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Impact of Native *Rhizobium* Strains Inoculation on Local Common Bean Production at Southern Ecuador

ROLDÁN TORRES-GUTIÉRREZ¹, KLEVER IVAN GRANDA MORA², BETTINA EICHLER-LOEBERMANN³, JOSÉ FRANCISCO GUAMÁN DÍAZ², YELENYS ALVARADO CAPÓ⁴

¹Universidad Regional Amazónica IKIAM, Biotechnology, Ecuador

²Universidad Nacional de Loja, Centro de Biotecnología, Ecuador

³University of Rostock, Fac. of Agricultural and Environmental Sciences, Germany

⁴Universidad Central Marta Abreu de Las Villas, Instituto de Biotecnología de Las Plantas, Cuba

Abstract

Common bean (*Phaseolus vulgaris*) has been a staple for the majority of low income families in Ecuador. Seeking the increasing of production of this important crop through sustainable methods, our research aimed to assess the effect of native *Rhizobium* strains inoculation on nodulation, plant biomass and yields of two local genotypes at southern region of Ecuador. Seeds of Calima and Mantequilla genotypes were planted under field conditions in clay loam soil. A total of four native *Rhizobium* strains isolated from common beans were compared with the inoculation of a wild type strain (*Rhizobium etli* CNPAF512), the application of urea and a control without inoculation and fertilisation. Nodule number, shoot and root dry weight yield parameters and yields of both genotypes were assessed. The results for nodules number showed that all the strains differed statistically with control and fertilisation treatments. Although there were no differences among strains, *Rhizobium leguminosarum* bv. *viciae* (COL6) for Calima and wild type strain for Mantequilla turned out the highest values. The plant biomass was variable for both genotypes, however it was remarkable affected by isolate COL6 and urea application for Calima and *Rhizobium mesoamericanum* (NAM1) for Mantequilla. All yields components were also stimulated by the inoculation of the isolate COL6, highlighting the high performance of the strain. Surprisingly, the inoculation of the strain PIN1 (*R. etli*), the same species than wild type strain, evidenced a negative effect on most of the parameters evaluated, suggesting the specific effect of each strains for the enhancement of plan parameters and not the effect of the *Rhizobium* species. The final yields of beans were concomitant with the previous results. The inoculation of NAM1-*Rhizobium mesoamericanum* (1.58 t ha⁻¹ in Calima) and COL6- *Rhizobium leguminosarum* bv. *viciae* (1.70 t ha⁻¹ in Mantequilla), raised the best statistical results without difference with the application of nitrogen fertiliser. However, the increasing in both case comparing with the fertilisation treatment turned out of 2.53 % and 2.35 % respectively. These results clarify the genotypical variability among *Rhizobium* strains and genotypes for common bean production and to contribute to carry out a sustainable agricultural process in Andean region.

Keywords: Isolates, *Phaseolus vulgaris*, *Rhizobium*, sustainability, yield