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Article title	Physio-biochemical and agronomic changes of two sugar beet cultivars grown in saline soil as influenced by potassium fertilizer
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ABSTRACT

In salt-affected soils, more than one approach should be adopted for minimizing the salinity impacts and enhancing the land productivity. The most effective practices in crop management under saline soil are choosing the plant type and variety and exploiting the best nutrient tactics. Under two soil salinity levels (3.54 and 9.28 dS m^{-1}), representing low and high salinity, respectively), two sugar beet cultivars (Romulus and Francesca) were fertilized with three potassium (K) rates (48, 96, and 144 kg K ha^{-1}), in addition to the check treatment (0 kg K ha^{-1}). During two seasons of 2018/2019 and 2019/2020, treatments were distributed in a split-split plot design based on a randomized complete block arrangement with three replicates. Several physio-biochemical and agronomic traits, as well as leaf mineral contents and juice quality, were assessed. Briefly, findings illustrated that K at a rate of 144 kg ha^{-1} enhanced cell membrane stability, relative water content, and performance index by 1.17, 1.01, and 2.73 times, respectively, in high salinity soil, compared to low salinity × no K addition. Under high salinity, the addition of 48 and 144 kg K ha^{-1} recorded the highest values of total phenolic content and total antioxidant activity, respectively. In high salinity soil, K supplying (144 kg ha^{-1}) caused the maximum improvements in gross and white sugar content with a decrease of 42.0% in sodium content and an increase of 35.9% in root yield ha^{-1}. Romulus cultivar fertilized with 144 kg K ha^{-1} had the maximum relative water content, F_v/F_m, and performance index. Francesca cultivar with 144 kg K ha^{-1} was the potent combination for increasing total soluble sugars, total phenolic content, total flavonoid content, and total antioxidant activity. Romulus cultivar fertilized with 144 kg K ha^{-1} was the best practice for improving all agronomic traits of sugar beet. It could be concluded that a high potassium rate, i.e., 144 kg K ha^{-1}, reduced the injury ionic impacts of saline soils along with improving the genetic makeup of sugar beet cultivars, expressed in sugar yield and quality. However, all other attempts for reclamation of the saline soil should be adopted to increase the potentiality of K fertilizer and enhancing gene expressions of different sugar beet varieties.