

EFFECT OF TIMBER AND FIBREBOARD CASES ON RIND INJURIES TO LATE VALENCIA ORANGES DURING TRANSPORT BY RAIL

A limiting factor in the successful transport or storage of citrus fruits is the high incidence of green mould (*Penicillium digitatum*). It has been demonstrated by Bates (1933, 1936) that punctures or scratches small enough to rupture an oil gland are sufficient to permit infection. A method for the detection of small injuries was developed by Roistacher, Klotz, and Eakes (1956). They found that immersion of the fruit in low concentrations of 235 triphenyl tetrazolium chloride resulted in injuries appearing as clearly defined red-stained areas which could be easily counted when the fruit was examined through a stereo microscope.

As a result of the development in Australia of the fibreboard container for fruit and vegetable transport, a small trial was carried out in 1956 to determine whether transport in these containers would result in fewer injuries to the fruit, thus reducing their susceptibility to mould infection. The fibreboard container used was an experimental type, since replaced by a 2-piece telescopic type.

Methods and Materials

Fruit for the experiment was obtained from a citrus grower in the Gayndah district and consisted of oranges of the Late Valencia variety taken from the packing-shed after having been subjected to normal harvesting treatments. The treatments used were as follows:

- (1) Control.
- (2) Fruit packed in timber cases.
- (3) Fruit packed in fibreboard cases.

The control fruit consisted of seven replicates each of 30 fruit of uniform size, taken at random from the grading machine, packed in cotton wool and carried carefully to Brisbane by motor vehicle so as to minimize injuries. Treatments (2) and (3) consisted of full cases and cartons of uniformly sized fruit packed in the normal commercial manner for the fresh fruit market. After packing, the cases were taken by road to the railway siding and railed to Brisbane, where each case was sampled. The sample consisted of 30 fruit per case, 20 of which were taken from layers adjacent to the walls of the container and the remaining 10 from interior layers in the containers. Each fruit from each sample was marked with three circles of 1 in. dia. by Indian ink—one circle at the blossom end, one at the stem end, and the third at random on the equator of the fruit. The samples were then separately immersed in a 0.05 per cent. aqueous solution of 2,3,5 triphenyl tetrazolium chloride for 20-24 hr, when they were removed and the total number of injuries per fruit in the three marked circles counted by observation through a stereo microscope.

Results and Discussion

The results are summarized in the following table:—

<i>Average Number of Injuries per Fruit</i>	
<i>Treatment</i>	<i>Mean</i>
Control	24·4
Case	26·5
Carton	24·7
p 1·0%	11·4
p 5·0%	8·3

No significant differences were found to exist between treatments. This is in accord with the results of Roistacher, Klotz, and Eakes (1956), who found that there was little or no increase in the number of stainable wounds during the hauling and the subsequent standing period. In unpublished work by the authors, it has been shown that there is a large increase in injury during picking, brushing and grading, and it appears that infection occurs as a result of these injuries rather than from injuries during transport.

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