INTRODUCTION

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Phosphorus and zinc deficiency is one of the common problems in calcareous soils. In Egypt calcareous soils represent the most promising areas for agriculture extension.

The applied soluble fertilizers, to correct the deficiency of most nutrients, may react rapidly with the soil constituents and either precipitate or being adsorbed onto soil components with consequent relatively low availability.

The chemistry of the reactions of such nutrients with solids and soil solution components is of prime importance for assessing their availability to growing plants.

Main factors responsible for the availability of nutrients in soil are clay content, soil reaction and occurrence of $CaCO_3$ and iron oxides. Sequence of application of soluble phosphorus and zinc in the presence of organic ligands may influence their availability to plants. The soil solution contains many types of organic ligands originated from plant exudates, decay of organic matter and as products of microbial activities. These ligands can compete with both elements particularly in the anions form for sorbing sites or forming stable complexes with Ca, Fe and Al. Also, these ligands are able to form complexes with micronutrients which may become more soluble than the free ions.

The main objectives of this work are to investigate:

(i) The adsorption of P and Zn by soils in relation to soil properties .

(ii) The effect of some organic ligands at different concentrations (ctitrate, oxalate and acetate) on the adsorption of P and Zn by soils.

(iii) The effect of sequence of application of organic ligands with either P or Zn and vice versa on adsorption and availability of both nutrients.

(iv) hnhThe effect of applied P on the adsorption and desorption of Zn in the soil.

(v) The effect of the rates of P and Zn application and the time of contact on their availability to plants.