

Research Article

Efficiency of microbial population in rhizosphere at different growth stages of paddy in Vertisol of Chhattisgarh

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Summary

A field study was carried out during *Kharif* season of 2010-11 at the Research and Instructional Farm of Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur. Experiment was conducted to examine the efficiency of microbial population in rhizosphere at different growth stages of paddy in Vertisol of Chhattisgarh as influenced by long term application of fertilizers and manure. The experiment was carried out in Randomized Block Design with 4 replications having treatments: T₁ (Control without fertilizer), T₂ (100% NPK), T₃ (100% N alone), T₄ (100%NPK+FYM) and T₅ (50%NPK+green manure). A medium duration high yielding paddy variety Mahamaya was taken as crop. The microbial population (bacteria, fungi, actinomycetes, N₂ fixing bacteria) density at different growth stages in paddy crop showed variations in microbial population due to fertilizer application, the highest microbial population was recorded under T₄ (100% NPK +FYM) followed by T₅ (50%NPK+GM), T₂ (100% NPK) and T₁ (Control) recorded the lowest microbial population. The grain yield of rice was observed to be significantly influenced due to different treatments. The highest was recorded with T₄ (100%NPK +FYM) and was found significantly superior over rest of the treatments. The lowest grain yield was noticed under control plot.

Key words : Microbial analysis, N₂ -fixing bacteria, Bacterial population, Fungal population, Actinomycetes population,

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Introduction

Microbial population in the rhizosphere zone of the soil influence plant growth attributing characters because they affect soil chemical properties and interact with plant roots, where as the influence observed can be beneficial, neutral, or deleterious (Sakai *et al.*, 2004). Understanding, rhizosphere microorganisms is important for their effective use for low-inputs, sustainable agriculture (LISA) and phytoremediation (Doi *et al.*, 2006). The microorganisms in the rhizosphere soil are known to compose the complex of the microbial community, which might be changeable depending on plant root exudates (Watt *et al.*, 2006).

Beneficial plant-microbes interaction in the rhizosphere soil is primary determinants of plant health and soil fertility. Arbuscular mycorrhizae are the most important microbial symbiosis for the majority of plants and, under conditions of

P-limitation, influence plant community development, nutrient uptake, water relations and above-ground productivity. They also act as bioprotectants against pathogens and toxic stresses. Soil microorganisms are paramount in the biogeochemical cycling of both inorganic and organic nutrients in the soil and in the maintenance of soil quality. In particular, microbial activity in the rhizosphere soil is a major factor that determines the availability of nutrients to plant and has a significant influence on plant health and productivity. The soil –plant –microbe interactions are complex and there are many ways the outcomes can influence plant growth health and soil productivity. The results reported may be harmful, neutral or beneficial to the plants.

Resources and Research Methods

The present study entitled efficiency of microbial