

## Experiments on Fruit-Cluster Thinning in the Loquat

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### INTRODUCTION

The loquat or Japanese medlar (***Eriobotrya japonica***) is a hardy evergreen subtropical pome fruit the crop of which is borne in relatively large terminal clusters. It also has the rather unusual habit of fall blossoming and spring maturity of the fruit, which makes it one of the earliest to reach the markets and comprises a potential advantage of considerable importance. Under conditions of favorable winter temperatures and freedom from the pear blight disease, overbearing is characteristic and the fruit small and expensive to harvest. Moreover, the exceptionally long blossoming and fruit setting period—commonly three months or longer—makes necessary a relatively large number of pickings of which only the earlier are profitable; ordinarily the late-ripening portion of the crop is left un-harvested.

Practicable measures which would increase the size of the fruits and concentrate the pickings in the early part of the fruit-ripening season would therefore be highly advantageous and conducive to greater development of commercial culture of this distinctive and delicious fruit. Fruit-cluster thinning, consisting primarily of the removal of the late clusters, is obviously the practice which suggests itself. Moreover it is said that thinning is regularly employed in loquat culture in Japan.

### Experimental Materials and Procedures

**Materials.** The data and results here reported were obtained from trials conducted in 1939 and 1940 involving one pair of trees of each of the four loquat varieties—Early Red, Advance, Champagne, and Thales—in the loquat collection, Laboratory Orchard of the Division of Subtropical Horticulture, campus of the University of California, Los Angeles. The Champagne and Thales trees were employed in both trials; for the others but one trial was conducted. As to season of fruit maturity, Early Red and Advance have been classed as early, Champagne as medium and Thales as late; the data obtained corroborate this classification. The last-mentioned is the principal variety grown in California.

The trees are 24 feet apart in a single row and are all on loquat root-stock. In the case of the varieties Champagne and Thales the members of each pair adjoin each other, are the same in age—ten years—and approximately the same in size. With the other varieties one member of each pair is seven years old and considerably smaller than the other.

With the exception of the unthinned Thales tree, all were given a moderately heavy thinning pruning in August, 1938, and a light pruning of the same kind in October, 1939.

**1939 Experiment.** In the 1939 trials cluster-thinning was done during the period March 2-10, by which time the period of bloom was past, save for an occasional late flower cluster, the crop well set and the natural drop just beginning. A special effort was made to confine the thinning to the removal of the fruit clusters latest in development so as to leave the most advanced clusters and thus concentrate most of the crop in the early part of the normal maturity period. With this objective in mind, approximately half the fruit clusters were clipped off. There still seemed to remain too many clusters so the trees were gone over again and more removed. Counts were not made but it is estimated that approximately two-thirds were removed.

The crops of the six trees were harvested May 19, at which time only part of the fruit on even the early varieties was ripe. The crop from each tree was sorted into three maturity grades, and counts and weights obtained for each.

**1940 Experiment.** In the 1940 trials thinning was done much earlier, while the trees were still in good bloom, and before any appreciable part of the crop had set. At the first and much the heaviest thinning, December 7, 1939, the trees were in full bloom. At this time the objective was to remove approximately half of the flower clusters in such a way as to distribute those left as uniformly over the bearing surface of the trees as practicable. Late flower clusters continued to develop, however, which made it desirable to go over the trees again January 13. At this time the objective was to remove the late flower clusters; a few of the older clusters were also removed. The counts of flower clusters removed show that in all cases the first thinning accounted for 65 per cent or more of the total removed.

The harvesting procedure for this experiment differed from that followed in 1939 in that, beginning March 20 and extending to May 23, pickings were made at weekly intervals. At each picking all clusters which showed ripe fruits were removed. Each picking from each tree was sorted into the three grades employed in 1939 and counts and weights obtained. The largest number of pickings per tree was eight.

Contrasting the two experiments, it will be noted that the thinning in 1939 was all done at one time and was relatively late whereas in 1940 it was early and accomplished in two operations; also that in 1939 the harvesting was all done at one time, whereas in 1940 it was spread over a period of nine weeks. It may also be noted that because of an unusually mild winter, the 1940 season was much advanced over that of 1939.

## **Data and Results**

The results from the 1939 experiments are shown in summary in table 1 and in detail in table 2.

Examination of table 1 reveals the fact that with all three varieties thinning materially increased the size of the fruit left on the trees. It also suggests that the effect of thinning was greatest when it was done earliest in relation to the normal period of fruit maturity, since the difference is least for the earlier variety and greatest for the late. Lacking counts of the number of fruits removed, however, it is impossible to make a true comparison and field notes indicate the probability that the rate of thinning was least with the Advance variety and greatest with Thales. Moreover, it should be recalled that

the un-thinned Thales tree is the only one of the lot which was not pruned in 1938.

**TABLE 1**  
Effects of Cluster-Thinning on Fruit Size in the Loquat, 1939

Location	Variety	Treatment	No. of Fruits	Weight in grams	Average Wt. per Fruit
31 (3)	Advance	Control	7,265	80,220	11.0
31 (5)	Advance	Thinned	2,115	37,440	17.8
31 (11)	Champagne	Control	11,012	129,560	11.8
31 (13)	Champagne	Thinned	3,477	68,700	19.8
31 (19)	Thales	Control	6,097	84,200	13.8
31 (17)	Thales	Thinned	1,194	28,010	23.5

**TABLE 2**  
Effect of Cluster-Thinning on Maturity and Fruit Size in the Loquat, 1939

Variety	Treatment	Maturity Grade	Wt. in Grams	Per Cent of Crop	No. of Fruits	Average Wt. per Fruit
Advance	Control	Ripe	31,120	38.4	1,998	15.6
		Yellow	24,940	30.8	2,065	12.1
		Green	24,160	29.8	3,202	7.5
Advance	Thinned	Ripe	21,020	56.0	924	22.8
		Yellow	9,620	25.6	539	17.9
		Green	6,800	18.1	652	10.4
Champagne	Control	Ripe	21,220	16.3	851	24.9
		Yellow	49,620	38.2	3,186	15.6
		Green	58,720	45.2	6,975	8.4
Champagne	Thinned	Ripe	20,520	29.8	652	31.5
		Yellow	24,620	35.8	1,099	22.4
		Green	23,560	34.2	1,726	13.7
Thales	Control	Ripe	5,120	6.1	652	28.1
		Yellow	26,640	31.6	1,337	19.9
		Green	52,440	62.3	4,578	11.5
Thales	Thinned	Ripe	6,910	24.6	203	34.0
		Yellow	11,540	41.2	419	27.5
		Green	9,560	34.2	572	16.7

That thinning which removed a considerable part of the later developed fruit clusters materially increased the per cent of early ripening fruit is clearly shown in table 2. And that the effect of thinning on fruit size extended throughout all stages of development is very evident. The relative seasons of maturity of the three varieties are also obvious.

Tables 3 and 4 give the results of the 1940 experiment.

Examination of table 3 shows that again the thinned trees produced crops of larger average size per fruit. Moreover it indicates that the increase in size which resulted from thinning was roughly proportional to the per cent of fruit clusters removed. Thus the

largest fruits were produced where 75.8 per cent of the clusters were removed and the smallest where only 46.5 per cent were taken off.

It is evident, however, that the differences were considerably less than in 1939 though, as previously indicated, the thinning was done earlier, and the season was milder and hence more favorable for fruit growth. Comparison of the 1939 and 1940 data for the Champagne and Thales varieties (tables 1 and 3) shows that fruit sizes for the thinned trees was virtually the same but that the sizes on the un-thinned trees were considerably larger in 1940 than in 1939. It is believed that the behavior of the un-thinned Thales tree, the only tree which served as a control during the two seasons, supports the conclusion that the larger sizes in 1940 were the result of the more favorable growing season.

**TABLE 3**  
Effects of Cluster-Thinning on Fruit Size in the Loquat, 1940

Variety	Treatment	Trunk Cross- Sectional Area sq. cm.	Clusters Removed	Clusters Harvested	Per Cent Clusters Removed	Number of Fruits Harvested	Weight of Crop in Grams	Average Wt. Per Fruit
Early Red	Control	239.0	None	842	00.0	6,978	100,659	14.4
Early Red	Thinned	346.4	930	1,069	46.5	9,618	158,195	16.5
Champagne	Control	248.5	None	1,221	00.0	9,343	146,250	15.6
Champagne	Thinned	261.2	763	759	50.1	7,150	138,471	19.3
Thales	Control	260.2	None	1,587	00.0	9,691	148,101	15.3
Thales	Thinned	233.8	866	276	75.8	3,317	77,152	23.3

The question may well be raised as to why the fruit sizes on the thinned trees were not similarly larger in 1940 than in 1939. The answer to this question is not evident from the data. Presumably the increase in fruit size evidenced by the control trees brought about by the seasonal influence, in the thinned trees was more than offset by other factors, among which may be suspected differences in the degree of thinning between the two seasons, or differences associated with the thinning and harvesting procedures.

**TABLE 4**  
**Effect of Cluster-Thinning on Maturity and Fruit Size in the Loquat, 1940**

Variety	Treatment	Maturity Grade	Wt. in Grams	Per Cent of Crop	No. of Fruits	Average Wt. per Fruit
Early Red	Control	Ripe	46,013	45.7	2,895	15.9
		Yellow	42,616	42.3	2,957	14.4
		Green	12,030	12.0	1,126	10.6
Early Red	Thinned	Ripe	58,840	37.2	3,116	18.9
		Yellow	73,836	46.6	4,521	16.3
		Green	25,519	17.2	1,981	12.9
Champagne	Control	Ripe	53,882	36.8	2,884	18.6
		Yellow	69,656	47.6	4,296	16.2
		Green	22,712	15.6	2,163	10.5
Champagne	Thinned	Ripe	42,470	30.6	1,872	22.7
		Yellow	67,332	48.6	3,424	19.7
		Green	28,669	20.8	1,854	15.5
Thales	Control	Ripe	50,741	34.2	2,877	17.6
		Yellow	69,036	46.6	4,654	14.8
		Green	28,324	19.2	2,160	13.1
Thales	Thinned	Ripe	33,671	43.6	1,321	25.4
		Yellow	26,817	34.7	1,125	23.8
		Green	16,664	21.7	871	19.1

Comparing the results shown in tables 2 and 4, it will be seen that they are in agreement as to the general effect of thinning on fruit sizes, though this effect was much less marked in 1940. On the other hand there is at least the suggestion that in 1940 the thinning reduced the percentage of early ripening fruit. Thus two of the three controls showed higher percentages of ripe fruit than the corresponding thinned trees and all three had smaller percentages of green fruit. The differences are not large, however, and no great significance is attached to them. Moreover, the early thinning practiced in the 1940 experiment was observed to result in considerably more terminal and sub-terminal shoot growth than occurred on the control trees; this may have disturbed temporarily the carbohydrate economy and delayed the maturity of the fruit. This point will be investigated during the coming season.

### Summary and Conclusions

Two years of experiments with pairs of loquat trees of four varieties, ranging in season of maturity from early to late, appear to support the following tentative conclusions:

1. That fruit-cluster thinning applied prior to the period of natural fruit drop materially increases the size of the fruit left.
2. That the increase in size of fruit resulting from fruit-cluster thinning is approximately proportional to the per cent of clusters removed.
3. That cluster-thinning which consists primarily of the removal of the late fruit-clusters materially increases the per cent of early ripening fruit.