DEVELOPMENT OF A LEAF INOCULANT TO OPTIMIZE PHYTOREMEDIATION OF SALT-AFFECTED SOILS

Juliana Fidelis dos Santos[1], Millena Salles Araujo[1], Luiz Rodrigo Pereira de Souza[1], Luíza Santa Brígida de Barros Góes[1], Luiz Fernando Martins[2], Caio Tavora Coelho da Costa Rachid[1].

1 - Instituto de Microbiologia Paulo de Góes, Universidade Federal do Rio de Janeiro. Avenida Carlos Chagas Filho, 373, Cidade Universitária – Ilha do Fundão, Rio de Janeiro, RJ.

2 - Centro de Pesquisas e Desenvolvimento Leopoldo Américo Miguez de Melo (CENPES), PETROBRAS. Avenida Horácio Macedo, 950, Cidade Universitária – Ilha do Fundão, Rio de Janeiro, RJ.

Soil salinization is a serious environmental problem, which results in the loss of biodiversity and productive agricultural areas. A possible way to mitigate salinization is through the phytoextraction of salts from the soil by halophytic plants, such as *Atriplex nummularia*. In this context, the use of plant growth-promoting bacteria (PGPB) has been studied as a biotechnological tool to accelerate the process, by stimulating growth and increasing plant biomass. Thus, the objective of this work was selecting endophytic bacteria from leaves of *A. nummularia* that are potential PGPB to develop a leaf inoculant to optimize the remediation of salt-affected soils. For this, samples of *A. nummularia* were collected in salinized areas in three municipalities of Pernambuco. The leaves were submitted to external disinfection, liquefaction, serial dilution (10^{-1} to 10^{-4}) and plated in five different culture media (*Atriplex* extract medium, TBNR, phytate medium, *Spirillum* nitrogen-fixing medium and NBRIP). The cultivable bacterial communities ranged between 10^4 (NBRIP medium) and 10^7 (*Atriplex* extract) CFU ml^{-1}, with no statistical difference among the sites of origin. 340 bacterial strains were isolated and submitted to three tests: i) production of indoleacetic acid (IAA), ii) presence of genes related to biological nitrogen fixation (*nifH*) and iii) production of the ACC-deaminase enzyme (*acdS*). Fifty-two were IAA producers (15.3%), 12 had the *nifH* gene (3.5%) and seven had the *acdS* gene (2.05%). To know the identity of the isolates, the 18 strains with the highest production of IAA and all strains *nifH*+ and *acdS*+ were submitted to sequencing of the gene encoding 16S rRNA. The main genera found were *Bacillus* (19), *Enterobacter* (5) and *Pantoea* (5), already described in the literature as PGPB. Furthermore, genera such as *Salana*, *Dietza*, *Kushneria* and *Plantibacter* were also found. Eleven strains related to the main genera of PGPB were inoculated *in vivo* in an experiment with 288 seedlings of *A. nummularia* in order to observe the effects of leaf inoculation of these strains. These results reinforce the expectation of developing an innovative leaf inoculant, capable of increasing *A. nummularia* productivity and optimizing the recovery of salinized soils.

Keywords: Soil salinization, phytoremediation, *Atriplex nummularia*, leaf inoculant, old man saltbush.

Funding: ANP, CNPq, FAPERJ.