

Effect of Phosphorus on the Growth and Yield of Hybrid Maize (*Zea mays* L.)

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Phosphorus is the backbone of any fertilizer management. The phosphorus status of our soils have revealed in the low category. There is a need to apply phosphorus for achieving higher yield in about 98 % of the soils of our country (Ghosh and Hassan, 1979). Response to P application in soils, having high available P status (Tandon 1987). Therefore there is a need to workout optimum requirement of phosphorus to exploit higher yield potential of hybrid maize.

A field experiment was conducted to study the response of phosphorus level on growth and grain yield of maize at Main Maize Research Station, Gujarat Agricultural University, Godhra during three kharif seasons of 1995, 1996 and 1997 under rainfed conditions. The experiment was laid out in randomized block design with 6 replications. The soil was sandy loam, containing 251, 48 and 417 kg/ha, total N, available P_2O_5 and available K_2O respectively. The treatments consisted of 4 phosphorus levels (0, 20, 40 and 60 kg P_2O_5 /ha). A uniform dose of nitrogen 100 kg/ha was applied in all the treatments. Seeds were uniformly sown in furrows and

later on thinned to obtain the required plant density. All package of practices required for the crops were followed.

The growth characters like plant height (cm) and dry matter production were significantly affected by application of 0 to 60 kg P_2O_5 /ha. Maximum plant height 161 cm was recorded with 60 kg P_2O_5 /ha. Likewise the highest dry matter production (3680 kg/ha) was obtained with 60 kg P_2O_5 /ha. These findings are in accordance to the results observed by Subbian *et al.* (1991). The yield attributes like number of Cobs/ha and test weight (1000 grain weight in g) were also known to be significantly affected by graded levels of phosphorus. Maximum number of cobs per ha. (69167) was noted with 60 kg P_2O_5 /ha, which was however at par with 40 kg/ P_2O_5 /ha. The highest test weight (195.g) was also recorded with 60 kg P_2O_5 /ha. which remained statistically at par with 40 kg/ P_2O_5 /ha.

The grain yield was significantly influenced by different doses of phosphorus, highest being in 60 kg P_2O_5 /ha treatment followed by 40 kg P_2O_5 / ha treatment. The yield of both the treatments was statistically at par and significantly superior than remaining doses of phosphorus (Table-1). This increase in grain yield with the increase in phosphorus levels may be attributed probably to the development of extensive root system, which enabled the plants to absorb more nutrient from the soil depth

TABLE 1

Effect of different phosphorus levels on growth parameter and yield of hybrid maize (pooled data).

Treatments	Plant height (cm)	No. of cobs /ha ('000)	1000 grain weight (g)	Length of cobs (cm)	Grain yield (kg/ha)	Yield of stover (kg/ha)
Phosphorus levels (kg/ha)						
PO	152	60.0	156	16.6	1354	1896
P20	153	63.3	170	17.1	1824	2736
P40	159	66.7	188	17.6	2248	3484
P60	161	69.20	195	18.0	2453	3680
S.Em. +	1.74	0.77	2.20	0.79	111	122
C.D. at 5%	6.03	2.23	7.63	NS	385	423
C.V.%	5.22	4.14	5.72	16.30	7.40	8.19

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TABLE 2

Economics as influenced by different treatments.

Treatments	Grain yield (kg/ha)	Yield of stover (kg/ha)	Gross realization (Rs./ha.)	Cost of production (Rs./ha.)	Net realization (Rs./ha.)	CBR
P0	1354	1996	8666	5000	3666	1:1.73
P20	1824	2736	11856	5391	6465	1:2.20
P40	2248	3484	14724	5782	8942	1:2.55
P60	2453	3680	15945	6173	9772	1:2.58

and might have growth of the plant enhanced photosynthetic activities. The positive effect of phosphorus levels on grain yield and yield attributes have also been reported by Kumpawat and Rathore (1995) and Singh *et al.* (1995).

It was also found that higher net/profit of Rs. 9772/ha was obtained with 60 kg P_2O_5 /ha with a CBR at 1:2.58 followed by Rs. 8942/ha with CBR of 1:2.55 in 40 kg P_2O_5 /ha. Therefore to harvest higher yield (2453 kg/ha) of hybrid maize under rainfed condition of middle Gujarat Agro-climatic Zone-II (AES-II) a dose of 60 kg P_2O_5 in conjunction with 100 kg N/ha K_2O was observed to be economical.

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