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Effect of various levels of seed treatment and field spray on growth and seed yield of chickpea (*Cicer arietinum* L.)

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Abstract

A field experiment was conducted during rabi season of the year 2010-11, at Agricultural Farm of Bundelkhand University, Jhansi (UP) to study the effect of various seed treatments on seed yield and quality of chickpea. The experiment was laid out in randomized block design having ten treatment combinations with three replication. The growth parameters of chickpea i.e. plant height, branches plant^{-1}, number of pods plant^{-1}, number of seeds plot^{-1} and 100-seed weight was recorded higher under GA+GA, rhizobium as compared to other seed treatment, where as the minimum growth chickpea recorded under rhizobium + GA. Maximum seed yield was recorded under thiram followed by hydropriming and GA.

Key Words: Growth, Yield and Quality of chickpea.

Introduction

India is a largest producer of pulses in the world with 25 per cent share in global production. Chickpea is the one of the major pulse crop growth during rabi season and contains 18-22% protein, 52-70% carbohydrates, 4 to 10 fat, minerals and vitamins. Besides being a rich source of protein, it improved the physicochemical and biological properties of soil and function as mini nitrogen factory. Its deep root system also open up the soil which ensure better aeration and heavy leaf drop increase the organic matter in the soil and fix huge amount of nitrogen through symbiosis and these minimize dependence on chemical fertilizer thus chickpea plays a vital role in improving the soil health. The productivity of chickpea is very low due to the hungry soil, mainly deficient in nitrogen and phosphorous *Chaudhary et. al., (2000b) and Chaudhary et. al. (2000a*). Plant growth regulation GA and rhizobium application to legume plays a key role in formation of energy rich bonds, phospholipids and for development of root system. GA and rhizobium increased yield and quality. Parameters in legumes such as protein and amino acids, bio-fertilizer is promoting certain metabolic reaction. It is directly or indirectly required by several enzyme system, anxin and protein synthesis, seed production and rate of maturity. Therefore, an experiment was initiated to study the effect of bio-fertilizer and seed treatment on yield and update of nutrient an chickpea on sandy loam soil.

Materials and Methods

A field experiment was conducted during rabi season of 2010-11 at Research farm of institute of Agricultural Sciences, Bundelkhand University Jhansi (UP). The experiment was laid out randomized block design (RBD) and three replications with ten treatments viz. the treatment GA (100ppm), thiram @ 3g/kg, rhizobium and trichoderma @ 3g/kg of seed 24 hours before sowing, and hydro-priming seed treatment. The plot size was 15.7'x14.6m^2 with row spacing 30 cm x 10 cm. chickpea varity- BG.256 was shown on 25 and 23 Nov. 2010-11, respectively. The observation on the following growth, flowering characters were recorded to make a critical analysis of the performance of the plant as affected by different treatment in order to determine the effect of different treatment, the following observations of growth and yield attributing characters as well yield were recorded i.e., days of appearance 50%. Flowering, days of 100% flowering, Plant height (cm) number of branches per plant, number of pods and seed per plant and seed yield per plot (kg). The data obtained from various observations on growth and yield attributing were subjected to statistical analysis using standard method.

Results and Discussion

Effect on growth

Data presented in Talbe-1, the various level of treatment the higher flowering stage was recorded under treatment GA + GA as compared to other treatment practices of chickpea. Significantly lower flowering stage was observed under hydropriming. The higher plant height (58.06cm) was recorded under GA + GA as compared to other treatment practices of chickpea. Significantly, lower plant height (39.16cm) was observed under Trichoderma. Higher plant height under these treatments were due to fact that there was lower plant competition of other plants, which allowed chickpea to absorb required amount of nutrient

Table 1: Growth and yield attributes of chickpea as effected by seed treatment and field spray.

Treatment	Code	Days to 50% flowering	Days to 100% flowering	Height of plant (cm)	No. of branches per plant
GA+GA	T_1	104.33	110.33	58.06	11.50
Rhizobium + GA	T_2	102.66	108.33	54.36	10.13
Trichoderma +GA	T_3	101.66	108.33	55.40	10.63
Thiram + GA	T_4	102.33	109.66	55.20	10.60
GA	T_5	103.66	110.33	43.20	12.13
Rhizobium	T_6	98.66	105.33	42.00	16.50
Trichoderma	T_7	99.33	107.00	39.16	10.83
Thiram	T_8	96.66	102.00	41.33	12.83
Hydropriming	T_9	94.66	101.33	41.55	12.26
Control	T_{10}	96.33	101.66	39.50	9.80
SE (diff.)		1.44	1.60	0.41	0.30
CD at 5%		3.33	3.96	1.30	0.84

and water for its growth. This favored the higher plant height of chickpea. The maximum number of branches per plant (16.60) was registered in treatment of Rhizobium significantly, the lower number of branches per plant (10.13) was observed under Rhizobium + GA treatment *Anuja 2006*. This could be an account of vigorous vegetative growth due to greater cell division & more meristematic active increasing supply of photospothates for the formation of branches. These results are quite in line with the early research work done by *Jain et al., (2008)* who has reported that the increasing level seed treatment (Rhizobium and GA + GA) increased plant height, number of branches, yield, relative growth rate and net assimilation rate at all the stages of crop growth.

Effect of yield and yield components

The treatment rhizobium proved to be the best in enhancing pods per plant (72.46%) and it was significantly superior to rest of the other treatments, and minimum no of pods per plant (21.53) combination of rhizobium + GA treatment respectively.The treatment rhizobium produced maximum seed per plot (2.10) and it was significantly superior to other treatment practices (Gupta *et al*., 1988 and Tongary *et al*., 2008) where lowest seed per plot (1.10) was recorded under combination of trichoderma + GA treatment. This was due to better suppression of field spray, more availability of nutrient. Production of higher crop growth and favorable influence on sink capacity and its effective translocation towards the maximum seed yield per plant (13.07g) under the treatment thiram as compared to other treatment *Punam et. al.* (*2007)*, *Yadav et. al. (2009*). Practices minimum seed yield per plant was observed under treatment combination of trichoderma + GA (9.68g) which was significantly lower than rest of other treatment. The maximum seed yield per plot was produced under rhizobium (1.04 kg/plot) as compared to other treatment *Solaiman et. al.* (*2005*). Practices the minimum seed yield per plot was observed under the treatment

Table 2: Seed yield and seed weight of chickpea affected by seed treatment and field spray.

Treatment	Code	No. of pod per plant	No. of seed per pod	Seed yield per plant (g)	Seed yield per plot (kg)	1000-seed weight (g)
GA+GA	T_1	33.36	1.50	11.77	0.94	281.34
Rhizobium + GA	T_2	21.53	1.13	10.52	0.86	276.56
Trichoderma +GA	T_3	27.13	1.10	9.68	0.78	284.41
Thiram + GA	T_4	22.23	1.40	11.77	0.95	281.39
GA	T_5	32.00	1.73	12.64	1.01	263.51
Rhizobium	T_6	72.46	2.10	12.72	1.04	260.44
Trichoderma	T_7	34.5	1.30	11.44	0.92	234.64
Thiram	T_8	40.46	1.93	13.07	1.04	248.14
Hydropriming	T_9	65.9	2.00	12.95	1.03	242.64
Control	T_{10}	32.53	1.03	9.23	0.74	229.60
SE (diff.)		0.37	0.12	0.12	0.04	0.31
CD at 5%		0.98	0.36	0.36	0.12	0.93

combination of trichoderma + GA (0.78 kg/plot). Ultimately all these yield attributes has their pronounced effect in significantly increasing the seed yield of chickpea at higher in treatment application of rhizobium. Seed yield of chickpeas is chiefly a product of yield attributing characters like seed weight per plant etc. These result confirm the findings of *Kantar F et. al. (2003)*.

1000 seed weight:

Concerning 1000 seed weight under the studies of treatment and field spray rates, data of (Table-2). The treatments combination of trichoderma + GA recorded significantly height 1000 seed weight (284.41g) as compared to other treatment. The minimum 1000 seed weight was recorded under the treatment component of trichoderma (24.64g) which was significantly lower than other treatment. Henceforth, improvement in growth and yield attributers of chickpea due to trichoderma application was quite logical. The result are in conformity with the findings of *Neelima et. al.(* 2006).

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