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Phenotypic and Symbiotic Characterization of Rhizobia Isolated from Faba Bean (Vicia faba L.) in Moroccan Soils

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Abstract : Faba bean (Vicia faba L.) is an important food legume crop in Morocco. It is mainly used as human food and feed for animals. Faba bean also plays an important role in cereal-based cropping systems, when rotated with cereals it improves soil fertility by fixing N2 in root nodules mediated by Rhizobium. Both faba bean and its biological nitrogen fixation symbiotic bacterium Rhizobium are affected by different stresses such as: salinity, drought, pH, heavy metal, and the uptake of inorganic phosphate compounds. Therefore, the aim of the present study was to evaluate the phenotypic diversity among the faba bean rhizobial isolates and to select the tolerant strains that can fix N2 under environmental constraints for inoculation particularly for affected soils, in order to enhance the productivity of faba bean and to improve soil fertility. Result have shown that 62% of isolates were fast growing with the ability of producing acids compounds , while 38% of isolates are slow growing with production of alkalins. Moreover, 42.5% of these isolates were able to solubilize inorganic phosphate Ca3(PO4)2 and the index of solubilization was ranged from 2.1 to 3.0. The resistance to extreme pH, temperature, water stress heavy metals and antibiotics lead us to classify rhizobial isolates into different clusters. Finally, the authentication test under greenhouse conditions showed that 55% of the rhizobial isolates could induce nodule formation on faba bean (Vicia faba L.) under greenhouse experiment. This phenotypic characterization may contribute to improve legumes and non legumes crops especially in affected soils and also to increase agronomic yield in the dry areas.

Keywords : rhizobia, vicia faba, phenotypic characterization, nodule formation, environmental constraints
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