

EFFECT OF ROOTSTOCK PROPAGATION, NITROGEN FERTILIZATION, AND TOP PRUNING ON BACON AVOCADOS

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This is a summary of the study conducted on Bacon Avocados that was initiated in 1958 at the South Coast Field Station, and concluded with the Fall harvest in 1970. Preliminary work and detailed description of propagation was reported in the California Avocado Society Yearbook (1). The description and results of the irrigation management program appears in the current yearbook (2). There has also been work on mechanical harvesting that will be reported later.

Rootstock propagation

A comparison in yield and variation was made between starting the rootstock from seed or rooted cutting. Ganter was selected by E. F. Frolich as the rootstock, because it could be readily rooted, and was compatible with Bacon. The rooted cuttings and seedlings were grown in containers in the greenhouse, under the guidance of P. W. Moore, and tip grafted to Bacon by M. K. Harjung, in early 1958. The trees were planted in the field in the summer of 1958 when they were approximately three feet tall. In rows that were 20 feet apart, 968 trees were spaced 12.5 feet apart. The field was divided into four blocks, and each block into 6 plots with 24 trees. The plot trees, to be used in yield records, were alternated on seedling or rooted cutting rootstock for later thinning. All of the border or guard trees around the plots were on seedling rootstock.

TABLE 1. BACON AVOCADO TRUNK AREA INCREASES —
AVERAGE CM² PER TREE

Rootstock type	Number of trees	Year				
		1958-66	1967	1968	1969	1970
Rooted cutting	98	193	76	64	71	71
Seedling	108	231	79	74	81	85
Seedling (Guard rows)*	128	269	77	72	46	37

*Effects of Top Pruning—See note on Table 2.

At the time of planting, the trees on rooted cutting rootstock were not as vigorous, consequently several died in the first year. From Table 1 it can be seen that the trees on seedling rootstock continue to grow somewhat faster. The numbers reported are increases in cross-sectional areas of the trunks in square centimeters calculated from

measurements of trunk circumference.

Four years of yield records, 1963-1966, showed no significant difference between trees on seedling or rooted cutting rootstock. At this time, tree limbs were touching each other in the rows, so alternate trees were removed on a plot basis leaving half of the plots with seedling rootstock, and the other plots with rooted cuttings.

TABLE 2. BACON AVOCADO YIELDS –
AVERAGE POUNDS PER TREE

Rootstock type	Number of Trees	Year								Total
		1963	1964	1965	1966	1967	1968	1969	1970	
Rooted cutting	98	30	41	43	55	100	188	139	216	812
Seedling	108	35	38	33	52	103	183	159	200	803
Seedling (Guard rows)°	128	32	66	127	82	133	188	48	160	836

°Effects of Top Pruning – The growing tips of plot trees were topped in 1962-65 to hold back vertical growth, while guard trees remained unpruned. From 1966-70, plot trees were unpruned, and in 1969, the guard trees were topped to 15 feet.

Table 2 shows the average yearly fruit yields in pounds per tree. Yearly differences between rooted cutting and seedling rootstock are not significant. The eight year total is the same—812 pounds per tree for the rooted cuttings and 803 pounds per tree for seedlings.

TABLE 3. COMPARISON BETWEEN EFFECTS OF SEEDLING
AND CUTTING ROOTSTOCKS ON NUTRIENT COMPOSITION
OF BACON AVOCADO LEAVES. MEAN OF 4 YEARS, 1966-1969.

Rootstock type	Dry Leaves									
	Per cent			PPM						
	N	P	K	Ca	Mg	Zn	Mn	Cu	Fe	B
Rooted cutting	2.05	0.116	1.02	1.70	0.45	24	112	8.2	55	19
Seedling	2.04	0.113	1.06	1.84	0.47	22	116	7.6	52	21
Significance ^{1/}	NS	NS	NS	**	°	°	NS	NS	NS	NS

^{1/} NS indicates not statistically significant.

° indicates significance at the 5% level.

** indicates significance at the 10% level.

Data in Table 3 show some slight but statistically significant effects of type rootstock on nutrient concentrations in leaves. Rooted cuttings were associated with lower calcium and magnesium and higher zinc concentrations in the leaves. There is no indication that these differences are of practical value at this time.

Nitrogen Fertilization

Until 1969 all trees were fertilized uniformly. Prior to 1964 they received minimal amounts of nitrogen. From 1964 through 1966 all trees received one pound of nitrogen per tree; in 1967 and 1968 no fertilizer was applied. In 1969 each irrigation-rootstock plot was divided into two subplots and on a randomized basis one subplot received no more nitrogen for the duration and the other received two pounds of nitrogen per tree in

1969 and one pound in 1970. Ammonium sulfate was the nitrogen source.

The differential nitrogen treatment did not affect yield significantly. In 1969 the zero nitrogen trees averaged 151 pounds of fruit per tree and those receiving nitrogen averaged 148 pounds. In 1970 the zero nitrogen trees averaged 218 pounds of fruit and those receiving nitrogen averaged 196 pounds.

Differential fertilization had a slight but significant effect on the nitrogen concentration in the leaves. A September, 1970 leaf sample showed 1.95 per cent mean nitrogen for the zero nitrogen trees and 2.06 per cent for the nitrogen-treated trees.

Top Pruning

Bacon trees have a tendency to grow very tall, so an attempt was made to prune back the growing tip to stimulate lateral growth. As a comparison, the guard trees around the plots were not pruned. Yield data (Table 2) for 1964 and 1965 indicated that top pruning was considerably reducing the fruit production, therefore pruning was discontinued after 1965. By 1968, the guard rows had grown to a height of 25 to 30 feet. At this time, they were cut back to a height of approximately 15 feet. Reduction in yield was great in 1969, and also there were lower yields in 1970 as compared to trees that were not topped.

Effects of priming are also shown in Table 1. The seedlings that were pruned in the initial period showed less trunk increase than guard row seedlings. The effects of topping in 1968 are shown by reduced trunk growth in both 1969 and 1970.

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LITERATURE

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