Poster VI.12

Can *Herbaspirillum seropedicae* alleviate plant water stress?

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Severity and frequency of drought is expected to increase with global climate changes affecting crop yields. Inoculation with endophytic bacteria have been reported to reduce the negative impact from water stress. In the present study we evaluate in vitro the potential of *H. seropedicae* (*Hs*) to mitigate plant water stress in two biological systems: (a) stress simulated by polyethylene glycol 6000 on tomato plants cv Santa Clara and (b) stress after water suspension on maize plantlets (var SHS 5050). For tomato, *Hs* inoculation reduced the negative impact of PEG on root growth and lateral root emission. Inoculated plants improve photosynthesis and relative water content in either in the presence or absence of PEG. Using epifluorescent microscopy and *Hs* strain RAM 10 linked with gfp we had shown distinct colonization pattern of root surface under PEG-stress and changes density of root hairs. For maize, the plants were analyzed after leaf wilt to determine fresh weight, dry weight, electrolyte extravasation, proline content and in situ location of $O2^-$ and H2O2. *Hs*-Inoculation reduced the negative impact of the water stress by reduction of electrolytes extravasation and increasing of proline content. Also, stressed plants treated with bacteria had shown lower accumulation of ROS in relation to stressed and non-inoculated plants. Ultrastructural analysis from maize leaf revealed that the water deficit affected the chloroplast membrane, but there was less damage in *Hs*-treated plant. Collectively, the results point that *H. seropedicae* can alleviate water stress by modulation of root architecture, increasing water uptake and contents, keeping highest photosynthetic rates as well reducing reactive oxygen species accumulation and chloroplast membrane damage.

Keywords: ***beneficial bacteria; drought stress; cellular ultrastructure.***
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Poster VI.13

Effect of the association of endophytic bacteria in *Urochloa ruziziensis* submitted to osmotic stress

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Urochloa ruziziensis presents high quality of forage, with high food value, but is not tolerant to drought. Plants constantly subjected to stresses have the ability to modulate defense responses to get back to their normal metabolism, these responses can neutralize the cytotoxicity of reactive oxygen species and are known as antioxidant mechanisms. Plant growth promoting bacteria (PGPB) can aid plants to develop mechanisms involved in responses to abiotic stresses. The objective of this study was to evaluate the effect of PGPB on plants submitted *in vitro* to water stress. *Urochloa ruziziensis* and the bacteria *Azospirillum brasilense*, *Herbaspirillum seropedicae* and *Leclercia adecarboxylata* were used. The experiment was entirely randomized with 8 treatments. Pre-germinated seeds were placed in test tubes containing 25ml of MS medium with Polyethylene glycol (-0.3MPa) and inoculated with 10^6 CFU.seed^{-1} of each of the strains. After 13 days of cultivation, the length, fresh and dry weight of shoot and root biomass, microbial counts, relative water content (RWC) and membrane stability index (MSI), roots morphology by staining with blue 1% methylene, stomatal morphology and enzymatic analysis were evaluated. Polymerase chain reaction (PCR) was performed to confirm the presence of the adhered bacteria. Data were submitted to ANOVA and compared by the Tukey test ($p > 5\%$). As result, the strain *A. brasilense* had positive effect on the maintenance of the cellular metabolic activity observed by the maintenance of the RWC and MSI in plants under water restriction, and showed the capacity to promote the greatest increases in the aerial and root part and the stomatal area maintenance under both conditions. *L. adecarboxylata* strain was shown to be promising for use in forages due to increase shoot and root biomasses, and the MSI and RWC maintenance at high levels. The enzymatic activity was modified by the presence of the bacterium and even more by the stress imposition, and SOD (*A. brasilense* and *H. seropedicae*) and GST (*L. adecarboxylata*) could be used as response markers. *A. brasilense* can be considered the best strain for commercial purposes.

Keywords: **Brachiaria*; water deficit; antioxidant enzymes.***