Silicon supplementation induces tolerance to water deficit in sorghum plants, increasing the growth of the root system and improving the photosynthetic rate

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Silicon has emerged as a potential drought tolerance inducing agent in plants, since, besides a structural element, it can induce metabolic responses which increase drought tolerance in several crops. Thus, the purpose of this study was to observe the effects of silicon on the root system architecture and morphometry of sorghum plants grown in two soil water levels, in search to show if physiological improvements promoted by silicon are connected to root system morphometric changes. For this purpose, the drought sensitive genotype BRS332 was grown in a greenhouse during pre-flowering stage. It was used the completely randomized design with four treatments and six replicates. The treatments were field capacity (FC), water deficit (WD), field capacity + silicon (FC + Si) and water deficit + silicon (WD + Si). Silicon was provided through fertigation in a concentration of 2mM applied to the soil in a volume of 250mL per day, for 17 days (5 days before stress and 12 days of stress). Posteriorly, leaf hydric potential was assessed at midday, gas exchange, photosynthetic pigments levels, root system morphometry and yield. The silicon treatment mitigated the drought effects over the leaf hydric potential, photosynthesis, instant carboxylation efficiency and root system morphometry of sorghum plants. These positive effects contributed for a higher grain yield and, therefore, higher drought tolerance. At that, it is concluded that the supplementation with Si increases drought tolerance in sorghum plants by increasing root system growth and by mitigating the effects of drought over photosynthesis.

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