

Name: Shagufta Nahid

Supervisor: Prof. Arif Ali

Department of Bioscience

Faculty of Natural science

Title of thesis. "Study of Genetic Diversity of Wheat Rhizospheric Isolates of Plant Growth Promoting Rhizobacteria"

## **Abstract**

**Key words:** PGPR, Metagenomics, Bacterial Diversity, SSU rRNA, Phylogeny

In agroecosystems, bacteria are responsible for diverse metabolic functions that affect soil fertility and plant health. Plant growth promoting rhizobacteria have first been used for agricultural purposes in the former Soviet Union and India in the early 20th century and are now being tested worldwide. In the present study a comparative analysis of bacterial diversity based on 16S gene sequencing and RFLP module was done for samples collected from agricultural fields during pre harvesting and post harvesting of Wheat crop, that provides a clear idea about impact of Wheat plant on the diversity of root associated bacteria. Wheat is the most widely cultivated cereal grain, occupying about 17% (220 million hectares in 1994) of the total cultivated land in the world. The vegetative phase and post harvest phase cultivation success of wheat rhizospheric bacteria (January-May) was assessed in different laboratory media in the present study. In order to identify and characterize novel, not-yet-cultured typical representatives of bacterial community in wheat rhizosphere culture independent studies were also conducted in this thesis for regions of North India rich in wheat cultivation.

**Findings:-**

Five genera of beneficial bacteria viz *Pseudomonas*, *Bacillus*, *Stenotrophomonas*, *Sporosarcina* and *Arthrobacter* sharing a similarity percentage of 81-98 % with documented strains according to BLAST analysis. An extensive research work done on PGPR worldwide for over last five decades has classified the members of above mentioned genera to be highly efficient in promoting plant growth by their high antiphytopathogenic activity and root colonising activity. The genus *Actinobacteria* has also been helpful in biofilm production. According to this study, *Pseudomonas spp* was found to be dominating in wheat rhizosphere of North India followed by *Bacillus*. Although no significant regional variation was observed in species composition in rhizospheric soil, the presence of *Stenotrophomonas spp.*, *Sporosarcina spp.* and *Arthrobacter spp.* were unique to North Indian soils as they are not common inhabitants of wheat rhizosphere.

Unclassified sequences implying novel groups of bacteria were also found to be present in wheat rhizosphere and such a finding could be beneficial in future research.