EFFECT OF BIOINPUTS ON GASEOUS EXCHANGE OF CORN GROWN IN SOILS UNDER DIFFERENT MANAGEMENT SYSTEMS

EFEITO DE BIOINSUMOS SOBRE TROCAS GASOSAS DO MILHO CULTIVADO EM SOLOS SOB DIFERENTES MANEJOS

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Abstract

The inoculation of bioinputs based on microorganisms in corn crops has been showing positive results for plant development. The literature contains several reports of such effects, in which acting in isolation or co-inoculated, they stimulate physiological changes in plants, promoting changes in the root architecture and in the aerial part of the plant. *Herbaspirillum seropedicae* and *Azospirillum brasilense* are promising bacteria for use as bioinputs, with distinct effects on plant development. Thus, the objective of this study was to evaluate isolated or co-inoculated bioinputs based on *H. seropedicae* and *A. brasilense* and their effects on the gaseous exchange of creole corn, cultivated in soils with different management histories. The experiment was carried out in a greenhouse, with planting in 5 dm^3 pots containing soil collected in an experimental area under different management systems, implemented in a 2x2x4 factorial scheme, with four replications, as follows: two soils collected in areas with history of no-tillage system (HNTS) and conventional tillage system (HCTS), two soils collected in areas with a history of irrigation with swine wastewater (HSW) and water (HW), equivalent to 100% of the actual crop evapotranspiration - ETc, and; four applications of bioinputs with variations in fertilization (NPK): B0 - without bioinputs + 100% fertilization, B1 - *H. seropedicae* + 40% fertilization, B2 - *A. brasilense* + 40% fertilization and B3 - co-inoculation with *H. seropedicae* and *A. brasilense* + 40% fertilization. Pot irrigation was calculated to reach 70% of field capacity. After 60 days, the gaseous exchange in fully expanded leaves was measured using a portable infrared gas analyzer (IRGA), model LI 6400 XT Portable Photosynthesis Siystem (LI-COR, Lincoln, NE, USA), to obtain the following variables: instantaneous water use efficiency (USA) (W/E) [(µmol CO_2 m^{-2} s^{-1})/(mmol H_2O m^{-2} s^{-1})] and gs – stomatal conductance (mol H_2O m^{-2} s^{-1}). The experimental data were submitted to analysis of variance with the F-test ($p \leq 0.05$). Data related to A/E showed a tendency to increase when bioinputs were applied, especially when *A. brasilense* was present in isolation (B2) or co-inoculated (B3) for HSW. The data related to gs showed a trend of significantly higher stomatal conductance when analyzing the HSW values in the HNTS. The treatments (B1, B2 and B3) were responsible for providing higher gs, which is described as promoting increased gaseous exchange and also increased activity of H^+-ATPases. The production of auxin, which stimulates stomatal opening, was an extremely positive result, since the functioning of the stomata controls the absorption of CO_2, and consequently the plant production. In addition, bioinputs raised A/E, i.e., plants produced more while consuming less water. The bioinputs positively affected the attributes related to gaseous exchange of creole corn, even in a condition with lower nutrient availability.

Keywords

Plant growth-promoting bacteria, biotechnology, corn nutrition.