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Abdar JP
Ex. M.Sc Student, Department of Horticulture College of Agriculture, Latur, Maharashtra, India

Dhutraj SV
Assistant Professor, Banana Research Station, Nanded VNMKV, Parbhsni, Maharashtra, India

BR Gajbhiye
Assistant Professor, Department of Soil science and Agril. Chemistry COA, Parbhani, Maharashtra, India

Corresponding Author:
Abdar JP
Ex. M.Sc Student, Department of Horticulture College of Agriculture, Latur, Maharashtra, India

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

Abdar JP, Dhutraj SV and BR Gajbhiye

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Abstract
The experiment "Effect of different levels of phosphorous and sulphur on yield and quality of Cow pea (*Vigna sinensis*) Pusa Phalguni was conducted at the instruction a cum Research farm Department of Horticulture, Collage of Agriculture during kharif season 2012-2013. The experiment was laid out in factorial Randomized Design with three levels each of phosphorus and Sulphur consisting nine treatment combination replicated thrice. The treatment comprising of levels of phosphorus *viz*. P_1:40 kg P_2O_5/ha, P_2:50 kg P_2O_5/ha, P_3:60 kg P_2O_5/ha and three levels of sulphur *viz*. S_0:0 kg S/ha, S_1: 20 kg S/ha, S_2:40 kg S/ha and P_1:60 kg P_2O_5/ha. Minimum crop duration (109) days to first picking (53.11) and highest no of picking (7.00) yield green pod (5o.51q) per hacter protein (23.19) B:C ratio (3.7) of cow pea under study.

Keywords: *Vigna sinensis*, conducted, hacter

Introduction
Cowpea is commercially growth through out in India for its long pod green as vegetable for its seed as pulse for its foliage and fodder The nutrient available to plant particularly nitrogen and phosphorus are important constitution of protein and phospholipids, phosphorus not only enhance the root growth but also promotes early plant maturity Mullin *et al*., (1996) [4] phosphorus does not increase seed yield but also nodulation reported that an increase of about 5%seed protein content of cowpea as a result of phosphorus 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 reaction. Phosphorus does not only increase yield but also nodulation. Sulphur is a fourth major nutrient after nitrogen phosphorus and potassium Phosphorus all though not required in large quantities, critical to cowpea yield because of its multiple effect on plant nutrition (Muleba and Ezmumah, (1985) [5] Legume and oilseed crops have been found respond to sulphur application in soil because of deficiency in avaible sulphur dev and kumar (1982) [1]. Because of relatively higher protien content in seed and straw cowpea requirs high amount of sulphur than other legume crops.

Materials and Methods
The experiment on 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, Collage of Agriculture, Latur during kharif season 2012-2013. The experiment was laid out in factorial randomized design with three levels each of phosphorus and Sulphur consisting nine treatment combination replicated thrice. The treatment comprising of levels of phosphorus *viz*. P_1:40 kg P_2O_5/ ha, P_2:50 kg P_2O_5/ha, P_3:60 kg P_2O_5/ha and three levels of sulphur *viz*. S_0:0 kg S/ha, S_1: 20 kg S/ha, S_2:40 kg S/ha. The recommended N and K each of 50 kg per hacter. Where as the P and S was applied through urea and Diaammonium phosphate (DAP), phosphorus through DAP, potash through Mutrate of potash and sulphur through Gypsum. The cultural and other operation carried out during experimentation.

The crop was protected from insect and diseases by spraying pesticides, inecticides fungicides as and when required. The observation were recorded at 15 days interval.

Results and Discussions

Results presented in table in Table 1and 2 revelved that the different levels of fertigation had a significant influence on days to first picking, no of picking, crop duration, yield and protein content.

Days to initiation of flowering

Significantly minimum days (42.78 days) to first flowering recorded by treatment 50 and60 kg phosphorus per hectar. The significantly early flowering (42.33 days) was recorded when cowpea Crop was fertilizer with 20 kg S per hectar was found statically at par with 40kg per hectar Intraction effect found significant. Sulphur encourages vegetative plant growth ultimately resulted in early flowering.

Days to first picking: The minimum days (53.11) required to first picking with the application of 60 kg P_2O_5 $ha^{-1.}$ This treatment was found significantally superior over 40 kgP2O5. Significantly minimum days to first picking with the application of 40 kg sulphur. Intraction effect of phosphorous and sulphur on Days to first picking was non –significant. Itmay be happened due to early flowering was observed

No of picking: Significantly highhest number of picking (7.00) was recorded with the application of of 60 kg P_2O_5 ha^{-1}. In respect of sulphur, the maximum number of picking (7.00) of cowpea pod was done when 40 kg S per hectar was applied. Intraction effect found non-significant. It may be happened due to early flowering was observed

Crop duration: The cow pea fertilized with 40 kg P_2O_5 ha^{-1} completed their life cycle in (110 Days) which was very close 50 kg P_2O_5 ha^{-1}and60 kg P_2O_5 ha^{-1}. Application of 20 kg S per hactar completed their life cycle in 110 Days. Intraction effect of phourous and sulphur was found non-significant crop duration of cowpea was not significant due to genetic characteristics of cowpea variety Pusa fhalguni.

Green pod yield per plot and hectar

The maximum green pod yield per plot and pre hector was influenced significantly due to different levels of phosphorus. The maximum pod yield per plot (6.38kg) and per hector (50.61q) was produced with the application of 60 kg P_2O_5 $ha^{-1.}$ The application of 40 kg S per hector was produced higher green pod yoeld per plot (6.5kg) and per hectar (52.22q). Which was found superior over without application of sulphur per hector.

The application of 40 kgS h^{-1} was produced higher green pod yield per plot (6.5 kg) and per hectar (52.51 q) was found superior over without application of sulphur pper hectar. The higher green pod yield was recorde with higher level of phosphorus may be due to higher dose of phosphorus may be due to higher reproductive growth similar finding were reported by Rehman *et al*. (2007) [8] subhramanian *et al*. (1977) [10].

Protien content (%)

The higher protien content (23.19%) in cowpea seed was observerd due to application of 60 kg P_2O_5 ha^{-1}. Application of 40 kg S per ha recred highest protien content (23.16%) in cowpea seed. Interaction was found non-significant. The results might be due to sulphur which helps in the synthesis of amino acids these are the sourses of protein. Similrar results found by Kurdikeri *et al*., (1973), Meena *et al*., (2005).

B:C Ratio: The highest B:C ratio was obtained (3.6) with the application of 50 and 60 kg P_2O_5 ha^{-1}. As regard to sulphur application higher B:C ratio (3.7) was observed due to the application of 40 kg S per hactar. These results are in agreement with the finding of Patel *et al*., (2010) [7].

Table 1: Effect of different levels of phosphorus and sulphur and maturity charecters of cowpea

Treatment	Days to initiation of flowering	Days to first picking	Picking (no)	Crop duration
Phosphorus levels (P)				
P_1- 40P_2O_5/ha	43.11	55.67	6.78	110
P_2. ;50 kg P2O_5/ha	42.78	53.22	6.78	109
P_3 60P_2O_5/ha	42.78	53.11	7.00	109
SE+_	0.31	0.55	0.28	0.51
CD at 5 %	NS	1.65	NS	NS
Sulphur Levels (S)				
S_1- 0 kg S/ha	43.89	55.22	6.74	109
S_2- 20 kg S/ha	42.33	53.44	6.82	110
S_3-40kg/ S/ha	42.44	53.33	7.00	109
SE+_	0.31	0.55	0.28	0.51
CD at 5 %	0.95	1.65	NS	NS
Intraction effect-				
SE+_-	0.55	0.95	0.22	0.88
CD at 5 %	1.65	NS	NS	NS

Table 2: Effect of different levels of phosphorus and sulphur and yield and B;C ratio of cowpea

Treatment	Green pod yield per plot (kg)	Green pod yield per hectare (q)	Protein (%)	B: C Ratrio
Phosphorus levels (P)				
P_1- 40P_2O_5/ha	5.51	43.74	22.84	3.2
P_2. :50 kg $P2O_5$/ha	6.23	49.43	23.10	3.6
P_3 60P_2O_5/ha	6.38	50.51	23.19	3.6
SE+_	0.22	1.74	0.56	-
CD at 5 %	0.66	5.24	NS	-
Sulphur Levels (S)				
S_1- 0 kg S/ha	5.39	42.75	22.82	3.1
S_2- 20 kg S/ha	6.15	48.82	23.14	3.5
S_3-40kg/ S/ha	6.58	52.22	23.16	3.7
SE+_	0.22	1.74	0.56	-
CD at 5 %	0.66	5.24	NS	-
Intraction effect				
SE+_-	0.38	3.03	0.98	-
CD at 5 %	NS	NS	NS	-

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