ABSTRACT

Three rhizobacterial strains i.e., *Serratia sp.*, *Paenibacillus polymyxa* and *Pseudomonas fluorescens* were examined *in virto* for achieving the traits that being related to plant growth promoting effects as well as, two pot experiments were carried out to study the impacts of rhizobacterial co-inoculation on growth and productivity of lupine or chickpea plants under sand soil conditions infested with *Fusarium solani or Rhizoctonia solani*, respectively. Rhizobacterial strains were applied either singly or combined with nodulating *Bradyrhizobium* (lupine) or *Mesorhizobium (*chickpea) plants or as mixed inoculants. The qualitative assay revealed that the tested PGPRs expressed variable magnitudes of PGP-related properties with superiority of *P. polymyxa* and *Serratia* sp. in IAA, cyanide, siderophores, chitinase and protease production as well as P-solubilization and fungal antagonistic effect. The quantities of IAA by rhizobacteria were 12.0, 13.5, 14.01, 21.8 and 26.5 µg/ml synthesized by *Mesorhizobium ciceri, Bradyrhizobium* sp. *(lupinus), P. polymyxa, Serratia* and *Ps. fluorescens*, respectively. Concerning the damping-off of lupine and chickpea plants caused by *Fusarium* and *Rhizoctonia*, respectively, results revealed that all tested co-inoculants had ability to suppress the pre and post emergence damping-off for the two plants, particularly *Serratia in vivo*. Furthermore, there is significant depression occurred in the nodulation, growth aspects and yield of lupine and chickpea plants due to artificial infection with pathogens under investigation. However, co-inoculation approach resulted in improving the nodulation status and plant vigor and consequently the productivity of lupine and chickpea plants. Moreover, co-inoculants which comprised *Bradyrhizobium* or *Rhizobium* with *Serratia* exhibited superiority for hastening all parameters under investigation.

Key Words: PGPR, *Bradyrhizobium*, *Rhizobium*, *Serratia* sp., *Paenibacillus polymyxa*, *Pseudomonas fluorescens*, Co-inoculation, Lupine, Chickpea, *Fusarium solani* and *Rhizoctonia solani*.

CONTENTS

LIST OF ABBREVIATIONS

ADP	Adenosine di phosphate
ATP	Adenosine tri phosphate
CAS	Chrome-azurol S
DCP	Di calcium phosphate
HCN	Hydrogen cyanide
HDTMA	Hexa- decyl trimethyl ammonium bromide
IAA	Indole-3-acetic acid
IPM	Integrated pest manager
ISR	Induced systemic resistance
LB	Luria- Bertani
LCO	Lipo-chitooligosaccharide analogue
NPR	Nodulation promoting rhizobacteria
PBPR	Plant bioprotecting and promoting rhizobacteria
PDA	Potato dextrose agar
PGPBR	Plant growth promoting and bioprotecting rhizobacteria
PGPR	Plant growth promoting rhizobacteria
PSM	Phosphate solubilization microorganisms
RZT	Root zone temperature
TPF	2,3,5- triphenyl formazane
TTC	2,3,5-triphynyle triphenyl tetrazolium chloride