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Effects of different doses of fertilizer on growth and yield of chickpea under late sown condition

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Abstract

The chickpea (*Cicer arietinum*) is an edible legume of the family Leguminose Chickpeas are a helpful source of zinc, folate and protein. Chickpea seeds contain on average- 21.1% protein, 64% total carbohydrates (47% starch, 6% soluble sugar), 5% fat, 6% crude fiber and 3% ash. High mineral content has been reported for phosphorus (340 mg per 100 g), calcium (190 mg per 100 g) and magnesium (140 mg per 100 g), iron (7 mg per 100 g) and zinc (3 mg per 100 g). A field experiment conducted entitled, "Effects of Different doses of fertilizer on growth and yield of chickpea under late sown condition" at Shivalik Agriculture Farm, SIPS, Dehradun. Experiment was layout in RBD with 9 treatments and 3 replications. It revealed from results that plant height significantly affected by different doses of fertilizer at every stage of crop. Maximum plant height observed in Treatment (T₆)50% RDF + Sulphur 10 kg/ha + Zinc 5 Kg/ha at 50 DAS, 75 DAS and harvesting stage. Numbers of branches per plants were also significantly affected by different doses of fertilizer. Maximum number of branches was observed in 50% RDF + FYM 5 tonnes/ha + vermicompost 5 tonnes/ha (T₉). Results clearly depicted that highest 50% flowering observed in treatment T₃ (75% RDF), highest number of pods per plant, pod lengths (cm), numbers of seed per pod, Grain yield (q/ha) and Straw yield (q/ha) recorded in 75% RDF + vermicompost 10 tonnes/ha (T₈).

Keywords: RBD, chickpea, fertilizer, vermicompost, yield etc

Introduction

Legumes are main source of protein in human and other certain livestock. The chickpea (*Cicer arietinum*) is an edible legume of the family Leguminose Chickpeas are a helpful source of zinc, folate and protein. They are also very high in dietary fibre and hence a healthy source of carbohydrates for persons with insulin sensitivity or diabetes. According to the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) chickpea seeds contain on average- 21.1% protein, 64% total carbohydrates (47% starch, 6% soluble sugar), 5% fat, 6% crude fiber and 3% ash. High mineral content has been reported for phosphorus (340 mg per 100 g), calcium (190 mg per 100 g) and magnesium (140 mg per 100 g), iron (7 mg per 100 g) and zinc (3 mg per 100 g). Balanced fertilizer application in a cropping system is very necessary for a sustainable production system as well as appropriate soil nutrient flexibility. Increasing the level of NPK up to 100% RDF significantly improved growth parameters, yield attributes, grain and straw yield. Application of fertilizers correlated with requirement of plant and availability nutrients in soil. In precision agriculture excess use of fertilizers are not recommendable. The excessive and unbalance application of fertilizers increases cost of production without increasing production.

Material and Method

A field experiment conducted entitled, "Effects of Different doses of fertilizer on growth and yield of chickpea under late sown condition" at Shivalik Agriculture Farm, SIPS, Dehradun. Experiment was layout in RBD with 9 treatments and 3 replications. Details of experiments depicted in table-1. Five plants were selected at random from each net plot for recording observation. Growth and yield parameters were recorded. Days to 50% flowering was recorded by counting the total number of days required for 50% of the total population to reach flowering stage, days to physiological maturity was recorded by counting number of days required the entire plants to reach yellow and dry stage, number of pods plant⁻¹ was recorded by counting the total number of pods plant⁻¹, seed yield by taking the total yield ha⁻¹

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Table 1: Treatment combination and symbols

Symbol	Treatment combination
T ₁	Control
T ₂	100% RDF
T ₃	75% RDF
T ₄	100 RDF+ Sulphur 20 Kg/ha
T ₅	100 RDF+ Zinc 15 Kg/ha
T ₆	50% RDF + Sulphur 10 kg/ha + Zinc 5 Kg/ha
T ₇	75% RDF + FYM 1o tonnes/ha
T ₈	75% RDF + vermicompost 1o tonnes/ha
T ₉	50% RDF + FYM 5 tonnes/ha + vermicompost 5 tonnes/ha

Result and Discussion

It revealed from table-2 that plant height of chickpea significantly affected by different doses of fertilizer.

Plant height at 25 DAS

It also revealed that maximum (4.90 cm) plant height observed in Control (T₁) followed by T₆ and T₉ at 25 DAS while minimum plant height observed in T₄.

Plant height at 50 DAS

Table -2 clearly depicted that maximum (14.06 cm) plant height observed in T₆ followed by T₉ and T₁ at 50 DAS while minimum observed in T₄.

Plant height at 75 DAS

Table -2 clearly depicted that maximum (28.80 cm) plant height observed in T₆ followed by T₁ and T₉ at 75 DAS while minimum observed in T₄.

Plant height at harvesting

Table-2 clearly depicted that maximum (37.89 cm) plant height observed in T₆ followed by T₁ and T₉ at 75 DAS while minimum observed in T₄.

Table 2: Effects of different doses of fertilizer on plant height of chickpea

Treatment	DAS			
	25	50	75	at harvesting
T ₁	4.9	13.47	28.76	35.24
T ₂	4.02	12.56	27.36	29.72
T ₃	3.52	11.65	26.17	27.9
T ₄	3.29	11.22	25.24	27.46
T ₅	3.9	11.34	26.93	30.18
T ₆	4.56	14.89	28.8	37.89
T ₇	4.27	12.81	25.68	30.14
T ₈	3.97	12.87	27.53	32.92
T ₉	4.54	14.05	28.64	33.93
CD	0.515	1.12	1.345	3.506
SEm±	0.171	0.376	0.448	1.168

Number of branches per plant is essential parameters of plant biometry and plays an important role to achieve higher grain yield. It depicted from table -3 that No of branches per plant was significantly affected by different doses of fertilizer. It also revealed that maximum number of branches per plant observed 6.96 in 50% RDF + FYM 5 tonnes/ha + vermicompost 5 tonnes/ha (T₉) followed by T₁ and T₂ which was superior over other treatments. Minimum number of branches observed in treatment T₇ (75% RDF + FYM 1o tonnes/ha).

Table 3: Effects of different doses of fertilizer on number of branches per plant of chickpea number of Branches Per plant

Treatment	No of branches per plant
Control (T ₁)	6.86
100% RDF (T ₂)	5.73
75% RDF (T ₃)	5.4
100 RDF+ Sulphur 20 Kg/ha (T ₄)	5.13
100 RDF+ Zinc 15 Kg/ha (T ₅)	5.2
50% RDF + Sulphur 10 kg/ha + Zinc 5 Kg/ha (T ₆)	4.46
75% RDF + FYM 1o tonnes/ha (T ₇)	5.33
75% RDF + vermicompost 1o tonnes/ha (T ₈)	4.33
50% RDF + FYM 5 tonnes/ha + vermicompost 5 tonnes/ha (T ₉)	6.96
CD	0.776
SEm±	0.258

It was depicted from table-4 that 50% flowering, No. of pods/plant, Pod length (cm), number of Seed/plant, Grain yield (q/ha) and Straw yield (q/ha) significantly affected by different doses of fertilizer.

Table-4 stated that highest 50% flowering observed in treatment T₃ (75% RDF) followed by treatment T₂ and treatment T₈. Minimum flowering observed in treatment (T₄) 100% RDF+ Sulphur 20 Kg/ha.

It revealed from table-4 that 25.40 highest number of pods per plant recorded in 75% RDF + vermicompost 1o tonnes/ha (T₈) followed treatment T₆ and T₉. While Minimum number of pods per plant observed in treatment T₇.

It was revealed from table-4 that 1.97 cm highest pod lengths (cm) observed in in 75% RDF + vermicompost 1o tonnes/ha

(T₈) followed treatment T₉ and T₁. While Minimum length observed in treatment T₄ and T₆.

It was revealed from table-4 that 1.73 highest numbers of seed per pod observed in in 75% RDF + vermicompost 1o tonnes/ha (T₈) followed by treatment T₉ and T₁. While Minimum seed per pod observed in treatment T₄ and T₆.

It was revealed from table-4 that maximum grain yield 15.24 (q/ha) observed in in 75% RDF + vermicompost 1o tonnes/ha (T₈) followed by treatment T₆ and T₇. While Minimum grain yield observed in treatment T₃.

It was revealed from table-4 that maximum straw yield 18.59 (q/ha) observed in in 75% RDF + vermicompost 1o tonnes/ha (T₈) followed by treatment T₆ and T₇. While Minimum straw yield observed in treatment T₃.

Table 4: Effect of different doses of fertilizer on yield and yield attributes of chickpea

Treatment	50% flowering	No. of pods/plant	Pod length(cm)	Number of Seed/pod	Grain yield (q/ha)	Straw yield (q/ha)
T ₁	3.66	18.8	1.93	1.53	10.79	13.16
T ₂	3.86	18.33	1.91	1.47	10.10	12.32
T ₃	5.00	20.33	1.84	1.27	9.68	11.81
T ₄	2.73	16.06	1.82	1.3	7.83	9.55
T ₅	3.8	19.8	1.9	1.47	10.91	13.31
T ₆	3.33	22.73	1.82	1.4	11.93	14.55
T ₇	3.13	17.33	1.87	1.73	11.24	13.71
T ₈	3.86	25.4	1.97	1.6	15.24	18.59
T ₉	3.4	21.93	1.95	1.33	10.94	13.34
CD	0.633	2.900	0.055	0.160	1.829	2.231
SEm±	0.211	0.966	0.018	0.071	0.817	0.997

Summary and Conclusion

A field experiment conducted entitled, “Effects of Different doses of fertilizer on growth and yield of chickpea under late sown condition” at Shivalik Agriculture Farm, SIPS, Dehradun. Experiment was layout in RBD with 9 treatments and 3 replications. Results clearly depicted that plant height significantly affected by different doses of fertilizer at every stage of crop. Maximum plant height observed in Treatment (T₆) 50% RDF + Sulphur 10 kg/ha + Zinc 5 Kg/ha at 50 DAS, 75 DAS and harvesting stage. Numbers of branches per plants were also significantly affected by different doses of fertilizer. Maximum number of branches was observed in 50% RDF + FYM 5 tonnes/ha + vermicompost 5 tonnes/ha (T₉). Results clearly depicted that highest 50% flowering observed in treatment T₃ (75% RDF), highest number of pods per plant, pod lengths (cm), numbers of seed per pod, Grain yield (q/ha) and Straw yield (q/ha) recorded in 75% RDF + vermicompost 10 tonnes/ha (T₈).

It concluded from field experiments that in 75% RDF + vermicompost 10 tonnes/ha (T₈) superior over rest of all treatment.

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