1. INTRODUCTION

Soybean (*Glycine max* (L.) Merrill) is an annual legume and one of the world's major sources of vegetable oil and protein (soybean seeds contain about 20% and 38% of oil and proteins, respectively). Moreover, soybean is considered as one of the important forage crops. It is consumed in numerable ways, seeds may be eaten green before maturity, and whole mature seeds are eaten , sprouted to flour, or processed to soymilk. The seeds also may be fermented to produce a high protein product or dark sauces widely used in cooking. Soybean oil is edible, but also, has many industrial uses. In addition soybean meal after oil extraction is used as high protein animal feed.

Sunflower (*Helianthus annus* L.) also, is another annual crop and one of the most important oil crops in the world, as its seeds contain about 24-35% oil.

In Egypt a great attention has been recently paid to increase the cultivated areas of both crops. Increasing area covers the deficiency of human and animal protein and solves the problem of food security, as well as increase the edible oil production.

Several diseases attack both crops during the growing season, among which, charcoal-rot and root rot are the most common diseases causing considerable economic loses in yield and seed oil contents. *Macrophomina phaseolina* and *Fusarium solani* f.sp. *phaseoli* are destructive soil-borne fungi that are widely spread attacking many plant species. They have been reported to affect soybean and sunflower through-out the world as well as in Egypt. These pathogens were originally isolated during the present study.

Like other soil borne fungi, these two pathogens are difficult to control effectively using fungicides, without causing several ecological problems. For these reasons, many studies were done to use biological agents to control these fungi.

Hence, the main goal of the work described in this study was to investigate the effectiveness, among three selected groups, of microorganisms in reducing the efficiency of the two plant fungal pathogens against two of the important crops (soybean and sunflower) in Egypt.

One of the microorganisms tested was *Streptomyses sp,* because of the few of information on the use of these microorganisms as a biocontrol agent either *in vitro* and/or *in vivo* trials. It was decided to include it among the other two chosen diverse groups of micro-organisms which were namely; Bacteria, *B. subtilis* and the fungus, *T. harzianum.* Assessment of their role as a natural source for controlling the diseases of concern caused by the above mentioned pathogens was carried out.

Two of the tested streptomyces species isolates were originally isolated during this study and were selected on the basis of their potential fungitoxicity against the pathogens under study. The other two chosen micro-organisms, i.e., bacteria and fungi, were one isolate of the bacterium *B. subtilis* and one isolate of the fungus *T. harzianum.* These are known and already defined micro-organisms, with a known history of the biocontrol activity against various other pathogens in Egypt. Also, they were particularly chosen because the later has been widely studied as a biocontrol agent against a range of phytopathogenic micro-organisms of various economically important crops, while the former has rarely been used as a biological antagonist against the Macrophomina pathogen and none of *T. harzianum* was reported with the Fusarium pathogen. This study is the first in Egypt and worldwide to use the above three mentioned biocontrol agents *in vitro* and *in vivo* trials for the aim of protecting the soybean and the sunflower plants under greenhouse conditions against the charcoal rot and the root rot diseases caused by the *M. phaseolina* and the *F. solani* f.sp. *phaseoli* respectively.

Further, and more important, it was thought that secondary host aromatic metabolites like glyceollin; as well as other isoflavonoids and isoflavonoids glucosides phytoalexins, e.g., daidzein diadzin and scopoletin, which have only recently received much attention in host-pathogen interaction involving soybean -*Phytophthora. megasperma* and sunflower-*Helimintiosporium carbonum* fungal pathogens, other than the pathogens under study, in addition to other phenol are possibly involved in the resistance against fungal.

To achieve the above goal, this study involved analysis of some morphological, biochemical and structural aspects of the response of a susceptible cultivar of each of the soybean and the sunflower plants to infection by each of these two phytopathogenic soil-borne fungi and also, when these pathogenic fungi, separately, are simultaneously subjected to each of the above mentioned biocontrol micro-organisms.

It was hoped that differences observed in their response to infection which involved the pathogen alone or the pathogen and each of the biocontrol agents might contribute to the nature of the elucidation of the biological control resistance mechanism(s).

Analysis of the biochemical responses centered around the production of antimicrobial compounds (phytoalexins) of isoflavonoids and isoflavonoids glucosides nature, since these phytoalexins have been previously observed (**Emara 1987**) to occur in the excised organs of various CVs of soybean plants that were inoculated artificially with the same fungal pathogens, but alone only, using the droplet inoculation technique under environmental controlled condition.

The analysis of these phytoalexins was also applied to the sunflower plants. None of these phytoalexins analysis was previously studied with respect to their presence, isolation and identification in response to the two pathogens of concern in sunflower plants.