STUDIES ON THE CHEMISTRY OF CHELATING COMPOUNDS AND THEIR REACTION IN SOILS

By

Ibrahiem Atia Abdel - Latief

B. Sc. (Soils) , Ain Shams University (1959)
M. Sc. (Soils) , Assiut University (1965)

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1. INTRODUCTION

Chelation is an equilibrium reaction between a metal ion and an organic molecule, characterized by the formation of more than one bond between the metal and a molecule of the chelating agent and resulting in the formation of a ring structure incorporating the metal ion. Several investigators have reported that certain compounds of soil organic matter are capable of chelating metals and that such metal chelates are important in the physico-chemical properties of soils such as water-holding capacity, C.E.C., organo-metallic interactions retention, movement and availability of elements.

Fertility problems in alkaline calcareous soils of Egypt, due to retention and fixation of elements such as Fe, Zn, Cu, Mn and P are thought to be related to high pH and excess of calcium carbonate. Several investigators found that the application of organic manures was generally effective in increasing the productivity of soils. It is believed that soil organic matter plays an important role in mobilization as well as availability of some nutrient in soils.

Thus, this study was first planned to isolate and characterize certain soil organic matter compounds and to

determine their ability to form stable combinations with metal cations. Attempts were made in order to select the suitable extract for soil humus and to fractionate the extract to its main components, humic and fulvic acids.

Attempts were also made in order to characterize the nature of different organic matter compounds by determing their elementary analysis and C.E.C. Also type and amounts of functional groups were determined either by titration or infra-red analysis. The compounds were studied further with respect to their ability to form metal chelates with Fe, Zn and Mn.

A comparative study was also made in order to evaluate the ability of humic and fulvic acids in extracting certain elements from soils and clay mineral and compare such abilities with that of synthetic chelates namely EDTA (Ethylenediaminetetraacetic acid) and EDDHA (Ethylenediamine di (O-hydroxyphenylacetic acid).