Sorghum is one of the world’s leading cereal crops. It is a some species [1,2].

This study aimed to elucidate the physiological mechanisms of NH₄⁺ grown sorghum plants [Sorghum bicolor (L.) Moench] which increase the tolerance to salinity. Sorghum is one of the world’s leading cereal crops. It is a grass species, C₄-type, adaptable to extreme conditions and some genotypes are salinity tolerance [2]. This study aimed to elucidate the physiological mechanisms of NH₄⁺ grown sorghum plants [Sorghum bicolor (L.) Moench] which increase the tolerance to salinity.

Materials and Methods

Plants were cultivated in nutrient solutions containing two inorganic nitrogen sources, NO₃⁻ or NH₄⁺, both at 5.0 mM. Twelve days after sowing, the plants were subjected to salt stress with NaCl at 75 mM, which was applied in two doses of 37.5 mM.

Growth parameters, gas exchanges and photosystem II efficiency analyses were measured after ten days of salinity.

Results and Discussion

Although the leaf area and the dry mass of shoot and roots were strongly reduced by salinity, the highest reductions were observed in the stressed plants grown with NO₃⁻ than in the ones grown with NH₄⁺ (Figure 1A). These results disagree with the large majority of the findings in the literature, where plants show reductions in their growth when cultivated in presence of NH₄⁺ [3].

Salinity did not affect the gas exchange parameters of sorghum plants, regardless of nitrogen source; however, in both control and salt stress conditions, NH₄⁺ grown plants showed values of A and instantaneous carboxylation efficiency (A/Ci) higher than NO₃⁻ grown plants.

Maximum quantum yield of PSII (Fv/Fm) and the relative energy excess at the PSII level (EXC) were not changed neither salinity nor inorganic nitrogen source. Although the effective quantum yield of PSII (ΦPSII) and the apparent ETR were not significant affect by NaCl stress, these parameters were higher in NH₄⁺ grown plants under control and salinity conditions. These responses are an acclimation mechanism rather than an indicator of salt dangerous effects on the chloroplast’s machinery [4].

In salinity absence, the NO₃⁻ grown plants showed values of photochemical (qP) and non-photochemical (NPQ) quenching lower than in the NH₄⁺ grown plants. Salt stress caused an increase in qP and NPQ only in plants treated with NO₃⁻.

Conclusion

Our findings suggest that the increased salinity tolerance NH₄⁺ induced in sorghum is not attributed to better CO₂ assimilation and photosystem II efficiency.

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References