

# **SOME ASPECTS OF WATER RELATIONS ON AVOCADO *Persea Americana* (Mill.) TREE AND FRUIT PHYSIOLOGY**

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## **ABSTRACT**

The effect of long-term irrigation on water relations of 'Fuerte' avocado trees, and the consequences for fruit ripening and physiology, particularly physiological disorders, were studied.

Four irrigation regimes were used, namely dryland relying on rainfall, occasional (irrigation when soil moisture tension reached 80 kPa), regular (soil moisture tension 55 kPa) and frequent (soil moisture 35 kPa).

Seasonal tree leaf water potential was studied. This became more negative during the dry season (winter and spring) and less negative during the period of summer rainfall. During the dry periods, the dryland and 80 kPa treatments had considerably more negative leaf water potential than the 55 kPa and 35 kPa regimes. These differences decreased during the summer rainfall period.

Acclimation was studied by measuring leaf osmotic pressure and osmotic pressure at zero turgor. A pattern similar to seasonal leaf water potential emerged. Further, the dryland treatment showed higher osmotic pressure, particularly at zero turgor, during winter and spring. It was concluded that these trees may have acclimated. Diurnal cycles of stomatal resistance, transpiration and leaf water potential on a summer, two winter and a spring day were monitored. Dryland trees showed acclimation, with delayed reaction to environmental water demand and decreasing soil moisture. Trees of the 80 kPa treatment showed greatest stress.

Fruit water potential became more negative between April and July, with fruit softening becoming more rapid. Treatment differences were inconclusive.

Polyphenol oxidase activity (PPO), soluble and total, was measured. For fruit picked in April and July 1983, the 55 kPa treatment showed the lowest activity and the 80 kPa the highest. Storage at 5,5°C for 30 days increased the activity, while fruit softening decreased it. July activity was higher than the April-harvested fruit. The same pattern

emerged for fruit harvested in April 1985, although treatment differences were not significant. Rainfall was considerably higher during the fruit development period of 1985 fruit as compared with that of 1983. A significant interaction between restricted container ventilation during ripening and irrigation history was obtained, the 80 kPa fruit showing higher PPO activity than 55 kPa fruit.

Ethylene evolution during ripening showed a normal climacteric pattern for 55 kPa and dryland fruit, but a delayed peak for 80 kPa fruit.

Fruit calcium concentrations showed rapid changes between 7 and 16 weeks after fruit set thereafter remaining constant to harvest. There were no clear treatment differences.

Fruit abscisic acid levels at 50% soft (100% is eating soft) were lowest in 55 kPa fruit, and highest in 80 kPa. A significant correlation between these values and soft fruit PPO activity was found.

A preliminary fruit quality prediction model is suggested.