EFFECT OF COMPOST AND BIO-FERTILIZERS APPLICATION ON PHOSPHORUS AVAILABILITY OF PHOSPHATE ROCK

By

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B.Sc. (Soil Reclamation), Fac. Agric., Alex Univ., Egypt, 2002.
M.Sc. (Soil Science), Fac. Agric., Cairo Univ., Egypt, 2008.

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ABSTRACT

Low bioavailability of P in soil from the applied phosphatic fertilizers due to fixation/precipitation is considered the most critical factor in limiting optimum crop yields. Thus availability of alternate and cheap P resources is imperative for sustainable crop production and is a dire need of the hour. Phosphate Rock (PR) is a cheap source of P, but cannot be used directly as a soil amendment because of its very poor water solubility (0.1%). However, the bioavailability of PR-P can be enhanced by complexing it with compost and/or through the use of specific bioinoculants. A series of experiments were conducted to assess and evaluate the different Egyptian Phosphate Rock sources and select the best phosphate rock to produce phosphocompost to study the effectiveness of various approaches to solubilize PR-P and the impact of bioavailable PR-P on growth and yield of Banana and Soybean plants under green house and field conditions. According to the wide applications of phosphate rock types in Egyptian agricultural lands, phosphate rocks (PRs) were divided into three groups, the 1st (GI) is El-Sebaiya (east and west Nile Valley) group, the 2nd (GII) is Safaga (Red Sea, Hamraween) group and the 3rd (GIII) contains other types such as Abu-tartur (Western Desert) and Al-Oroba (Nile Valley) type. Different chemical and physical characterizations of these groups and phosphate desorption from the raw materials of these types were analyzed. The obtained results showed that Egyptian types of PRs have a significant variation in their potential toxic elements PTEs contents, total and available P and other chemical characterizations studied such as EC – pH and CaCO3. According to kinetic study used, the variations in kinetic parameters in different types concluded that phosphate retained in raw materials with different forces represent variation in P bioavailability. El-sebaiya west and Al-Oroba type have been the best phosphate rock to use.

Results for pot and field trials on banana and soybean plants, phosphocompost 20%El-Sebaiya with bacteria followed by phosphocompost 20% Al-Oroba with bacteria inoculate with Mycorrhizae the best in promoting growth and yield of banana and soybean plants in both pot and field trials. Other treatments also produced higher yield contributing traits than uninoculated with available Mycorrhizae, but with relatively less proficiency. The results of these studies may imply that PR inoculated with bacteria and Mycorrhizae proved to be aviable approach to use PR and organic waste for persistent crop production as well as for supporting healthier environment.

DEDICATION

I dedicate this work to whom my heartfelt thanks; to my parents, brothers and my sisters for all the support, patience and help they lovely offered along the period of my post graduation.

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