Ecophysiological evaluation of corn plants inoculated with Herbaspirillum seropedicae under water stress

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Drought is a limiting factor for productivity since it reduces photosynthesis, inhibits plant growth and generates delays in flowering and fruiting. Important agricultural systems could have their productivity affected, with estimated losses of R $ 1.2 billion in 2020. It is known that some endophytic bacteria are able to mitigate the negative effects of drought. Therefore, the objective of this work was to evaluate the resistance to water stress in corn plants inoculated with *Herbaspirillum seropedicae (Hs)*. The experiment was conducted in a greenhouse using PVC tubes 150 mm in diameter and 1 m in height, in order not to limit root growth. Corn seeds (SHS 5050) were disinfested and inoculated with $1x10^8$ ml^{-1} cells of *Hs* strain HRC54. After 21 days, 4 treatments were established by means of water suspension: Plants inoculated without stress (PI-); Inoculated plants submitted to water stress (PI+); Plants not inoculated without stress (PC-); Plants not inoculated under water stress (PC+). After 28 days of water suspension, liquid photosynthetic rate (*A*), transpiration (*E*) and stomatal conductance (*gS*) were evaluated through IRGA LCpro analyzes. The intrinsic water use efficiency (*EIUA*) was calculated using the formula *EUIA* = *A*/*gS*. Fluorescence of chlorophyll *a*, obtained through the fluorometer FMS2, was recorded with: Fo (minimum fluorescence), Fm (maximum fluorescence), Fv (variable fluorescence), Fv/Fm (maximum quantum yield of photosystem II). For gas exchange, it was observed that the values of *A* in (PC-) remained around 15 $\mu mol.m^{-2}s^{-1}$. The treatment (PC+) and (PI+) had values reduced by 90% and 75% (mean 1.5 $\mu mol.m^{-2}s^{-1}$ and 3.8 $\mu mol.m^{-2}s^{-1}$). For *gS*, (PI-) and (PI+) have higher values (0.19 $mol.m^{-2}s_{-1}$ and 0.04 $mol.m^{-2}s^{-1}$) for (PC-) and (PC+) , 17 $mol.m^{-2}s^{-1}$ and 0.01 $mol.m^{-2}s^{-1}$). Like *A* and *gS*, *E* was also reduced when water stress treatment was imposed. As *gS* decreased in the treatments under stress*, EIUA* increased, reaching higher values (PC+) (150 µmol CO^2/mol H_2O) and (PI+) (95 µmol CO^2/mol H_2O) in relation to irrigated treatments (PC-) (89 µmol CO^2/mol H_2O) and (PI-) (93 µmol CO2/mol H2O). The Fv/Fm ratio fell after 16 days of irrigation suspension, decreasing by 12.5% (PC+) (0.671) and 8.8% (PI+) (0.684) in relation to irrigated treatments (PC-) (0.758) and (PI-) (0.755). The effect of water limitation affected photosynthesis, since inoculation with the *Hs* bacterium was not able to mitigate the effects of water stress under the conditions tested.

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