

## FRUIT COLD STORAGE RESEARCH.

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## REFRIGERATED GAS-STORAGE OF APPLES.

The investigations of the Dominion Laboratory on the gas storage of Jonathan and Sturmer apples were advanced to the pilot-plant stage this year, and in addition a beginning was made with detailed, small-scale studies on the Granny Smith variety. Owing to continued delays in completion of the contract for construction of the two new gas-storage chambers, it was not possible to give the rooms adequate trial runs before they were put into service. The Jonathan chamber fell somewhat short of the required standard of gas-tightness, and on the Sturmer chamber the evaporator developed a leak that permitted an escape of methyl chloride into the room. Apart from methyl chloride injury to the Sturmer, the results bore out the earlier small-scale findings.

*Jonathan.*—Rather more than five hundred bushel cases were stored successfully for twenty-four weeks at a temperature of 41° F. in an atmosphere containing 5 per cent. to 6 per cent. carbon dioxide and 16 per cent. to 15 per cent. oxygen. Since the desired 8 per cent. carbon dioxide could not be built up, the fruit was marketed in early September. After fourteen days' further storage at room temperature there was 97 per cent. of good-quality, marketable fruit in the gas-stored sample, and 87 per cent. of softer and more yellow fruit in the cool-stored control sample. The marketable fruit from gas storage included 21 per cent. showing slight defect of one kind or other, whereas from the controls the amount was 33 per cent. Gas storage eliminated Jonathan-spot and reduced internal breakdown.

*Sturmer.*—A similar quantity of this variety was stored for thirty-seven weeks at 41° F. in 9 per cent. carbon dioxide with 12 per cent. oxygen. Although the methyl chloride injury nullified the commercial significance of the test, the gas-stored fruit otherwise had less core-flush, wilt, and fungus than the control fruit. The amounts of marketable fruit in the two samples (ignoring methyl chloride injury) were 92 per cent. and 79 per cent. respectively, including corresponding amounts of 27 per cent. and 43 per cent. showing slight defect at the 22nd December examination, made after the fruit had been held out of store for fourteen days at 68° F.

*Granny Smith.*—Temperatures selected were 35° F., 38° F., and 41° F. Carbon dioxide concentrations of 3 per cent., 6 per cent., and 9 per cent., with corresponding oxygen percentages of 18, 15, and 12, and also two sets of air-stored controls were provided at each temperature. The results indicated that a temperature of 35° F. or 38° F. with 3 per cent. carbon dioxide and 18 per cent. oxygen was the most satisfactory combination of the conditions selected; breakdown was almost eliminated, core-flush and fungus were at a minimum, and superficial scald was less than in the control lots. In view of the apparently low tolerance of the variety to carbon dioxide, it is possible that control of oxygen as well as of carbon dioxide would add considerably to the storage life of the Granny Smith.

## EFFECT OF FERTILIZERS ON COLD-STORAGE QUALITY OF APPLES.

Cold-storage studies were maintained as part of the long-term manurial experiments at the Appleby Research Orchard, and following are the main points noted for each variety:—

*Cox's Orange Pippin and Dunn's Favourite.*—Crops on these two varieties were exceptionally light, and the storage samples were too small and variable to give reliable data.

*Jonathan.*—Breakdown was increased in proportion to the amount of nitrogen used in the fertilizer application, and fungus was increased when the quantity of nitrogen was large. Potash again reduced susceptibility to breakdown and fungus, but increased Jonathan-spot incidence.

*Delicious.*—Manurial treatments had no influence on the incidence of breakdown, fungus, pit, scald, or wilt.

*Sturmer.*—Internal breakdown and fungus were both increased by nitrogenous dressings, but phosphate counteracted this adverse result. Nitrogen and potash both seemed to increase scald susceptibility.

## COLD-STORAGE ASPECT OF SPRAYING EXPERIMENTS.

With both Jonathan and Sturmer, losses through attack by fungi were considerably less in Bordeaux-sprayed fruit than in lime-sulphur-sprayed fruit.

## CONTROL OF WILT IN WINTER COLE PEARS.

Wilt was reduced to a very small amount in cold-stored Winter Cole pears by the use of waxed-paper liners inside the boxes. The maturity of the fruit did not seem to be materially advanced by the treatment, and the losses from fungi were only slightly increased. On balance the treatment definitely proved economic.

## ORCHARD STORAGE OF APPLES.

This investigation was continued through the co-operation of the Internal Marketing Division and the Department of Agriculture. The economic storage-life of all varieties tested was materially shorter in 1941 because of the continuance of high temperatures late into the autumn. The tests emphasized the advantages of a store that gave a low fruit-temperature. Only the most significant findings can be given here.

*Ballarat.*—The commercial storage-life of the variety was ended by mid-June, owing to yellowing of the ground colour, and at this date there was practically no waste in any of the stores.

*Washington.*—Superficial scald was the main cause of loss, and was much more severe in the high-temperature stores.

*Rome Beauty.*—The fruit kept without loss till mid-June, when texture began to soften.

*Statesman.*—The low-temperature store gave slightly better results than the other stores. A very early picking, on the 26th March, suffered severely from fungus. Bordeaux-sprayed fruit was more resistant to rots than lime-sulphur-sprayed fruit, but Bordeaux injury to the lenticels of this variety seemed to make these areas liable to fungous attack.