Progressive Research – An International Journal
Vol. 3 (Special Issue) : 480-481 (2008), ISSN : 0973-6417

Society for Scientific Development in Agriculture and Technology, Meerut (U.P.) INDIA

EFFECT OF PHOSPHORUS AND LIME ON CHICKPEA (*CICER ARIETINUM*) IN MEDIUM LAND RICE FALLOW ECO-SYSTEM OF JHARKHAND

Ashok Kumar
KVK, Baliapur, Dhanbad, (Jharkhand)
Email : kumarashok11339@gmail.com

ABSTRACT

An on station trial was conducted during *rabi* 2005-06 at KVK farm of KrishiVigyan Kendra, Pakur, Jharkhand to study the effect of phosphorus and lime on yield attributes, yield and economics of chickpea *(Cicerarietinum*L.*).* The best result was obtained under 40 kg/P_2O_5 + 300 kg lime/ha in pods/plant (36.88), seeds/pod (1.40), 100 seed weight (12.26 g), seed yield (13.25 q/ha), straw yield (21.59 q/ha), gross return (Rs.36,118/ha) and net return (Rs.27,918/ha) where as the further increment of phosphorus from 40 to 60 kg/ha failed to give significant effect on yield attributes, yield as well as net gain. The next treatment who also gave significantly at par result was 60 kg P_2O_5 without lime. The lowest yield attributes, yield and net gain was recorded in control without phosphorus and lime.

Key words : *Phosphorus, lime, chickpea, medium land.*

Majority of medium lands of Jharkhand are slightly to moderately acidic having pH ranging from6.5 to 5.5 and are deficient in phosphorus. Fertilizers are the most important input in crop production. Among the various factors of low productivity of chickpea in Jharkhand, low phosphorus application as well as no use of ammendments of acidic soils before sowing are the foremost. In acidic soils, the availability of plant nutrients is reduced and may be insufficient. Therefore, the present experiment was planned to study the effect of phosphorus and lime on chickpea in medium land rice fallow eco-sysytem of Jharkhand.

MATERIALS AND METHODS

A field experiment was conducted in *rabi season* (December –April) during 2005-06 at KrishiVigyan Kendra farm ,Pakur (Jharkhand). The soil was slightly acidic having pH of 6.1, organic carbon 0.67 per cent available N 343, P_2O_5 9.1, K_2O 228 kg/ha. The experiment was conducted with 8 treatments : T_1: Control (Without phosphorus and lime), T_2: 20 kg P_2O_5/ha, T_3: 40 kg P_2O_5/ha, T_4: 60 kg P_2O_5/ha, T_5: 0 kg P_2O_5/ha + 300 kg lime/ha, T_6: 20 kg P_2O_5/ha + 300 kg lime /ha, T_7: 40 kg P_2O_5/ha + 300 kg lime /ha and T_8:60 kg P_2O_5/ha + 300 kg lime/ha in randomized block design with 3 replications sowing was done after harvest of rice crop on 04.12.2005 and harvesting on 18.03.2006. N and K_2O @ 25 and 20 kg/ha and P_2O_5 and lime as per treatments were applied as basal. Sowing was done in line at 30 cm spacing with a seed rate of 75 kg/ha. Two irrigations were applied at 50 and 100 days after sowing. Weeding was done at 40 days after sowing. Small seeded desi variety C 235 was sown in the experiment. Initial and post harvest soil samples were collected from 0-25 cm depth and were analysed for bulk density, pH, OC, available N, P and K by using standard laboratory procedures.

RESULTS AND DISCUSSION

Yield attributes and yield **:**The storage capacity of any pulse depends on the number of pods per plant, number of seeds per pod and 100-seed weight. The relative magnitude of these yield attributes varied substantially with variety used but the most important factors which contribute most are soil productivity and management practices followed.

Yield attributes were significantly influenced by the application of phosphorus and lime (table-1). The highest number of pods/plant was obtained in 40 kg P_2O_5/ha + 300 kg lime/ha (36.88) which was at par with 60 kg P_2O_5/ha + 300 kg lime/ha (36.71) and 60 kg P_2O_5/ha (34.80) but significantly superior to other treatments. The lowest number of pods/plant was received in control (25.42). In case of seeds/pod, all the 9 treatments were found at par (1.22 to 1.41 pods/plant) but significantly superior to control (1.01 pods/plant). The same trend was seen in case of 100-seed weight where all other treatments were at par and recorded 100-seed weight from 12.20 to 12.26 g and all were significantly superior to control (12.03 g). Kumar and Sharma (2005) reported that each successive increase in levels of P up to 40 kg P_2O_5 ha^{-1} significantly increased the number of pods per

Table-1 : Effect of phosphorus and lime on chickpea.

Treatments	Pods/ plant (No.)	Seeds/ pod (No.)	100-seed wt. (g)	Seed yield (kg/ha)	Straw yield (kg/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B : C ratio
T_1 : Control (without phosphorus and lime)	25.42	1.01	12.03	6.23	8.73	13196	5996	1.83
T_2:20 kg P_2O_5/ha	30.71	1.22	12.22	9.50	15.0	25800	18400	3.49
T_3 : 40 kg P_2O5/ha	34.37	1.30	12.24	11.78	19.01	32074	24474	4.22
T_4 : 60 kg P_2O_5/ha	34.80	1.34	12.20	12.87	21.36	35160	27360	4.50
T_5 : 0 kg P_2O_5/ha + 300 kg lime/ha	30.81	1.24	12.23	8.02	12.35	21718	13918	2.78
T_6 : 20 kg P_2O_5/ha + 300 kg lime/ha	34.09	1.31	12.20	11.344	18.48	30912	22912	3.86
T_7 : 40 kg P_2O_5/ha + 300 kg lime/ha	36.88	1.40	12.26	13.25	21.51	36118	27918	4.40
T_8 : 60 kg P_2O_5/ha + 300 kg lime/ha	36.71	1.41	12.24	13.10	21.48	35758	27358	4.26
CD (0.05)	2.18	0.23	0.14	1.07	2.31	2835	2524	-

plant,seeds per pod and test weight of chickpea but found statistically at par with 60 kg P_2O_5 ha^{-1}.Tiwary*et al* (2005) reported that yield attributes of chickpea like number of pods per plant and test weight augmented significantly with application of P up to 50 kg P_2O_5 ha-1 over O and 25 kg P_2O_5 ha^{-1}. Lakpale*et al* (2003) reported that application of 25.8 kg P_2O_5 ha^{-1} significantly increased the number of pods per plant over control. The significant effect of lime was visualised in all yield attributes over control. This may be due to the fact that lime neutralizes the soil which increases the cation capacity and thus increases the availability of plant nutrients (Tisdale *et al.,* 1990).

The highest seed and straw yields were obtained under 40 kg P_2O_5/ha + 300 kg lime/ha (13.25 and 21.59 q/ha, respectively) which were at par with 60 kg P_2O_5 + 300 kg lime/ha (13.10 and 21.48q/ha) and 60 kg P_2O_5/ha (12.87 and 21.36 q/ha). These 3 treatments were found significantly superior over other treatments. The lowest yields of 6.23 q seed/ha and 8.78 q straw/ha were received under control without phosphorus and lime. Kumar and Sharma (2005) and Tiwary*et al* (2005) observed same effect of phosphorus on chickpea yield. Kumar *et al* (2006) also observed the incremental effect of other nutrients on yield of chickpea. The effect of lime on yield of legumes was also reported by Jessop and Mahoney (1982).

Gross and net return and B:C ratio : Data presented in table-1 reflects the positive effect of phosphorus and lime on gross and net returns as well as on B:C ratio. The highest gross and net return (Rs. 36118 and 27918/ha, respectively) were obtained under 40 kg P_2O_5/ha + 300 kg lime /ha which were at par with 60 kg P_2O_5/ha + 300 kg lime/ha and 60 kg P_2O_5/ha. These treatments were significantly superior to others in respect to gross and net returns. The lowest gross return of Rs 13196/ha and net return of Rs. 5996/ha were found under control. The B:C ratio of 4.5 was the highest and achieved by 60 kg P_2O_5/ha followed by 40 kgP_2O_5/ha + 300 kg lime/ha (4.4) and 60 kg P_2O_5/ha + 300 kg lime /ha (4.26). Therefore, it may be concluded that 40 kg P_2O_5 + 300 kg lime/ha might be suitable dose with N@25 and K_2O @ 20 kg/ha for getting optimum yield of chickpea in rice fallow acidic soils of SanthalPargana in Jharkhand.

REFERENCES

1. Jessop, R.S.and Mahoney, J, 1982. Effects of lime on the hrowth and nodulation of four grain legumes. *Australian Journal of Soil Research.* 20(3) : 265-268.
2. Kumar, A., Prasad, S. and Kumar ,S.B. 2006. Effect of boron and sulphur on performance of gram *(Cicerarietinum) Indian Journal of Agronomy*. 51(1) : 57-59.
3. Kumar, J. Sharma, M. 2005. Effect of phosphorus and molybdenum on yield and nutrient up take by chickpea. *Ann. Plant Soil Res*. 11:16-18.
4. Lakpale, R., Shrivastava, G.K., Chaube, N.K., Singh, A.P., Joshi, B.S., Pandey, R.L. 2003. Response of gram *(Cicerarietinum L.)* to integrated nutrient management in vertisols of Chattisgarh plains. *Indian Journal of Agric Sci.* 73:162-163
5. Tisdale, L.S., Nelson, L.W. and Beaton, D.J. 1990. Soil fertility and fertilizers (4^{th}Edn.), *Maxwell Macmillan International Editors* : 189-349.
6. Tiwary, B.K., Dubey, S., Mathew, R. 2005. Effect of phosphorus, sulphur and plant growth regulators on productivity and nutrient up take of chickpea. *Ann. Plant Soil Res.* 7:181-184.