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Effect of different levels of phosphorus and sulphur on yield of cowpea (*Vigna sinensis*) Cv. Pusa Phalguni

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Abstract

The experiment entitled “effect of different levels of phosphorus and sulphur on yield of cowpea (*Vigna sinensis*)” Pusa Phalguni was conducted at the instruction a cum Research farm Department of Horticulture, College of Agriculture, Latur during Kharif season 2012-13 The experiment was laid out in factorial Randomized Block design (FRBD) with three levels each of phosphorus and Sulphur Consisting nine treatment combinations replicated thrice. The treatment Comprising of levels of phosphorus viz. P₁: 40 kg P₂O₅/ ha P₂:50 kg P₂O₅/ha and P₃; 50 kg P₂O₅/ha and three levels of sulphur Viz So: 0 Kg /ha S₁: 20 kg S₃:40 kg /ha and The application of phosphorus @ 60 kg P₂O₅ /ha produced better growth yield with high B.C ratio (3.6) of Cowpea crop and it was found to be at par with the application of 50 kg P₂O₅/ ha. The most of yield as well as well economics character were found higher with application of 40 kg S/ha.

Keywords: Phosphorus, sulphur, yield, cowpea, *Vigna sinensis*

Introduction

Cowpea is commercially grown through out in India for its long green pod as vegetables, for its seed as pulse and for its foliage as fodder. The nutrient available to plant particularly nitrogen and phosphorus are important constituent of protein and phospholipids, phosphorus not only enhance the root growth but also promotes early plant maturity (Mullins *et al.*, (1996) ^[10] Phosphorus does not only increase seed yield but also nodulation. And thus nitrogen fixation phosphorus application influence the contents of other nutrient in cowpea leaves. Kuradikari *et al.* (1973) ^[2] reported that an increase of about 5% seed protein content of cowpea as a result of phosphorous application. Phosphorus is a vital element in all biological system and is limiting factor in enhancing the productivity of legumes. Its availability in tropical soils are less due to fixation by various soil reactions. Phosphorus dose not only increase seed yield but also nodulation (luse *et al.*, (1975) ^[3]. Sulphur is a fourth major nutrient after nitrogen Phosphorous and potassium. It required for the synthesis of chlorophyll and promot nodule formation sulphur absence in soil are gradually increasing with reduction of sulphur proportion in atmosphere and the descending usage of ammonium sulphate containing sulphur, but the ascending usages of urea from nitrogenous fertilizers without sulphur. It also increase the protein content of legume vegetables.

Material and Methods

The experiment on effect of different levels of phos phosphorus and sulphur on yield of cowpea (*Vigna sinensis*) Cv. Pusa Phalguni was laid out in a factorial Randomized Block design with three replications. The nine treatment Combinations of three each level of phosphorus and sulphur was studies. The nine treatment combination of three each levels of phosphorus and Sulphur Viz. P₁. 40 kg P₂O₅, P₂. 50 kg P₂O₅/ha, P₃. 60 kg P₂O₅/ha levels of sulphur, S₀:0 kg/ha, S₂. 20kg/ha and S₂:40kg /ha. The recommended N and Ke ach of 50kg / ha. Whereas the P and S was applied through Urea and Diammonium Phosphate (DAP), phosphorus through DAP, Potassium through Murate of Potash and Sulphur through gypsum. The cultural and other operations carried out during experimentation. The crop was protected from insect pests and disease by spraying pesticide and fungicides as and when required. The observation were recorded at 15 days interval from 30 days after sowing.

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Results and Discussion

Yield attributes

Clusters per plant

The highest number of clusters per plant (14.92) was produced with the application 60 kg P₂O₅/ha Application of 50 and 60 kg P₂O₅/ha and recorded significantly higher number of cluster per plant over 40kg P₂O₅/ ha and remains at par with each other. The different levels of Sulphur, the maximum number of clusters per plant (15.05) was produced with 40 kg P₂O₅/ha which was found significantly superior over without application of sulphur.

This might be due to higher dose of phosphorus resulted in higher number of cluster per similar results have been reported by mishra and Solanki (1996) [4]

Interaction effect of different levels of phosphorus and sulphur treatment on number of clusters per plant was not found significant.

Number of pods in a cluster

The data presented in table 1 revealed that the application of 50/ha 60 kg P₂O₅/ha was recorded significantly higher number of pods per cluster (5.43 and 5.87) over 40 kg P₂O₅ per ha and found at par with each other.

Interaction effect of phosphorus and sulphur treatments was not found statistical Significant. An adequate Supply of phosphorus early in plant life was resulted in laying down the primordial for the reproductive parts of the plant. The high number of pods in a clusters with high levels of phosphorus has been reported by mishra and solanki ((1996) [4]

Length of green pods

The pod length was Significantly effective in producing higher number of pods per cluster over control at par with each other longer green pods(12.89 cm) were harvested from treatment reiving 60 kg P₂O₅/ ha. This treatment was ground Significantly Superior over rest of the levels of phosphorus. The significantly Shortest green pods (10.64 cm) were harvested with the application of 40 kg P₂O₅ per ha. The treatment 40 kg S per hacter was found effective in increasing pod length (12.33 cm). Application of 20 and 40 kg S/ha were at par with each other and found Significantly due to interaction of different levels of phosphorus and Sulphur. The length of green pods (12.89 cm) were harvested from the crop receiving 60 kg P₂O₅ per hacter. it was Found Significantly Superior over rest of treatment. Similar results were reported

by Shukla *et al.* (1997) [7] and Rehman *et al.* (2007) [5], sen *et al.* (2010) [6].

Green pod yield per plant

The highest green pod yield per plant (96.62 g) was obtained by application of 60 kg P₂O₅ per ha Application of 50 and 60 P₂O₅ per cluster produced Significantly more yield of green pods per plant than 40 kg P₂O₅ per ha at with each other.

The effect of sulphur on green pod yield per plant. The higher green pod yield per plant (99.70 g) was received with the application of 40 kg S per hectar.

Interaction effect of phosphorus and sulphur on pod yield per plant was not found significant.

It might be due to higher dose of phosphorus resulted in producing more reproductive parts (pod).These finding are confirmative with the result of Subramanian *et al* (1977) [8] and Deshbhratar *et al.* (2010) [1].

Green pod yield per plot and hectar

The maximum green pod yield per plot and per hectar was influenced significantly due to different levels of phosphorus. The maximum pod yield per plot (6.38 kg) and per hectar (50.61 g) was produced with the application of 60 kg P₂O₅ /hectar

The application of 40 kg S per hectar was produced higher green pod yield per plot (6.58 kg) and per hectar (52.22 g) which was found superior over without application of sulphur per hectar.

The application of 40kg S per hectar was produced higher green pod yield per plot (6.5 kg) and per hectar (52.22 g). which was found significantly superior over without application of sulphur per hectar. The higher green pod yield (q/ha) with higher levels of phosphorus may be due to higher dose of phosphorus resulted in producing more reproductive parts (pods). The higher green pod yield (q/ha) with higher levels of phosphorus may be due to higher reproductive growth similar finding were also reported by Rehman *et al* (2007) [5] Subramanian *et al* (1977) [8] and Yadav and Yadav (2011) [9].

Conclusion- It is concluded that for getting high yield were found with the application 40kg S per hectar but it ws at par with the application of 20kg per hectar. The application of phosphorus 60kg P₂O₅ per hectar to cowpea produced higher yield and it was found at par with the application of 50 kg P₂O₅ per hectar.

Table 1: Effect of different levels of phosphorus and sulphur on No clusters plant/ha, No. of pods per cluster and pod length in Cowpea.

Treatments	No. of Clusters per Plant	No of Pods in a cluster	Pod length (cm)
Phosphorus levels(P)			
P ₁	13.16	4.75	10.64
P ₂	14.46	5.43	10.51
P ₃	14.92	5.87	11.09
SE+	0.37	0.17	0.53
CDat 5%	1.12	0.53	NS
Sulphur Levels(S)			
S ₁	12.80	4.94	9.88
S ₂	14.69	5.51	10.65
S ₃	15.05	5.61	10.72
SE+	0.37	0.17	0.53
CD at 5%	1.12	0.53	NS
Interaction (PXS)			
SE+	0.64	0.30	0.91
CD at 5%	Ns	NS	NS

Table 2: Effect of different levels of phosphorus and sulphur on pod yield in Cowpea.

Treatments	Green pod yield per plant	Green pod yield per plot	Green pod yield /ha
Phosphorus levels(P)			
P ₁	83.52	5.51	43.74
P ₂	94.38	6.23	49.43
P ₃	96.62	6.38	50.51
SE+	3.42	0.22	1.74
CD at 5%	10.26	0.66	5.24
Sulphur Levels(S)			
S ₁	81.60	5.39	42.75
S ₂	93.22	6.15	48.82
S ₃	99.70	6.58	52.22
SE+	3.42	0.22	1.74
CD at 5%	10.26	0.66	5.24
Interaction (PXS)			
SE+	5.93	0.38	3.03
CD at 5%	NS	NS	NS

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