Rootstock-dependent response of Hass avocado to salt stress

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Avocado (*Persea americana*) is a highly valuable crop, with rapidly increasing global popularity. Salt stress is a major limiting factor in avocado cultivation, exacerbated by global trends towards scarcity of high-quality water for irrigation. Israeli avocado orchards have been irrigated with relatively high-salinity recycled municipal wastewater for over three decades, over which time rootstocks were selected for salt-tolerance. This study's objective was to evaluate the physiological salt response of avocado as a function of the rootstock. We irrigated fruit-bearing 'Hass' trees grafted on 20 different local and introduced rootstocks with water high in salts (electrical conductivity of 1.4–1.5 dS/m). The selected rootstocks represent a wide range of genetic backgrounds, propagation methods, and horticultural characteristics. We studied tree physiology and development during two years of salt exposure by measuring Cl and Na leaf concentrations, leaf osmolality, visible damages, trunk circumference, LAI, CO_2 assimilation, stomatal conductance, spectral reflectance, stem water potential, trichomes density, and yield. We found a significant effect of the rootstocks on stress indicators, vegetative and reproductive development, leaf morphogenesis and photosynthesis rates. In another study, we compared the ion, metabolite and lipid profiles of leaves, trunks and roots of trees composed of mature 'Hass' scion that was grafted onto two rootstocks of different salt susceptibility, during gradual salinity exposure. We found that the leaves of the scion grafted on the selective rootstock acquired the standard level of necessary minerals without being exposed to excessive salinity. Simultaneously, the carbohydrates and storage lipids produced in the leaves were transferred to the rootstock organs, which became a strong sink. Our study describes mutual scion–rootstock relationships that enable salt tolerance through selective ion transport and metabolic modifications. We conclude that the rootstock strongly influences avocado tree response to salinity exposure in terms of physiology, anatomy, and development.