

Combined effects of endophytic actinobacteria and symbiotic *Rhizobium* on N₂ fixation, growth and development of Chick pea (*Cicer arietinum*)

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ABSTRACT

Chickpea (*Cicer arietinum*), being the second most significant pulse crop produced stands as a rich protein source for human consumption while less expensive. Improving the health of Chick pea plant roots and enhancing nitrogen fixation can conceivably improve its productivity and yield interms of quantity. Endophytic actinobacteria colonizing leguminous plant have been accounted for development, growth, nodulation of legumes and providing resistance against plant diseases. The aim of this investigation was to isolate endophytic actinobacteria from Chick pea (roots and nodules) and study their consequences in the development, growth and nodulation of Chick pea. In short, the Combined effects of endophytic actinobacteria and symbiotic *Rhizobium* on N₂ fixation, growth and development of Chick pea (*Cicer arietinum*) was intended to be studied.

The endophytic actinobacterium strains of the following species viz., ***Streptomyces* sp. LuP30**, ***Streptomyces* sp. LuP47B**, ***Streptomyces* sp. CP21A2**, ***Streptomyces* sp. CP200B**, ***Microbisporasp. CP56*** and ***Actinomadurasp. CP84B*** were used for the study. Two strains of *Streptomyces* sp. were isolated from Lucerne roots and Chick pea roots. The strain of *Microbispora* sp. CP56 and *Actinomadura* sp. CP84B showed improvement by legume-rhizobia symbiosis.

Six different endophytic actinobacteria were taken for investigating the impact on growth, development and nodulation of Chick pea in sand - vermiculite pot tests. Subsequently, four endophytic actinobacteria LuP30, LuP47B (isolated from Lucerne) CP56, CP21A2, CP200B, CP84B (isolated from Chick pea) were chosen for further examination as they upgraded the nodulation and total mass.

Two strains which were isolated from Chick pea roots CP200B and CP21A2 indicated the beneficial outcome on Chick pea development and was distinguished by RT- qPCR quality sequencing and amplification.

Isolated endophytic actinobacteria from Chick pea and lucerne substantiated the potential of effecient microbial inoculants for improving the development, growth and beneficial interaction of Chick pea via symbiosis. The six variants of endophytic actinobacteria that were isolated and screened delivered the most beneficial co-inoculationwith their *Mesorhizobium ciceri* strain CC1192 (rhizobial partner) and Chick pea. Screening of endophytic actinobacteria and further trials and experiments rendered a highly beneficial partner for co-inoculation with various rhizobium.