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Yield, Yield Attributes and Economics of Chickpea as Influenced By Varieties and Phosphorus Levels

Srinivasa Rao R, Pratap Kumar Reddy A and Sailaja V
Department of Agronomy, College of Agriculture,
Acharya N.G. Ranga Agricultural University, Rajendranagar,Hyderabad - 500 030, India

ABSTRACT

A field experiment was conducted during *rabi* 2009-10 with 3 varieties of chickpea viz., Annigeri, JG-11 KAK-2 with 4 levels of phosphorus (0, 25, 50, 75 Kg ha^{-1}) tested in a factorial randomized block design. The results revealed that KAK-2 produced significantly maximum number of pods per plant, test weight, grain yield, and straw yield ha^{-1} and harvest index. Application of 50 Kg P_2O_5 ha^{-1} resulted in significantly higher seed yield, gross and net returns and benefit cost ratio.

Key words : B.C ratio, Economics, Haulm, Harvest index, Phosphorus levels, Seed yield.

Chickpea (*Cicer arietinum* L.) is an important pulse crop sharing 36 percent of total area and 48 per cent of total production of grain legumes in the country. The average productivity of this crop is very low because it is traditionally cultivated under rainfed conditions with residual soil moisture. One of the ways of increasing the yield is by means of balanced fertilization of chickpea. Legumes are normally heavy feeders on phosphorus. Phosphate fertilization of chickpea promotes growth, nodulation and enhances yield. It imparts hardiness to shoots, improves grain quality, regulates the photosynthesis, governs other physio-bio-chemical processes and also helps in root enlargement, nodule production and by there increases nitrogen fixation. The root growth as well as plant development may differ in new plant types of gram cultivars. As a result the efficiency of phosphorus utilization by different varieties may differ under different phosphorus levels. The present investigation was conducted to find out the phosphorous requirement of different varieties of chickpea.

MATERIAL AND METHODS

The field experiment was conducted during *rabi* season 2009-10 at students' farm of Acharya N.G. Ranga Agricultural University, Rajendranagar, Hyderabad. The experiment at soil had a P^H of 7.8 and was clay loam in texture, containing 0.68% organic carbon, 268.4, 28.4 and 340 kg ha^{-1} available N, P_2O_5 and K_2O respectively. The experiment was laid out in a factorial randomized block design, with three replications, consisting three varieties viz., V_1 – Annigeri, V_2 – JG-11 and V_3 – KAK-2 as main treatments and four levels of phosphorus (P_1 – 0, P_2 – 25, P_3 – 50 and P_4 – 75 kg P_2O_5 ha^{-1}) as sub levels. Chickpea cultivars were sown on 5th November 2009 and harvested on 7th Feb, 2010. Fertilizers @ 20 kg N and 40 kg K_2O ha^{-1} were applied as basal dose in general through urea and muriate of potash respectively and phosphorus was applied as basal through single super phosphate according to the treatments. The spacing and plot size were 30x10cm and 6x3.5m respectively. Rainfall received during crop season was 22.2 mm.

RESULTS AND DISCUSSION

Yield: -

It is evident from the data in Table 1 that the number of pods per plant, 100-seed weight, seed yields, haulm yield and harvest index were significantly influenced by varieties. Among the varieties KAK-2 produced highest number of pods (54.7) per plant, Test weight(19.9 g), seed (1301kg ha^{-1}), and haulm (2084 kg ha^{-1}) yield due to more number of branches, higher canopy and drymatter production contributed to better seed filling as compared to Annigeri and JG-11. The branching pattern was better with more number of primary and secondary branches, resulting in production of more number of pods per plant, while in Annigeri variety the branching pattern was poor with less number of primary and secondary branches, resulting in production of less number of pods per plant. The number of seeds per pod of chickpea is mostly a genetic parameter and likely to be altered hardly by

Table 1. The yield, yield attributes and economics of chickpea as influenced by varieties and phosphorus levels

Varieties	No of pods plant^{-1}	No of seeds pod^{-1}	100 seed wt (g)	Seed yield (kg ha^{-1})	Haulm yield (kg ha^{-1})	Harvest index (%)	Gross returns (Rs ha^{-1})	Net returns Rs (ha^{-1})	B:C Ratio
V_1 : Annigeri	43.5	1.4	16.9	1040.0	1941.0	34.9	22880.0	14709.0	1.80
V_2 : JG-11	46.2	1.4	17.5	1150.0	1996.0	36.6	25300.0	16717.0	1.90
V_3 : KAK-2	54.7	1.6	19.9	1301.0	2084.0	38.4	28600.0	19730.0	2.20
SEm±	1.6	0.2	0.8	41.5	41.5	0.4	914.9	796.9	0.06
CD (P=0.05)	3.5	0.4	1.8	86.2	86.0	1.0	1897	1652.7	0.14
Phosphorus levels									
P_1 : 0 kg P_2O_5 ha^{-1}	37.3	1.2	17.0	901.0	1800.0	33.4	19800	11939.0	1.50
P_2 : 25 kg P_2O_5 ha^{-1}	41.0	1.3	17.4	1001.0	1900.0	34.5	22210.0	13756.0	1.60
P_3 : 50 kg P_2O_5 ha^{-1}	56.0	1.6	18.9	1341.0	2121.0	38.7	29480.0	20853.0	2.40
P_4 : 75 kg P_2O_5 ha^{-1}	58.3	1.7	19.1	1413.0	2207.0	39.0	31093.0	21660.0	2.20
SEm±	1.6	0.2	0.8	48.0	47.9	0.4	139.7	920.1	0.08
CD (P=0.05)	4.0	0.5	2.1	99.6	99.4	1.1	289.7	1908.4	0.16

agronomic manipulation. Grain yield significantly increased with increasing fertilizer application upto 50 kg P_2O_5 ha^{-1}. Further increase in the level of fertilizer application i.e, 75 kg P_2O_5 ha^{-1} did not cause additional increase on yield and yield attributes. This clearly indicated that 50 kg P_2O_5 ha^{-1} was optimum dose and increased in the grain yield over to control and 25 kg P_2O_5 ha^{-1}. Similar results were reported by Shiva kumar (2001), Saini and Faroda (1998) and Mustafa *et al*., (2008).

Economics: -

The gross, net returns and B.C ratio were significantly influenced by varieties. Among the varieties KAK-2 obtain highest gross, net returns and B.C ratio as compared to Annigeri and JG-11. Among the phosphorus levels highest gross, net returns and B.C ratio were recorded with the application of 50 kg P_2O_5 ha^{-1} it was significantly superior over control and 25 kg P_2O_5 ha^{-1}. The results revealed that the adoption of the KAK-2 variety has recorded higher seed yield with the application of 50 kg P_2O_5 ha^{-1} gave the highest net returns and resulted in maximum benefit. These findings corroborate with the findings of Bahadur *et al*., (2002).

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