Hand hedging orange trees from truck mounted platform.

EFFECT OF TRAINING
on yields of young Valencia

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ORANGE TREES are naturally upright and nearly spherical. When closely planted, crowding may cause them to become somewhat columnar. Training and pruning can change their shape. Pruning stimulates new growth; the heavier the cutting, the greater the stimulation—assuming there is no other problem. It has been reported that pruning reduced yield in almost the same proportion as the amount of foliage removed. In another experiment, trees were kept hedged to widths of 6, 9, and 12 feet and production was compared against unhedged trees. The wider the hedge the greater per tree production, and the unpruned trees produced the most fruit. However, a mature Valencia grove near Santa Paula, which was lightly hedged and topped before crowding occurred, showed no significant differences in yield over a four year period after treatment.

In these training and hedging trials trees were trained and pruned into a relatively thin hedgerow that could be harvested from each side—possibly from a platform or multiman position machine.

To determine the effect of the training and hedging of young Valencia orange trees on yield, two test blocks were established in Ventura County in December of 1960. Each test consisted of two treatments, trained and hedged, and the unpruned check, with four trees per treatment and replicated eight times. Trial I

was located east of Saticoy on the Petty ranch, in the coastal climatic zone. This orchard of Olinda Valencias on Cleopatra mandarin rootstock was planted in 1959. Trees were spaced 10 feet in the row, with rows 20 feet apart, giving a tree density of 217 trees per acre. The soil was a fertile, well drained loam of the Mocho series.

Trial 2 was located on Rancho Ventura east of Somis in the intermediate climatic zone. Trees are Olinda Valencias on Troyer Citrange rootstock, planted in 1959. Trees were 18 feet apart in the row, with 24 feet between rows, giving 100 trees per acre. The soil was a Sorrento silty clay loam with moderate permeability and a high water retention capacity.

In both trials, training during the first three years consisted of bending and tying back the scaffold branches with wire in an attempt to force them to grow parallel with the row. Branches which could not be tied back, or were situated so they grew into the area between rows, were

The results of two trials initiated in Ventura County in 1960 show that severe training and hedging of young Valencia orange trees significantly decreased production. The data from trial 1 at Saticoy clearly show that production from the large number of trees per acre did not compensate for the fruit lost because of training and hedging. Although fruit loss was less at trial 2 near Somis, where the tree density was lower, it still remained too high for commercial acceptance.

removed by pruning. The natural growth pattern of the tree tended to fill the open space created by the tying back of branches so that considerable additional pruning was required. Ties were removed after the third year to prevent limb girdling.

After the first three years, pruning was carried out by hand hedging with pruning shears from a truck-mounted platform (see photo). Selective cuts were made to

Harvest in 1969 at the Petty orchard, boxes in the left foreground were harvested from a block of four trained and hedged trees. Boxes in right foreground from four non-pruned trees.
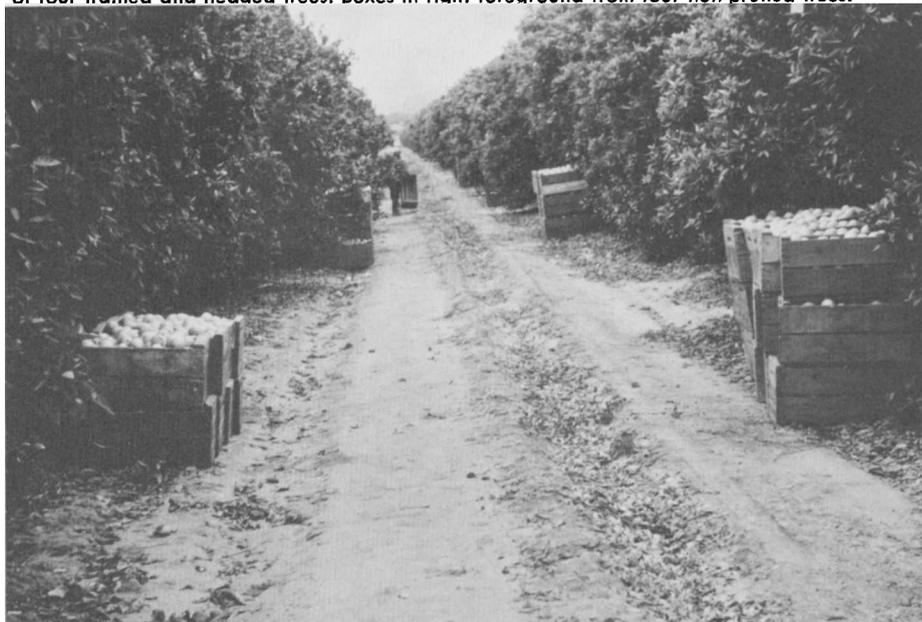
AND HEDGING
orange trees

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remove branches which grew into the area between the rows. In 1969 and 1970, tree width was controlled by mechanical hedging (see photo).

Yield records started in 1967 are shown in the table. In trial 1, over the four year period from 1967 to 1970, there was an average decrease of 0.6 of a box per tree per year on the trained and hedged trees compared with the control trees. With 217 trees per acre, this 0.6 of a box loss resulted in 520 less boxes of fruit per acre over the four year period compared with the non-trained, non-hedged trees (see photo). Trees in trial 1 at Saticoy were crowded in the row. This caused fruit set primarily on sides facing the row middle, which were subsequently hedged yearly—thereby eliminating more of the already light crop. Another problem in trial 1 was the relatively close proximity of the orchard to the coast, which may have somewhat reduced yields.

In trial 2 there was an average loss of 0.3 of a field box per year on the trained and pruned trees compared with the control trees. With a tree density of 100 trees per acre this resulted in a 90 box per acre loss over the three years that yield records were taken. In this trial, where there was less tree crowding, there was less loss per tree by training and hedging. The original theory was that hedgerow plantings with a large number of trees per acre, would compensate for an expected loss due to training and hedging. It is still too early to draw definite conclusions from these trials, but the data show that consistent hedging causes some loss of production.

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MEAN ANNUAL YIELD PER TREE IN FIELD BOXES FROM YOUNG VALENCIA ORANGE TREES TRAINED AND HEDGED

Treatments†	1967	1968‡	1969	1970	Total	Average
Petty Ranch, trial 1						
Trained & Hedged	2.44	.70	3.17	1.10	7.41	1.85
Check	4.13	.55	4.38	.80	9.86	2.47**
Rancho Ventura, trial 2						
Tranied & hedged	5.27	1.72	§	3.82	10.81	3.60*
Check	6.40	1.38	§	3.98	11.76	3.92*

* Indicates significance of F. at the 5% level.
** Indicates significance of F. at the 1% level.
† 32 trees per treatment, 8 replications per treatment.
‡ An on tree count of the fruit was made and converted to field boxes on the basis of 80 fruit per field box.
§ Yield records were not obtained for this year.