ISSN: 2155-6199

Introduction

Production of nitrogenous fertilizers has stagnated in recent years because of high costs and pollution. Estimated 90% of applied fertilizers never reach roots and contaminate groundwater. Hence, the importance of nitrogen xing organisms has emerged as key issue. e nitrogen xation by organisms occurs by a symbiotic relationship, association or free living organisms (Figures 1-3) that plays an important role in maintaining the nitrogen cycle in the environment. e biological xation in brief that could be depicted as follows:

Nitrogenase

N_2 + 8 avodoxin + 8H^+ + MgATP$_2$- + 18 H_2O 2NH_4^+ + 2OH^- + 8 avodoxin + 16 MgADP + 16$H_2PO_4^-$ + H_2

It is a rare, extremely energy consuming conversion because of stability of triply bonded N_2 e xed Nitrogen which can be directly assimilated into Nitrogen containing bio-molecules. Some of the host plant and bacterial symbiont are shown in the Table 1.

e nitrogen can be xed by non-symbiotic nitrogen xation by Cyano bacteria Anabaena nostoc. It can be xed by terrestrial and rhizosphere associated microorganisms like Azospirillum, Azotobacter, Acetobacter, Klebsiella and Clostridium [1,2].

Sinorhizobium melilotiand its uses to the environment

and nutritional conditions. S. meliloti has been the subject of extensive genetic, biochemical and metabolic research. The sequencing of the strain Rm1021 genome provided a solid foundation for a number of molecular studies of the genetic basis of plant-bacterium interactions and of the response of S. meliloti to environmental stimuli. Strains of S. meliloti, as for other rhizobial species, are known to show different nodulation capabilities and phenotypic characteristics, such as salt and stress tolerance and exo-polysaccharide production. Despite the large number of genetic and molecular biology studies of the sequenced Rm1021 strain and its natural populations, little is known about the overall extent of metabolic diversity of Rm1021 and environmental strains. Consequently, clear evidence on possible functional and metabolic roles of the observed genomic polymorphism is still lacking. In past years, more attention has been focused on that part of bacterial genetic variation which is directly related to the phenotype.

Sinorhizobium meliloti cells serve a significant role in the survival of many plant species and they also largely contribute to the environment. The atmosphere is composed of approximately 85% nitrogen and it is an essential element to most living organisms and their metabolic activities. But, nitrogen exists in the atmosphere as dinitrogen (N_2) that is unusable by most plants and animals. S. meliloti cells in the environment form symbiotic relationships with leguminous plants and convert N_2 into organic nitrogen. S. meliloti also serves as denitrifying agent that reduces nitrate and nitrite into free N_2 in the environment (Figure 2). S. meliloti is unique and one of the first organisms to have