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Abstract: Aim of the present study is to identify unique proteins from Rhizobium isolates of Vigna mungo collected from acidic soils of the State of Jharkhand and comparing its protein profile with Rhizobium residing in neutral pH. By employing two-dimensional gel electrophoresis, we obtained unique spots, which may be responsible for acidic stress tolerance. Rhizobium provides the major source of fixed nitrogen in agricultural soil. It is responsible for a significant amount of nitrogen fixation. Rhizobium-legume symbiosis is one of the ideal solution to the improvement of soil fertility and restoration of arid land. Soil acidity is one of the most serious problems affecting growth of Rhizobia in the soil of Jharkhand. One of the most important factors that affect the efficiency of symbiosis between Rhizobia and plants is the pH of the soil in which they interact. The host plant to any symbiotic Rhizobium appears to be the limiting factor for growth in extreme pH, as most legumes require a neutral or slightly acidic soil for growth especially when they depend on symbiotic nitrogen fixation. Environmental factors influence all aspects of nodulation and symbiotic nitrogen fixation, in some cases reducing rhizobial survival and diversity in soil; in others affecting nodulation or nitrogen fixation and even growth of the host. Factors that are important include acidity, temperature, mineral nutrition, salinity and alkalinity. Nitrogen fixation in acidic soils can be markedly reduced, with the effect due to hydrogen ion concentration, aluminium and manganesium toxicity and deficiencies of calcium, phosphorus and molybdenum. Rhizobial cell respond to acidity by either up-regulation or down-regulation of genes that leads to the increased or decreased translation of specific proteins. To study the stress proteins of Rhizobia, protein profiles under different pH ranges were compared. Through studying the proteome of Rhizobium in acidic soil condition, the response of the isolates towards acidity of soil is being analyzed. At the molecular level, we find that the two-dimensional gel analysis reveals a host of proteins which are found to be up-regulated or down-regulated in response to different pH conditions. We hypothesize that the protein changes observed on two-dimensional electrophoresis in response to different pH of acidic soil reflect the molecular adaptation mechanisms taking place in progress in Vigna mungo to combat and recover in response to abiotic stress such as acidic soil.

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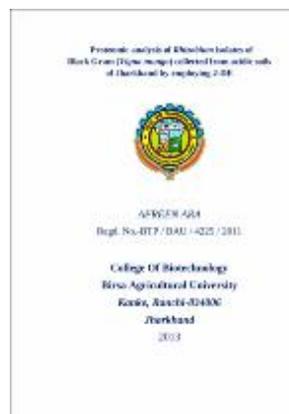
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