Poster V.5

Effect of biochar on the mirobial enzymes activity of soil with eucalyptus

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Biochar is a carbon-rich material obtained from carbonized biomass under a low oxygen atmosphere, used as soil conditioner. It has potential to alter physical, chemical and microbiological properties of the soil, increasing the availability of water and nutrients to the plants. This work evaluated the effect of biochar produced from eucalyptus residues in the soil microbial activity of beta-glucosidase and urease enzymes of a commercial cultivation area of *Eucalyptus urograndis* installed in a Red-Yellow Latosol in São Jerônimo da Serra, Paraná. The experiment was designed in randomized blocks varying the dose of biochar (0 or 1.11 mg/ha) and fertilization (0, 120 or 150 g of NPK 4:42:6 per tree) with four replicates. The rhizospheric and non-rhizospheric soil were collected 90 days after planting and used for determining the most probable number of diazotrophs and the microbial beta-glucosidase and urease activity enzymes. The highest beta-glucosidase activity was recorded in the absence of fertilization and biochar in the rhizospheric soil (2, 173 ug/g of soil). In general, fertilization and biochar reduced beta-glucosidase activity and the number of nitrogen-fixing bacteria. In the non-rhizospheric soil, the beta-glucosidase activity was 50% to 75% lower than in the rhizospheric soil; this indicates that the closer the bacteria are to the root, the greater is the breakdown of carbohydrates and the production of glucose, providing more energy for their proliferation. In contrast, the highest urease enzyme activity was recorded in presence of medium fertilizer and biochar in non-rhizospheric soil (18.5 ug NH_4-N/g). In general, the presence of biochar generated higher urease activities, indicating that more NH_3 was being produced, thus there was more availability of N for eucalyptus plants in this condition. Both enzymes showed to be good indicators of soil quality and fertility, since they were sensitive to soil management as well as nutrient availability variations.

Keywords: ***Beta-glucosidase enzyme; urease enzyme; biological nitrogen fixation****.*
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Poster V.6

Responses to elevated c-di-GMP levels in *Azospirillum brasilense* Az39

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The Alphaproteobacteria *Azospirillum brasilense* is a nitrogen-fixing plant-growth-promoting rhizobacteria (PGPR) which have beneficial effects in many agronomically important plants. Its beneficial properties depend on an efficient attachment and colonization of the plant root surface, which implies a genetic and metabolic adaptation to stablish an intimate association with the plant host. Cyclic diguanilate (c-di-GMP) has emerged as an ubiquitous second messenger in bacteria, probably best known for controlling the transition from a planktonic/motile lifestyle to a sessile biofilm mode of growth. *Azospirillum*, as many other plant-associated bacteria, encode dozens of c-di-GMP metabolic enzymes involved on its synthesis and degradation. The likely functional redundancy evidences a complex and evolved signal transduction systems on these bacteria but often hinder genetic approaches to reveal c-di-GMP networks and components affecting a particular function. In this work, we have exploited the overexpression of a well characterized diguanylate cyclase to artificially raise the intracellular levels of c-di-GMP in *Azospirillum brasilense* Az39. The altered c-di-GMP levels generate a substantial colony morphology change evidencing the overproduction of at least one c-di-GMP-promoted polymer when was grown on solid media supplemented with different dyes. Furthermore, c-di-GMP promotes flocculation in liquid media and different forms of biofilm formation. The swimming motility was also altered and GFP-labelled versions allowed us to study the impact of high levels of this bacterial second messenger on the colonization of the plant host.

Keywords: **A. Brasilense*; mobility; colonization****.*
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