INTRODUCTION

The problem of increasing the chemical fertilizers cost inputs is growing and plays a major role in increasing production cost of crops and the outlook for reducing the use of fertilizers in future is still pendulous. Therefore, actions should be taken to reduce both the economic and ecological costs of fertilizers. The use of Biological Nitrogen Fixation agents is one of the most powerful alternative solutions which play an important role in reducing the consumption of chemical N-fertilizers, increasing soil fertility, decreasing the production cost and eliminating the undesirable pollution impact of fertilizers in the environment. Worldwide, about 44-66 million tons of nitrogen is biologically fixed annually, providing nearly half of all nitrogen requirements used in agriculture (Alberton *et al*., 2006).

Peanut (*Arachis hypogaea* L.) is considered one of the most important edible oil crops in Egypt, which is due to its seeds high nutritive value for humans. Peanut seeds are characterized by their high oil content (50%), which is utilized in different industries, besides they contain 26–28% protein, 20% carbohydrates and 5% fiber (Fageria *et al.,* 1997). Peanut like other legumes, forms symbiosis relationship with rhizobia. Symbiotic nitrogen fixation by legumes plays an important role in sustaining crop productivity and maintaining the fertility of the semi-arid lands.

Soil borne fungal peanut diseases are one of the most constraints influence crop productivity in Egypt. Contamination of peanuts with aflatoxins is one of the main factors that compromise the quality of the product. This contamination results from growth in peanut kernels by toxigenic strains of the fungi, *Aspergillus flavus* and *Aspergillus parasiticus* (Diener *et al*., 1987). These fungi are commonly found in soil where peanuts are grown, and many strains of *A. flavus* and most strains of *A. parasiticus* produce aflatoxins (Horn *et al*., 1996).

Using fungicides to protect seeds and seedlings from these diseases is a common powerful solution. Nevertheless, these chemically treated seeds are adversely affecting rhizobial inoculants (Kyei-Boahen *et al.*, 2002), in addition their undesirable effect on environment (Heydari *et al*., 2007). Thus, biological control is a potential alternative solution for the chemical control of such plant diseases. There is a currently considerable interest in the role of rhizosphere organisms in plant growth promotion and biological control of soil borne pathogens (Kloepper *et al*., 1989 ; Vargas *et al.*, 2009).

The way to achieve success is by developing antimicrobials that can be delivered directly from one bacterium to another bacterium utilizing conjugation, a process that can be remarkable efficient (Jensen *et al*., 1996; Andrup *et al*., 1998; Andrup and Andersen, 1999; Lawely *et al*., 2004). The potential for bacterial plasmids to be used as agents controlling disease is based on a universal property of conjugative system: plasmid-encoded information (Diaz *et al*., 1994; Peng *et al*., 2006).

This study was carried out to obtain new peanut nodulated bradyrhizobia that have dual functions; symbiotic effectiveness with peanut roots and antagonistic activity against peanut fungal pathogens.

The objectives of this work were:

1. Evaluation the symbiotic effectiveness of different rhizobial strains/ isolates with different peanut cultivars (foreign and local cultivars) under greenhouse conditions.
2. Screening the antagonistic activity of different rhizobacterial isolates (*Serratia* and *Pseudomonas* related species) against peanut-fungal growth, *Aspergillus flavus in-vitro.*
3. Construction of new *Bradyrhizobium* transconjugants using the most effective bradyrhizobia, as a recipient and the most antagonistic rhizobacteria, as a donor *via* bacterial conjugation process.
4. Evaluation the symbiotic effectiveness of new *Bradyrhizobium* transconjugants under greenhouse conditions.
5. Evaluation of antagonistic activity of new *Bradyrhizobium* transconjugants in controlling peanut- fungus, *Aspergillus flavus in-vitro.*
6. Proteomic analysis of peanut nodulated rhizobial strains/ isolates using SDS-PAGE.
7. Tracking the conjugation process on proteomic level using SDS-PAGE.