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THE CONTROL OF APPLE SCALD WITH SHREDDED OILED PAPER

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CONTROL OF SCALD IN BARREL APPLES

Shredded oiled paper was developed for the control of apple scald in the barrel pack. It has now been under commercial test for three seasons and when properly distributed in the package has proved highly efficient in scald control.

The results of 19 different tests with shredded paper, covering 7 different varieties, are shown in Table 1 and in Figure 1. The records were taken after the fruit had been out of storage and in a warm room for three days. The percentages are based on the number of apples having sufficient scald to be discriminated against on the market, the apples having mere traces or touches of scald not being included.

It will be seen that in the untreated barrels from 24 to 96 per cent of the apples were scalded, whereas in those having shredded oiled paper there were but three instances where more than 7 per cent of the apples were scalded, and there were eight instances where they were entirely free from scald. On the untreated apples the average percentage of scald was 67, whereas on the apples in shredded paper the average was 4. The reduction in the disease from the use of the shredded paper is very significant.

The experiments of Table 1 were all made on barrel apples. Tests have also been made with apples in hampers, baskets, and boxes with equally good or somewhat better success in scald control.

I. AVERAGE OF 19 EXPERIMENTS

(A) SHREDDED OILED PAPER IN BARRELS

(B) UNTREATED BARRELS

PERCENTAGE OF SCALD
20 40 60 80



II. AVERAGE OF 8 EXPERIMENTS

(A) SHREDDED OILED PAPER IN BARRELS

APPLES IN CONTACT WITH PAPER

APPLES NEAR PAPER, BUT NOT IN CONTACT WITH IT.

(B) UNTREATED BARRELS



FIG. 1.—Results of experiments in the control of apple scald with shredded oiled paper

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TABLE 1.—Tests in the control of scald in barrel apples with shredded oiled paper

| Variety | Locality | Date of picking | Date of note taking | Percentage of apples scalded | |
|-------------------------------|--------------------|-----------------|---------------------|------------------------------|----------|
| | | | | Packed with paper | No paper |
| Grimes Golden | Rockville, Md. | Sept. 13, 1923 | Jan. 15, 1924 | 4 | 73 |
| Do | Arlington, Va. | Sept. 11, 1924 | Jan. 25, 1925 | 7 | 93 |
| Do | Charleston, W. Va. | Sept. 11, 1925 | Jan. 16, 1926 | 17 | 77 |
| York Imperial | Vienna, Va. | Oct. 11, 1923 | Apr. 3, 1924 | 6 | 70 |
| Do | Rockville, Md. | Oct. 18, 1923 | Feb. 29, 1924 | 1 | 94 |
| Do | do | Oct. 17, 1924 | Apr. 2, 1925 | 0 | 25 |
| Do | Winchester, Va. | | Mar. 26, 1925 | 0 | 35 |
| Do | do | | Mar. 5, 1926 | 11 | 95 |
| Do | Rockville, Md. | Oct. 23, 1925 | Mar. 16, 1926 | 0 | 32 |
| Do | Winchester, Va. | | Mar. 26, 1926 | 2 | 62 |
| Stayman Winesap | Inwood, W. Va. | Oct. 9, 1924 | Feb. 27, 1925 | 0 | 96 |
| Do | Rockville, Md. | Oct. 6, 1925 | Mar. 15, 1926 | 0 | 24 |
| Rhode Island Greening | Albion, N. Y. | | Mar. 19, 1926 | 1 | 69 |
| Arkansas (Mammoth Black Twig) | Inwood, W. Va. | Oct. 29, 1923 | Mar. 17, 1924 | 4 | 79 |
| Do | do | Oct. 24, 1924 | Feb. 28, 1925 | 0 | 91 |
| Do | Woodside, Del. | Oct. 13, 1925 | Mar. 16, 1926 | 1 | 95 |
| Do | Inwood, W. Va. | | Mar. 26, 1926 | 23 | 93 |
| Yellow Newtown | Hurds, Va. | Sept. 17, 1924 | June 18, 1925 | 0 | 28 |
| Ben Davis | Inwood, W. Va. | Oct. 29, 1923 | May 20, 1924 | 0 | 45 |
| Average | | | | 4 | 67 |

DISTRIBUTION OF THE PAPER IN THE BARREL

In the experiments reported in Table 1 the shredded paper was well distributed in the barrel, practically every apple coming in contact with the paper. Other tests were made where several layers of apples were run in between the layers of paper, resulting in many apples being entirely out of contact with the paper. A part of these tests were made in connection with the tests reported in Table 1 and part as independent experiments. The results are shown in Table 2 and also in Figure 1.

In two instances the development of scald on the apples that were in the barrels with shredded paper but out of contact with the paper was little different from that on the apples in the untreated barrels, but in the other five cases scald was decidedly reduced on the apples in barrels with paper even when out of contact with the paper.

As compared with the apples in contact with the paper, the scald control on those out of contact with it but near it was a decided failure. The average for the seven tests gives 7 per cent of scald on the apples in contact with the paper, 43 per cent on the apples of the same barrels that were near the paper but not in contact with it, and 76 per cent for the apples in the untreated barrels.

The results show that careful and thorough distribution of the paper is essential to good scald control. It is

also a decidedly vital matter in the success of the shredded-paper treatment in general. If packages that are offered on the market as containing shredded paper are found to have 40 per cent or more of the apples scalded in certain parts of the barrel, the price is liable to be set on the basis of the poorest rather than the best of the apples and the conclusion drawn that the shredded paper has added nothing to the market value of the fruit.

One of the greatest obstacles in the control of scald with shredded oiled paper is the rather common habit with growers and packers of running a large quantity of apples into the barrel at one time. This is done for the sake of speed and because of the rush of work during the packing season, but it precludes the successful use of the shredded paper. If the paper is to be scattered over the apples only between the runs, good scald control requires that not more than two layers of apples across the barrel should be run in at one time, and if the variety is particularly susceptible to scald, one layer of apples at a time is much to be preferred. Small runs and frequent shaking have a value, aside from the control of scald, in the way of producing a tighter pack that is less likely to require plugging later in the season.

The shredded paper must always be shaken apart before being thrown into the barrel. Large mats and heavy layers of paper not only prevent the paper from having its full efficiency in

TABLE 2.—Results with poor distribution of shredded oiled paper in barrels of apples

| Variety | Locality | Date of picking | Date of note taking | Percentage of apples scalded | | |
|----------------------------|-------------------------|-----------------|---------------------|------------------------------|-------------------------------------|-----------------------|
| | | | | Paper in barrels | | Barrels with no paper |
| | | | | Apples in contact with paper | Apples having no contact with paper | |
| York Imperial..... | Winchester, Va..... | ----- | Mar. 5, 1926 | 11 | 43 | 95 |
| Do..... | do..... | ----- | Mar. 26, 1926 | 5 | 58 | 62 |
| Stayman Winesap..... | Inwood, W. Va..... | Oct. 9, 1924 | Feb. 27, 1925 | 2 | 53 | 96 |
| Arkansas..... | do..... | Oct. 24, 1924 | Feb. 28, 1925 | 0 | 27 | 91 |
| Do..... | do..... | ----- | Mar. 26, 1926 | 22 | 58 | 93 |
| Do..... | Havre de Grace, Md..... | ----- | May 21, 1926 | 12 | 67 | ----- |
| Yellow Newtown..... | Hurds, Va..... | Sept. 17, 1924 | June 18, 1925 | 0 | 21 | 28 |
| Rhode Island Greening..... | Albion, N. Y..... | ----- | Mar. 19, 1926 | 2 | 20 | 69 |
| Average..... | ----- | ----- | ----- | 7 | 43 | 76 |

scald control but also give a temporary bridging effect that results in the barrel becoming slack later in the season.

The face layers of apples should receive their share of the oiled paper. There should be a layer of paper between the face layer of apples and the corrugated cap. The writers have seen instances where the face layers were left without paper and where scald was confined almost entirely to these layers.

QUANTITY AND CHARACTER OF PAPER

If evenly distributed, $1\frac{1}{2}$ pounds of paper to the barrel is sufficient to give satisfactory scald control. Two pounds has sometimes given better results, but it is doubtful if under average conditions the additional scald control from using this quantity of paper would be sufficient to justify the extra cost. One pound of shredded paper to the barrel is not sufficient to give satisfactory scald control under average conditions.

With $1\frac{1}{2}$ pounds of paper well distributed in the barrel, and with proper shaking, a barrel of apples weighs approximately $1\frac{1}{2}$ pounds more than a barrel similarly packed but without the paper. The shredded paper makes no appreciable decrease in the number of apples to the barrel.

A paper that is somewhat resilient and springy is better than one that is soft and inclined to mat. It is easier to shake apart after it has been baled, and when thrown into the barrel it has a greater tendency to spread out between the apples and give the maximum contact with them.

The paper should be cut so as to be readily scattered in the barrel. Strips

about 5 inches long and three-eighths inch wide have met with rather general approval among growers.

The shredded paper must carry at least 15 per cent of its finished weight in odorless, tasteless mineral oil if it is to give satisfactory scald control, and 18 to 20 per cent of oil is desirable. Still higher percentages of oil (25 to 35 per cent) probably add something to the efficiency of the paper and in so far as they have been tested have not been found harmful to the apples.

COST AND RETURNS

It is generally estimated that the shredded paper adds 20 to 25 cents a barrel to the cost of packing the apples. If the apples are to be passed into consumption early in the storage season there is little chance of recovering this amount in the selling price, but when they are held past the peak of the season for the variety, the shredded paper has often given returns several times greater than its cost. The writers have received reports from growers giving 50 cents, 75 cents, \$1, \$1.25, and even \$3 a barrel as their profit from the use of shredded oiled paper.

The shredded paper is not a guaranty against all misfortune; it is not even a guaranty of complete scald control. When properly applied it does delay scald several weeks and usually prevents its development completely. It can usually be made a source of profit to the grower, and by adding to the keeping quality of the apples it contributes a stabilizing effect to the apple industry.

Poor distribution of the paper and scant use of material are likely to result in disappointment and loss. The mere presence of paper in the barrel may sometimes be used as a talking point in selling the apples, but if the paper is improperly applied the purchaser does not receive the protection he is led to expect, and both the grower and the paper are brought into disrepute. If the rush of work prevents the proper use of the paper it should be left out entirely. If kept in large bulk or in the original pack it can be held for use the next year.

SUMMARY

The results of three years' experiments with shredded oiled paper in the control of apple scald are here re-

ported. Seven different varieties of apples were used in the experiments. Scald was reduced from an average of 67 per cent to an average of 4 per cent by the use of the paper.

Poor distribution of the paper resulted in poor scald control. For complete control with susceptible varieties, every apple should have some contact with the paper. Thick mats of paper give a temporary bridging effect and result in the barrel becoming slack later in the season. Not less than 1½ pounds of paper should be used to the barrel. The paper should carry at least 15 per cent of its weight in oil and 18 per cent or more is desirable. The cost of using the paper is estimated at 20 to 25 cents per barrel. When properly applied it has usually given good returns on the investment.

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