SHOULD APPLES BE THINNED?

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SHOULD APPLES BE THINNED?

F. H. HALL.

The practice of thinning fruit rests on simple and well understood principles; but its profitable application in the apple orchard calls for careful study and the exercise of good judgment.

The healthy tree, under good climatic conditions during its growing season, takes from soil and air large quantities of inorganic materials, transforms these into organic compounds, and uses the latter, partly to ripen a crop of seeds for the perpetuation of its kind, partly to produce new wood for its own growth and to form new buds for the development of future crops. In the ideal tree, these two methods of disposal of the new compounds formed in any season would be so balanced that each fruit produced would receive material enough to make it perfect in size, shape, flavor and color; while the store remaining would be ample to build up the new wood necessary for continuous, symmetrical growth and to form the buds required for the leaves and fruit of the next season.

Should too much of the material elaborated be turned to the growth of wood, the fruit could but suffer. Then, judicious trimming, with proper adjustment of the food supply and con-

* This is a brief review of Bulletin No. 239 of this Station, on Thinning Apples, by S. A. Beach. Any one specially interested in the detailed account of the investigations will be furnished, on application, with a copy of the complete bulletin. The names of those who so request will be placed on the Station mailing list to receive future bulletins, popular or complete, as desired. Bulletins are issued at irregular intervals, as investigations are completed, not monthly.
control of other conditions tending to rank growth, will restore the balance and promote fruitfulness.

On the other hand, for a young or weak tree to mature the largest number of fruits possible would divert too much food from new wood and buds and might thus cause serious weakening of the tree. Also, mature trees frequently lose large branches through inability to stand the strain imposed by the burden of an over-crop. Thinning out part of the little fruits on such trees would lessen the draft upon the vegetative organs and the strain upon the wood and so avert weakening and accident.

With trees in a state of nature, large size of fruit, fine flavor and high color are not essential, except as they indicate perfect seed development, since it is upon viable seed only that reproduction depends. Therefore, Nature need not thin heavily to secure perfection of fruit but is satisfied with small size. The "June drop," and removal of fruits by insect injury or by disease, by the beating of storms, or by other accidents, provide against over-cropping and consequent weakening of the tree.

Man, however, wants fruit, not seed, hence strives in every way to secure the maximum quantity of the most perfect specimens possible. Placed, as they are in the best orchards, under most favorable environment, relieved from injurious competition, well-fed, protected from enemies and stimulated to productiveness, trees often set and carry through the season much more fruit than they can bring to such perfection as man desires. In such cases removal of part of the setting will give more of the food supply to those fruits that are left and thus increase their size and improve their quality, at the same time lessening the demand upon the growing parts of the tree.

On this principle, then, of using the energy of the tree where it will do the most good, rests the practice of thinning; but so many factors enter into the problem, especially in applying the practice to commercial apple orchards, that to formulate a rule for thinning is one of the most difficult tasks of the experimenter.

First, the set of fruit, even on a regular-bearing tree, varies
from nothing to a burden heavy enough to break down branches. It would be unwise, when the latter condition threatens, to omit thinning; yet the same tree might, in most years, carry to perfection every fruit that the natural thinning agencies leave upon it. Next, different trees, though of the same variety and same age and standing side by side in what are, to all appearances, uniform conditions, habitually bear different loads of fruit. This is clearly shown by the records, for 10 years, of six Greening trees in the Station orchard. Two of these trees in that time yielded about 125 bushels each, two about 85 bushels each, one 72 bushels, and the sixth, 65 bushels; and the yearly yields of the same trees generally ranked about the same as the total yields. It is evident that thinning might be called for upon some of these trees in certain years, while the others, unthinned, could easily ripen their full crops. In some years probably none of the trees would bear enough fruit to promise any improvement through thinning.

Again, apples sold from commercial orchards for shipment are usually marketed at a price which varies but little for differences in quality within the grade. That is, No. 1 Baldwins would be likely to go upon the market at the same price, whether grading just above the minimum size and poorly colored, or 10 per ct. larger and highly colored. Such improvement is often secured by thinning, but it is usually at the expense of lessened quantity; and if better quality brings no better price, the thinning would be a losing operation.

If by thinning, however, a considerable percentage of the fruit can be raised from second grade to first grade, the operation may be profitable even though fewer bushels are marketed. Some light has been shed upon these points by Experiments experiments conducted by the Station; but, as indicated, the most that has been, or can be, accomplished is to obtain a measure of the effect of thinning under stated conditions. Guided by this measure, by knowledge of the behavior of his own trees under varying conditions, and by information as to both the crop prospects throughout the entire competing section and the kind of market accessible to his fruit, the individual orchardist must decide for himself the advisability of thinning.
These experiments have been carried through four seasons on selected trees in a productive commercial apple orchard at Halls Corners. In 1896, sixteen well-formed, vigorous apple trees in this orchard were selected for experiment;—eight Baldwins, six Greenings and two Hubbardstons. The trees were paired for comparison by selecting two of each variety as nearly alike as possible, one of each pair being thinned and the other unthinned; aside from the thinning the trees were given the same care and treatment.

Three methods of thinning were tested: (1) Removing all inferior or defective specimens and thinning clusters to one fruit; (2) the same as the first and leaving remaining fruits at least four inches apart; (3) the same as the first and leaving fruits 6 inches apart.

Two trees only were used in testing the first method, Baldwins, both heavily loaded the first year, and bearing a fair crop the third year; but setting no crop the second year and not enough to allow of thinning the fourth year. As compared with the unthinned tree, the thinned tree yielded 4½ bushels less of marketable fruit at each of the two harvests; but 10 per ct. more of the fruit graded No. 1 the first year and 8 per ct. more the second year. That is, of a total marketable yield, for the thinned tree, of 42¾ bu., 32¾ bu. was No. 1 fruit; while the unthinned tree produced 51¾ bu. of marketable fruit to obtain 34½ bu. grading No. 1.

The No. 1 fruit from the thinned tree also averaged considerably larger than the same grade from the unthinned tree, and was noticeably higher colored and of better quality. The culls and drops from the thinned tree in 1898, the only year they were measured, were only one-third as many as from the unthinned tree.

The second method, in which only perfect fruits were left at least four inches apart, was tested on more trees than either of the other methods. The same six Baldwins and six Greenings were used for the first three seasons, but in one of these years, 1897, the crop was too light to be considered in the test. In 1899 none of these
trees set fruit, so other trees were substituted, four each of Baldwin and Greening, in the same orchard as the others and of the same age.

In 1896, with a very full setting of fruit on the trees, the thinned Baldwins gave 26 per ct. less marketable fruit than the unthinned trees, but 22 per ct. more of it graded No. 1. The Greenings had borne a very heavy crop the previous year, and set only a fair crop in 1896; so that thinning did not exert such a marked influence as on the Baldwins. The yield of marketable fruit was about two bushels less per tree on those unthinned and about 10 per ct. less of the marketable fruit was of No. 1 grade.

In 1898 the thinned Baldwins gave fruit clearly superior in grade, color and quality to that on the unthinned trees, but the total yield of marketable fruit was one-fifth less. The unthinned Greenings bore smaller crops of fruit from the outset than did those which were thinned, consequently the thinned trees gave fruit of no better quality than those unthinned. In fact the percentage of No. 1 fruit was slightly greater on the untreated trees.

In 1899 the trees selected were carrying good crops of fruit when thinned; and the operation improved the quality of the Baldwins, while the yield also was heavier on the thinned trees. With the Greenings there was little difference in quality, except that on one thinned the fruit was exceptionally fine. The thinned trees gave 5 bushels less of marketable fruit.

Considering this method as a whole the yields are as follows:

**YIELD PER TREE, FOR THREE YEARS, UNDER SECOND METHOD, THREE TREES IN EACH GROUP IN 1896 AND 1898; TWO IN 1899.**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Barrel fruit.</th>
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<tbody>
<tr>
<td></td>
<td>No. 1</td>
<td>No. 2</td>
<td></td>
<td>Total</td>
<td></td>
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<tr>
<td>BALDWIN:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinned</td>
<td>39.2</td>
<td>75.5</td>
<td>12.7</td>
<td>24.5</td>
<td>51.9</td>
</tr>
<tr>
<td>Unthinned</td>
<td>37.5</td>
<td>60.9</td>
<td>24.1</td>
<td>39.1</td>
<td>61.6</td>
</tr>
<tr>
<td>GREENING:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinned</td>
<td>30.2</td>
<td>80.8</td>
<td>7.2</td>
<td>19.2</td>
<td>37.4</td>
</tr>
<tr>
<td>Unthinned</td>
<td>28.1</td>
<td>79.4</td>
<td>7.3</td>
<td>20.6</td>
<td>35.4</td>
</tr>
</tbody>
</table>
Thinning the fruit to six inches was tested by the use of two Hubbardston trees for three seasons, in all of which good crops were grown; and of two Greening trees for one season. In the three years the thinned Hubbardston tree produced 56 3/4 bu. of marketable fruit, of which 42 3/4 bu., or 76 per ct., graded No. 1; the unthinned tree yielded 74 3/4 bu. marketable fruit, of which 47 3/4 bu., 65 per ct., graded No. 1. That is, the trees not thinned had to carry 18 bushels more of fruit to give 4 3/4 bu. more of No. 1 grade.

The Greening trees bore only small crops in one year; but showed plainly a similar increase in size and raising of the grade of fruit from thinning.

With each variety under test by any of the three methods, thinning improved the color of the fruit, yellow hues were heightened and tended to be more brilliant when the fruit was harvested than they were on corresponding unthinned fruit.

Of course when the crop on unthinned trees was much below the normal in quantity, it would be as well colored as that on trees thinned for comparison.

Size was increased by thinning in every case where heavy or good crops were produced. Not only was more of the fruit large enough to be graded as No. 1, but the average size of the fruit in any grade of thinned apples would be larger than the average in the same grade of unthinned fruit. This increase in size was most often noticed with Baldwin and Hubbardston; as the Greenings, in these experiments, produced more regularly than these other varieties, and set lighter crops. Hence thinning naturally would have little effect since the crops were not heavy enough to over-burden the trees, or to limit the size of individual fruits.

Culls and drops are diminished by thinning to from one-half to one-third the number of those on unthinned trees.

The improvement in color and size should raise the market value of the apples but the experiment was not on a sufficiently large scale to test this question by actual sale. It was estimated
by an apple expert that the thinned fruit from the crop of 1896, if it could be placed on the market in quantity, would bring from 10 per ct. to 15 per ct. more than the unthinned fruit. But unless arrangements could be made for placing the thinned fruit advantageously, thinning, unless necessary for the protection of the tree, would not be financially profitable, since the yields are usually reduced.

As to the effect of thinning upon subsequent fruit production, the tests give no positive evidence. The yields in subsequent seasons were not increased by thinning; but unthinned trees were not heavily enough loaded during any year of the test to cause a severe draft upon these mature trees. The contrast between thinned and unthinned trees in such cases could be only slight.

As a test of the different methods of thinning, these experiments were not conclusive, nor could any series of tests be so for all conditions. The amount of fruit which sets, the distribution of it on the tree and the ability of the tree to bring fruit to perfection vary with the same tree from season to season, as well as with different trees in the same season; consequently no mathematically exact method can be followed in thinning. However, the experiments seem to indicate that with a full to heavy setting it would be better to thin the fruits to at least 4 inches apart rather than to reduce the clusters to one fruit only, irrespective of the distance apart of the clusters.

The date of thinning in these tests varied from June 27 to July 25. The best results seemed to be obtained by early thinning, the fruits being removed within three or four weeks after setting, without waiting for the second drop to be completed. The fruits should be removed by hand, as no method of shaking or whipping can be depended on to remove inferior specimens or to leave the fruit evenly distributed.

The operation took from ½ hour to 5 hours labor to a tree, usually about the time needed in picking the fruit on the same tree. Thinning reduces to some extent the time and labor of picking and handling, since it lessens the number of culls and low grade apples to be handled. Under the first method it
took four hours to thin and four hours to harvest the fruit on the thinned tree, as compared with five hours to pick the fruit on the unthinned tree. The cost of thinning should not exceed 50 cents a tree.

The fair conclusions from these tests, then, are Conclusions. about as follows:

The operation of thinning apples will cost less than 50 cents a tree and may to a slight degree reduce the expense of harvesting the fruit.

It will, if crops are heavy, add from 10 to 15 per cent. to the intrinsic value of the fruit by increasing the size, by improving the quality and by brightening the colors.

It will probably decrease the total amount of salable apples, this decrease coming principally in the amount of second grade fruit.

It will not, on mature, well-established trees, materially influence the regularity of production or the amount of fruit setting for subsequent crops. The profit, if there be any, must come from the crop thinned.

It will, if judiciously applied, protect young trees from weakness through over-bearing; and will lessen the loss from broken branches and splitting of mature trees.

Whether or not it will be a paying operation will depend on market possibilities. Where near a market that will respond with extra prices for extra quality, the grower of apples could probably thin with good financial results, either directly or by establishing a reputation for fine fruit. The whole question as it relates to commercial orchards is well summed up in the words of Mr. T. B. Wilson, President of the New York State Fruit Growers' Association, in whose orchards these tests were made: "When there is a general crop of apples and the crop, or set, is very full, so that the chance for small fruit is very great and widespread over the country, I think it would pay to thin to such an extent as to insure good-sized fruit. Aside from this I do not think it would pay, only for the protection of the tree."