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Assessing the Impact of Diazotrophic Isolates Variability on the Phenotypic Parameters of *Phaseolus vulagris* L. Genotypes.

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Abstract

Increasing the diazotrophic bacteria application and improving nitrogen fixation in legume crops are some of the main strategies to achieve sustainability in agricultural processes for countries which are dependent on low input farming. The present work aimed to determine the effect of *Rhizobium* isolates on nodulation parameters, biomass and nitrogen fixation of common bean genotypes. The phenotypic analysis of isolates was carried out under controlled conditions, where nodulation, morphological and biomass parameters and nitrogen fixation of the genotypes ICA Pijao and BAT-304 were evaluated. A complete randomized experimental design was applied to determine the effect of the isolates on the genotypes, comparing with a control treatment and the inoculation of *Rhizobium etli* wild type strain CNPAF512. The inoculations of all the strains were done at the moment of the seeds sowing. At forty-two days after inoculation the nodulation parameters were measured: total nodule number, fresh and dry weight of the nodules, as well as biomass: shoot and root fresh and dry weight and nitrogen fixation: total nitrogen content. The results showed that the isolated strains have the ability for abundant nodule formation in roots plant of both genotypes analyzed. Among the strains, a remarkable beneficial effect was for the inoculation of *Rhizobium etli* isolated from two different regions and *Rhizobium pisi*. The genotypic variability showed the close positive correlation among these strains and the genotype BAT-304 compared with ICA Pijao. These results are crucial to improve the interplay among native strains and bean genotypes to achieve the efficiency of *Rhizobium*-legume symbiosis in this crop, increase grain production and to reduce the synthetic nitrogen applications. However, field experiments should be conducted to validate under natural conditions the entire benefit of the genotypic variation.

Keywords: Common bean, interplay, nitrogen fixation, *Rhizobium*, sustainability