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Effects of container size and fruit load intensity on tomato under salt stress

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Container size and fruit load intensity are two common factors manipulated to regulate plant growth and development. As saline water is increasingly used for irrigation in arid and semi-arid regions, it is important to study effects of container size and fruit load intensity on tomato in both aboveground and belowground parts under salt stress. The experiment was conducted in a net house located in Sede Boqer Campus, Israel. Containers of four sizes (8-, 28-, 48-, and 200L with the same depth but vary in diameters), two salinity levels (1.5- and 7.5 dS m^{-1}) and two crop load intensities (0% and 100%) were applied. Gas exchange parameters (i.e., stomatal conductance and CO_2 assimilation rate), plant growth parameters (i.e., plant height and stem diameter), and root development were monitored periodically. Plant biomass and various root traits were measured at harvest. For aboveground part, results revealed that container size and salinity level significantly influenced gas exchange performance while fruit load intensity had no significant effect. Plants grown in larger containers without salt stress had higher stomatal conductance and CO_2 assimilation rate. Plant height and stem diameter were significantly greater in plants grown in 200L than those in other containers despite salinity and fruit load levels. Moreover, plants grown in 200L containers exhibited significant increase of 56.3%, 152.9%, and 174.9% respectively in yield compared with those grown in 48-, 28- and 8L under salt stress. The increase magnitudes were greater when there was no salt stress: 109.0%, 430.8%, and 454.0% respectively. For belowground parts, increased container size leads to increased rooting depth. Besides, Minirhizotron data showed that in 200L containers, plants grown under low salinity without fruit developed the greatest total root length. More detailed root data will be presented. It is concluded that container size has a pronounced effect on physiological behaviours of tomato plants. Therefore, properly increasing container size can alleviate yield reduction under saline irrigation.