

EFFECT OF DIFFERENT DOSES OF PHOSPHORUS ON GROWTH, YIELD AND QUALITY OF COWPEA (*Vigna unguiculata* (L.) WALP).

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A field experiment was conducted at the College of Agriculture, Gwalior (M. P.) to study the response of three cowpea varieties (Phillipines early, GC 176 and GC 185) and four levels of phosphorus on various plant characters (dry matter accumulation, number of branches and leaves and also on the yield and yield contributing characters viz. number of seeds per pod, Weight of 10 pods, number and weight of green pods per plant and yield of green pods (q/ha). From the pooled data, it was observed that yield and most of the yield attributes were optimum at 40 kg P₂O₅/ha. Variety GC 185 produced maximum green pod yield but GC 176 with equal yield possessed better yield contributing traits.

Cowpea (*Vigna unguiculata* (L.) Walp) not only maintains the soil fertility, but also utilizes more phosphorus from applied source (Reddy and Saxena, 1983). Beneficial effect of phosphorus on cowpea has been reported by Ahlawat *et al.* (1979), and Kumar and Pillai (1979). But, the response of legumes to applied phosphorus will depend upon the available soil phosphorus (Choudhary *et al.* 1971). However, the research information regarding selection of suitable variety of cowpea for vegetable purpose and its fertilizer requirement under soil and climatic conditions of Northern Region of Madhya Pradesh is meagre, and hence the present study was undertaken

MATERIALS AND METHODS

The experiment was conducted during 1976-77 and 1977-78 at Jawaharlal Nehru Krishi Vishwa Vidyalaya, College of Agriculture, Research Farm, Gwalior (M.P.). The soil was sandy loam, poor in available nitrogen (40 kg N/ha) medium in available phosphorus (21.5

kg P₂O₅/ha), low in available potash (140 kg K₂O/ha) and neutral in reaction (7.1 pH). The experiment comprised four levels of phosphorus (0,20, 40 and 60 kg P₂O₅/ha) and three varieties (Phillipines early, GC-176, and GC-185) with four replications in a randomized block design Uniform basal dose of 30 kg N + 15 kg K₂O/ha was drilled along with each phosphorus treatment before sowing. The seeding was done using 15 kg/ha in rows spaced 45 cm apart and plant to plant distance was 30 cm apart.

Table-1: Rainfall distribution during cowpea growth period in Kharif 1976-77 and 1977-78.

Period of growth	Monthly rainfall (mm)	
	1976-77	1977-78
June	107.7 (6)	Nil
July	154.5 (16)	35.6 (4)
August	127.5 (17)	407.4 (15)
September	248.9 (14)	100.5 (7)
October	9.4 (1)	Nil
Total	648.0	543

Figures in the parenthesis indicate number of rainy days

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Table-2: Mean length of main shoot, number of leaves and branches and fresh and dry weight per plant as affected by levels of phosphorus and varieties.

Treat-ments	Length of Main shoot (Cm.)		Number of branches / plant		Number of leaves / plant		Fresh weight/ plant(g)		Dry weight/plant (g)		1000 grain weight (g)							
	1976	1977	1976	1977	1976	1977	1976	1977	1976	1977	1976	1977						
Control	269.1	214.9	242.0	7.9	10.2	9.0	48.3	101.1	74.7	257.5	165.0	211.2	80.3	44.3	62.3	74.8	97.2	86.0
20	280.3	222.7	250.5	7.9	10.4	9.2	52.1	104.8	78.4	273.8	185.6	229.7	83.9	52.5	68.2	75.2	98.6	86.9
40	178.6	227.3	253.5	8.3	11.5	9.9	56.3	115.0	85.6	266.8	171.7	219.2	72.4	46.2	59.3	71.4	102.4	86.9
60	252.5	240.6	246.5	9.2	11.5	10.3	61.1	120.0	90.9	373.1	211.1	292.1	109.4	59.2	83.4	76.9	105.0	90.9
C:D. 5%	13.9	3.2	7.1	0.0	0.5	0.4	6.1	6.5	4.4	31.6	36.6	24.2	8.8	9.8	6.6	N.S.	4.87	4.00
Varieties																		
Philippi nes early	243.6	221.2	232.4	6.2	9.3	7.8	40.6	110.3	75.7	149.4	166.0	157.7	48.3	45.3	46.8	76.2	98.5	87.3
G.C.176	345.9	238.2	292.0	10.6	11.4	11.0	74.3	111.9	93.1	214.7	186.0	200.4	56.5	54.5	55.5	65.0	94.6	79.8
G.C.185	220.8	228.9	224.9	7.7	12.0	9.8	48.4	108.4	78.4	214.2	117.9	206.0	54.0	52.0	53.0	82.2	109.3	95.8
C.D. 5%	8.4	3.2	6.1	0.1	0.7	0.4	5.3	N.S.	3.8	27.30	N.S.	0.9	7.5	N.S.	5.7	5.5	4.2	3.4

N.S. = Non-significant

Table-3. Effect of phosphorus levels and varieties on the yield contributing characters.

Treatments	Length of pod/ plant (Cm.)		Number of seeds/ pod		Weight of pods (g)		Number of green pods/plant		Weight of green pods/plant (g)		Green pod yield (q/ha)							
	1976	1977	1976	1977	1976	1977	1976	1977	1976	1977	1976	1977						
P₂O₅ (kg/ha)																		
Control	18.5	26.8	22.6	13.0	15.5	14.3	39.0	82.4	60.7	41.1	47.4	44.2	158.1	172.1	160.3	136.0	78.8	107.4
20	17.8	22.2	22.5	13.0	16.4	14.7	38.8	84.2	61.5	38.0	48.2	43.1	147.5	178.5	163.0	136.5	80.0	108.3
40	18.7	29.8	23.8	13.7	17.2	15.4	39.0	89.6	64.3	37.3	48.9	43.1	146.0	181.1	163.1	122.4	84.8	103.6
60	18.9	28.3	23.6	13.3	18.2	15.8	39.6	94.6	67.1	38.1	52.8	45.4	152.2	201.7	176.9	130.9	96.1	113.5
C.D. 5%	N.S.	1.1	0.83	N.S.	0.6	0.6	N.S.	4.4	2.3	N.S.	3.7	N.S.	N.S.	19.3	14.8	N.S.	8.9	N.S.
Varities																		
Philip- pines early	22.3	29.2	25.7	13.4	17.9	15.6	43.8	89.1	66.4	32.1	48.1	40.1	141.6	179.8	160.7	112.5	87.9	100.3
G.C. 176	16.5	29.5	23.0	14.7	18.0	16.3	35.0	41.8	63.4	48.2	49.4	48.8	171.8	186.7	180.7	130.6	86.6	108.6
G.C. 185	16.6	24.6	20.2	11.6	14.6	13.1	38.5	82.1	60.3	35.4	50.5	42.9	140.0	180.6	160.3	151.3	80.3	115.8
C.D. 5%	0.9	1.0	0.7	0.9	0.4	0.5	1.2	3.9	2.0	4.5	N.S.	2.7	21.1	N.S.	12.8	22.9	N.S.	11.7

NS = Not significant

RESULTS AND DISCUSSION

EFFECT OF PHOSPHORUS:

Phosphorus significantly influenced the growth characters of cowpea in both the years. Increase in branches, leaves, fresh and dry weight/plant were recorded at 60 kg P_2O_5 /ha. But the length of main shoot/plant, was maximum at 20 Kg P_2O_5 /ha during first season and at 60 kg P_2O_5 /ha in the second season, while on pooled basis, it was higher at 40 kg P_2O_5 /ha and was at par with 60 Kg P_2O_5 /ha (Table-2). These results are in agreement with those reported by Gautam and Khare (1971).

Yield and yield attributes viz., number of seeds/pod, number and weight of green pods/plant and green pod (q/ha) were affected significantly by 60 kg P_2O_5 /ha over other levels of phosphorus during the second year (Table-3). Application of phosphorus did not affect these parameters during the first year. However, on the basis of pooled data of both years, weight of pods and total green pod weight per plant were highly influenced by 60 kg P_2O_5 /ha. The present findings are in agreement with those reported by Kaul and Sekhon (1976).

Significant increase in green pod yield was recorded only at 60kg P_2O_5 /ha during 1977. But the pooled data were not significant. protein content was not influenced by phosphorus application. Grain weight increased with 60 kg P_2O_5 . On this whole 40 kg P.O. appears optimum.

EFFECT OF VARIETIES:

In general higher pod yield was obtained in 1976 due to low rainfall at flowering (Table-1). Lower pod yield in the

second year was due to heavy down pour by August and to early September coinciding with the flowering period of crop and later part of September and completely dry as a result of which pollination was hampered.

Variety GC-185 gave the highest yield of green pod (151.85 q/ha), which was at par with variety GC-176 and significantly superior to philippines early. However, Varieties GC-176 and philippines early were statistically at par with each other. On the basis of pooled data, it was noted that though this variety GC-185 gave the maximum yield of green pods, for other yield parameter GC76 was superior.

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