

ABSTRACT

ALTERNATIVE TEMPERATURE MANAGEMENT TECHNIQUES IN ALLEVIATING CHILLING INJURY OF THE JULIE MANGO (*MANGIFERA INDICA* L.)

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Two alternative temperature management techniques (step-wise temperature conditioning and cyclical cooling and warming) were evaluated to determine their effects in ameliorating chilling injury in mature green Julie mangoes.

Three cyclical cooling and warming treatments were evaluated including storage of fruits in 12 hour cycles at 5°C followed by 12 hours at 16°C, storage for 18 hours at 5°C followed by rewarming at 16°C and storage for 21 hours at 5°C followed by rewarming at 16°C. In addition, two step-wise temperature conditioning regimes were also assessed: conditioning fruits in increments of 3°C to a final holding temperature of 5°C (TC1) and conditioning in 5°C increments to a final holding temperature of 5°C. Fruits were also stored at 28°C (ambient temperature and relative humidity), 5°C and 16°C at 90-95% (relative humidity).

Based on the physico-chemical, physiological and sensory evaluations measured during storage and ripening, cyclical cooling and warming and step-wise conditioning delayed the onset of chilling injury when compared to storage at a chilling temperature of 5°C at 90-95% (r.h.).

Anthraxnose infection proved to be the major constraint to ripening during refrigerated

ripening as well as ambient ripening.

When fruits were stored and ripened at 16°C, no chilling injury was manifested either during storage or during ambient ripening. Beyond 14 days however, fruits became ripened in storage with peel colour superior to ambient ripened fruits.

The study also indicated that sustained respiration and cessation of ethylene production does occur during chilling and these may be good indices that can demarcate reversible from irreversible chilling injury. Measurement of electrolyte leakage was also substantially higher once visible chilling injury was observed but this was not a good index of incipient chilling damage. In addition, the study indicates some distinct role for lipid peroxidation (measured as ethane evolutions during chilling injury). The detection of ethane was shown in all fruits that became chill injured but was noticeably absent from fruits stored at non-chilling temperatures of 28°C and 16°C (90-95%) relative humidity.

The respiratory behaviour and ethylene evolution patterns confirmed that at non-chilling temperatures Julie mangoes are climacteric fruits with the climacteric peak coinciding with other parameters of fruit ripening.

Keywords: Ayoub Mohammed; chilling injury; temperature management; cyclical cooling and warming; temperature conditioning and mangoes.