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MAXIMIZING SOYBEAN GROWTH AND YIELD: THE IMPACT OF DUAL FOLIAR INOCULATION WITH *Azospirillum argentinense* STRAINS

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Inoculation methods significantly impact the effectiveness of biofertilizers, with seed inoculation being the most widely used. However, factors such as chemical treatments, root exudates, and environmental stress can hinder their success. In this context, foliar spray inoculation is becoming popular as it minimizes the factors that could interfere with the beneficial effects of *Azospirillum*. Given that *Azospirillum argentinense* Az39 and Az19 strains can alleviate drought stress, promote growth, and enhance productivity, this study aimed to assess the effects of dual foliar spray inoculation with strains in soybean. *A. argentinense* strains were grown separately, and the inoculant concentrations were adjusted to 1×10^9 CFU mL⁻¹. Experimental trials were conducted as follows: (A) Greenhouse, for one month using pots with sterilized substrate. Plant height (H), aerial fresh weight (AFW), root dry weight (RDW), nodulation on primary (PRN) and secondary roots (SRN), and dry weight of nodules (DWN) were subsequently measured and B) Field, in Entre Ríos province (Argentina). Yield components and number of nodes and pods per plant were determined at harvest. Four treatments were applied, all of them inoculated in seeds with *Bradyrhizobium japonicum* E109: i) Control, ii) Az39 foliar, iii) Az19 foliar, iv) Az39+Az19 foliar. Foliar inoculation was carried out at V4 growth stage using 500 mL ha⁻¹ and a wetness volume of 110 L ha⁻¹. The trials presented a completely randomized design (greenhouse: n=12/treatment; field: 4 plots, 4x20 m/treatment). The results were analyzed by ANOVA and DGC's Test. In the greenhouse, dual foliar inoculation resulted in a significant increase in several of the measured parameters. The increases compared to the control were 16%, 51%, 39%, and 50% for H, PRN, DWN, and RDW, respectively. In comparison to single-strain foliar inoculation, the increases were 20%, 27%, 19%, and 24% with Az39, and 16%, 43%, 21%, and 25% with Az19 for the same parameters. Although the AFW did not show significant differences between treatments, dual foliar inoculation was 0.8% higher than control. In contrast, SRN did not differ from Az19 but was significantly different from the control (61%) and the Az39 treatment (29%). In field, there were no significant differences in yield between foliar inoculation treatments (single-strain or dual). However, dual foliar inoculation resulted in a 31% increase compared to the control. Furthermore, plants in this treatment exhibited an increase in node number (8%) and pod

(13%) compared to control. In conclusion, dual foliar inoculation in soybean with *A. argentinense* strains Az39 and Az19 improved soybean growth and yield parameters under different crop conditions, and it revealed great potential as a foliar microbial biostimulant. However, further studies are required to obtain more robust and detailed information.

Palabras clave: *Azospirillum argentinense* - foliar inoculation – soybean - PGPR