

- (c) In the first shipment breakdown was rather more severe in the larger sizes of exposed fruit than in the corresponding sizes of shaded fruit. In the second shipment breakdown was equally severe in the two types of fruit.
- (d) Fungus diseases were practically unaffected by position of fruit on tree.

(2) *Effect of Precooling on Incidence of Storage Disorders.*

Wastage in this experiment was similar in character to that noted for Experiment (1) above.

- (a) In the first shipment there was no difference in pit incidence between treatments till the second examination, three weeks after discharge, when rather more pit was found in pre-cooled than in non-pre-cooled fruit.
- (b) In the second shipment there was less pit in the pre-cooled than in the non-pre-cooled fruit at each of the two examinations.
- (c) Comparing pit incidence in the two pickings, there was less pit in the second picking of pre-cooled fruit, but more pit in the second picking of non-pre-cooled fruit.
- (d) Breakdown was unaffected by treatments in the first picking, but was more severe in non-pre-cooled fruit of the second picking than in pre-cooled.
- (e) Fungus-development showed a tendency to be more severe in non-pre-cooled fruit, but the figures are of doubtful significance owing to individual variability.
- (f) Storage-pit, breakdown, and fungus disease were more severe in fruits of 150 count than those of 180 count.

(3) *Influence of Different Types of Wrapper on Incidence of Storage Disorders.*

Only one picking was dealt with in this experiment, and wastage consisted chiefly of storage-pit, with a small percentage of breakdown and a trace of fungus. Fruit was wrapped in plain, copper-sulphate-treated, and oiled papers, but no differences of any kind developed between treatments. The only consistent feature of the experiment was the well-established association of higher breakdown susceptibility with the larger fruit sizes.

Taking the group of experiments as a whole, pit susceptibility could not be correlated with position of the fruit in the case. In the oversea experiments of a previous year it had been found that fruits from the outside layer round the case developed more pit than inside fruits. This season this relationship held more or less true for the first examination, three days after discharge, but at the second examination, three weeks later, the position was reversed.

“ NO DUNNAGE ” DEMONSTRATION SHIPMENT.

In co-operation with the Cambridge Low Temperature Research Station, a demonstration shipment of apples (nearly fifty thousand cases) on the “no dunnage” system of stowage was carried to London by one of the modern vessels of the Blue Star Line, and proved completely successful in that the fruit, apart from the usual amount of bruising, was in excellent condition when examined after being discharged.

At selected stations throughout the hold electric thermometers were placed inside specially marked cases of apples (two varieties selected from the same orchard, picked and packed at the same time and of the same grade and size) and readings were regularly taken during the voyage. The maximum range of temperatures, after cooling, was approximately 1° F. on either side of the mean, while for four-fifths of the consignment the temperature was uniform to $\pm 0.5^\circ$ F. of the mean.

With the omission of dunnage the close stowage enabled about three thousand extra cases to be carried in the hold.

The efficiency and reliability of the refrigeration plants and equipment, also the improvements in design and construction of the holds of the modern vessels, accentuates the shortcomings of many of the older vessels, to several of which the needed improvements probably could not be effected. As a result of observations during past seasons it is felt that ample evidence to justify a reasonable expenditure on effecting improvements to at least some of the ships in the latter group could be readily obtained by a co-operative effort in securing data regarding the actual distribution of or variation in temperature throughout the holds of the respective vessels when carrying fruit to England.

DR. A. J. M. SMITH'S INVESTIGATIONS.

Arising out of the visit of Dr. A. J. M. Smith to New Zealand and Australia last season, several points of interest in connection with the transport of fruit overseas emerge from the preliminary report presented on this work :—

- (1) In the large hold, stowed without dunnage, the “jacket” system of cooling has proved to give the most uniform range of temperature that has been recorded for a cargo of fruit, and it would appear that further experiment in the transport of fruit in such vessels is unnecessary.
- (2) In some holds prolonged ventilation is necessary during the first two or three days of a voyage in order to guard against excessive accumulation of CO₂.
- (3) The close correlation between the temperature of carriage of pears at 32° F., 34° F., and 37° F., and their condition on arrival has been given further emphasis.
- (4) The need is shown for improvement in the design of indicating instruments, particularly because of the shortcomings of thermometers for use in a tube and of portable CO₂ indicators.