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SURFACE COATING AND STORAGE EFFECTS ON
MANDARIN (Citrus unshiu Marc.)
FRUIT QUALITY

A thesis presented in partial fulfilment of the requirements
for the degree of
Master of Applied Science at
Massey University

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April 1996
ABSTRACT

Satsuma mandarin grown in the marginal climate of New Zealand has a niche market in Japan and properly managed this trade has good prospects for expanding. The internal quality of satsuma usually do not reach the minimum requirement of a total soluble solids (TSS) to titratable acid ratio of 10:1 during the harvest season with conventional management, thus lowering the export quantity. Two cultivars of mandarin fruit from Kerikeri, Gisborne and Bay of Plenty were picked on 4-5 dates to record the pattern of quality change and to investigate the effect of storage temperature, storage period and surface coatings on the keeping quality and acceptability of mandarin.

The TSS and colour of fruit remained mostly similar while the titratable acidity showed a downward trend as the harvest season progressed in the three districts. The TSS:acid ratio increased due to the progressive decrease in juice acidity. At no harvest did mandarin fruit reached the desired TSS:acid ratio of 10:1. ‘Silverhill’ had higher a TSS:acid ratio than ‘Miyagawa’ during the harvest season in all districts. Fruit from Gisborne had the highest ratio while Bay of Plenty had the lowest.

The juice TSS remained similar during storage except in late harvested ‘Miyagawa’ fruit it increased after 3 weeks cold storage storage at 6°C plus one week at 20°C. Titratable acidity always decreased as the storage period progressed. Provided fruit of both cultivars is not harvested too early it can be improved to meet Japanese market internal quality standards by about 1 month in cold storage. This results from a 20-30% decline in juice titratable acidity.

Fruit dipped in one of the three coatings carnauba, ‘Citruseal’ (polyethylene) and ‘Citrus Gleam’ (shellac) had similar TSS, titratable acid, TSS:acid ratio and colour during 6 weeks cold storage at 6°C and one week at 20°C. During this period the coated fruit accumulated high levels of acetaldehyde, ethanol and carbon dioxide and low levels of oxygen, especially when coated with carnauba or shellac. The resultant off-flavours made the juice unpalatable within as little as 3 weeks at 6°C. Holding
fruit at 20°C accelerated these undesirable changes. Fruit dipped in shellac had higher levels of off-flavours present compared to sprayed fruit. Increasing the shellac coating by a double dip accentuated its effect on fruit oxygen and carbon dioxide in storage.

Coated fruit consistently had a lower level of weight loss compared to uncoated during cold storage (6°C) and at 20°C. Fruit stored at 60% relative humidity had >5% weight loss which is commercial unacceptable.
ACKNOWLEDGEMENTS

I would like to express my deepest gratitude and sincere thanks to my supervisor Dr G.S. Lawes, senior lecturer in the Plant Science Department of Massey University for his patient guidance, encouragement throughout the course of this study. His advice was most helpful and friendly.

I greatly appreciate the help from C. Yearsley and Sue Jolly for their kind assistance in laboratory work of the experiments and to the staff and student of the Plant Science Department for their valuable assistance in many ways.

I wish to thank Dr Woolley, Dr D.E.J. Wood, A. Currie, M. Currie, P. Fleming, L. Pulupol of Plant Science Department, Mrs M. Hoseason of Works and Services Department and Mrs R. Neill of Marketing Department for participating in the sensory evaluation. I am gratefully indebted to Ms C.B.M. Groenendijk of Food Technology for her expert advice on the procedure of sensory evaluation.

I would also like to thank the following growers for supplying experimental fruit: R. Davies, J. Willets from Kerikeri, D. Smith, R. Jefferson from Bay of Plenty and C. Lewis from Gisborne.

I gratefully acknowledge the New Zealand Ministry of Foreign affairs and Trade for awarding me the scholarship and the Fiji Government for approving my study leave to undertake this study.

To my family, wife Pravin and children Shalesma and Shalvin for their love, moral support, encouragement and understanding during the course of my study.

And finally to almighty God through whose blessing I was able to complete my study.
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