Characterization and Authentication of Isolated Rhizobia from Some Selected Host Plants

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Rhizobia are naturally occurring soil bacteria, of them plant growth-promoting Rhizobacteria (PGPR) have an ability to fix atmospheric inert nitrogen into plant utilizable forms like ammonia and amino acids. Rhizobia are either specific or promiscuous for nodulating certain legumes under different environmental conditions. In the present study, Rhizobia strains isolated from soybean (*Glycine max*), groundnut (*Arachis hypogaea*), mung bean (*Vigna radiata*), cowpea (*Vigna unguiculata*), common bean (*Phaseolus vulgaris*), and white clover (*Trifolium repens*) where purified using selective culture media and characterized morphologically, biochemically and physiologically. According to morphological characterizations, Rhizobia were found to be gram-negative and rod-shaped/ roughly rounded bacteria. The colony appearance was gummy, white, opaque, or immersed. Biochemical characteristics were tested against five different antibiotics (Tetracycline, Cloxacillin, Ampicillin, Ciprofloxacin, Doxycycline, and Metronidazole), five different amino acids (L-tryptophan, Urea, Glycine, Cysteine, and L-tyrosine) and six different carbohydrates (D-glucose, Galactose, Fructose, Lactose, Mannitol, and Sucrose). Tetracycline was given solitary observation for the resistance of selected strains. Sucrose and dextrose were optimally utilized by Rhizobia besides mannitol. Utilization of amino acids by many strains was restricted to Cysteine and L-tyrosine. Green gram and cowpea strains were fast growers with acid-production in BTB and BRYMA, while soybean and common bean Rhizobia were detected as slow growers. Similar results were obtained in UV absorbance of Rhizobial culture densities at 254 nm wavelength for their growth rate. Following the physiological characteristics, many strains were restricted to the 6.5-9.5 pH range and 0.5% -1% salinity levels. There was optimized growth of all strains at 32^0C and 35^0C temperatures incubation. Authentication gave a respectively high performance with a particular host plant. Groundnut, cowpea, and green gram obtained excellent potential to nodulation out of other Rhizobia inoculated legumes. Anyhow, this study implies the importance of selecting the most effective and efficient Rhizobial strain for a particular physical and biochemical conditions of the host plant and rhizosphere. The recorded properties of isolated Rhizobia confirmed their potential to implement sustainable agriculture by promoting them as biofertilizers to replace chemical N fertilizer.

Keywords: *Authentication of Rhizobia, Nitrogen Fixation, Nodulation Rhizobium Characterization, Rhizobium Spp.*