

## The effect of bacterial fertilizers on seedling development of *Cajanus cajan* and *Vigna radiata*

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(Accepted : March, 2010)

Biofertilizers are an alternative to mineral fertilizers for increasing soil productivity and plant growth in sustainable agriculture. The objective of this study was to evaluate possible effects of three plant growth promoting rhizobacteria (PGPR) as biofertilizers on the growth of *Cajanus cajan* and *Vigna radiata*. The application treatments included the control (without bacterial inoculation) and plant growth promoting rhizobacteria (*Rhizobium*, *Phosphobacterium*, and *Azotobacter*) in sterilized soil. Data suggested that seed inoculation of *Cajanus cajan* and *Vigna radiata* with PGPR strains increased root length, shoot length, leaf surface area and plant height when compared with control. Present results showed that PGPR strains stimulated plants growth and could be used as an alternative to chemical fertilizer.

Key words : *Rhizobium*, *Phosphobacterium*, *Azotobacter*, Biofertilizer, *Cajanus cajan*, *Vigna radiata*

### INTRODUCTION

Modern agriculture technologies based on balanced fertilization, irrigation, pest management and mechanization are required for good crop productivity. The use of expensive chemical fertilizers is a limiting factor for the low income of farmers and increases the cost of crop production. Biofertilizers are ecofriendly and have been proved to be effective and economical alternate of chemical fertilizers with lesser in put of capital and energy (Hafeez *et al.*, 2002). It is defined as a substance which contains living microorganisms when applied to seed, plant surface, or soil, colonize the rhizosphere or the interior of the plant and promotes growth by increasing the supply or availability of primary nutrients to the host plant (Vessey, 2003).

Biofertilizers are well recognized as an important component of integrated plant nutrient management for sustainable agriculture and hold a great promise to improve yield (Narula *et al.*, 2005; Wu *et al.*, 2005). A group of biofertilizer contains beneficial rhizobacteria have been termed as plant growth promoting rhizobacteria (PGPR). Among them the strains from genera such as *Pseudomonas*, *Azospirillum*, *Azotobacter*, *Bacillus*, *Burkholderia*, *Enterobacter*, *Rhizobium*, *Erwinia* and *Flavobacterium*. Several mechanisms have been suggested by which PGPR can promote plant growth, including phytohormone production, N<sub>2</sub> fixation, stimulation of nutrient uptake and biocontrol of pathogenic microorganisms (Rodriguez and Fraga, 1999).

Red gram (*Cajanus cajan*) and green gram (*Vigna*

*radiata*) are one of the major pulse crops in India that has considerable importance as food, feed and fodder. It also plays an important role in sustaining soil fertility by improving soil physical properties and fixing atmospheric nitrogen. These are drought resistant crops and suitable for dry land farming and predominantly used as an intercrop with other crops (Hshvanchen, 2008). The objective of this study was to evaluate the effects of a symbiotic bacterium (*Rhizobium*) and some strains of nonsymbiotic rhizobacteria from two genera, including *Azotobacter* and *Pseudomonas* on the growth and yield of red gram (*Cajanus cajan*) and green gram (*Vigna radiata*).

### MATERIALS AND METHODS

#### *Collection of seeds :*

The seeds of *Cajanus cajan* var.Co<sub>6</sub> and *Vigna radiata* CoRC<sub>7</sub> were procured from Tamil Nadu Agricultural University, Coimbatore (T.N.).

#### *Isolation of microorganisms :*

The bacterial fertilizers *Rhizobium*, *Azotobacter* and *Phosphobacterium* were isolated from root nodules and rhizosphere soil region of the respective plants by dilution plate method (Waksman, 1992). Bacterial strains were characterized using standard procedures. Selective medium were employed for the cultivation of *Rhizobium*, *Azotobacter* and *Phosphobacterium* using Yeast extract mannitol agar, Jensen's medium, Trypticase soy agar, respectively. The inoculum concentration of