

RESPONSE OF GROUNDNUT VARIETIES TO PHOSPHORUS FERTILIZATIONS

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To study the response of groundnut varieties to phosphorus fertilization, field experiments were conducted during *kharif* season of 1982 and 1983 at the Research Farm, College of Agriculture, Gwalior (Madhya Pradesh). Results revealed that of the 6 cultivars tested, S-1 and TG-17 producing more number of branches and highest number of pods per plant yield significantly higher. The profitable yield was recorded with the application of 40 kg P₂O₅/ha.

Groundnut (*Arachis hypogaea* L.) could not become popular amongst the farmers of northern Madhya Pradesh inspite of the fact that region possesses enough potential for the productivity of groundnut crop as the soils of the region are alluvial, well drained and most suitable for its cultivation. In this context investigation was undertaken during *Kharif* season of 1982 and 1983 to evaluate the optimum dose of phosphorus for raising the average yield and stabilizing the production of groundnut under the agro-climatic conditions of northern parts of Madhya Pradesh.

MATERIALS AND METHODS

Field investigations were carried out in split plot design at the Research Farm, College of Agriculture, Gwalior (Madhya Pradesh) India, during *Kharif* season of 1982-83 and 1983-84. The trials comprised of 6 groundnut varieties (Jyoti, AK-12-24, Gangapuri, S-1, M-13 and TG-17) as main treatments and 5 levels of P₂O₅ (0, 20, 40, 60 and 80 kg/ha) in the form of superphos-

phate as sub-treatments. Each treatment was replicated 4 times in plots of 5m x 2.4m having 8 rows at a distance of 30 cm. Basal dose of 20 kg each of N and K₂O/ha was applied in all the plots at sowing. The soils of the experimental area was alluvial, loamy, deep medium in fertility having E. C. 3 m-mhos; Organic carbon 0.41% and available N, P₂O₅ and K₂O as 140, 15 and 179 kg/ha, respectively and pH 7.6. Sowing was done in early July during both the years. Observations on different parameters like height of the plant, number of branches and number of pods per plant, number of kernels per pod, weight of 100 kernels and weight of dry pods were taken at the time of harvest on 5 randomly selected plants per plot. The data were statistically analysed.

RESULTS AND DISCUSSION

(i) *Effect of varieties :*

There were significant yield differences among the cultivars. Cultivar S-1 (flow runner x Jyoti) registering

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Table 1 : Effect of different treatments on various growth, development, yield contributing and quality components of groundnut.

Varieties	Plant height (cm)		No. of branches/plant		No. of pods/plant		No. of kernels		Weight 100 kernels (g)		Dry pod (q/h3)							
	82-83	83-84	Mean	82-83	83-84	Mean	82-83	83-84	Mean	82-83	83-84	Mean	82-83	83-84	Mean			
Jyoti	57.5	35.5	46.5	3.5	5.0	4.3	13.8	18.2	16.0	1.3	1.4	1.35	29.9	29.9	29.8	22.5	22.3	22.4
AK 12-24	58.8	34.2	46.5	3.5	5.4	4.5	13.5	22.5	18.0	1.3	1.4	1.35	33.1	32.8	33.0	25.0	22.4	23.7
Gangapuri	62.5	45.6	54.1	3.5	5.4	4.5	9.3	11.6	10.5	2.2	2.3	2.25	36.6	36.5	36.6	22.6	33.5	23.1
S-1	41.1	20.3	30.7	6.5	7.4	6.9	12.2	38.8	25.5	1.7	1.8	1.75	53.2	53.2	53.2	37.7	37.1	37.4
M-13	39.6	20.1	29.8	6.9	7.2	7.0	8.2	20.3	14.3	1.6	1.6	1.60	70.4	70.0	70.2	28.9	28.6	28.8
TG-17	40.6	20.8	30.7	4.4	4.9	4.7	15.9	28.5	20.2	1.2	1.2	1.22	46.4	47.3	46.2	36.1	35.2	35.6
C.D. at 5%	4.9	3.9	—	0.8	0.59	—	1.8	6.52	—	0.6	0.09	—	1.6	4.2	—	0.57	2.7	—
Levels of P ₂ O ₅ (kg/ha)																		
0	48.0	26.1	37.0	4.6	5.4	5.0	10.6	17.4	14.0	1.4	1.5	1.5	41.3	41.9	41.6	25.6	25.4	25.5
20	49.6	30.6	40.1	4.7	5.8	5.3	11.5	20.2	15.8	1.5	1.1	1.5	43.4	44.8	44.1	28.3	27.7	28.0
40	51.4	35.9	43.7	4.9	6.7	5.8	12.5	23.5	18.0	1.6	1.6	1.6	45.0	46.0	45.5	29.6	28.9	29.2
60	50.5	29.8	40.2	4.5	5.8	5.2	12.7	30.0	21.4	1.6	1.7	1.6	46.6	47.8	47.2	30.9	30.1	30.5
80	50.5	26.3	38.4	4.8	5.5	5.2	13.6	25.7	19.7	1.6	1.6	1.6	45.8	44.39	45.1	29.9	18.5	24.2
C.D. at 5%	N.S.	3.5	—	N.S.	0.19	—	1.2	4.2	—	0.5	0.25	1.6	4.9	1.20	—	1.6	4.1	—

Table-2: Effect of different treatments on pod yield (q/ha) of groundnut

Treat- ments P ₂ O ₅ (kg/ha)	Jyoti		AK 12-24		Gangapuri		S-1		M-13		TG-17							
	82-83	83-84	82-83	83-84	82-83	83-84	82-83	83-84	82-83	83-84	Mean	82-83	83-84	Mean				
0	18.4	19.4	18.9	26.6	19.0	21.3	19.0	19.1	19.0	33.2	34.3	33.8	26.4	29.1	27.7	33.3	31.0	32.2
20	22.1	22.6	22.3	23.9	22.0	22.9	22.9	23.7	23.3	35.3	36.5	35.9	28.3	29.1	28.7	35.1	31.3	33.2
40	23.8	23.0	23.4	23.8	22.7	23.2	23.8	24.4	24.1	38.6	37.5	37.5	30.9	29.9	30.4	36.8	36.2	36.5
60	24.1	23.6	23.8	24.7	24.1	24.4	23.9	25.3	24.6	40.7	39.0	39.0	29.0	30.0	29.5	37.2	37.0	37.1
80	24.1	23.1	23.6	24.2	23.1	23.6	23.4	25.1	24.3	40.8	37.8	37.8	29.5	30.0	29.8	37.7	36.5	37.1
Mean	22.5	23.34	22.4	25.1	22.2	23.6	22.6	23.5	23.1	37.7	37.0	37.0	28.9	29.6	29.25	36.1	34.4	35.2

C. D. at 5%
 1982-83 2.5
 1983-84 3.56

Varieties P levels
 2.5 1.64
 3.56 2.17

highest yield of dry pods proved significantly superior to rest of the varieties in 1982 and in 1983-84, where it was on a par with TG-17. Cultivar TG 17 in turn was significantly superior to remaining cultivars (Table-1). The lowest dry pod yield was recorded by Jyoti in both the years.

The cultivars M-13 and S-1 produced equal number of branches which were significantly more than rest of the cultivars. From two years data, it is seen that cultivar S-1 had more number of pods per plant followed by TG-17. While Gangapuri contained more number of kernels per pod followed by S-1. Highest kernal weight was however, recorded in M-13 followed by S-1. Thus, on the whole the highest yield recorded by cultivar S-1 could be attributed to the cumulative effect of all the growth and yield attributes, which ultimately pushed this cultivar ahead of the rest of cultivars. These findings are in conformity with that of Tomar *et al.* (1983).

ii) Effect of phosphorus

Various levels of phosphorus marginally influenced the growth ancillary characters of groundnut (Table-1). Although a significant increasing trend with regard to growth ancillaries viz, height and number of branches per plant was observed only up to 40 kg P_2O_5 /ha, there-after a trend of decline was noticed during both the years. Findings of Tomar (1983) provided ample support to present investigations. Phosphorus application significantly increased the growth ancillaries probably due to the cell division and more development of meristematic tissues. Yield and yield attributes were also appreciably influenced due to various levels of phosphorus. There was a significant increase in dry pod yield with successive increase in phosphorus levels only up to 40 kg P_2O_5 /ha during 82 and 83. Application of 60 kg P_2O_5 /ha also resulted in increased yields in both the years but was on par with

40 kg P_2O_5 /ha. These findings are in conformity with those earlier reported by Dahatonde and Rahate (1974) and Tomar *et al.* (1983). It was further noticed that a significant increase in number of pods per plant and test weight (weight of 100 kernels) was also observed at 40 kg P_2O_5 /ha, but number of kernels per pod did not show any markedly differences due to varying levels of phosphorus. Application of phosphorus beyond 60 kg P_2O_5 /ha showed a trend of decline in all the attributes in both the years. However, their differences were on par. Similar results were also reported by Tomar *et al.* (1983), which may be ascribed to toxic effects of excessive application of phosphorus beyond the super normal range of requirement, which might have resulted decrease in yield and yield attributes

The interaction effect of variety and phosphorus levels was found to be significant in both the years. The dry pod yield in cultivars "S-1" and "TG-17" was significantly higher at 40 kg P_2O_5 /ha as compared to 20 and 0 kg P_2O_5 /ha in both the years. Further, increased in levels of phosphorus recorded almost similar yields in groundnut cultivars. Thus, it was inferred that "S-1" and "TG-17" were proved to be superior to the rest of the cultivars tried. A dose of 40 kg P_2O_5 /ha was profitable for achieving the higher yields of dry pod of groundnut under agro-climatic conditions of northern part of Madhya Pradesh.

REFERENCES

- DAHATONDE, B. N. and V. T. RAHATE. 1974. Effect of levels and methods of phosphate fertilization on yield contributing characters of summer groundnut. *PKV. Res. J.* 3 : 1-4.
- TOMAR, S. P. S., Y. S. CHAUHAN V. K. JAIN and P. C. JAIN. 1983. Response of phosphorus on different varieties of groundnut, (*Arachis hypogaea* L.) *Madras agric. J.* 70 (5) : 301-5.