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Balanced nutrition of chickpea in groundnut-chickpea cropping system

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ABSTRACT

The field experiment was conducted during winter season of 2002-03 and 2003-04 at Regional Research Station, Mainpuri, C.S. Azad University of Agriculture and Technology, Kanpur. The experimental soil was sandy loam having pH 8.7, organic carbon 0.37 %, total nitrogen 0.03%, available phosphorus 10 kg /ha and available potash 296 kg/ha. Chickpea genotypes Radhey, KPG 59 and KPG 173-4 were tested under four levels of NPS and Ca (Control, 20 kg N + 40 kg P_2O_5 + 10 kg S + 20 kg Ca, 25 kg N + 50 kg P_2O_5 + 15 kg S + 30 kg Ca and 30 kg N+ 60 kg P_2O_5 + 20 kg S + 40 kg Ca /ha, sown in the first fortnight of December. Calcium was applied for improving intake of N by correcting soil pH and increasing the root development with phosphorus. During two experimental seasons cultivar KPG 59 was found significantly superior to KPG 173-4, while Radhey was the poorest. KPG 59 gave significantly higher yield as compared to KPG 173-4 at 25 kg N + 50 kg P_2O_5 + 15 kg S + 30 kg Ca/ha. Application of 25 kg N + 50 kg P_2O_5 + 15 kg S + 30 kg Ca/ha increased significantly grain yield of chickpea. The further installment of these nutrients *i.e.* 30 kg N + 60 kg P_2O_5 + 20 kg S + 40 kg Ca/ha did not affect the yield attributes and grain yield significantly.

Key words : Genotype, Genetical, Nutrition, Late sown, Sustaining, Calcium

INTRODUCTION

Pulses in general and chickpea in particular grown with nominal or unbalanced fertilizer, which is turn lead to poor growth and grain yield. The farmers do not like to grow chickpea on large scale under late sown condition. The concept of integrated nutrients management for sustaining the soil fertility is also not being followed by the most of the farmers, so far, resulted in the fertility status of Uttar Pradesh soil declined. Development of genotypes of chickpea, which are amenable to late planting offer, potential of their introduction in groundnut-chickpea cropping system with the adoption of improved technology package, which in turn boost up the productivity. Balanced application of nutrients may help in enhancing the growth closely compensating the yield of the chickpea. Keeping this in view, the present study was, therefore, conducted to study the balanced nutrition for chickpea in chickpea-groundnut cropping system under late sown condition.

MATERIALS AND METHODS

The field experiment was carried out for two consecutive years during winter (*Rabi*) seasons of 2002-03 and 2003-04 at Regional Research Station, Mainpuri, C.S. Azad University of Agriculture and Technology, Kanpur. The soil of the experimental site was sandy loam having pH 8.7, organic carbon 0.37 %, total nitrogen 0.03%, available phosphorus 10 kg/ha and available potash 296 kg/ha, therefore, fertility status of the experimental site was low. The preceding crop groundnut was fertilized with 20 kg N+ 30 kg P_2O_5+ 45 kg K_2O/ha. The treatments consisted of four nutrients levels (Control, 20 kg N + 40 kg P_2O_5 + 10 kg S + 20 kg Ca, 25 kg N + 50 kg P_2O_5 + 15 kg S + 30 kg Ca and 30 kg N + 60 kg P_2O_5 + 20 kg S + 40 kg Ca/ha) and three varieties of chickpea *viz*., Radhey, KPG 59 and KPG 173-4. The sulphur and calcium were supplied through gypsum @ 66, 100 and 133 kg/ha to fulfill the dose of 10 kg S + 20 kg Ca, 15 kg S + 30 kg Ca and 20 kg S + 40 kg Ca/ha, respectively. The full doses of all the nutrients were given at sowing. The experiment was laid out in randomized block design with 3 replications. The crop was planted in rows 45 cm apart using 100 kg seed ha/ha. Three irrigations were given to crop at flower initiation, pod formation and pod filling stages, respectively. The crop was sown on 5 December and harvested after 130 days on 13 April during both experimental seasons.

RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below :

Performance of cultivars:

The cultivars did not differ significantly for pods and pods weight plant/ha, grains /pod and grain weight/ plant but differed significantly in plant height, 100 grain weight and grain yield (Table1). Cultivar KPG 59 produced highest grain yield (27.43 q /ha) by 12 % and 26 % compared over KPG 173-4 and Radhey, respectively. Cultivar KPG 173-4 gave higher yield than Radhey. The greater yield recorded by KPG 59 could be attributed due to higher pod weight plant/ha, grains/ pod and grain weight/ plant. However, KPG 173-4 and Radhey spite of being a double seeded varieties did not perform well perhaps due to poor

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Table 1: Growth, yield attributes and yield of chickpea as affected by different varieties and nutrients (pooled data of 2 years)

Treatments	Height/ plant (cm)	Pods /plant	Pods weight /plant (g)	Grains /pod	Grain weight /plant (g)	100 grain weight (g)	Grain yield (q/ha)
Cultivars							
Radhey	38.79	86.28	24.70	1.82	18.74	18.66	20.21
KPG 59	35.95	75.65	26.52	1.91	20.35	17.62	27.43
KPG 173-4	42.37	73.93	25.92	1.88	19.88	21.28	24.15
S.E. ±	0.30	4.68	1.54	0.11	1.20	0.41	0.79
C.D. (P=0.05)	0.87	NS	NS	NS	NS	1.20	2.31
Nutrients (kg/ ha)							
$N_0+P_0+Ca_0$	34.21	60.33	19.67	1.71	15.10	18.02	14.59
$N_{20}+P_{40}+S_{10}+Ca_{20}$	36.77	82.84	27.04	1.78	20.73	19.22	22.30
$N_{25}+P_{50}+S_{15}+Ca_{30}$	40.10	84.99	27.82	1.99	21.34	19.58	29.11
$N_{30}+P_{60}+S_{20}+Ca_{40}$	45.05	86.43	28.30	1.99	21.71	19.94	29.74
S.E. ±	0.35	5.28	1.78	0.13	1.38	0.48	0.95
C.D. (P=0.05)	1.02	15.48	5.22	N S	4.04	1.40	2.78

NS-Non significant

source sink relationship as indicated by poor pod development under late sown condition. The variation in grain yield can be attributed due to genetical variation among the chickpea cultivars. Theses results are in line with those of Patel (1994).

Response of nutrients:

Plant height, pods/ plant, pod weight/ plant, grain weight/plant and 100 grains weight increased significantly up to the use of 30 kg N + 60 kg P_2O_5 + 20 kg S + 40 kg Ca/ha over control but the differences in grains/pod were not significant due to different doses of nutrients (Table 1). The use of N + P_2O_5 + S+ Ca brought about an all round improvement in plant height, pods/ plant and pods weight/ plant, grains/ pod, grain weight/ plant and 100 grains weight resulted in, the grain yield enhanced significantly (Table1). The use of nutrients in nutrients deficit soils indicated a strong linear relationship of grain yield of chickpea with nutrients doses. Grain yield of chickpea increased significantly up to the use of 25 kg N + 50 kg P_2O_5 + 15 kg S + 30 kg Ca/ ha by a margin of 14.52 q/ ha and 6.81 q/ ha over control and 20 kg N+ 40 kg P_2O_5 + 10 kg S + 20 kg Ca/ ha, respectively. The further increase in nutrients did not show significant response. Nutrients application in deficient soils caused for all round growth and development of chickpea due to higher assimilation of photosynthates, which brought about significant increase in growth and yield attributes and ultimately the grain yield of chickpea. These results confirm with the findings of Patel and Patel (1991), Ram and Dwivedi (1992) and Shinde and Saraf (1992).

REFERENCES

Patel, J.R. (1994). Performance of gram (*Cicer arietinum*) varieties in rice fallow under different levels of phosphorus. *Indian J. Agron.,* **39** (4) :650-651.

Patel, R.S. and Patel, Z.G. (1991). Efficient of organic, inorganic and bio-fertilizers on yield and quality of chickpea (*Cicer arietinum*). *Indian J. Agron.*, **36** (3): 419-420.

Ram, H. and Dwivedi, K.N. (1992). Effect of source and level of sulphur on yield and grain quality of chickpea (*Cicer arietinum*) *Indian J. Agron.*, **37**(1): 112-114.

Shinde, V. S. and Saraf, C.S. (1992). Sulphur and phosphorus interaction in the presence of phosphorus solubilizing bacteria in chickpea. *Internat. Chickpea News Letter,* **26** : 27-29.

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