Abstract

Chilling injury (CI) is a major factor influencing the postharvest quality of citrus fruits stored at low temperatures. This thesis reports on the effects of various postharvest treatments such as ethylene removal, hot water dipping, phorone, calcium application, shrink wrapping, growth regulators, waxing and fungicides of the development of CI in lime, grapefruit, orange and mandarin. The relationships between CI in the fruits, and the changes in putrescine, squalene, and α-farnesene, compounds that have recently been implicated in the development of low temperature injury in certain plants and plant products, were also investigated.

Lime was found to be the most chilling sensitive, followed by grapefruit, mandarin and orange. Ethylene in trace amounts of less than 1 ppm promoted CI of citrus fruits.

Chilling injury in citrus fruits was ameliorated by dipping in hot water at 53°C for 2 min prior to storage. The effectiveness of hot water treatment was further enhanced by wrapping fruit individually in shrink film following dipping, or applied in combination with thiabendazole or benomyl.

Phorone vapour was highly effective in suppressing CI development in citrus fruits. Calcium chloride reduced CI of orange and grapefruit, but not mandarin and lime fruit. While 2,4-dichlorophenoxyacetic acid (2,-4 D), gibberellic acid (GA_3) and wax coating did not have a consistent effect on the CI of citrus fruits, the treatments inhibited respiration and the loss of green colour of lime.

The patterns of change of squalene, α-farnesene and putrescine in citrus fruits in response to the various postharvest treatments during low temperature storage, indicate that squalene could be a CI inhibitor, while α-farnesene and putrescine could be CI promoters. The results of this investigation seem to suggest that the mechanisms responsible for CI of chilling-sensitive and non chilling-sensitive produce could be similar, and not as distinctly different as traditionally believed.