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IRRIGATION MANAGEMENT AND FERTILIZATION MANAGEMENT OF AVOCADOS

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A five-year study of water use, fertility interrelationships with yield, fruit size, maturity, and economics was initiated in 1987. This project has been conducted at Corona Foothill, irrigation, and the Cashin Ranch, fertility, at Valley Center. A third site has been negotiated in Pauma Valley and was initiated in January 1992. The latest field trial will investigate the interaction of irrigation frequency and amount on mature tree productivity.

An integrated approach to determine the relationship between the amount of low volume irrigation water applied, fertility, yield, and root distribution is used in this study. Four years of yield data have shown no significant increase in total crop yield with water use above 100 percent ET_C. Evapotranspiration has averaged 28 inches of water. Fruit size at early harvest and root distribution are significantly related to the amount of applied water. However, in the fifth and final year at Corona Foothill, fruit size was significantly increased at the .05% level comparing 80% and 100% ET to 120% ET.

CONCLUSIONS

The crop coefficients, Kc, of avocado vary seasonally between 0.35 and 0.55, (Table 1). The actual water requirement for maximum size and salinity control is somewhat higher than previously believed (Table 2). The average early harvest yield per irrigation treatment is affected by increased water (Table 3) after three years of this differential irrigation. Fruit size (Figure 1) in 1991 was significantly increased when 80% and 100% ET are compared to 120% ET. This increase in 1991-1992 is however only after four to five years of differential treatments.

At Cashin Ranch avocados show increased nutrient uptake with increasing applications of N, P, and K, however, to date yield above threshold tissue levels has not increased yield. Increased nitrogen, above normal tissue levels, has significantly increased zinc levels (Figure 2).

It appears that irrigation frequency or lack of water stress is a major factor in avocado fruit size, particularly early sizing.

Table 1. Avocado crop Kc's for CIMIS ETo

Month	Kc
January	.35
February	.40
March	.45
April	.45
May	.50
June	.55
July	.55
August	.50
September	.45
October	.45
November	.45
December	.40

Table 2. Mean water use (irrigation) in inches for 1987 - 1991, Corona Foothill, CA.[z]

	80% Mean	100% Mean	120% Mean
Jan	0.45 ± 0.30[y]	0.55 ± 0.40	0.62 ± 0.48
Feb	1.12 ± 0.10	1.29 ± 0.12	1.41 ± 0.24
Mar	1.05 ± 0.73	1.28 ± 0.90	1.51 ± 1.05
Apr	1.49 ± 0.60	1.86 ± 0.76	2.37 ± 0.76
May	2.33 ± 0.59	2.83 ± 0.64	3.42 ± 0.89
Jun	2.99 ± 0.17	3.58 ± 0.34	4.24 ± 0.41
Jul	3.45 ± 0.32	4.16 ± 0.51	4.83 ± 0.66
Aug	2.96 ± 0.29	3.60 ± 0.40	4.20 ± 0.58
Sep	2.41 ± 0.85	2.85 ± 0.92	3.32 ± 1.05
Oct	1.74 ± 0.64	2.12 ± 0.81	2.52 ± 0.88
Nov	1.30 ± 0.44	1.59 ± 0.48	2.02 ± 0.57
Dec	1.20 ± 1.28	1.37 ± 1.35	1.55 ± 1.27

[z] Corrected for 92% irrigation uniformity.

[y] Standard deviation.

Table 3. Average weight per tree per irrigation treatment for early avocado harvest, Corona Foothill, CA.

Irrigation Treatment (%ETc)	Pounds per Acre				
	11/89	1/90	12/90	3/91	Total
80%	287	129	91	97	604
100%	544	244	208	228	1224
120%	771	314	193	393	1671
Significance Level:	***[z]	***	N.S.	**	
L[y]	***	***	N.S.	***	
Q[x]	N.S.[w]	N.S.	N.S.	N.S.	

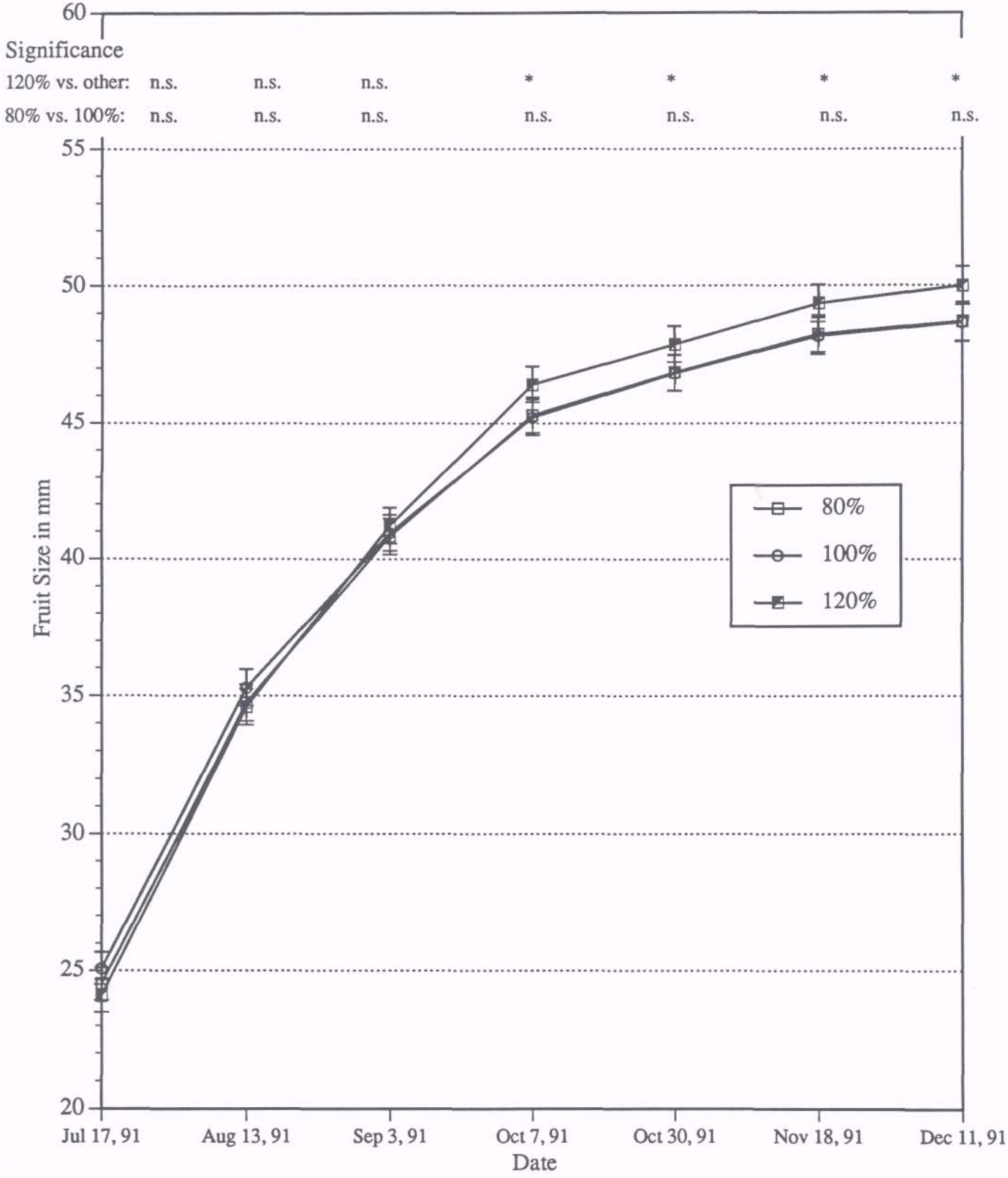
[z]= *, **, *** = P ≤, .05, .01, .001, respectively.

[y]L = Linear

[x]Q = Quadratic

[w]N.S. = Not Significant

Figure 1. Fruit Size Increase per day with Error Bars
Corona Foothill, CA. 1991



Significance: *** .001 * .05
** .01 n.s. not significant

Figure 2. Average Zinc in ppm by Nitrogen Treatment from Leaf Analysis, Brown Block. Cashin Creek, CA.