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PROMOÇÃO:



Network modulation of leaf gas exchange in a drought-tolerant sugarcane cultivar under severe water deficit

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Since water deficit is the major environmental factor limiting sugarcane yield, the objective of this study was to identify what kind of changes in the photosynthetic network would be linked to the homeostasis modulation of a drought tolerant sugarcane cultivar subjected to severe water deficit. Moreover, we tested the potential effect of phosphorus supplying on the plant physiological responses to drought. This study was carried out in a greenhouse where sugarcane plants (*Saccharum* spp.) cv. RB 86-7515 were grown. One single-node stalk segment was planted in plastic pots (20 L) filled with soil (red-yellow ultisol). Plants were subjected to the original P concentration in soil (36 mg dm⁻³) or supplied with the equivalent to 100 kg P₂O₅ ha⁻¹ using CaH₄(PO₄)₂. Plants were irrigated daily until the beginning of drought treatment. After 90 days of shoot emergence, plants were irrigated with the equivalent to 100% (control) or 10% (water deficit) of daily evapotranspiration for ten weeks. At the end of this period, light response curves of leaf gas exchange and other physiological and growth variables were performed in each treatment. The experiment was performed in a completely randomized design, with four repetitions. To assess changes in photosynthetic network, we evaluated the occurrence of system modulation under distinct water regimes and phosphorus supplying via network global connectance, *C_g*. The set of results from *C_g* analyses indicated adjustments in the relationships among the elements of the leaf gas exchange network that support the high drought tolerance of the sugarcane cultivar RB 86-7515, which maintained *A_{max}* values around 31 μmol CO₂ m⁻² s⁻¹ and non significant crop yield differences even under drought conditions. *C_g* values were higher (1.620) under water deficit conditions than in irrigated plants (1.370) supporting the homeostasis of both photosynthesis and plant growth under water deficit. Moreover, P-

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supplying improved the sugarcane acclimation capacity by affecting plant characteristics related to water status and photosynthetic performance and causing network modulation under water deficit, allowing high physiological stability.

Key words: drought, network connectance, phosphorus nutrition, photosynthesis, *Saccharum* spp.

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