TO PREVENT CROWDING IN MATURE TREES

C. D. MC CARTY • R. M. BURNS • L. N. LEWIS

for the 1964 loss right after pruning.

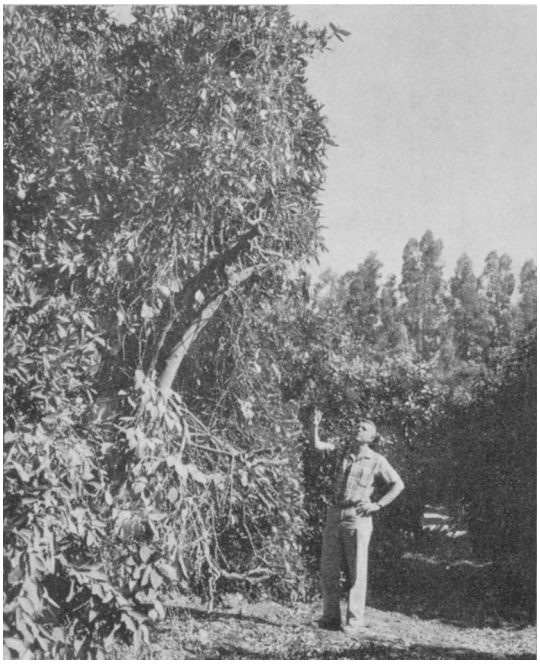
Although the 4-year average shows no significant increase, the trend favored the pruned trees. Tree size was reduced without an overall reduction in yield for the 4-year period.

Pack-out data were obtained for three years—1965, 1966, and 1967. Fruit from each replicate was lumped according to treatment so that enough fruit could be obtained for a packinghouse run. No statistical analysis is available. The lowest percentage of pack-out was obtained from the unpruned check while the most heavily pruned trees produced the largest percentage of fruit size 113 or larger (see table 2).

S. B. Boswell is Associate Specialist, L. N. Lewis is Associate Horticulturist, Department of Horticulture, and C. D. McCarty is Horticulture Technologist, Agricultural Extension Service, University of California, Riverside; B. W. Lee and R. M. Burns are Farm Advisors, Ventura County. Kimball Toppers cooperated by performing the topping and hedging, and the Limoneira Company supplied the orchard test plot site.

Citrus hedger, and topper (left and cover photo) were photographed in action in a mature orange grove.

Severe hedging shown in photo below removed the entire vegetative wall of the tree, and reduced yield until a new wall was formed.



The training of young orange trees in close-spaced hedgerow plantings to allow easier picking, and use of harvesting aids such as movable scaffolds and platforms—or possible machine harvesting—is being considered and tested by many citrus growers. The two reports included here involve many aspects of the topping and hedging operations involved and the effects on trees, fruit quality, and yields. One article discusses results of experiments with both topping and hedging to prevent crowding of mature citrus trees in the Ventura area, and the other discusses yield effects from annual sidewall trimming of trees in an Orange County plot. These are progress reports of continuing research by both Experimental Station and Extension Service researchers toward cost reduction and eventual mechanization in citrus harvesting.

Yield effects of annual SIDE-WALL TRIMMING *on young orange trees*

J. E. PEHRSON • C. D. MC CARTY • G. L. SUTHERS • L. N. LEWIS

THIS ORANGE COUNTY pruning experiment was initiated in 1961 to measure effects on citrus yields resulting from annual side-wall trimming of young Valencia trees. The trial was a joint undertaking of the Citrus Research Center, University of California, Riverside, and the Agricultural Extension Service. Plots were located in the Santa Ana Canyon orchards of the Santa Ana Valley Irrigation District in northeastern Orange County.

The orchard was planted in 1957 with Olinda Valencia trees on Troyer citrange rootstock. Tree spacing was 12 ft by 22 ft; irrigation furrows were in a north-south direction. The soil was Hanford sandy loam to loamy sand. Average tree diameter was 6 to 8 ft at the base of the skirts, and tree height was 5 to 7 ft. By 1967 the unpruned checks were 14 to 16 ft across and 12 to 15 ft high.

The trial consisted of four treatments replicated six times; there were seven trees per plot. The treatments were a series of hedged pruning steps increasing in severity. The cutting was done by mechanical hedger to maintain trees at thicknesses of 12, 9, and 6 ft. The amount of wood removed by these treatments is compared in table 1.

Fruit production resulting from each treatment was measured individually in each plot. Replicates were combined in this report so that each of the treatments represents the yield of 42 trees. Results of the treatments are compared in table 2. Trees trimmed to a 12-ft wide hedge produced the largest number of boxes of fruit (684) over the six-year test, and results were closely comparable to those of the control plot (715 boxes).

The fruit was picked each season and sent to a packinghouse whenever there was sufficient volume to obtain pack-out records. This was done to see if there was any correlation between fruit size and quality resulting from the pruning treatments. The pack-out records indicated that no treatment improved fruit size. The packing grade did not vary greatly between treatments in given crop years. In one year, all treatments failed to produce first-grade fruit. Fruit was subjected to higher than average wind and frost at this orchard location.

A successful hedgerow planting depends on the setting of a heavy crop of

This hedgerow planting of young Valencia oranges has been sidewall-pruned after harvest each year since 1962.

high-quality fruit, evenly distributed throughout the hedge. As the experiment progressed, the zone of production on the pruned trees shifted to the top and shoulders. Fruit-set during the sixth year, which was an "on crop" year, was mainly in the upper portion of the hedge, with 35 per cent of the fruit located below a height of 6 ft and 65 per cent of the fruit from 6 to 13 feet. Increased fruit-set in the top of the hedge was probably correlated with higher light intensities at the top. The hedge was thinned by hand pruning after the 1967 harvest to allow more light into the interior, in the hope that fruit-set would be improved throughout the entire hedge. No mechanical hedging was done in 1967 and, as a result, the trees were growing beyond the 6-ft width. Mechanical hedging should have been used as well as hand thinning.

While it is much too early to draw conclusions from the data available, the hedgerow planting offers promise for platform harvesting. In this trial the spacing of trees 12 ft apart in rows was apparently too close for the vigorous top and rootstock. Allowing more room in the row, but moving rows closer together may be a way to maintain yields equal to those of non-hedged trees on a per acre basis. Trials now under way in orchards of the Kern County Land Company are expected to provide further data about the optimum spacing of trees.

J. E. Pehrson and G. L. Suthers were farm advisors in Orange County, and are now located in Tulare County. C. D. McCarty is Extension Horticultural Technologist; and L. N. Lewis is Associate Horticulturist, Department of Horticultural Sciences, Citrus Research Center, University of California, Riverside. R. G. Platt, Extension Subtropical Horticulturist, U.C., Riverside, assisted with these trials. Trees were supplied by the Santa Ana Valley Irrigation District. Rudy Herman and Henry Bosch, managers of the Olive Heights Citrus Association, supplied the pack-out information.

TABLE 1. WEIGHT OF FRESH CLIPPINGS REMOVED AT EACH HEDGING TREATMENT (42 TREES)

Season	12-foot hedge lbs. removed	9-foot hedge lbs. removed	6-foot hedge lbs. removed
1961	weights not taken	—	—
1962	weights not taken	—	—
1963	44	136	799
1964	103	260	290
1965	100	255	490
1966	47	178	433

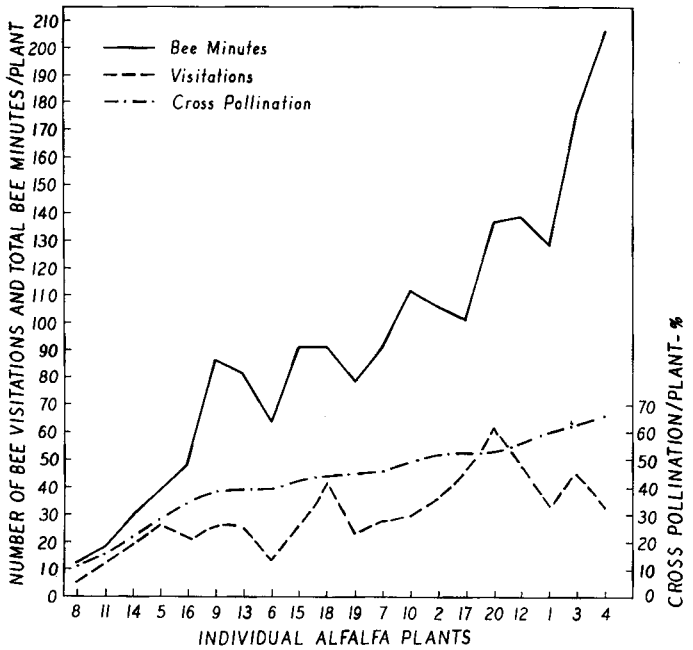
TABLE 2. FIELD BOXES HARVESTED FROM EACH HEDGING TREATMENT (42 TREES)

Season	Unpruned (control) no. boxes	12-foot hedge no. boxes	9-foot hedge no. boxes	6-foot hedge no. boxes
1962	39	32	34	35
1963	126	126	102	100
1964	98	89	66	66
1965	121	140	146	132
1966	67	65	50	47
1967	264	232	207	209
Totals	715	684	605	589

PLANT PREFERENCE OF HONEYBEES *in white-flowered* ALFALFA

R. W. HAGEMANN • L. G. JONES • J. T. FEATHER

PREFERENCE OF HONEYBEES FOR INDIVIDUAL ALFALFA PLANTS, EXPRESSED IN BEE MINUTES AND NUMBER OF VISITS PER PLANT, PLUS PERCENTAGE OF CROSS-POLLINATION TO COLORED-FLOWER ALFALFA



White-flowered alfalfa plants vary widely in attractiveness to honeybees, according to this study under open pollination conditions at University of California, Davis. Several instances of plant preference were noted, but in general, plants having the most bee activity showed the greatest amount of cross pollination. When a strain of honeybees is developed with a distinct preference for alfalfa, it would appear to be advantageous to have parental lines equal in as many of the attractiveness characteristics as possible, to insure increased alfalfa seed production.