

Conclusion

The present work was started in the spring of 2011 with a view to characterize the rhizobia found in Sub-Himalayan West Bengal and Sikkim from various biochemical, morphological and physiological aspects. With an intention to study the genetic diversity of the native strains found in these regions, molecular study was also undertaken.

Several *Rhizobium* genomes have been sequenced and are available in the public domain. However, till date there is no completely sequenced genome from Eastern India. Therefore, the whole genome sequencing of at least one strain from these regions was considered to be done, as it is believed that there will be considerable diversity of the native strains from the strains of the rest of the world as this region is considered to be one of the most important biodiversity hot spot.

Out of the 28 native bacterial strains, seventeen were confirmed to be

Rhizobium through morphological observation (SEM and Light microscopy) and via Koch's postulation. The 17 strains were subjected to various biochemical characterizations including carbohydrate utilization, antibiotic resistance test and got excellent diversity among the isolated strains. The molecular diversity was also studied with a number of techniques like RAPD, rep-PCR, 16SrDNA PCR-RFLP etc. and a considerable diversity was found existing among the strains.

From the agricultural point of view, some of the strains showed promising results in producing siderophore, HCN, IAA etc., and many of the strains were also found to be excellent PGPR.

Analyzing the molecular and biochemical diversity, three strains were initially chosen for whole genome sequencing in collaboration with Dr. Louis Tisa of University of New Hampshire and ultimately could

sequence one strain called RSm-3 which is a strain isolated from Sonada. The total genome of the RSm-3 strain was found to be roughly around 7 Mbp with a quite pretty number of protein coding genes.

While executing the present study, there was a growing realization that

Sub-Himalayan West Bengal and Sikkim region of India is a gold mine of *Rhizobium* diversity. Excellent variation exists among strains and virtually little work has been done. Therefore, a lot needs to be done to properly characterize the native strains of these regions.