



# EXPER OF ON

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Re-growth shoots of young Lisbon lemon on macrophylla rootstock. Trees were topped 6 inches above the bud union three months previously. Chicken wire was used early in the trial to protect trees from rabbits.

As one approach to growing a large number of lemon trees per acre, a trial was started in 1965 in Ventura County in which trees were trained on trellises. Due to exceptional growth and vigor of the Lisbon strain on *C. macrophylla* rootstock, three to four prunings were necessary each year. This excessive pruning in the case of treatment (1)—the heaviest pruned—caused a reduction in yield. Treatments (2) and (3), which were moderately pruned and trained, produced almost twice as much fruit as treatments (1) and (4) (the control). The low yields from the control trees were caused primarily from excessive wind. From the results of this trial it was difficult to justify the extra labor and costs of training and pruning necessary to commercially grow lemons on trellises.

**R**ISING LAND COSTS, uncertainty of labor supply, increased taxes, equipment, and material costs have forced growers to plant more trees per acre in order to increase yield and lower unit costs. One method of growing more trees per acre is to train them on trellises. Deciduous fruit crops such as pears, plums, and apples have been test grown on trellises for a number of years. By

growing these fruit trees on trellises the number of trees per acre has been increased—to as high as 360 trees per acre in some cases. To test the trellis method on lemons, a field trial was initiated in Ventura County in the spring of 1965.

This field trial was located on Kaiser-Aetna property northeast of Somis (Ventura County) in the intermediate climate zone. The soil was a Sorrento silty clay loam with moderate permeability and a high water-holding capacity. The trees were Prior Lisbon lemons on *C. macrophylla* rootstock, planted in 1965. Trees were 10 ft apart in the rows, with 15 ft between rows—giving 290 trees per acre. The rows were planted in an east-west direction. Four types of tree training were used. Each treatment consisted of 2 rows with 18 trees per row. Three of the treatments involved training the trees on trellises. Trellises were similar to those used in grape culture and contained three wires equal distance apart.

### Pruning and training

In treatment (1) the trees were cut off 6 inches above the bud union, approximately 18 months after planting. At that time the trunk diameters averaged  $2\frac{3}{4}$  inches. Selected shoots which sprouted

from the scion were tied to wires as shown in the photo. In treatment (2) the central leader was removed and scaffold branches were tied to the trellis wires. The trees were subsequently slabbed and topped. In treatment (3) scaffold branches were threaded through the wires without heading or tying and the trees were heavily slabbed and topped as in the previous treatment. Treatment (4) consisted of control trees which received normal hand pruning. No trellises were involved.

In treatment (1) laterals were tied to trellis wires and kept parallel with the row. Branches which tended to grow at right angles to the row were removed. Because of excessive rootstock-scion vigor, pruning was required three to four times a year. Hand pruning was discontinued during 1968 in favor of machine hedging and topping. Trees were held to a width of 4 ft and a height of 7 ft.

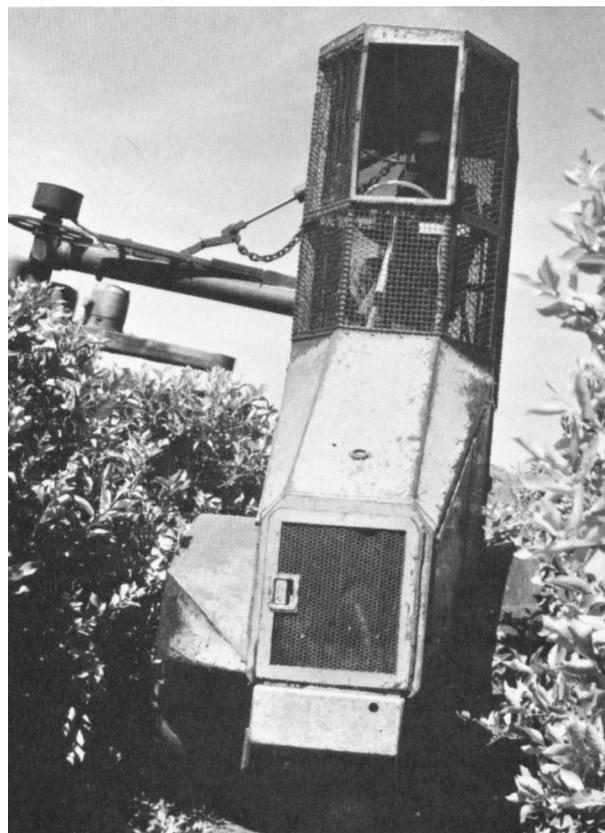
Little hand pruning or tying was done in treatments (2) and (3). The trees were held to a width of 6 ft and a height of 7 to 8 ft by mechanical pruning (see photo). In 1970 the trellis wires were removed from treatment (3). Unfortunately, treatment (4), which consisted of control trees, was the two outside rows of the planting and was subjected to wind damage which reduced yield.

# MENTAL GROWING

## LEMONS

### TRELLISES

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Mechanical topping of trellis-grown lemon trees to 7 ft height.

Fruit counts were obtained for the years 1970 and 1971. These were the first years of measurable fruit production due to the freeze damage of 1968. The yield from treatment (1) was low (62.25 field boxes from 36 trees) due to continued pruning. Because of their vigor, shoots that would normally produce fruit were continually pruned to conform to the trellis concept. Yield records (see table) show that treatment (2) and (3), which produced 112.5 and 122 field boxes respectively, are nearly twice as high as

yield from treatment (1). Recent reports have shown that training and hedging of young Valencia orange trees also reduces yield. In other tests, trees were kept hedged to widths of 6, 9, and 12 ft and production was compared with unhedged trees. Results indicated that the wider the hedge, the greater per tree production—with the unpruned trees producing the most fruit.

Treatment (4), the control, was hand pruned according to normal ranch methods. It produced the least amount of

fruit—53.25 field boxes per two rows. These two rows were located on the north and received excessive wind damage. Also, with the rows only 15 ft apart and planted in an east-west direction, there was more shading of the control trees, which possibly contributed to less yield.

Expanding the yields—mathematically—from the 36 trees per treatment to an acre basis (10 ft × 15 ft = 290 trees per acre) gives some interesting figures. Treatment (1) could equal 501.7 field boxes per acre; treatment (2), 904.8 field boxes; treatment (3), 997.6 field boxes; and the check trees would total 429.2 field boxes per acre—assuming the same detrimental influence of wind and shading.

RELATIONSHIP OF GROWING LEMON TREES (3 TRIALS) ON TRELLIS TO YIELD PER ROW AS COMPARED WITH NORMALLY PRUNED CHECK PLOT

Harvest date	No. field boxes per row of 18 trees							
	Treatment rows*							
	(1)		(2)		(3)		(4)	
	1	2	3	4	5	6	7	8
1/26/70	1.75	5.0	7.0	4.0	4.0	8.0	8.0	7.0
4/2/70	1.0	1.5	2.0	2.0	4.0	3.0	5.0	3.0
6/25/70	5.0	5.0	1.0	1.0	2.0	1.0	2.0	1.0
11/17/70	2.0	3.0	7.0	5.0	3.0	4.0	5.0	1.5
1/22/71	4.5	9.5	16.0	16.5	20.0	16.0	2.5	0.5
3/11/71	2.0	5.0	12.0	8.0	10.0	9.0	1.0	0.5
4/30/71	3.0	2.0	8.0	12.0	11.0	13.0	1.0	0.75
7/26/71	3.0	5.0	4.0	4.0	6.0	5.0	5.0	2.0
11/1/71	1.0	3.0	1.0	2.0	2.0	1.0	4.5	3.0
Total	23.25	39.00	58.00	54.50	62.00	60.00	34.00	19.25
Total/2 rows	62.25		112.50		122.00		53.25	
Total/acre Field Boxes (Computed)	502		905		998		429	

\* (1) - Cut off 6" above bud and shoots tied to trellis; (2) - central leader removed and branches tied to trellis; (3) - branches threaded through trellis; and (4) - normal ranch pruning.

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