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IRRIGATION MANAGEMENT OF AVOCADO IN A CALIFORNIA COASTAL ENVIRONMENT

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Hass avocado trees have been irrigated differentially for four years. This trial started as 15 levels of irrigation, but with time it has become obvious from tree size, that a eucalyptus windrow has affected the results. Treatment plots from that end of the study have been dropped, leaving 7 application amounts — kc's of 0.37, 0.46, 0.63, 0.70, 0.75, 1.00 and 1.11. The seven levels of irrigation have resulted in significantly different tree size, stomatal conductance, soil tension, tissue chloride, and soil salinity. The higher levels of irrigation have resulted in trees with a significantly reduced yield per canopy volume.

Annual and cumulative harvest yields (figure 1) were not dramatically affected by treatment, although there is a somewhat curvilinear response which conforms to a second order polynomial regression of $y=6.47+2123.97x-1542.34x^2$ (coefficient of determination of 0.61). More clearly affected was canopy volume (figure 2) which had a coefficient of determination of 0.74, a closely linear response of tree size to treatment. Yield per canopy volume (figure 2) had a negative correlation (correlation of determination of 0.67). There was no correlation between yield and fruit size.

It has taken four years of imposed treatments for the cumulative yields to show a significant difference in treatment. This points out the need for long term studies in tree trials. Much of the yield difference is due to the substantially larger trees that result with more water. In fact, at 111% ETo it appears the trees have sacrificed yield in favor of growth. The trees receiving less than 70% ETo are significantly smaller and show the stress of chloride accumulation and lack of adequate leaching.

This study is not completed. The tree canopies in the 111% treatments are touching and the 70, 76 and 100% ETo trees are not far behind. This will entail either a thinning of the orchard or more likely some pruning program. However, if the economics of increased pruning and the cost and availability of water are such that die water-stressed trees give a higher return to the grower, the reduced water treatments may be the grower's choice.

This would need to be made on purely an economic basis, since esthetically the high water treatment trees looked better.

According to tensiometer data, in adequate rainfall years, trees begin water stressing only by mid-July in this area. This is because the trees can fully use the stored soil moisture from rains. By mid-July, the trees are reliant primarily on the irrigation water. During four years of this trial, we have had the first rains in either September or October. This means the trees are significantly reliant on irrigation for only about a two to three month period in adequate rainfall years.

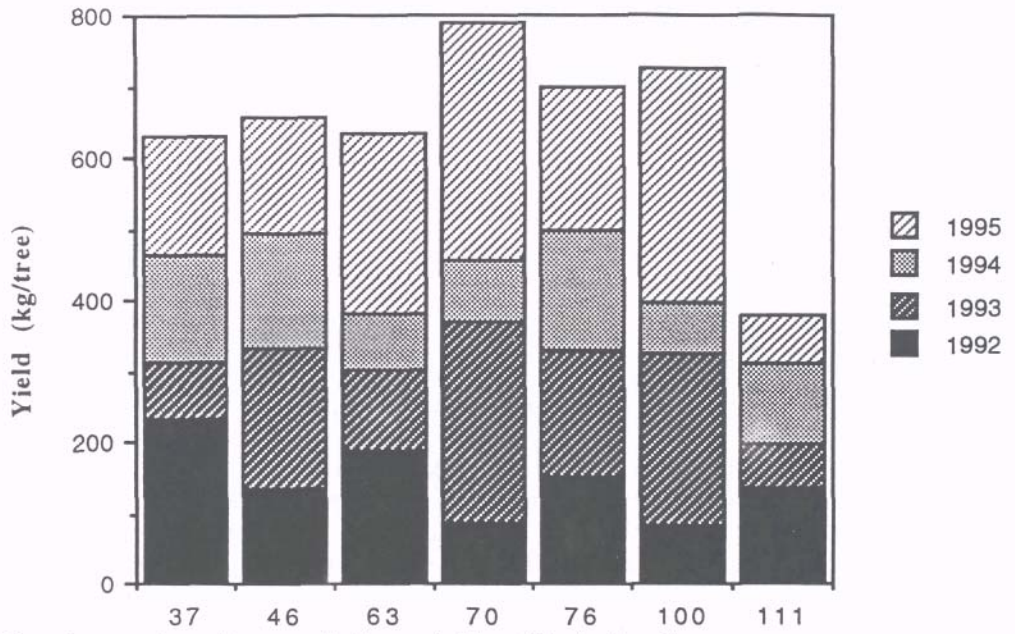

Figure 1. Annual and cumulative yield with irrigation as percent of ETo.

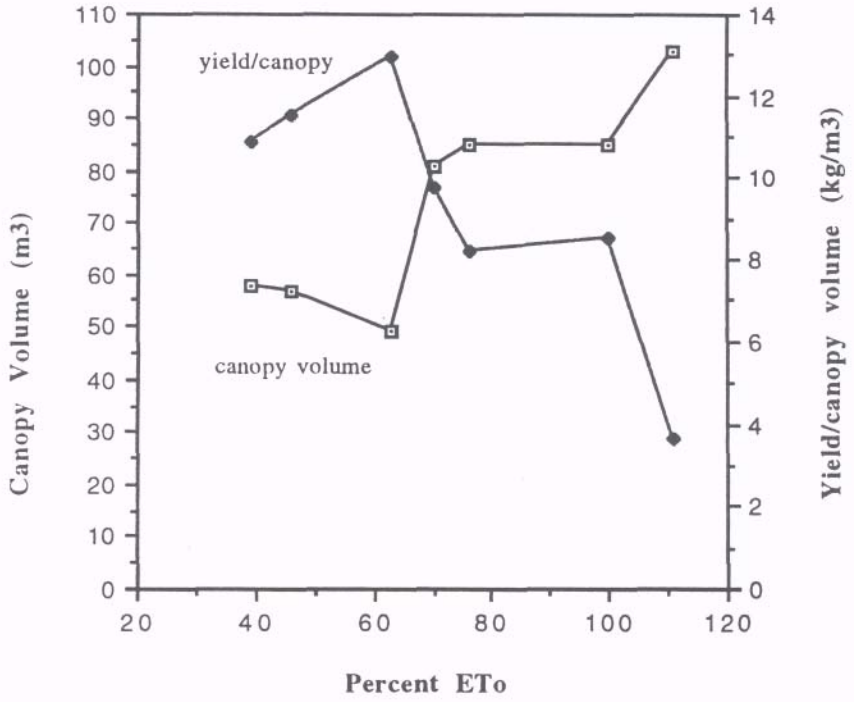

Figure 2. Canopy volume and yield per canopy volume as affected by percentage of ETo applied water.