STUDIES ON SOLUBILIZATION AND FRTILIZATION BY PHOSPHATE ORES AND BEHAVIOR OF THEIR ASSOCIATED ELEMENTS IN SOME EGYPTIAN SOILS

By

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دراسات عن الذوبان والتسميد بخامات الفوسفات و سلوك العناصر المصاحبة لها في بعض الأراضي المصرية

رسالة مقدمة من

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للحصول على
درجة دكتور فلسفه في العلوم الزراعية
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ABSTRACT

Rania Mohamed Abdel Hakam Mahdy: Studies on Solubilization and Fertilization by Phosphate Ores and Behavior of Their Associated Elements in Some Egyptian Soils. Unpublished Ph.D Thesis, Department of Soil Science, Faculty of Agriculture, Ain Shams University, 2011

Biological solubilization of rock phosphate is more friendly environmental than acidulation. There is a need therefore to develop a microbial process that will make phosphorous available for plant use with minimum pollution to the environment. Three natural phosphate rock samples were collected from Sebaiya (Nile Valley), Safaga (Red Sea) and Abu Tartur (Western Desert) together with tri-Ca phosphate as industrial fertilizer for comparison and to study the effect of phosphate rock application rates, type of rock phosphate deposits, the time of incubation (2,4 and 6weeks) and different soils on phosphorus rock solubilization. Also, the study included counting, isolation and identification of two phosphate dissolving bacteria. The obtained results indicated that there does exist a reasonable potentiality to use the rock phosphates directly as fertilizers instead of the industrial ones by applying 2g of the phosphate rock /1kg soil which represents two tons/Fadden. To improve the phosphorous solubility, three types of amendments were applied namely elemental sulphur, compost and orange waste. The rate of addition and the incubation period then the potentiality of performing such amendments were investigated. A trial to propose a modified diagram concerning the factors influencing the phosphorous solubility and/or availability was discussed. The study of organic amendments such as composts, manures and plant wastes proved to be effective on wheat cultivation under greenhouse conditions.

An agricultural pot experiment using wheat plant (Sakha-63) in both clay and calcareous soils and applying the phosphate rocks Abu Tartur oxidized; Red Sea and El Sebaiya were conducted. The shoot dry weight of grown plants was correlated with its phosphorous, uranium and rare earth elements concentration, along with uptake and utilization efficiency of mycorrhizal infection percent.

Finally, the present study indicated that a reasonable possibility could be existed for the application of the rock phosphates directly as fertilizers instead of the industrial ones under certain conditions. Moreover, the application of phosphate rock natural fertilizers combined with amendments of organic manures may improve the phosphorous solubilization and availability. In fact, this application is more friendly environmental with respect to the environmental concerns and impacts.

Key Words: Phosphate rock**,** Solubilization, Fertilization, Factors, Bacteria, Mycrrohiza, Uranium, Rare earth elements.

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