COMPARISON OF P FERTILIZER AND THEIR APPLICATION METHODS FOR MAIZE CROPS

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INTRODUCTION

In Pakistan, phosphate fertilizers are applied manually on soil surface and ploughed down before crop sowing. This practice results in uneven distribution of fertilizer, thereby effecting P utilization efficiency of the crop due to restricted movement of P in soil. By the time, seed germinates and develops its roots, most of the applied P gets fixed in the soil or changes into less soluble forms (7). Soil application of plant nutrients have been made through irrigation water and the practice is termed as fertigation in modern fertilizer technology (3). The advantages of fertigation include saving in labour and energy as well as application of nutrients synchronized with the need of the plant during the growth period. Injection of N alone or with K through irrigation water is a common practice in U.S.A. and many other countries (2, 4, 5). However, no information regarding application of P fertilizer through irrigation water is available. The present paper reports on the comparison of conventional surface application of P and its application in irrigation water.

MATERIALS AND METHODS

Soil collected from surface layer (0-15 cm depth) of NIAB farm was air dried, crushed and passed through 2 mm sieve. The soil was alkaline (pH 8.0) sandy loam, having 0.5% organic matter, 4.5% free lime, 7.7 mg P kg^{-1} soil ($NaHCO_3$ Extractable), and 160 mgK kg^{-1} soil (Ammonium acetate extractable). Two and a half kg soil was taken in each plastic pot. The pots were arranged in a complete randomized design. Each treatment ... addition of deionized water. After 44 days growth, plants were harvested, dried in an oven at 70°C and yield was recorded. Plants material was ground by a Wiley cutting mill and one gram portions of ground material were digested with HNO_3-H_2SO_4-$HClO_4$ Ternary acid mixtdures according to the procedure outlined by Jackson (1). Phosphorus was determined by Barton's reagent (1).

RESULTS AND DISCUSSION

Application of P fertilizers by both the methods significantly (P 0.05) increased the dry matter yield of maize plants (Table 1). P concentration in plants varied from 1214 to 1456 mg kg^{-1} but these differences were statistically non-significant, irrespective of the method and P source applied. Obviously this may be due to the dilution effect resulting from better growth of the plants with P fertilizer as indicated in %age increase data (Table 1).

Table 1: Dry matter yield and P content of maize as affected by P fertilizer and application methods.

P application mg P kg^{-1}	Source	Application method	Dry matter yield g $plant^{-1}$	%age increase over control	P conc. mg kg^{-1}	P uptake ug $plant^{-1}$
Control	-	-	1.17 C	-	1214	1422 C
10.0	KH_2PO_4	Solution	2.08 A	77.8	1400	2905 A
10.0	KH_2PO_4	Plough down	1.60 B	37.2	1313	2105 B
10.0	SSP	Solution	1.98 A	69.6	1358	2694 A
10.0	SSP	Plough down	1.48 B	26.5	1456	2134 B

The plants receiving P in solution form produced