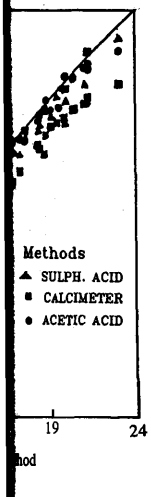

COMPARISON OF DIFFERENT PHOSPHORUS SOURCES FOR RICE AND SUBSEQUENT BERSEEM CROP PRODUCTION

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ABSTRACT

Various phosphorus (P) sources were compared to evaluate the efficient and economical P source for crop production under alkaline soil conditions. A field experiment was conducted having soil characteristics texture, sandy clay loam; pH, 7.7; ECe, 1.1 dS m^{-1}; N, 0.07%; available P_2O_5 9.2 mg kg^{-1}; and K_2O, 115 mg kg^{-1}. For this purpose P was applied to rice crop @ 30,60,90 kg P_2O_5 ha^{-1} as single superphate (SSP); 60,90 kg P_2O_5 ha^{-1} as bone meal (BM) and 180, 270 kg P_2O_5 ha^{-1} as rock phosphate (RP). The residual effect of these treatments on the following berseem fodder crop was also worked out. In rice crop SSP was superior to other sources with respect to yield and yield contributing factors like plant height, tillers and panicles count $hill^{-1}$, number of grains $panicle^{-1}$ and 1000-grain weight. The best P rate was 90 kg P_2O_5 ha^{-1} as SSP. Rock phosphate produced the lowest crop yield as compared to SSP and BM. The residual effect of these P sources on the following berseem fodder crop was similar to rice crop. The low efficiency of RP seemed due to its less solubility in alkaline soil conditions. On overall basis, SSP was the best source of P under the studied soil conditions.

INTRODUCTION

Commonly used source of phosphorus (P) for rice in Pakistan is single superphosphate (SSP). Due to its limited productions, there is a need to find out other alternate P sources. Rock phosphate (RP) is raw material for the manufacture of SSP. The positive response of RP for some crops on certain soils has been reported by Datta and Gupta (1983) and Bandhyopadhya (1988). Bone meal (BM) containing 20% P_2O_5 produced at Neelum Glass Industries Limited, is extensively used in plants only in small quantities due to its fixation either by colloidal complex or formation of sparingly soluble compounds, which remain available to the succeeding crops. Hence P sources like SSP, Bm and RP have shown lastling effect for the succeeding crops. (Malik et al., 1977; Datta and Gupta, 1983). Berseem is one of the most common rabi fodders in Pakistan. It is not only capable of fixing atmospheric nitrogen but also has high capacity of extracting P even from unacidulated phosphate rocks (Vincent, 1965).

In the present study it was, therefore, contemplated to test the comparative effectiveness of SSP, BM and RP for their P fertilizing value on rice and their residual effect on the following barseem fodder.

MATERIALS AND METHODS

These studies were carried out at the field in the research area of Soil Science Department, University of Agriculture, Faisalabad during 1988-89. The soil was sandy clay loam with pHs 7.7, ECe 1.1 dS m^{-1}, total N 0.07%, available P_2O_5 9.2 mg kg^{-1} and extractable K_2O 115 mg kg^{-1}.

Three P sources viz., SSP, BM and RP were compared. Single superphosphate @ 30,60 and 90 kg ha^{-1}, BM @ 60 and 90 kg ha^{-1}, and RP @ 180 and 270 kg ha^{-1} were applied. The P_2O_5 contents of SSP, BM and RP were 18, 20 and 32%, respectively.

Rice (oryza sativa L.) variety Basmati-385 was grown with 25x20 cm row spacing in 16x1.5 m size plots. The experiment comprised of eight treatments including control laid out according to randomized complete block design with four replications. To fulfil the N requirement of the crop.