1-INTRODUCTION

Citrus is one of the most important fruit crops in the world and ranked the second after grape. In Egypt, citrus ranks the first of fruit crop production and most of attention is given to enhance its cultivation by many horticulturists. Citrus acreage is about 355518 feddans (represents 34.24%) out of the total fruit area which amounted about 1038325 feddans according to the latest statistics of the Ministry of Agriculture, Egypt (1999)*. Thereupon, strenuous efforts have always been extended to enhance citrus production through a better understanding of its reaction to environment, mineral nutrition and using the suitable rootstock. In this respect, most of citrus varieties under local conditions are commonly budded on Rangpur lime (***Citrus limonia*, Osbeck**), besides the common rootstock, *i.e.* Sour orange (***Citrus aurantium* L.**). Rangpur fruit is an acid mandarin type. Rangpur lime is similar in many aspects to Rough lemon. It induces high vigour, large trees, minimum cold tolerance, high yields, large fruit sizes and juice quality is only slightly better than that produced on Rough lemon. Trees sprout badly and have no tolerance of either citrus nematodes or burrowing nematodes. Like Rough lemon, it is highly tolerant to tristeza. It is damaged by both exocortis and xyloporosis. It is susceptible to ***Phytophthora*** foot-rot, but it is considered one of the best salt tolerance rootstocks. Moreover, Volkamer lemon (***Citrus volkameriana*, Ten and Pasq**) is a new rootstock. Trees on Volkamer lemon are generally similar in behaviour, but superior to those on Rough lemon. Trees on Volkamer lemon are very

*Statistics of the Ministry of Agriculture, Egypt (1999).

vigorous and productive for their size as young trees and appear to be less affected by cold and foot-rot than those on Rough lemon. It is not susceptible to tristezia, exocortis or xyloporosis, but it is damaged by both burrowing and citrus nematodes. In addition, the traditional citrus rootstock namely Sour orange (***Citrus aurantium*, L.**) gave trees somewhat slower in their growth rate than those grown on Rough lemon. It produces tree moderate in its growth vigour and size. Fruits produced by trees on Sour orange are less coarse than those arised form trees on rootstocks that induce high vigour and store well on the tree. Sour orange induces maximum cold hardness. It is tolerant to ***Phytophthora*** foot-rot, exocortis or xyloporosis viroid, but it is extremely sensitive to citrus tristezia virus. It has no resistance to damaging nematodes. Sour orange does well on calcareous soils and is more tolerant to saline soils **(Castle *et al.*, 1989).**

On the other hand, bio-fertilization for fruit crops mainly seedlings called the attention of the nurserymen and it became in the last few decades a good alternative to chemical fertilization. Besides, biofertilization has the advantages of avoiding environmental pollution and being cheap.

Inoculating the soil with mycorrhizae fungi is considered an item of biofertilization, where biomyces live between plant roots. In fact, mycorrhizae fungi are beneficial microorganisms, since they live near the feeder roots of plants and consequently play a vital role in stimulating the various physiological processes related to plant growth and development. Moreover, **Gianinazzi *et al.* (1989)** demonstrated abnormal development of seedlings grown in sterilized soil and suggested a strategy for inoculating the soil with vesicular-arbuscular mycorrhizae (VAM) fungi.

However, the most important types of mycorrhizae are vesicular-arbuscular mycorrhizae and ectotrophic mycorrhizae. The vesicular-arbuscular mycorrhizae are caused by an aseptate fungus, which in most cases belong to one of several species of Endogene. They produce a loose weft of hyphae ramifying in the immediate enviroms of the roots. The hyphae penetrate the root tissue mainly the cortex cells, forming there in much branched haustoria called arbuscules (big spores) and vesicles (small spores) basidomycetous. Conversely, the ectotrophic mycorrhizae are characterized by dense usually basidomycetous hyphal mental which encloses the root and the hyphae which penetrate the root cortex between the external cells to form what is called the hearing net.

Furthermore, rock-phosphate [$Ca_3(PO_4)_2$] is considered the cheapest source of phosphorus element, which is important for plant nutrition. Mycorrhizae fungi are known to play an important role in improving the availability and absorption of phosphorus.

Thereupon, this study was initiated to throw some light on the effect of inoculating sterilized and rock phosphate fertilized soil with mycorrhizae fungi (***Glomus australe*** and ***Glomus macrocarpum***) and soil type *i.e.* calcareous, sandy and loamy sandy soil as well as their combinations on seedling growth and leaf mineral content of some citrus rootstocks namely sour orange, Rangpur lime and Volkamer lemon.