

Title: CHARACTERIZATION OF PUTATIVE PLANT GROWTH PROMOTING BACTERIA ISOLATED FROM THE MAIZE RHIZOSPHERE

Authors: Silva, F. C.¹, Souza, A. M.¹, Furmam, R. W.¹, Hirooka, L. S.¹, Furmam, F. G.¹, Ayub, R. A.¹, Etto, R. M.¹, Galvão, C. W.¹

Institution: ¹UEPG – Universidade Estadual de Ponta Grossa (Av. General Carlos Cavalcanti - 474 – Uvaranas – 84.030.900 – Ponta Grossa – PR.)

Abstract:

Maize is an important crop for meeting increasing global demands for food, livestock and biofuel production. Due to the negative environmental impact of agrochemicals and their increasing costs, the use of plant growth-promoting bacteria (PGPB) as inoculants is an alternative for the development of sustainable agriculture. PGPB can enhance plant growth by a wide variety of mechanisms like phosphate solubilization, siderophore production, biological nitrogen fixation, production of 1-Aminocyclopropane-1-carboxylate deaminase etc. The rhizosphere is well known to host a variety of PGPB due to the presence of root exudates and rhizodeposits. In this study we isolated seventy-six diazotrophic bacteria from the rhizosphere of maize plants, which had been tested in the presence of different PGPBs and N doses in the field at Ponta Grossa, Paraná State. After bacteria isolation in N-free semi-solid media, they were identified by partial 16S rRNA gene sequencing and characterized biochemically. Most of the isolates belonged to the *Betaproteobacteria* group (57.1%), but there were also isolates from the following groups: *Alphaproteobacteria* (2.9%), *Gammaproteobacteria* (20%), *Firmicutes* (5.7%), *Actinobacteria* (11.4%) and *Bacteroidetes* (2.9%). The plant growth-promoting activities were also evaluated. Protease production was widely distributed among the isolates, with a frequency of 46%. Cellulase production and phosphate solubilization showed intermediate distribution, with rates of 23.9% and 14.4%, respectively. Just two bacterial isolates presented values of auxin production greater than 850 μM AIA per μg of protein, and therefore, were considered as a high-potential PGPB. Cyanide production was also rare, with an incidence of 5.3%. Siderophore production was measured using two methodologies, the chrome azurol S (CAS) agar or O-CAS, which showed 31.7% and 67.2% frequencies, respectively. Despite the effectiveness of both tests, the second one might have showed more positive results because the detection reagent, CAS/HDTMA, was added after a previous bacterial growth, reducing a possible toxic effect of this compound. Genera *Pseudomonas*, *Bacillus* and *Burkholderia* presented more overlapping biochemical activities, thus can be potential agents to increase crop yield in maize plants.

Keywords: Biofertilizers, enzymes, maize, PGPB, rhizosphere.

Promotion agency: INCT – Fixação Biológica de Nitrogênio, CNPq, Fundação Araucária.