic manures, on the other side provide a good substrate for the growth of micro-organisms and maintain a favourable nutrient supply environment and improve soil physical properties. Biofertilizers that live within the root zone promote plant growth and nutrient uptake by releasing auxins and gibberellins hormones to plants (Kumar *et al.*, 2009) [7]. Pulse crops have unique properties of nodulation through *Rhizobium* bacteria. *Rhizobium* bacteria absorbed atmospheric nitrogen about 80-90% of the total nitrogen requirements of legumes (Verma, 1993) [12]. Phosphate solubilising bacteria like *Pseudomonas, Microbacterium, Pantoea* play a vital role in P solubilisation by producing organic acids (Singh *et. al.* 2008), produce growth-promoting substances (kumar *et.al.* 2009) [7], and increase the overall phosphate use efficiency of the crops.

Material and methods
A field experiment was conducted at kargua Agricultural research farm Institute of Agricultural Science, Bundelkhand University, Jhansi during Rabi 2015-16, to evaluate the effect of integrated nutrient management on growth, yield and seed quality of chickpea (*Cicer arietinum* L.) under rainfed condition. The soil of experimental plots was red soil, (pH 7.3), low in organic carbon (0.52%), available nitrogen (162.3 kg ha^{-1}), available phosphorus (18.5 kg P_2O_5 ha^{-1}) and medium in available potassium (200.3 kg K_2O ha^{-1}) content. The experiment was carried out in randomized block design with three replications, assigning 7 treatments consisting T_1- (Control), T_2- (100 % RDF), T_3-(FYM 5t ha^{-1}), T_4- (PSB), T_5- (100% RDF+ FYM 2.5t ha^{-1}), T_6-(100% RDF+ PSB) and T_7- (100% RDF+ FYM 2.5t ha^{-1} +PSB).The recommended doses of NPK were applied basal as per treatments. FYM was incorporated as per treatments and phosphate solubilising bacteria applied through soil application. The gram variety JG-16 was sown on 16th October 2015 at 30 cm row to row spacing by using recommended seed rate of 100 kg ha^{-1}. All the agronomic practices were adopted as per need of the crop. For recording data of different character *viz.* growth character (plant height), yield contributing characters (number of pods plant^{-1}, number of seed pods^{-1}, number of seeds plant^{-1},

seed yield plant^{-1}, seed yield kg ha^{-1} and 100 seed weight), seed quality parameters namely (germination percentage, root length, were recorded as per schedule. Statistical analysis was based on the method analysis of variance as suggested by Panse and Sukhatme (1967) [6] and the standard error difference was computed by at 5 % and 1 % level of significance.

Result and Discussion

The recorded data (Table-1) indicated that the growth parameters of chickpea *viz.* plant height, number of pod, number of seed pod^{-1} showed significantly results with the treatment. The maximum plant height (87.50 cm) was recorded in treatment T_7, followed by treatments T_2 (84.60 cm), T_5 (83.50 cm), T_6 (79.40 cm), T_3 (78.40 cm), and T_4 (74.30 cm). The lowest plant height (53.50 cm) was recorded in control (T_1). The maximum number of pods plant^{-1} (49.30) was reported in T_7 (100% RDF+ FYM 2.5t ha^{-1}+PSB), which was significantly superior over T_2, T_5, T_6, T_3, and T_4 having 48.30, 44.70, 42.50, 39.20, and 35.60, respectively. While, Minimum number of pods plant^{-1} (31.50) was noted in T_1 (control) which produced significant effects with all other treatments under study. The maximum number of seeds pods^{-1} (1.57) were recorded in treatment T_7 (100% RDF+ FYM 2.5t ha^{-1} +PSB), whereas minimum values of number of seeds per pods (1.42) were recorded under the control plot. The maximum number of seeds per plant (55.60) was recorded in T_7 (100% RDF+ FYM 2.5t ha^{-1} +PSB), which was significantly superior over T_2, T_5, T_6, T_3, and T_4 having 52.14, 47.30, 45.20, 43.40, and 41.50 number of seeds plant^{-1} respectively. All these treatments were statistically at par with each other. Minimum number of seeds plant^{-1} (32.12) was recorded in treatment T_1 (control) which showed significant differences with all other treatments. The maximum seed yield plant^{-1} (9.45g), seed yield (22.01q ha^{-1}) and 100 seed weight (19.3g) were recorded in treatment T_7(100% RDF+ FYM 2.5t ha^{-1} +PSB), followed by T_2(9.15g, 21.30q ha^{-1} and 18.15g), T_5(9.01g, 20.40q ha^{-1} and 17.90g), T_6(8.76g, 19.80q ha^{-1} and 17.80g), T_3(8.34g, 17.80q ha^{-1} and 17.40g), and T_4(7.56g, 16.06q ha^{-1} and 17.3g). All the treatments were statistically at par to each other and minimum seed yield^{-1} and ha^{-1} (5.51g, 15.70q ha^{-1} and 17.02g) was recorded in T_1 (control). It might be due to positive effect of organic manures, microorganism by increasing the nodulation resulted higher fixation of atmospheric nitrogen and ultimately increased the growth characters. The similar findings were also reported by Abdul *et al*., (2008) [1].

The statistical analysis of data showed significant differences among different treatments for seed germination, root length, shoot length. The maximum seed germination (93.50%) was recorded in treatment T_7 (100% RDF+ FYM 2.5t ha^{-1} +PSB), followed by T_2 (91.43%), T_5 (90.20%), T_6 (88.30%), T_3 (87.50%), and T_4 (86.70%). All the treatments were statistically at par with each other and minimum seed germination (85.10%) was recorded in T_1 (control). Seed germination is a test indicating the capability of the seed to produce normal seedlings under ambient conditions. It may be due to NPK provides optimum availability of nutrients at all stages and thus gave bold, good quality and vigorous seeds resulting ultimately in maximum germination. Phosphate solubilising microbes are beneficial in seed germination as well as in increasing radicle and plumule length by releasing of growth promoting substances. It may be due to increase in availability of nutrient by Bio-fertilizer, resulted better growth and yield attribute the similar results was also reported by Ashoka *et al*., (2008) [2] Sharma *et al*., (2007) [9, 10]. The maximum root length (10.97cm) and shoot length (4.78 cm) were recorded in treatment T_7 (100% RDF+ FYM 2.5t ha^{-1} +PSB), whereas minimum values of root length (7.56 cm) and shoot length (3.56 cm) were recorded under the control plot. The maximum seed vigour index (1472.63) was recorded in treatment T_7 (100% RDF+ FYM 2.5t ha^{-1} +PSB), followed by T_2 (1337.29), T_5 (1201.46), T_6 (1139.95), T_3 (1085.00), and T_4 (1043.87). The minimum seed vigour index (946.31) was recorded in T_1 (control). The increased in root length, shoot length might be due to more uptake of nutrient with combine application of nutrient sources. The results are also supported by Tewar *et al.* (1996) [11] and Abdul *et al*., (2008) [1], Kumar, *et al*., (2018) [8].

Table 1: Effect of Integrated Nutrient Management on growth, yield and seed quality of chickpea under rainfed condition

Treatment	Plant height (cm.)	Number of pods plant^{-1}	Number of seeds pod^{-1}	Number of seeds plant^{-1}	Seed yield plan^{-t-1} (g)	Seed yield (q ha^{-1})	100 seed weight	Germination (%)	Root length (cm)	Shoot length (cm)	Seed vigour index
T_1	53.50	31.50	1.42	32.12	5.51	15.70	17.02	85.10 (67.29)	7.56	3.56	946.31
T_2	84.60	48.30	1.53	52.14	9.15	21.30	18.15	91.43 (71.66)	9.82	4.70	1337.29
T_3	78.40	39.20	1.47	43.40	8.34	17.80	17.4	87.50 (69.30)	8.75	3.65	1085.00
T_4	74.30	35.60	1.44	41.50	7.56	16.06	17.3	86.70 (68.53)	8.43	3.61	1043.87
T_5	83.50	44.70	1.52	47.30	9.01	20.40	17.9	90.20 (71.76)	9.30	4.02	1201.46
T_6	79.40	42.50	1.50	45.20	8.76	19.80	17.8	88.30 (70.00)	8.95	3.96	1139.95
T_7	87.50	49.30	1.57	55.60	9.45	22.01	19.3	93.50 (75.33)	10.97	4.78	1472.63
S.Em±	1.94	1.49	0.03	1.23	0.51	0.99	0.16	0.94	0.28	0.15	22.74
CD at 5%	5.96	4.60	0.08	3.79	1.57	3.04	0.50	2.86	0.83	0.46	68.98

*T_1- (Control), T_2- (100 % RDF), T_3-(FYM 5t/ha), T_4- (PSB), T_5- (100% RDF+ FYM 2.5t/ha), T_6-(100% RDF+ PSB) and T_7- (100% RDF+ FYM 2.5t/ha +PSB)

References

1. Abdul Baser, Zanier Shat, Muhammad Naeem, Fehan Bakht, Hfan ZH. Effect of phos pharos and farm yard manure an agronomic trait of chickpea. Journal of Agriculture. 2008; 24(4):567-572.
2. Ashoka P, Mudalagiri Yappa M, Pufari Hugar PS, Besai BK. Effect of Micro Nutrients with or without Organic Manures on Yield of Baby Car (*Zea mays* L.) chickpea (*Cicer arietinum* L). Karnataka Journal of Agricultural sciences. 2008; 21(4):485-487.
3. Balasubramanian V. Managing soil quality for sustainable rice production. Tamilnadu Rice Research Institute, Anuthrai, 1999, 11-24.
4. FAO. Tapes about statistics of food crops. Food and Agriculture organization, Rome, Italy, 2008.
5. FAO. Tapes about statistics of food crops. Food and Agriculture organization, Rome, Italy, 1993, 105-15.

6. Panse GV, Sukhatme VP, Statistical Methods for Agric. Worker, Indian Council of Agricultural Research, New Delhi, 1976.
7. Kumar GS, Lenin M, Thamizhiniyan P, Ravimycin T. Response of biofertilizers on the growth and yield of blackgram (*Vigna mungo* L.). Recent Res. Sci. Tech. 2009; 1:169-175.
8. Kumar H, Yadav DD, Saquib M, Chahal VP, Yadav R, Yadav OS. Effect of integrated nutrient management (INM) on productivity and profitability of chickpea. Int. J Chem. Studies. 2018; 6(6):1672-1674.
9. Sharma K, Dak G, Agrawal A, Bhatnagar M, Sharma R. Effect of phosphate solubilising bacteria on germination of Cicer arietinum seeds and seedling growth. Journal of Herbal Medicine and Toxicology. 2007; 1(1):61-63.
10. Sharma K, Dak G, Agrawal A, Bhatnagar M, Sharma R. Effect of phosphate solubilising bacteria on germination of Cicer arietinum seeds and seedling growth. Journal of Herbal Medicine and Toxicology. 2007; 1(1):61-63.
11. Tewari O, Pandey S. Tripathi RS. Effect of planting date, irrigatiov and phosphorus on chickpea (*Aicer arietinum* L.) Grownon Clay Loam Soil, Mdion. Journal of Agronomy. 1996; 30(4):504.
12. Verma LN. Biofertiliser in agriculture. In: Organics in Soil Health and Crop Production. Peekay Tree Crops Development Foundation, Cochin, India, 1993, 152-183.