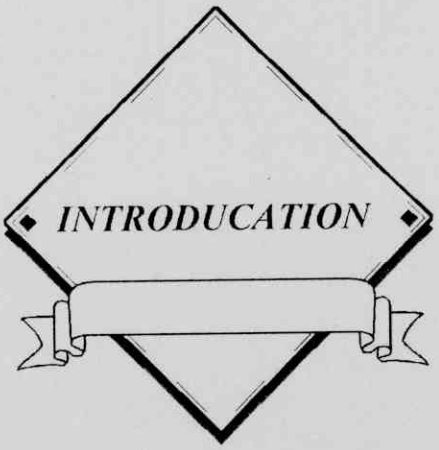
INTRODUCATION

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 344789 feddans represents 32.32% out of the total area which amounted about 1066663 feddans according to the latest statistics of the Ministry of Agriculture, Egypt (2001)*. Thereupon, strenuous efforts have always been extended to enhance citrus production through a better understanding of its nutritional requirements and fertilization program, *i.e.* source, rate and application method of fertilizers. It is well known that more than 40% of production costs is devoted to nutrition practices. Besides, the need for fertilizers particularly nitrogen fertilizers is in a continuous demand to compensate the reduction of soil fertility that resulted from intensive cultivation over the years and the depletion of loamy colloids after building the High Dam.

On the other hand, the chemical fertilizers have been extensively used before the First World War. By that time, the main source of minerals for plant nutrition was organic matter. The Chili salt used during the World War as an explosive material was used latter after the war as chemical fertilization, which opened the area of extensive use of chemical fertilizers in Agriculture. Over the years, the heavy use of chemical fertilizers have resulted in serious problems in the soil. It is not only the salinity, but also and more importantly the pollution of the

*Statistics of the Ministry of Agriculture, Egypt (2001).

underground waters and the accumulation of the chemicals in plant tissue that is a major components of animal fodder human diet. As a result of misuse of chemical fertilizers, the natural biological balance in the soil is disturbed. Organic manure fertilizers are the best alternative for chemical fertilizers. Organic manures are composed mainly of wastes and residues from plant and animal life. They contain much carbon and relatively small percentages of plant foods usually those come from plants that fix the carbon. Organic manures supply some nutrients for plants and the carbon containing compounds are food for small animals and microorganisms. Manures often improve the structure of soils; they may do this directly through their action as bulky diluents in compacted soils or indirectly when the waste products of animals or microorganisms cement soil particles together. These structural improvements increase the amount of water useful to crops that soil can hold; they also improve aeration and drainage and encourage good root growth by providing enough pores of the right sizes and preventing the soil from becoming too rigid when dry or completely over logged and devoid of air when wet. There are several sources of organic manure, but the most used everywhere are cattle manure, poultry and sheep manure.

In addition, the technology of animal waste handling, treatment and disposal is available in many cases, it is not adequate to guarantee pathogen free product. The technology of radiation processing can be used as integral part in safe recycling animal waste. Moreover, it can be used to reduce microbial load in contaminated materials such as animal wastes and sewage sludge. Also, it can be used to destroy toxic organic materials

(**Dickson *et al* 1987**). Besides, **Farag and Mohamed 1999** reported that irradiating dried poultry manure with doses up to 10 KGy showed a marked reduction in total bacterial count, mold and yeast. Recently, there has been emphasis on the use of animal manure as a natural source of nutrients in many fruit orchard and field crops.

Furthermore, Biofertilizers are biological preparation containing primarily potent strains of micro-organisms in sufficient numbers. These micro-organisms have definite beneficial roles in the fertility of soil rhizosphere and the growth of the plant. Biofertilizers proved to eliminate the use of pesticides sometimes, and rebalance the ratio between plant nutrients in soil. Handle with field applications improved their efficiency in increasing crop yields and decreasing the costs of some agricultural practices. It is worthy to state that biofertilizers do not replace mineral fertilizers, but significantly reduce their rate of application **(Ishac, 1989 and Saber, 1993)**. Rhizobacterien and Nitrobien are a multi- strain biofertilizers constituting a set of micro-organisms having a definite beneficial role in soil fertility. Four main functions are carried out by symbiotic and a symbiotic: nitrogen fixation, mobilizing certain macro- and micro- nutrients in a form available for pant absorption, controlling some soil born diseases and secreting a set of growth promoters. Rhizobacterien and Nitrobien could be used as a source for fixing nitrogen in the soil. The use of bacteria in combination with organic fertilizers results in encouraging yield and helps to keep the environment clean for coming generations.

Therefore, this investigation has two main targets: **Firstly**: to study the effect of organic manure source namely cattle, poultry and sheep manure and the method of organic manure application *i.e.* superficial and trench as well as materials of N-fixing bacteria namely Rhizobacterien and Nitobien, besides their interactions on tree growth, leaf mineral content, fruiting and fruit quality of Balady mandarin. **Secondly**: to study the effect of irradiation of organic manure source namely cattle, poultry and sheep manure and method of organic manure application *i.e.* dry organic manure soil application and organic manure water extract soil application, besides their interactions on plant growth and leaf nutrient content of Sour orange and Volkamer lemon rootstock seedlings.