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## Effect of salinity on ion concentration and growth of two genotypes of *Solanum lycopersicum* and *Cucumis sativus* under contrasting VPD levels

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### Abstract

Plants react sensitively when a certain threshold value of dissolved mineral salts in water or soil is exceeded. The resulting salt stress is one of the most severe causes limiting agricultural productivity. Therefore, research on salt tolerance and salt stress mitigation strategies is crucial.

In this study, the response of each two varieties of *Solanum lycopersicum* (cv's Saluoso, Sweeterno) and *Cucumis sativus* (cv's Addison, Proloog) to high (2.8 kPa) and low (1.7 kPa) vapour pressure deficit (VPD) at different NaCl concentrations (0, 15, 30 and 60 mM) in hydroponic solutions was investigated. Total dry weight, leaf area, nutrients ( $\text{NH}_4^+$ ,  $\text{NO}_3^-$ , and  $\text{PO}_4^{3-}$ ) uptake, evapotranspiration, plant height, leaf count, and stem diameter were recorded. Plants were partitioned into leaf, stem (upper, middle, and lower), and root to analyse the nutrient distribution ( $\text{Na}^+$ ,  $\text{Cl}^-$ , and  $\text{K}^+$ ). Though studies have examined the effect of salinity and humidity, our research is unique because of the analysis of the distribution of nutrients within the plant. This could provide a better understanding of the tolerant strategies of tomato salinity. At 15 and 30 mM root zone salinity, neither the total dry weight nor the leaf area of any variety was affected. At 60 mM, the dry weight and leaf area of cucumber were reduced by 88 % and 94 %, respectively, and of tomato by 55 % and 61 %, respectively. VPD did not affect the plant growth and nutrient uptake but in general biomass production, cv Saluoso performed better than cv Sweeterno and cv Proloog performed better than cv Addison with increasing NaCl concentrations. However, this difference was not significant. As with biomass production, the daily nutrient uptake was only affected at salinity levels above 60 mM root zone salinity.

With these initial results, we expect a salinity threshold between 30 and 60 mM for all plants considered. Further, we conclude that genotype selection is an easier entry point to mitigate salinity stress than VPD control for the studied species. The presentation reports on the distribution of nutrients within the plants which is currently still being analysed. Finally, we suggest methodological improvements and outline knowledge gaps and research needs.

**Keywords:** Nutrient uptake, cucumber, hydroponics, tomato