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Irrigation Management of Avocados

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The approximately five-acre test site is located at Thornhill-Sierra Vista Ranch in Camarillo with 11-year-old trees. As of the summer of 1991, fifteen separate irrigation blocks of thirty trees each have received a percentage of reference evapotranspiration (ETo) as determined from an evaporation pan and an atmometer. Rates of application range from 37% to 185% of ETo. Water is applied on a weekly basis by minisprinklers. The plot map is shown in *Figure 1.* From these rates, a crop coefficient (kc) for avocado will be developed. The summer of 1994 was the third year of imposed treatments, and fall 1994 was the third harvest date with the treatments. Irrigation studies of tree crops historically require long-range trials to arrive at conclusions. It is hoped that this trial will continue for another two harvests.

Figure 1. Irrigation Plot Map by Crop Coefficient (30 trees/block)

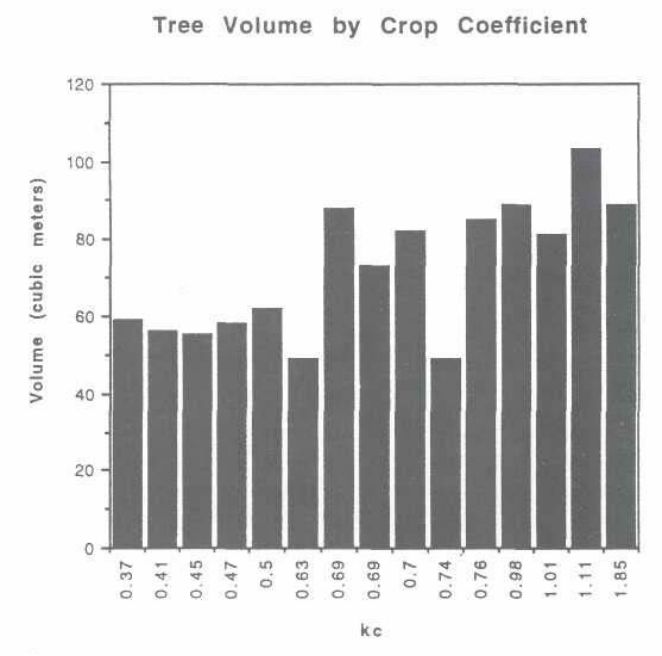
0.41	0.63	0.76	
0.70	0.37	1.11	0.74
1.01	0.69	0.45	1.85
0.47	0.98	0.69	0.50

Irrigation treatments have had a significant effect on tree size. There is a strong tendency for trees with kc's greater than 0.63 to be much larger *(Figure 2).* However, tensiometer readings are consistently higher for the low-irrigation treatments at time of watering. The well-watered trees also show much less stress when measured for stomatal conductance, the ease with which trees transpire water. Visually, trees with kc's of 0.37 to .05 show much more salt burn on their leaves. Tissue analysis reveals little significant differences, although chloride levels at kc's below 0.63 consistently showed greater than 0.5% chloride.

Fruit yield has not shown a good correlation to applied water on either a yearly or a cumulative basis *(Figure 4).* The pattern of alternate bearing is also little affected by

irrigation regimes. Average fruit weight has a low correlation (R =0.165) to applied water *(Figure 5),* but is more likely related to tree yield.

Figure 2.



Due to the large differences in tree size and the evident stress on the trees receiving lesser amounts of water, one would expect to see a greater effect on tree yield. It may just hasten the need to thin or prune the larger trees. A coastal climate may not impose a severe enough stress to create major differences in yield. The soil at the site is a loam texture that is fairly deep (greater than 5 feet). Rain during the last three winters has been good, and tensiometer readings do not really start diverging according to treatment until July. This is when rain water in the alleys would be depleted and the trees would be dependent solely on water supplied by irrigation. The wetted area of the minisprinklers is only 40% of the soil surface. It is possible that the period from July to the first rains in October might be a short enough period of stress to cause increased flower initiation in the fall, and stored winter rains might be adequate to carry the tree through fruit set.

In order to get a better idea of the actual water transpired by the trees according to irrigation regime, a technique using the Bowen Ratio will be employed in the summer of 1995. The technique consists of measuring the temperature and humidity above the canopies of each treatment block, and from those values calculate an actual tree water use. This study will be in conjunction with biometeorologist Rick Snyder from the University of California at Davis.

Figure 3.

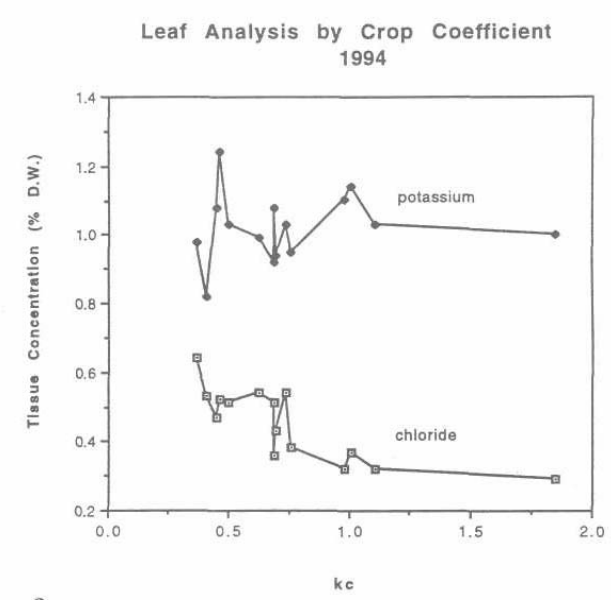


Figure 4.

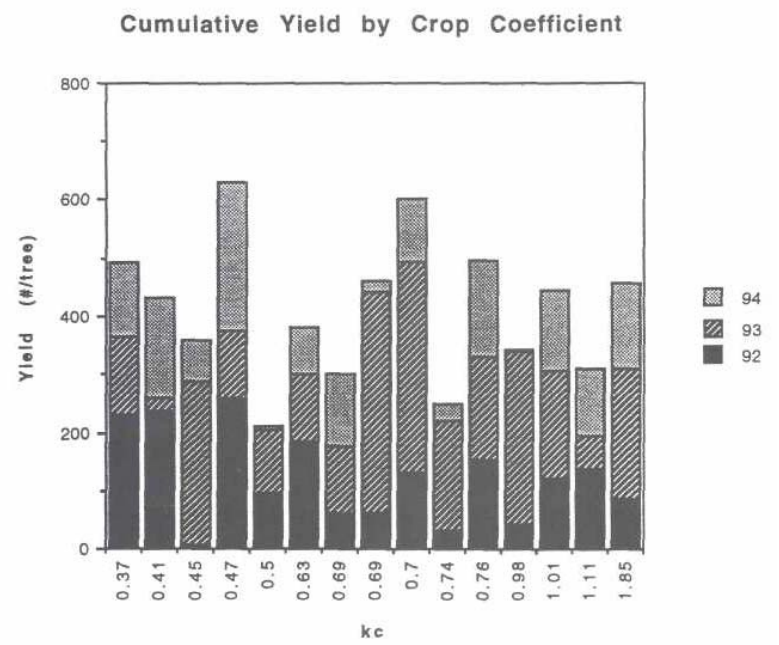


Figure 5.