

## The Cold Storage of Apples\*

J. A. Ruddick, Cold Storage Commissioner, Ottawa

ANY apple which is ripe enough to show signs of softening is past the stage for successful cold storage treatment. Any decay in the form of rots, especially the ordinary brown or soft rot, will be arrested very little, if arrested at all. Take the Northern Spy for instance. Well-developed specimens with sound skins, and put away in time, will keep with the best, but at the same time this variety is also very susceptible to rots if the skin is broken or injured in any way, and for this reason it frequently does not keep well in cold storage.

### KEEPING QUALITIES

Apples which are well matured on the trees, but still firm, will keep better and longer than if picked at an earlier stage. Well-matured apples show less tendency to scald. This is very marked in the case of the Greening. In tests which the Department made in 1909-10 apples of this variety picked rather early at a certain date, scalded badly in cold storage, while others from the same tree picked three weeks later were almost free of this rather serious defect. If the Greening has reached the stage when it shows a faint blush there is not apt to be much scalding. A good color seems to be a great protection against scalding in all varieties. Late varieties of apples which are grown in localities where the season is longest and where they reach the greatest maturity on the trees, are the ones which will give the best results in cold storage. This is all the more important, when considered along with the well-known fact that under what may still be termed as normal conditions of handling the apples grown in these localities are not noted for good keeping qualities. The same thing applies in general to a season like 1911, when the crop matured early on account of the hot weather. There are very general complaints about the poor keeping of apples this winter, and yet the 1911 crop possessed the very qualities which would have given good results in cold storage, providing the storing had not been too long delayed after picking, as was the case with some that I have heard of.

I believe that the repacking of barrelled apples, which is now so generally practised in the frost-proof warehouses in Ontario and Nova Scotia, could be dispensed with if the apples were sent promptly to cold storage. In 1909 the Dairy and Cold Storage Branch made some trial shipments to test this matter. A car load of Spies and Baldwins were divided, one lot being put in a frost-proof warehouse and the other sent to cold storage at St. John, N.B. The first lot was repacked, but the cold storage lot was shipped without repacking. Both lots were sold together in Glasgow in the month of March. After paying the cold storage rates we found that the cold storage lot netted us from ten to seventy cents a barrel more than the others.

There were both number one and number two apples in these lots, and it is interesting to note that the number one apples gave the greatest gain in cold storage. Full particulars of these trial shipments will be found in bulletin number two of the Dairy and Cold Storage Series. It may be of interest to add that one box of Spies from the cold storage lot was held for eighteen months. The quality was well preserved and the apples stood up well after being removed to an ordinary room temperature.

\*Extract from a paper read at the Dominion Fruit Conference in Ottawa.

This box was held for the first six months at thirty-two degrees, and after that at thirty. The latter is the best temperature, but of course it is very near the danger line, and great care has to be taken at such an extreme low temperature to prevent some part of the storage room from reaching the freezing point of the apples.

There is considerable difference in the behavior of different varieties of apples in cold storage. This phase of the subject offers a field for further investigation and study.

### STORAGE OF PEARS

With respect to other fruits, the pear probably is the one which is best adapted for successful handling in cold storage. Some varieties may be carried for several months in perfectly satisfactory condition. Many growers in the Hudson River Valley store a large part of their crops and market them in New York for the Christmas trade. The total quantity of pears carried in cold storage for several months every year in the United States is said to be nearly half a million bushels.

I am of the opinion that the season for special varieties of grapes might easily be extended very considerably with proper management. We have not had an opportunity to acquire much data in this connection, but in the fall of 1910 some twenty-five commercial baskets of "Wilder" and "Vergennes" were sent to the London cold storage and held at about thirty-four degrees. I had some of these grapes sent to Ottawa on March 8th and they were in very fair condition.

I hope sometime to be able to secure facilities that will enable me to study the matter of grape and other fruit storage more carefully, because I feel that we have much to learn as to the most suitable temperatures, style of packing, and other conditions of storage. It may not be out of place to say that opinion has changed with respect to the most suitable temperatures for carrying fruit, and it is now pretty well established that the lowest possible temperature without freezing will give the best results, and that a difference of one or two degrees will have a noticeable effect on the length of time that fruit will be preserved.

The actual freezing temperature of fruits will depend largely on the percentage of sugar in the juices. I do not think any apples will freeze at thirty, but how much lower some varieties might be safely carried I am unable to say. Australian experts say that pears will keep best at twenty-nine to thirty degrees, and that grapes grown in that country will stand even lower temperature because of a higher percentage of sugar. I think it is likely, however, that Australian grapes contain much more sugar than those grown in Canada do, because of the hotter climate in that country.

There is another side to the question of cold storage, and that is the commercial one, as to how far the cost of cold storage will be balanced by increased returns in the sale of the fruit. This will have to be determined very largely by practical experience. I do not believe for a moment that it is necessary or desirable to provide cold storage for the whole of the Canadian apple crop. I have indicated some of the special ways in which it may be of great service. I believe that it would pay to refrigerate a large proportion of the so-called frost-proof warehouses now in use in Ontario and in Nova Scotia. This could be done at com-

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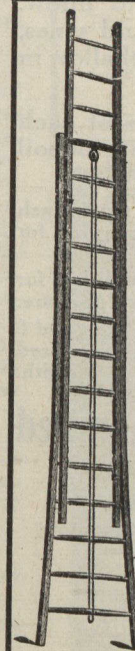
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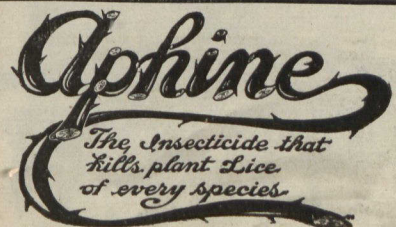
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