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Extractants of phosphorus and their correlationship with soil properties and yield of maize

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ABSTRACT

A pot experiment was conducted with 15 soils of Anand and Kheda varying widely in their P availability to find the suitable extractants for the determination of available P. It was found that the available P extracted with various extractants negatively associated with soil characteristics such as pH, EC, OC, $CaCO_3$ and clay. On the basis of correlation obtained between soil test values and P uptake, it was observed that Olsen's and AB-DTPA extractable P were equally good indices of P availability for predicting P response to maize.

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Key words : Different soil test methods, Soil properties, Yield and uptake

INTRODUCTION

Crop responses to phosphatic fertilizers vary with soil physico-chemical properties with the nature of crop, variety and climate. The variation in responses is due to the differences in their phosphorus requirement, utilization efficiency of soil and fertilizer phosphorus for same level of production. The crop responses have remained unpredictable because of poor recovery of phosphorus from applied fertilizers due to fixation in the soil and also for want of proper soil testing methodology.

The availability of soil phosphorus has been estimated by different reagents which include use of water, CO_2 saturated water, mild organic and inorganic acid solutions, alkalies buffered solutions or even chelating agents of the reagents proposed 0.5 M $NaHCO_3$ pH 8.5 (Olsen *et al*., 1954) has become more popular. In recent years, the methods Mehlich-3 (Mehlich, 1984) and AB-DTPA (Soltanpour and Schwab, 1977) are gaining importance. The information regarding appropriate extractant for determining phosphorus in Anand and Kheda soils is lacking for sound fertilizer recommendation.

MATERIALS AND METHODS

Fifteen surface soil samples varied from low to high in Olsen's extractable P were collected in bulk quantity from different locations of Anand and Kheda districts. The soils under study have Ustochrepts as great group and inceptisols as order. But soils S_1, S_2, S_3, S_4, S_9, S_{11}, S_{12}, S_{13}, S_{14} and S_{15} have Typic Ustochrepts as sub-group, while soils S_5, S_6, S_7, S_8 and S_{10} fall under vertic Ustochrepts. The soils S_1, S_2, S_3 and S_4 have loamy sand. So S_7, S_8 and S_{10} have sandy loam and S_5, S_9, S_{11}, S_{12}, S_{13}, S_{14} and S_{15} have sandy clay loam texture. The values of water holding capacity ranged from 33.9 per cent in case of S_4 to 49.5 per cent in S_9 soil. The $CaCO_3$ content in these soils varied between 0.78 and 5.0 per cent. These soils are alkaline in reaction (7.40 - 8.77) but have no salt accumulation (0.08 - 0.52 dSm^{-1}). The values of CEC in these soils varied between 9.25 in S_{10} and 18.52 Cmol kg^{-1} in S_{14}. The organic carbon content ranged from 0.21 per cent in case of S_7 to 0.52 per cent in S_{15}, while the total nitrogen percentage ranged between (0.018 and

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