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Coinoculations of Rhizobium and Pseudomonas strains isolated from Trigonella foenum graecum (Methi) and check their PGPR potential

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The rhizosphere is populated by a diverse range of microorganisms, and the bacteria colonizing this habitat are called rhizobacteria. Plant root colonizing bacteria can function as harmful, deleterious rhizobacteria (DRB) or beneficial, PGPR inhabit plant growth promotion directly and indirectly There are several ways of promoting plant growth like by fixation of atmosphere nitrogen, solubilization of minerals such as phosphorus, production of siderophore that enhance plant growth at various stages of development. Auxins are produced by several rhizobacterial genera e.g. Azospirillum, Agrobacterium, Erwinia and Pseudomonas. Cytokinins promote root formation. Siderophore are low molecular weight, extracellular compounds with a high affinity for ferric iron, that are secreted by microorganisms to take up iron from the environment and their mode of action in suppression of disease were thought to be solely based on competition for iron with the pathogen .The cyanide ion is exhaled as HCN and metabolized to a lesser degree in to other compounds. Indole Acetic Acid (IAA) is phytohormone which is known to be involved in root initiation, cell division and cell enlargement. Phosphorus (P) is major essential macronutrient for biological growth and development. Pseudomonaceae is a large family of Gram negative bacteria, they are very good PGPR. The most effective strains of Pseudomonas used as PGPR belong to the category of fluorescent pseudomonads. These act as systemic bio-control agent against various fungal and bacterial diseases such as Fusarium, Pythium, Phytophthora, Rhizoctonia, Sclerotium, Sclerotinia and Ustilogo. Rhizobia are well known bacteria works as the microbial symbiotic partners of legumes, forming N2-fixing nodules. Rhizobia can produce phytohormones, siderophore, HCN; they can solubilise sparingly soluble organic and inorganic phosphates. Inoculation of Rhizobium causes a greater increase in growth and yield and the number of nodules per root system. Seed bacterization with both fluorescent Pseudomonas strains and Rhizobium and their combinations (co-inoculations) brought distinct crop enhancement in most cases. Fenugreek (Trigonella foenum-graecum or Methi) is an annual forage legume crop. Fenugreek is regarded as the oldest known medicinal plant in recorded history. Its seed and leaves have medicinal value, and have been used to reduce blood sugar and lower blood cholesterol in cancer, sexual health, digestion, coughs, fever and flu symptoms. Fenugreek has traditionally been used to ease coughing and reduce fever. The two most common fungal diseases infecting Fenugreek are Cercospora leaf spot and Powdery mildew. In this study investigation was carried out to assess the effect of fungal pathogen levels on Fenugreek seedlings grown in sand. Fungal inoculums affected the mortality of crop seedlings. It is showed from the present study that co-inoculation of Pseudomonas and Rhizobium strains shown better PGPR activity by suppressing the growth of fungus and enhancing the growth of Fenugreek plant.

Keywords: PGPR, Rhizobium, Pseudomonas, Coinoculation, Fenugreek.

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Biogenic synthesis of gold nanoparticles using Trichoderma harzianum and their characterisation

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Nanotechnology is the new evolution of science and technology. Currently nanoparticles have drawn much attention because of its various valuable properties. Biogenic synthesis of nanoparticles is considered to be good approach because it is cost effective, easy, eco-friendly, reliable and rapid methods. Nanoparticles have been already synthesised by chemical and physical route. In this study, we have synthesized gold nanoparticles using fungus (Trichoderma harzianum). These gold nanoparticles were characterized by UV-Vis spectrophotometer; Dynamic Light Scattering (DLS), Transmission electron microscope (TEM), X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FTIR).In UV Vis spectra, the surface Plasmon resonance of gold nanoparticles was occurred at 532 nm. The particles size distribution profile of the nanoparticles was determined by using Dynamic Light Scattering (DLS). TEM micrograph showed formation of well dispersed spherical gold nanoparticles in the range of 20-40 nm. XRD pattern of nanoparticles exhibits the formation of metallic gold. The involvement of Trichoderma harzianum in the stabilization of nanoparticles was confirmed by FTIR.

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