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"Filling gaps and removing traps
for sustainable resource management"

Growth and Yield Response of two Mungbean (*Vigna radiata* L.) Genotypes to Inoculation with N_2-fixating and P- and K-Solubilising Bacteria

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Abstract

Economic problems as well as environmental concerns related to the excessive application of agricultural chemicals have shifted the attention to application of biological fertilisers in many agroecosystems. In order to evaluate the effect of free-living nitrogen fixating and phosphorus and potassium solubilising bacteria on yield and nitrogen fixating root nodes of two mungbean (*Vigna radiata* L.) genotypes, a two-year factorial experiment was carried out as a randomised complete block design with three replications. Two mungbean genotypes (Dezfouli and Indian) were planted under six fertilisation systems at the Agricultural Research Station of Ferdowsi University of Mashhad, Iran, in 2018. Fertilisation treatments were free-living nitrogen fixating bacteria (NFB), phosphate solubilising bacteria (PhSB), potassium solubilising bacteria (PSB), NFB+PhSB+PSB, chemical nitrogen fertiliser (NF), and no fertiliser application as control (C). The crop growth parameters including leaf area index (LAI), crop growth rate (CGR), accumulation dray matter (DM) as well as its yield and its components were assessed every year and reported in a two-year average, as there were no significant differences between two growing years. According to the results, the highest LAI (3.85), CGR (27.14 g m^{-2} d^{-1}) and DM (796 g m^{-2}) were obtained for Indian genotype planted under NFB+PhSB+PSB treatment. Similarly, the values recorded for LAI, CGR and DM for Dezfuli genotype were 3.84, 26.27 g m^{-2} d^{-1} and 836 g m^{-2}, respectively, under NFB+PhSB+PSB treatment. The number of nitrogen fixating root node was affected by treatment significantly increasing from 5.83 in C treatment to 25.33 per plant in NFB+PhSB+PSB treatment. The highest biomass and grain yield obtained also under NFB+PhSB+PSB treatment by the value of 7621 kg ha^{-1} and 1828 kg ha^{-1}, respectively. All the investigated parameters decreased markedly in both genotypes under C treatment as compared to either chemical and/or biological treatments. In conclusion, application of nitrogen fixating bacteria as well as phosphate and potassium solubilising bacteria can be an appropriate and environment friendly strategy for mungbean cultivation in areas with low nutrient availability.

Keywords: Crop growth rate, leaf area index, Mungbean

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