

Study of the interaction between endophytic actinobacteria and lentil crop

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ABSTRACT

Lentil (*Lens culinaris*) is a winter crop and one of the most ancient foods having been cultivated in Southwestern Asia since 7000BC. Lentil crops play a vital role in the food and to complete nutritional security requirements of millions of people particularly in Asia. It is affordable highly nutritional food for those who cannot afford animal protein. Endophytic actinobacteria which colonize plant roots can increase the yield of legume crop and nitrogen fixation capacity by controlling the losses caused by the significant fungal root pathogens. The aims of this study were to isolate endophytic actinobacteria from leaves, roots and nodules of lentil plants which planted into seven different soils and screen their effects on the growth and nodulation of lentil. Endophytic actinobacteria which were isolated from different legumes were also examined on the lentil plants. The isolated endophytic actinobacteria were examined on lentils to investigate the drought stress.

Sixty two endophytic actinobacteria were isolated from roots, leaves, nodules and shoots of lentil and twenty endophytic actinobacteria were successfully purified and recovered from contamination. Most of the endophytic actinobacteria were isolated from lentil planted in Karoonda soil. Humic acid Vitamin B was the best and most effective isolation media. Sixteen out of Twenty endophytic actinobacteria produced spores and seven actinobacteria were examined on lentil plants in sand – vermiculite pot experiment to investigate their effect on the growth, yield and nodulation of lentil. The six exist endophytic actinobacteria from chickpea and lucerne were tested on lentil plants inoculated with rhizobium *Mesorhizobium ciceri* strain WSM-1455 to examine the growth and nodulation process of lentil. The endophytic actinobacteria CP200B, CP21 and CP56 were selected for further study as they increased the total dry mass and nodulation process.

The isolated endophytic actinobacteria LT5, LT6 and LT10 showed positive effect on lentil growth and identified by 16S rRNA gene sequencing. In the drought stress experiment LT6, LT5 and LT10 endophytic actinobacteria improved drought stress in lentil plants. As a result the selected endophytic actinobacteria are beneficial bacteria for using as microbial inoculants with inoculated rhizobium *Mesorhizobium ciceri* strain WSM-1455 for increasing the yield and symbiosis of lentil.