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Research Article

EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON GROWTH AND YIELD OF CHICKPEA UNDER NORTH SAURASHTRA REGION

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Abstract: A field experiment was conducted at Main Dry Farming Research Station, Junagadh Agricultural University, Targhadia during the *Rabi* season, 2015-16 to 2018-2019. The results revealed that ten treatments combination evaluated on growth parameters *i.e*., root length, no. of root nodules, plant height, no. of branches and no. of one seeded pods, mature pods, seedless pods, damage pods, total pods per plant and yield parameters of chickpea were obtained higher due to application of 50 % RDF + 10 kg K_2O ha^{-1} + 5 kg S ha^{-1} + 500 kg vermi compost ha^{-1} (T_7). The significantly higher pod yield (3499 kg ha^{-1}) and seed yield (2750 kg ha^{-1}), straw yield (2336 kg/ha) and biological yield (5850 kg ha^{-1}) were recorded due to application of 50 % RDF + 10 kg K_2O ha^{-1} + 5 kg S ha^{-1} + 500 kg vermi compost ha^{-1} (T_7).

Keywords: *Integrated Nutrient Management, Growth, yield and Chickpea*

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Introduction

Chickpea is a crucial winter pulse crop grown in Gujarat. In Gujarat, chickpea occupied an area of 2.15 lakh hectares with a production of 2.10 lakh tones and average productivity of 977 kg ha^{-1}, accounts 2.46% and 2.80% area and production of country, respectively [1-3].

Nitrogen (N) deficiency is often a significant limiting factor for high yielding crops all over the world [4,5]. The most important role of N in the plant is its presence in the structure of protein and nucleic acids which are the most important building and information substances of every cell. In addition, N is additionally also found in chlorophyll that enables the plant to transfer energy from sunlight by photosynthesis. Thus, the supply of N to the plant will influence the amount of protein, amino acids, protoplasm and chlorophyll formed. Consequently, it influences cell size, leaf area and photosynthetic activity [6-9]. Therefore, adequate supply of N is necessary to achieve high yield potential in crops. In general, N deficiency causes a reduction in growth rate, general chlorosis, often accompanied by early senescence of older leaves, and reduced yield [10]. Mckenzie and Hill (1995) [11] studied the effects of two levels of N applications (0 and 50 kg N ha^{-1}) on chickpea and reported that the increase of N rate from 0 to 50 kg N ha^{-1} significantly enhanced seed and dry matter yield, harvest index, number of pods per plant and 1 000 seed weight. Walley *et al*. (2005) investigated chickpea response to starter N (0, 15, 30 and 45 kg N ha^{-1}) and stated that the application of 45 kg N ha^{-1} enhanced seed yield by as much as 221 kg ha^{-1} over control. Alam and Haider (2006) studied the effects of N fertilizer on growth attributes of barley and found that total dry matter (TDM), leaf area index (LAI), crop growth rate (CGR) and net assimilation rate (NAR) increased due to N fertilization. Kibe *et al.* (2006) in wheat and Yasari and Patwardhan (2006) [12] in rapeseed concluded the same results about these growth indices. Amany (2007) [13] reported that urea foliar application had a significant impact on plant height, number of branches, pods and seeds per plant, TDM, seed yield and harvest index in chickpea. Walley *et al*. (2005) investigated chickpea response to starter N (0, 15, 30 and 45 kg N ha^{-1}) and stated that the application of 45 kg N ha^{-1} enhanced seed yield by the maximum amount as 221 kg ha^{-1} over control.

Nutrient supply is a key factor in crop production but the global crises of energy and due to escalation in the price of chemical fertilizers; a greater emphasis has to be laid on supplementing the chemical fertilizers with low priced sources of nutrients such as organics and bio fertilizers. Application of organic materials along with inorganic and bio-fertilizers into soil leads increase in productivity of the system and also sustained the soil health for longer period. But, at present, farmers are applying more and more chemical fertilizers for getting higher yield. Under such a situation, it is essential to evolve and adopt a method of integrated nutrient management by employing a judicious combination of chemical fertilizers and organic manures and bio-fertilizers which can not only increase production but also improve soil health for sustaining the productivity. The experiment was, therefore conducted to review the effect of integrated nutrient management on productivity of chickpea, growth, yield, quality, nutrient uptake and fertility status under North Saurashtra region.

Materials and Method

The experiment was conducted at Main Dry Farming Research Station, Junagadh Agricultural University, Targhadia during the *Rabi* season for four consecutive years (2015-16 to 2018-2019. The soil of the experiment was clayey in texture, having pH. Each treatment was replicated three times in randomized block design with the plot size of a) Gross: 5.0 m X 3.6 m and Net: 4.5 m X 2.4 m. The spacing and seed rate of chickpea were 45 cm x 10 cm and 60 kg/ha kg/ha respectively. The experiment includes total ten treatments are as under

Result and Discussion

The pooled data presented in [Table-1] indicated that significantly higher root length per plant(16.3 cm) were recorded at 75 DAS and (17.0 cm) at maturity under T_7 (50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}) which was statistically at par with T9 (50 % RDF + 500 kg vermin-compost ha^{-1} + *Rhizobium* and PSB each of 1 l ha^{-1}) and T_6 (50 % RDF+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1})

Table-1 *Effect of integrated nutrient management practices on growth parameters of chickpea*

Tr. No.	Treatment	Pooled Results (Four years)			
		Root length (cm)		No. of Root Nodules/ plant	
		At 75 DAS	At maturity	At 75 DAS	At maturity
T_1	RDF (20-40 N-P_2O_5 kg ha^{-1})	13.1	13.6	13.0	13.4
T_2	RDF + 20 kg K_2O ha^{-1}	14.3	14.5	13.4	14.0
T_3	RDF + 10 kg S ha^{-1}	14.7	15.1	14.1	14.5
T_4	RDF + 20 kg K_2O ha^{-1}+10 kg S ha^{-1}	14.7	15.2	14.8	15.2
T_5	50 % RDF + 10 kg K_2O ha^{-1}+500 kg vermi-compost ha^{-1}	14.9	15.3	14.7	15.1
T_6	50 % RDF+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}	15.5	15.9	15.7	15.8
T_7	50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}	16.3	17.0	16.2	16.6
T_8	50 % RDF + *Rhizobium* and PSB each of 1 l ha^{-1}	14.2	14.7	18.1	18.5
T_9	50 % RDF + 500 kg vermi-compost ha^{-1} + *Rhizobium* and PSB each of 1 l ha^{-1}	15.7	16.0	18.7	19.3
T_{10}	1 t Vermi-compost ha^{-1} + *Rhizobium* and PSB each of 1 l ha^{-1}	14.2	14.7	17.6	18.2
	S Em±	0.4	0.4	0.2	0.3
	CD at 5%	1.1	1.2	0.7	0.7
	CV%	12.9	13.5	12.2	13.4
		Y	YxT	Y	YxT	Y	YxT	Y	YxT
	S Em±	0.2	1.1	0.3	1.2	0.15	1.10	0.2	1.2
	CD at 5%	0.7	3.1	0.8	3.4	0.44	3.10	0.5	3.5

Table-2 *Effect of integrated nutrient management practices on growth parameters of chickpea*

Tr. No.	Treatment	Pooled Results of Four years			
		Plant height (cm)		No. of branches/ plant	
		At 75 DAS	At maturity	At 75 DAS	At maturity
T_1	RDF (20-40 N-P_2O_5 kg ha^{-1})	44.2	45.0	4.6	4.9
T_2	RDF + 20 kg K_2O ha^{-1}	45.4	46.6	5.3	5.5
T_3	RDF + 10 kg S ha^{-1}	47.5	48.4	5.8	6.1
T_4	RDF + 20 kg K_2O ha^{-1}+10 kg S ha^{-1}	48.8	50.1	6.4	7.0
T_5	50 % RDF + 10 kg K_2O ha^{-1}+500 kg vermi-compost ha^{-1}	48.4	49.3	6.2	6.7
T_6	50 % RDF+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}	51.8	53.5	7.2	7.6
T_7	50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}	52.3	53.7	7.4	7.8
T_8	50 % RDF + *Rhizobium* and PSB each of 1 l ha^{-1}	45.2	46.2	5.2	5.5
T_9	50 % RDF + 500 kg vermi-compost ha^{-1} + *Rhizobium and* PSB each of 1 l ha^{-1}	47.8	49.1	6.0	6.4
T_{10}	1 t Vermi-compost ha^{-1} + *Rhizobium* and PSB each of 1 l ha^{-1}	44.2	45.1	4.7	5.0
	S Em±	0.5	0.4	0.2	0.2
	CD at 5%	1.3	1.3	0.5	0.4
	CV%	6.3	6.9	14.8	14.2
		Y	YxT	Y	YxT	Y	YxT	Y	YxT
	S Em±	0.29	1.72	0.3	1.9	0.10	0.50	0.10	0.51
	CD at 5%	0.85	4.84	0.8	5.5	0.29	1.41	0.28	1.45

Table-3 *Effect of integrated nutrient management practices on yield attributes of Chickpea*

Tr. No.	Treatment	Pooled Results of Four years			
		No. of One seeded pods / plant		No. of mature pods/ plant	
		At 75 DAS	At maturity	At 75 DAS	At maturity
T_1	RDF (20-40 N-P_2O_5 kg ha^{-1})	8.5	10.7	4.3	23.2
T_2	RDF + 20 kg K_2O ha^{-1}	8.0	9.9	5.1	26.5
T_3	RDF + 10 kg S ha^{-1}	8.0	9.9	5.4	29.2
T_4	RDF + 20 kg K_2O ha^{-1}+10 kg S ha^{-1}	7.7	9.8	8.3	33.8
T_5	50 % RDF + 10 kg K_2O ha^{-1}+500 kg vermi-compost ha^{-1}	7.7	10.0	7.1	33.3
T_6	50 % RDF+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}	8.8	10.8	9.0	36.1
T_7	50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}	9.2	11.0	9.0	37.5
T_8	50 % RDF + *Rhizobium* and PSB each of 1 l ha^{-1}	6.8	8.9	5.1	27.8
T_9	50 % RDF + 500 kg vermi-compost ha^{-1} + *Rhizobium and* PSB each of 1 l ha^{-1}	8.4	11.0	6.9	31.5
T_{10}	1 t Vermi-compost ha^{-1} + *Rhizobium* and PSB each of 1 l ha^{-1}	8.4	10.6	5.0	24.9
	S Em±	0.7	0.8	0.6	1.2
	CD at 5%	1.9	2.4	1.8	3.5
	CV%	15.0	15.0	16.2	14.5
		Y	YxT	Y	YxT	Y	YxT	Y	YxT
	S Em±	0.42	0.71	0.5	0.9	0.40	0.61	0.8	2.5
	CD at 5%	1.23	1.99	1.5	2.5	1.16	1.72	2.2	7.2

Significantly the higher value of root nodules per plant (18.7) was observed at 75 DAS under T9 which remained statistically at par with T8 (50 % RDF + *Rhizobium* and PSB each of 1 l ha^{-1}), whereas, root nodules per plant (19.3) at maturity was recorded under T9 which remained significantly the superior over rest of the treatments. The pooled results presented in [Table-2] indicated that plant height (52.3 cm) of chickpea remained significantly higher at 75 DAS and 53.7 cm at maturity under T_7 (50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}) which remained statistically at par with T_6 (50 % RDF+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}).

The pooled results presented in [Table-2] indicated that number of branches per plant at 75 DAS (7.4) remained significantly higher under T_7 (50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermin-compost ha^{-1}), which remained statistically at par with T_6 (50 % RDF+ 5 kg S ha^{-1}+ 500 kg vermin-compost ha^{-1}), while significantly higher (7.8) was recorded at maturity under T_7 which was statistically at par with T_6 (50 % RDF+ 5 kg S ha^{-1}+ 500 kg vermi-compost) and T_4 (RDF + 20 kg K_2O ha^{-1}+10 kg S ha^{-1}). From [Table-1] & [Table-2], It can be concluded that the application of T_7 (50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi compost ha^{-1}), recorded maximum plant height, number of branches/plant, number root

Table-4 *Effect of integrated nutrient management practices on yield attributes of chickpea*

Tr. No.	Treatment	Pooled Results of Four years							
		No. of seedless pods / plant				No. of damage pods/ plant			
		At 75 DAS		At maturity		At 75 DAS		At maturity	
T_1	RDF (20-40 N-P_2O_5 kg ha^{-1})	6.1		6.8		1.7		2.35	
T_2	RDF + 20 kg K_2O ha^{-1}	5.4		6.5		1.7		1.95	
T_3	RDF + 10 kg S ha^{-1}	4.9		5.6		1.6		1.81	
T_4	RDF + 20 kg K_2O ha^{-1}+10 kg S ha^{-1}	4.5		5.1		1.3		1.43	
T_5	50 % RDF + 10 kg K_2O ha^{-1}+500 kg vermi-compost ha^{-1}	4.8		5.2		1.5		1.68	
T_6	50 % RDF+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}	4.0		4.7		1.3		1.46	
T_7	50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}	3.6		4.6		1.0		1.46	
T_8	50 % RDF + *Rhizobium* and PSB each of 1 l ha^{-1}	5.7		6.3		1.7		1.89	
T_9	50 % RDF + 500 kg vermi-compost ha^{-1} + *Rhizobium* and PSB each of 1 l ha^{-1}	4.7		5.6		1.4		1.83	
T_{10}	1 t Vermi-compost ha^{-1} + *Rhizobium* and PSB each of 1 l ha^{-1}	5.8		6.8		1.6		2.12	
	S Em±	0.2		0.3		0.1		0.08	
	CD at 5%	0.6		0.7		0.3		0.23	
	CV%	14.6		18.2		16.7		15.1	
		Y	YxT	Y	YxT	Y	YxT	Y	YxT
	S Em±	0.14	0.41	0.2	0.6	0.07	0.14	0.05	0.16
	CD at 5%	0.41	1.17	0.5	1.7	0.19	0.40	0.15	0.44

Table-5 *Effect of integrated nutrient management practices on yield attributes of chickpea*

Tr. No.	Treatment	Pooled Results of Four years			
		No. of total pods / plant			
		At 75 DAS		At maturity	
T_1	RDF (20-40 N-P_2O_5 kg ha^{-1})	41.2		46.0	
T_2	RDF + 20 kg K_2O ha^{-1}	43.9		48.4	
T_3	RDF + 10 kg S ha^{-1}	45.7		50.2	
T_4	RDF + 20 kg K_2O ha^{-1}+10 kg S ha^{-1}	50.6		54.4	
T_5	50 % RDF + 10 kg K_2O ha^{-1}+500 kg vermi-compost ha^{-1}	48.3		54.3	
T_6	50 % RDF+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}	53.6		57.9	
T_7	50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}	54.8		59.5	
T_8	50 % RDF + *Rhizobium* and PSB each of 1 l ha^{-1}	42.8		48.4	
T_9	50 % RDF + 500 kg vermi-compost ha^{-1} + *Rhizobium and* PSB each of 1 l ha^{-1}	48.0		54.6	
T_{10}	1 t Vermi-compost ha^{-1} + *Rhizobium* and PSB each of 1 l ha^{-1}	43.0		47.9	
	S Em±	0.9		1.2	
	CD at 5%	2.7		3.4	
	CV%	10.5		10.5	
		Y	YxT	Y	YxT
	S Em±	0.58	2.86	0.74	3.17
	CD at 5%	1.70	8.06	2.14	8.95

Table-6 *Effect of integrated nutrient management practices on yield of chickpea*

Tr. No.	Treatment	Pooled Results of Four years							
		Pod yield (kg/ha)		Seed yield (kg/ha)		Straw yield (kg/ha)		Biological yield (kg/ha)	
T_1	RDF (20-40 N-P_2O_5 kg ha^{-1})	2450		1840		1716		4138	
T_2	RDF + 20 kg K_2O ha^{-1}	2627		2004		1830		4494	
T_3	RDF + 10 kg S ha^{-1}	2952		2289		1960		4987	
T_4	RDF + 20 kg K_2O ha^{-1}+10 kg S ha^{-1}	3119		2493		2213		5314	
T_5	50 % RDF + 10 kg K_2O ha^{-1}+500 kg vermi compost ha^{-1}	3012		2357		2131		5096	
T_6	50 % RDF+ 5 kg S ha^{-1}+ 500 kg vermi compost ha^{-1}	3410		2627		2305		5686	
T_7	50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}	3499		2750		2336		5850	
T_8	50 % RDF + *Rhizobium* and PSB each of 1 l ha^{-1}	2604		2034		1773		4415	
T_9	50 % RDF + 500 kg vermi-compost ha^{-1} + *Rhizobium and* PSB each of 1 l ha^{-1}	3006		2343		2023		5128	
T_{10}	1 t Vermi compost ha^{-1} + *Rhizobium* and PSB each of 1 l ha^{-1}	2573		1944		1712		4296	
	S Em±	87		72		43		116	
	CD at 5%	254		209		126		338	
	CV%	13.0		14.0		13.8		10.6	
		Y	YxT	Y	YxT	Y	YxT	Y	YxT
	S Em±	55	220	46	183	27	159	74	301
	CD at 5%	160	661	132	517	79	448	214	850

nodule per plant significantly superior. The higher values of these growth parameters with this fertility level might be due to supply of all the essential mineral nutrients in a balanced amount. These results were in conformity with the findings of Choudhary *et al* (2011) [14] and Tiwari *et al* (2011) [15]. The maximum pooled values [Table-3] of number of one seeded pods per plant (9.2 at 75 DAS and 11.0 at maturity), number of mature pods per plant (9.0 at 75 DAS and 37.5 at maturity) were observed in T_7 (50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}). The minimum number [Table-4] of seedless pods per plant (3.6 at 75 DAS and 4.6 at maturity) and number of damage pods/plant (1.0) was observed in T_7 (50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermin-compost ha^{-1}). Whereas, at maturity the minimum number of damage pods (1.43) was observed in treatment T_4 (RDF + 20 kg K_2O ha^{-1}+10 kg S ha^{-1}). The pooled results presented in [Table-5] indicated that number of total pods per plant (54.8) at 75 DAS and (59.5) at maturity remained significantly higher under T_7 (50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermin-compost ha^{-1}) which was statistically at par with T_6 (50 % RDF+ 5 kg S ha·+ 500 kg vermin-compost ha^{-1}.

a) *Treatment: Total 10 Treatment combinations*

Treatment No.	Treatment Combinations
T_1	RDF (20-40 kg N-P_2O_5 ha^{-1})
T_2	RDF + 20 K_2O ha^{-1} (Muriate of potash)
T_3	RDF + 10 kg S ha^{-1} through betonies clay (elemental S),
T_4	RDF + 20 kg K_2O ha^{-1}+ 10 kg S,
T_5	50 % RDF + 10 kg K_2O ha^{-1} + 500 kg vermi compost ha^{-1}
T_6	50 % RDF+ 5 kg S ha^{-1} + 500 kg vermi compost ha^{-1}
T_7	50 % RDF + 10 K_2O ha^{-1}+ 5 kg S+ 500 kg vermi compost ha^{-1}
T_8	50 % RDF + *Rhizobium* and PSB each of 1 L ha^{-1}
T_9	50 % RDF + 500 kg vermi compost ha^{-1} + *Rhizobium* and PSB each of 1 L ha^{-1}
T_{10}	1 tone Vermi compost ha^{-1} + *Rhizobium* and PSB each of 1 L ha^{-1}

b) *Observation recorded*

SrNo	Observation to be recorded
1	Root length (cm) at 75 DAS and maturity,
2	No. of Root nodules/plant at 75 DAS and maturity
3	Plant height (cm) at 75 DAS and maturity,
4	No. of branches/plant at 75 DAS and maturity
5	No. of one seeded pods/plant at 75 DAS and maturity
6	No. of mature pods/plant at 75 DAS and maturity
7	No. of seedless pods/plant at 75 DAS and maturity
8	No. of damage pods/plant at 75 DAS and maturity
9	Yields

The pooled result presented in [Table-6] revealed that significantly higher pod yield (3499 kg ha^{-1}) and seed yield (2750 kg ha^{-1}) were recorded due to application of 50 % RDF + 10 kg K_2O ha^{-1} + 5 kg S ha^{-1} + 500 kg vermi compost ha^{-1} (T_7), which was statistically at par with T_6 (50 % RDF+ 5 kg S ha·+ 500 kg vermi compost ha^{-1}) and significantly higher straw yield (2336 kg/ha) was obtained due to application of 50 % RDF + 10 kg K_2O ha^{-1} + 5 kg S ha^{-1} + 500 kg vermin compost ha^{-1} (T_7) which was statistically at par with T_6 and T_4, whereas biological yield (5850 kg ha^{-1}) was recorded due to application of 50 % RDF + 10 kg K_2O ha^{-1} + 5 kg S ha^{-1} + 500 kg vermi compost ha^{-1} (T_7) which was statistically at par with T_6 (50 % RDF+ 5 kg S ha·+ 500 kg vermi compost ha^{-1}). The similar result is also found that the yield of Vermi compost, goat manure and fertilizers recorded higher compared to rest of fertilizer treatment followed by vermi compost with fertilizers [16]. These findings are also in agreement with those of Das *et al*. (2015) [17] and Kumari *et al*. (2017) [18], they were reported that the highest grain and stover yield of soybean with INM.

Conclusion

The pooled data results on growth parameters of chickpea for four years (*Rabi* 2016-2019) revealed that root length (16.3 cm and 17.0 cm), no. of root nodules per plant (18.7 and 19.3) were found significantly higher at 75 DAS and at maturity in the treatment of T_7 (50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi compost ha^{-1}) and Similarly results also observed in plant height (52.3 cm and 53,7 cm), number of branches per plant (7.4 and 7.8) and T_7 was found best in number of one seeded pods per plant (9.2 and 11.0) but same result was also obtained from the treatment of T9 (50 % RDF + 500 kg vermi-compost ha^{-1} + *Rhizobium* and PSB each of 1 l ha^{-1}) at maturity and number of mature pods per plant (9.0 and 37.5) were seen at 75 DAS and at maturity in the treatment of T_7 (50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi-compost ha^{-1}) but same result was also recorded from the treatment of T_6 (50 % RDF+ 5 kg S ha·+ 500 kg vermi-compost ha^{-1}) at 75 DAS.

Number of seedless pods per plant (3.6 and 4.6) was found maximum in the treatment of T_7 (50 % RDF + 10 kg K_2O ha^{-1}+ 5 kg S ha^{-1}+ 500 kg vermi compost ha^{-1}) at 75 DAS and at maturity and also number of damage pods per plant (1.0) was found similarly at 75 DAS but maximum value (1.43) observed in the treatment RDF + 20 kg K_2O ha^{-1}+10 kg S ha^{-1} (T_4), no. of total pods per plant (54.8 and 59.6) at 75 DAS and at maturity were found significantly higher at T_7 due to different integrated nutrient management practices.

Application of research: The significantly higher pod yield (3499 kg ha^{-1}) and seed yield (2750 kg ha^{-1}) were recorded due to application of 50 % RDF + 10 kg K_2O ha^{-1} + 5 kg S ha^{-1} + 500 kg vermi compost ha^{-1} (T_7), and also significantly higher straw yield (2336 kg/ha) and biological yield (5850 kg ha^{-1}) were obtained due to application of 50 % RDF + 10 kg K_2O ha^{-1} + 5 kg S ha^{-1} + 500 kg vermi compost ha^{-1} (T_7).

Research Category: Nutrient Management

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Study area / Sample Collection: Main Dry Farming Research Station, Targhadia, 360 023

Cultivar / Variety / Breed name: Chickpea

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