Weerahewa, H.L.D(2002). A study of internal browning of two cultivars of pineapple with special reference to heat shock treatment as a control measure, Ph.D Thesis, University of Peradeniya, Peradeniya

ABSTRACT

Internal Browning, commonly encountered in pineapple during prolonged cold storage, is a major obstacle to long distance export of fruit under sea freight. In the present study, the Internal browning of fruit of two pineapple cultivars was investigated with the view of establishing suitable postharvest physical treatments that induce tolerance to disorder.

Three-week storage trials were conducted simulating the sea freight export conditions at 10^0C and 85% RH. In *Mauritius*, the Internal Browning symptoms appeared within a week of storage at 10^0C initially in the marginal core tissue which subsequently spread to the surrounding flesh. But in *Kew*, the symptoms commenced only after 2-3 weeks of storage as isolated patches in the tissue surrounding the core.There was a clear difference in the time of incidence and pattern of symptom development between the two cultivars. The cv.*Mauritius* showed comparatively faster ripening and respiratory rates and greater accumulation of acids during cold storage, than the cv.*Kew*.In both cultivars the tissues undergoing browning displayed greater PPO, peroxidase activity and electrolyte leakage. Harvesting fruit at early at 100% green stage reduced incidence and severity of Internal Browning in both cultivars.

Several postharvest treatments were tried out to induce cold tolerance of fruit. Heat Shock treatment in the form of hot water dip immediately after harvest was found to induce fruit tolerance to internal browning in both cultivars and best temperature-time combination was 38^0C for 60 minitues.The treated fruit developed 75% and 50% lesser browning in the flesh and the core region respectively. The overall reduction of internal browning was about 55-60%.The results obtained from different temperature time combinations suggested that internal tissue temperature of 36-38^0C is a prerequisite for induction of fruit tolerance. Although the heat treatment significantly reduced internal browning, it slowed down fruit ripening and associated changes and increased water loss compared to untreated controls. However, provision of modified atmosphere conditions to heat treated fruit during cold storage enhanced cold tolerance by another 10% resulted in lesser water loss, hence better appearance. The mechanism of induction of fruit tolerance following heat treatment appeared to be through production of heat shock proteins. It is possible that the cellular repair mechanisms following cold injury may be taking place more rapidly in treated fruit.

A cold shock at 4^0C for 60 min, preceded or followed by heat treatment, also effectively reduced the internal browning of cv.*Mauritius*. Here the treated fruit remained firmer and showed lesser cell damage than the fruit provided with heat shock treatment alone or heat shock followed by MA. Intermittent warming of fruit during the cold storage regime also reduced internal browning cv.*Mauritius*.