A Preliminary Report on Anjou Scald and Its Control

Agricultural Experiment Station
Oregon State Agricultural College
CORVALLIS
A Preliminary Report on Anjou Scald and Its Control

By

Henry Hartman

The physiological troubles of fruits in storage still present unique and baffling problems to investigators. In spite of many valuable contributions by qualified workers much remains to be learned regarding this group of abnormalities. It is true that the nature and control of apple scald and one or two similar disorders are now pretty well understood, but many of the troubles of this character must still be classed in the category of unsolved difficulties.

Nature of Anjou scald. The particular trouble described here as Anjou scald was first noticed by the author in 1928. Since that time commercial and experimental lots of Anjou pears have frequently developed the disease, especially when the fruit has been held for several months in cold storage. Usually it is found in fruit held until after February 1. It does not occur in fruit that is ripened shortly after picking.

The trouble, as a rule, does not appear while the fruit is at low temperatures, but develops very quickly when the fruit is removed to a warm place. This is especially true when removal to high temperatures is accompanied by removal of the wraps. It is not uncommon for Anjou pears to be completely scalded within twenty-four hours following this treatment.

Although the fact is not thoroughly established, it appears that Anjou scald and common pear scald are distinct troubles. Common pear scald usually results in discoloration and sloughing of the skin. A foul odor is usually present and the fruit becomes practically inedible. Anjou scald, on the other hand, results in brownish or dark discoloration, which detracts materially from the appearance of the fruit, but this is not accompanied by sloughing of the skin, nor is it accompanied by odors or impaired eating quality. In this respect it is very similar to apple scald.

While Anjou'scald has been confined largely to Anjou pears from the Rogue River Valley, it has appeared at times in fruit from the Hood River Valley and elsewhere.

Early observations on Anjou scald indicate that the trouble occurs under a wide range of conditions. In past years it has occurred in both washed and unwashed fruit. It has occurred in precooled fruit and also in fruit not precooled. It has occurred in fruit held constantly at 32° F. during the cold-storage period, and it has occurred in fruit held for varying periods at 29°, 30°, and 31° F. It has occurred in fruit held somewhat above the freezing point, and it has occurred in fruit that was frozen for varying periods of time. It has occurred in fruit sprayed with oil during the growing season, and it has occurred in fruit which received only the customary applications of arsenate of lead.
Figure 1. Typical cases of Anjou scald.
General methods. During the season of 1930-31 an experiment was conducted to ascertain the effect of certain chemically treated wraps on the development of Anjou scald. The experiment was started on September 9 with several boxes of Anjou pears, all taken from a single tree at Medford. Immediately after picking, the fruit was packed in standard box lots and the following treated wraps were used.

Lot 1. An oiled-paper wrap containing 18.2 percent oil as determined by Fisher's method.

Lot 2. A copper-oil paper wrap containing 18.1 percent oil and 1.4 percent copper, equivalent to 5.5 percent copper sulfate (CuSO₄·5H₂O). This particular wrap was originally prepared for use in tests on the control of Botrytis rot. The copper-sulfate content was only incidental to the experiments on Anjou scald.

Lot 3. A plain-paper wrap which had been dipped into a saturated solution of calcium hydroxide and dried in the sun.

Lot 4. A plain-paper wrap of the type commonly used for pears.

After packing, the fruit was stored at Medford at 31° F. until the first week in December, when it was shipped to New York City under “standard refrigeration.” Upon arrival in New York City, it was again stored at 31° F. On December 22, one-half of the test boxes were removed to a ripening room, where the fruit was allowed to reach maturity at a temperature of 65° F. On April 2, the remaining boxes were placed in the ripening room, and the fruit was allowed to ripen at 65° F. as in the case of the former lots.

<table>
<thead>
<tr>
<th>Lot No.</th>
<th>Kind of wrap</th>
<th>Date of removal from 31° F.</th>
<th>Amount of scald upon removal from 31° F.</th>
<th>Date of prime condition</th>
<th>Amount of scald at time of prime condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1........</td>
<td>Oiled wrap</td>
<td>4/2/31</td>
<td>None</td>
<td>4/10/31</td>
<td>None</td>
</tr>
<tr>
<td>2........</td>
<td>Oiled wrap and copper sulfate</td>
<td>4/2/31</td>
<td>None</td>
<td>4/10/31</td>
<td>None</td>
</tr>
<tr>
<td>3........</td>
<td>Plain wrap and calcium hydroxide</td>
<td>4/2/31</td>
<td>None</td>
<td>4/10/31</td>
<td>Severe</td>
</tr>
<tr>
<td>4........</td>
<td>Plain wrap</td>
<td>4/2/31</td>
<td>None</td>
<td>4/10/31</td>
<td>Severe</td>
</tr>
</tbody>
</table>

PRESENTATION AND DISCUSSION OF RESULTS

Scald development prevented by oiled wraps. From the data presented in Table I, it appears that oiled wraps have a marked influence on the development of Anjou scald. In fact, under the conditions of this experiment, Anjou scald was entirely prevented by the use of these wraps. In the case of the fruit packed in plain wraps and in the wraps treated with calcium hydroxide, scald began developing a few hours following removal from cold storage. With the oiled wraps, however, the fruit remained free from scald even to the time when it was breaking down from overmaturity.
Figure 2. Left: Anjou pears packed in common wraps. Scald in this case developed within twenty-four hours after the fruit was removed from cold storage.

Right: Anjou pears from the same tree packed in oiled wraps. This picture was taken eighteen days after the fruit was removed from cold storage. The wraps had been removed fourteen days when the picture was taken.
Even in cases where the wraps were taken off upon removal from cold storage, the fruit from the oiled wraps remained free from scald to the end.

The fruit removed from cold storage on December 22 did not develop scald. This was true of the fruit in plain wraps as well as of that in oiled wraps. Apparently, it had not reached the scalding stage at this time.

Just how much oil needs to be incorporated in the wraps to prevent Anjou scald was not determined by this experiment. As already stated, the wraps used contained approximately 18 percent oil. It is possible that similar results can be obtained with wraps containing less oil, but more experimentation is needed before this can be assumed.

Effect of oiled wraps on the fruit itself. The possibility of deleterious effects from the use of oiled wraps on pears needs to be considered very carefully before these wraps can be generally adopted for pears. This is especially true since it is known that the respiratory activities of pears in storage can be influenced by the presence of oil or waxy materials. So far as the present experiment is concerned no deleterious effects appeared that could be definitely charged to oiled wraps. The fruit in all cases ripened in a natural manner and developed normal color. For several years past, shippers of pears have used oiled wraps from time to time, and there appears to be no prejudice against the practice in commercial circles.

Oil-copper combination offers promise. Since copper-treated wraps are now coming into use for the control of Botrytis rot, the desirability of using a combination oil-copper wrap, which would be effective against both Botrytis and Anjou scald, is obvious. As already indicated, such a paper was used in the present experiment with the result that both diseases were effectively controlled. Attempts are now being made to perfect a commercial oil-copper wrap. While the matter is still in the experimental stage, the results thus far obtained are promising.

RECOMMENDATIONS

Final recommendations regarding the use of oiled wraps for the control of Anjou scald cannot be made at this time, but the use of these wraps in a limited way appears to be justified, particularly in the case of the Anjou pears from the Rogue River Valley. While it is not recommended that entire crops of this variety be packed with oiled wraps this year, a number of cars so treated would afford opportunity to observe the results under commercial handling methods. In this connection it would be well, also, to try out in a limited way the oil-copper wraps, if wraps of this type can be obtained in time for the present season.

SUMMARY AND CONCLUSIONS

(1) The trouble described here as Anjou scald has been prevalent in Oregon Anjou pears for the past several years.

(2) While this disease does not materially affect eating quality, it detracts considerably from the appearance of the fruit.
(3) Although the fact is not thoroughly established, Anjou scald and common pear scald appear to be distinct troubles.

(4) Under the conditions of these experiments, Anjou scald was effectively controlled by the use of oiled wraps.

(5) The use of a combination oil-copper wrap which would be effective in the control of both Botrytis rot and Anjou scald appears feasible as a result of these experiments.

(6) While it is not recommended that the entire tonnage of Anjou pears be packed in oiled wraps this year, the use of these wraps in a limited way appears to be justified. The same recommendation holds true for the oil-copper wrap, provided a wrap of this type is available in time for the present season.

ACKNOWLEDGMENTS

The author, in the course of these investigations, received valuable assistance, especially from Professor R. H. Robinson, Professor F. C. Reimer, The Pinnacle Packing Corporation of Medford, and the Merchants Refrigeration Co., New York City.