

EFFECT OF AIR CONTENT OF SOIL ON AVOCADO TREE WATER STATUS AND GROWTH

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Avocado trees evolved in andosol soils, which are considered the optimum type for tree growth due to their physical properties, mainly low bulk density ($0.5 - 0.8 \text{ g cm}^{-3}$) and high macro porosity (approx. 46%). In Chile, avocado plantations are mostly located in fine textured soils, with bulk densities between 1.3 and 1.5 g cm^{-3} and macro porosities below 20%. Due to these soil conditions, severe problems of poor root aeration are observed, which in part may reduce production levels of the crop. The objective of this research was to study the effect of soil aeration in the root zone on avocado water status. The ultimate goal of this study was to generate information for developing irrigation management strategies for avocado orchards that optimize both air and water distribution in the soil.

The study was conducted during the 2004/05 production season. Two-year-old 'Hass' trees on Mexicola rootstock were used for the study. The treatments were T0: loam soil; T1: sandy soil; T2: sandy loam soil; T3: clay loam soil. Results showed that air levels in soil between 5% and 18% affected stomatal conductance but not stem water potential. Soil air content below 17% reduced the oxygen diffusion rate below $20 \mu\text{g cm}^{-2} \text{ min}^{-1}$, which is the threshold value for normal avocado tree development. In addition, macro porosity and ethylene content, and O_2 and CO_2 in the soil atmosphere were correlated.