



“Gheorghe Asachi” Technical University of Iasi, Romania



IMPLICATION OF MICROBIAL CONSORTIUM ON BIOMASS AND YIELD OF CHICKPEA UNDER SUSTAINABLE AGRICULTURE

Jay Prakash Verma^{1,2*}, Janardan Yadav²

¹Institute of Environment and Sustainable Development, Banaras Hindu University, Varanasi-221005, Uttar Pradesh, India

²Department of Soil Science and Agricultural Chemistry, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi – 221005, Uttar Pradesh, India

Abstract

Five indigenous soil microbes were isolated from chickpea rhizosphere soils of different location of Jaunpur, Mirzapur, Varanasi and Azamgarh district of eastern Uttar Pradesh. The microbial strains were identified as *Pseudomonas aeruginosa* BHUPSB01, *Pseudomonas putida* BHUPSB04, *Bacillus megaterium* BHUPSB14, *Paenibacillus polymyxa* BHUPSB16 and *Mesorhizobium* sp. BHURC05 by biochemical and molecular characterization. The isolated strains were tested for their plant growth promoting properties. All strains were found positive for indole-3-acetic acid (IAA), ammonia production, and phosphate solubilization. Furthermore, the strain *P. aeruginosa* showed siderophore and hydrogen cyanide (HCN) production, and inhibited the growth of fungal pathogens such as *Fusarium oxysporum* and *Rhizoctonia solani*. The different treatment combinations of soil - bacteria enhanced nodulation, plant growth and yield of chickpea under the glasshouse and field experiments, respectively. The microbial consortium of *P. aeruginosa* and *Mesorhizobium* sp. showed more significant nodulation and biomass dry weight followed by *P. polymyxa* and *Mesorhizobium* as compared to *Mesorhizobium* alone and uninoculated control under glasshouse and field condition, respectively. Similarly, significant increases in grain yield and grain protein were recorded in microbial consortium of *P. aeruginosa* BHUPSB01 and *Mesorhizobium* sp. BHURC05. The present study confirmed that *Mesorhizobium* sp. and *P. aeruginosa* is an effective microbial consortium for biomass and grain production of chickpea in Indo-Gangetic plain of Eastern Uttar Pradesh, India.

Key words: biomass, chickpea, *Mesorhizobium*, microbial consortium, *Pseudomonas*, yield

Received: March, 2013; Revised final: June, 2014; Accepted: July, 2014; Published in final edited form: March 2018

* Author to whom all correspondence should be addressed: e-mail: verma_bhu@yahoo.co.in; jpv.iesd@bhu.ac.in; Phone: 0542-6701662 (O), +91-9452762725; Fax: +91-542-2307225