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PHOSPHORUS REQUIREMENT OF MAIZE (*ZEA MAYS. L*) UNDER THREE TILLAGE PRACTICES IN DIFFERENT SOIL SERIES IN RAINFED CONDITIONS

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ABSTRACT

Experiments were conducted during 1992-93 in sub-humid zone under rainfed condition, to find P requirement of maize grown with three tillage practices on different soil series. The tillage practices selected were zero tillage, cultivator and moldboard plough. The results revealed that P requirement depended upon soil inherent characteristics and tillage practices adopted. The pivotal soil characteristics which influenced P requirements were amount of clay, degree of calcareousness of soil, presence or absence of lime concretion zone within tillage depth, organic matter and soil reaction. Tillage practices influenced on moisture conservation and root penetration depth in soil, affected P requirement as well as grain yield of the crop. In general, P requirement for maize with zero tillage practice was highest, followed by cultivator and least with moldboard plough. However, in the case of soil having lime concretion zone within tillage depth, the requirement of P was greater with moldboard plough than with cultivator. The requirement for selected soils with three tillage practices was different. The grain yield was highest with moldboard plough, followed by cultivator and least with zero tillage. However, the yield potential of various soils and difference in grain yield due to three selected tillage practices on a particular soil depended upon the inherent characteristics of the soil.

INTRODUCTION

Deficiency of phosphorus (P) in Pakistan soils is widespread resulting in low crop yields without P application (Wahab, 1985; Memon, 1986 and Rashid, 1994). The prevalent P status of agricultural soils in classification. Almost no experiment has been conducted on a known category of soil classification, e.g. soil series, soil family, subgroup etc. Therefore it was difficult to apply the results successfully at other locations. However, the available data from these experiments served as a basis for making generalized fertilizer recommendations to the farmer. No site specific recommendations could be made for a particular crop from this data. The present studies were carried out to assess the P requirement of maize and its yield grown on different soil series with different tillage practices and to identify the soil factors affecting P requirement.

MATERIALS AND METHODS

Six soil series namely Guliana, Peshawar, Missa, Burhan, Balkassar and Kahuta were selected from subhumid subtropical climate. The relevant physico-chemical characteristics of soil series are listed in Table 1. The tillage practices were: zero tillage (only one time ploughing was done with cultivator before application of fertilizer), cultivator and moldboard plough. The level of P were; 0, 15, 30, 45, and 90 kg ha^{-1} and source was single super phosphate. Nitrogen as urea was applied at the rate of 100 kg ha^{-1}.

The experiment was laid out in spilt plot design with main plot as tillage and sub plot fertilizer. There were three replications, each subplot was 5 meter wide and 6 meter long. The main plot at a place was 25 meter