TITLE: ROOT COLONIZATION CAPABILITY VERSUS SUGARCANE GROWTH PROMOTION EFFECTS OF SOME *BRADYRHIZOBIUM* STRAINS

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ABSTRACT:

Bradyrhizobium spp. are bacteria widely known as nitrogen-fixing micro-symbionts in legumes, but some strains belonging to this genus are also capable of colonizing grasses, including sugarcane, and promoting their growth. The present work aimed to investigate the relationship between the growth-promoting effect of *Bradyrhizobium* strains isolated from sugarcane and their level of root colonization on this crop. Growth promotion studies were carried out with sugarcane plants grown from mini-setts (cultivar RB867515) inoculated with 13 strains of *Bradyrhizobium* isolated from sugarcane roots. Three strains that positively affected the chlorophyll content (strain AG48), root mass (strain P7-6) and/or total leaf area (strain RBR134b) were identified. To investigate their colonization capability, rooted micropropagated sugarcane plantlets were inoculated under axenic conditions with approximately $5x10^4$ CFU of each of the three growth-promoting strains and with two strains with no growth effects (P9-20 and P1-6). Strain USDA 110 of *B. diazoefficiens*, recommended for inoculation of soybean and without any known relationship with sugarcane, was also included as a control. Inoculated plantlets (3 per treatment) were grown for 30 days in glass tubes containing sterilized vermiculite and nutrient solution. After this period, the roots of the plants were washed with PBS buffer, weighed and then macerated to obtain the intimately associated bacterial population (endosphere and rhizoplane). Colony-forming units (CFU) were quantified after plating serial dilutions of the extracts on yeast mannitol agar. The strains differed with respect to their population density associated with roots. Unexpectedly, strain USDA 110 showed the highest colonization levels ($2.4 \pm 0.9 \times 10^7$ CFU g^{-1} root). P1-6 and P9-20, the less efficient strains, showed intermediate levels of colonization ($3.3 \pm 1.5 \times 10^6$ and $1.1 \pm 0.2 \times 10^7$ CFU g^{-1} root, respectively), while P7-6, RBR134b and AG48, the most efficient strains, had the lowest levels (between $7.9 \pm 5.2 \times 10^5$ and $1.7 \pm 0.8 \times 10^6$ CFU g^{-1} root). Therefore, these results indicate that there is no positive relationship between colonization efficiency and positive effects of *Bradyrhizobium* strains on the growth of sugarcane.

Keywords: plant growth-promoting rhizobacteria (PGPR); micropropagated plants; mini-setts

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