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## THE COLD STORAGE OF APPLES AND OTHER FRUITS\*

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## Cold Storage should not be depended on to Preserve Windfalls and other Culls. All varieties do not require Cold Storage. The Function and Advantage of Cold Storage

NY one who has followed the matter closely, must be convinced that there is a fine opportunity to improve the fruit trade of Ontario by the intelligent employment of cold storage and refrigeration in transit. I could quote many instances where the value of apples stored or shipped in cold storage, has been greatly enhanced. As an instance, a sales catalogue from Glasgow of recent date, shows that cold storage Kings ex S.S. "Pretorian" fetched thirtyone shillings, while the highest paid that day for the same variety shipped as ordinary cargo in the same steamer was twenty-four shillings and six pence. Other varieties show similar differences: Wealthy in cold storage sold for twentyfour shillings, as compared with fourteen shillings and six pence for those carried as ordinary cargo, and so on. I quote these figures merely to indicate the possibilities of shipping early apples in cold storage and not as an attempt to prove that such results could always be ob-

THINGS COLD STORAGE WILL NOT DO

As fruit growers, rather than shippers, you are more interested in cold storage on land and I shall confine myself to that phase of the question and get as near to the orchard as posible, for that is where cold storage will be the most effective. There are, however, some things which cold storage will not do and it is just as well that we should have at the beginning, a clear understanding of its limitations as well as its possibilities. Reference has frequently been made to the large quantities of apples which are wasted every year in Ontario orchards, especially when there is a heavy crop, and it has been urged that if cold storage was available, all this enormous loss would be avoided. I need hardly say to experienced fruit growers, that such an assumption is an absolute fallacy; that it is not cold storage which is needed primarily, but better orchard methods and management. The fruit grower who depends on cold storage to preserve windfalls, worm-eaten, bruised and skin punctured apples from early decay, will be grievously disappointed. ONLY CHECKS GROWTH OF ROT, ETC.

The lowest temperature which it is possible to employ does not absolutely stop either the life processes of the apple or all of those destructive changes which include various forms of rot, etc. It only checks them, but some forms of decay are checked more effectively than others. Experiments at Geneva showed that pink rot, black rot and bitter rot developed very little in cold storage, but, that the ordinary soft rot, which is due to the growth of the common blue mould (Penicillium glaucum) and which is probably the most common form of apple decay, is not pre-

vented to any marked extent. Fortunately, the apple resists the attacks of this mould, unless there has been some puncture or weakening of the skin due to fungus or bruising, until it begins to deteriorate with old age. The injury need only be of the slightest character-a mere pin prick, for instance-to provide an open door for the entrance of the spores of the destroying

MATURITY AND RIPENESS DEFINED

If you place over-mature or ripe apples in cold storage, they are bound to go down in a short time. Let me here digress to make myself clear on the two terms, "maturity" and "ripeness." I would call an apple mature when it is fully grown and well colored for the variety, and call it ripe when it reaches its best condition for eating. The length of time which elapses between maturity and ripeness varies greatly according to variety. In some earlier or quick ripening varieties, it is only a matter of days, while in others, it becomes a question of weeks and even months.

The foregoing is probably more of a practical definition than a scientific one, for I suppose nature intended all apples to ripen fully on the

I must congratulate you in the improvement in Farm and Dairy. Its name is a great deal better known than formerly. The reading matter is good and profitable .-L. Tennant, Brant Co., Ont.

trees, but man with his perverseness has so shifted things around that he is growing many varieties in latitudes and climates where they cannot possilly do so. I do not say there is anything wrong in that. We call such apples mature when they reach the stage in which we are accustomed to find them as taken from the tree.

1.ARLY VARIETIES SHOULD NOT BE HELD

The earliest varieties should be rushed to the market as quickly as possible to take advantage of the trade. Prompt chilling before shipment is all that cold storage should be expected to do for apples of this class. Even with varieties whose qualities would commend them in competition with others past their regular season, some caution is necessary, because if an apple is carried much past the time when experience has taught every one that it has reached its best, and may be expected to "go down," dealers would hesitate ofore handling it.

REEPING QUALITY IN COLD STORAGE

It is not an easy matter to determine experimentally as to the relative keeping quality of different varieties of apples in cold storage, because of the difficulty of securing the different varieties at exactly the same stage of maturity, and unless this is done, any test is unreliable and the results are misleading. Generally speak-

ing, those varieties which ripen most slowly will keep the longest.

Some varieties hold their quality much better than others. That is to say, certain varieties retain their crisp, juicy texture and characteristic flavor almost to the end, while others become mealy and insipid long before the structure of the apple breaks down. Of course, they act the same way in any kind of storage. This it seems to me is a rather important consideration.

LENGTH OF TIME IN COLD STORAGE

It is safe to say that any variety of apples may be kept as long as it is commercially desirable to do so. Late winter apples may be kept a year without difficulty; fall and early winter varieties, from two to four months. Canadian Fameuse of the previous season's growth were shown in good condition at the Dublin Exhibition in the month of August. Of course, only a percentage of those originally stored were sound at that time, and the circumstance does not prove that it would pay to keep the Fameuse to that date.

COLD STORAGE MAY BE OVERDONE

The cold storage of apples might easily be overdone. It would be quite practicable, for instance, to preserve any of the early fall apples if placed in storage at the proper time, for several weeks or even months, but it would not be good business to do so, because the trade would be shy of such varieties out of season. It would be unbusinesslike to attempt to carry inferior varieties into the season for better ones.

SEASON MAY BE EXTENDED

By degrees, however, the season for superior varieties might be considerably extended. The Rhode Island Greening is a good type of this class. The season for the Greening has been extended for six weeks or two months in the United States by means of cold storage, with the decided advantage that it misses the competition of cheaper varieties. The question of variety should be carefully considered in selecting a stock for cold storing.

THE FUNCTION OF COLD STORAGE

The proper function then, of refrigeration in connection with our fruit trade, is two-fold. First, the rapid chilling of early apples and tender fruits, and their preservation in transit; and second, the storage and early checking of the ripening process in late apples intended for long keeping. When the cold weather comes on, natural temperatures can be utilized, but the damage is done before that time arrives, especially in those seasons when warm weather prevails late into October or November.

In these two fields there is a great opportunity. Of course, there is always the further advantage of being able to carry surplus stocks over a period of glut in the market. There is particular need for cold storage in those warmer localities where late apples approach more nearly the stage of full ripeness on the trees. There is this to be said also, that apples which are well matured and highly colored keep better in cold storage than greener and more immature ones do.

ALL APPLES DON'T REQUIRE COLD STORAGE But it would be a mistake to suppose that all

\*Extract from a paper read at the convention of the Ontario Fruit Growers' Association in Toronto.

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