

Title Heat treatment induces tolerance in pineapple (*Ananas comosus*) to internal browning during cold storage

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Abstract

Internal browning is a physiological disorder in pineapple that develops during prolonged exposure of harvested fruits to low temperature (8-15°C). This is a major obstacle to long distance sea transport of fruits. The symptoms characteristic to the disorder are the formation of translucent water-soaked spots at the base of fruitlets and the core-tissue interface initially and later during prolonged storage these areas develop into brown patches. The process that is leading to chilling injury can be separated into primary events and secondary events, the primary events being reversible a least for a period of time but the secondary events are eventually irreversible. The cultivar Mauritius is more susceptible to internal browning than Kew. There was a clear difference in the time of incidence and the pattern of symptom development between the two cultivars. The cultivar Mauritius exhibits faster ripening and respiration rates, greater accumulation of acids during cold storage than the cultivar Kew. A brief heat treatment in the form of a hot water dip induced tolerance in pineapple cultivars Mauritius and Kew to cold injury and in turn reduced internal browning during prolonged low temperature storage. Several temperature-time combinations were effective but the best was 38°C for 60 minutes. The fruits treated at 38°C for 60 minutes developed 70% and 45% lesser browning in the flesh and core region respectively than the untreated controls. The results also indicated that an internal tissue temperature of 36-38°C is a prerequisite for induction of fruit tolerance. Heat treatment also slowed down fruit ripening and increased water loss. Wrapping the heat-treated fruits in polythene covers prior to cold storage reduced water loss rendering the fruits a better appearance. A brief exposure of fruits to 4°C prior to or after heat treatment at 38°C for 60 minutes further increased cold tolerance by a small margin. The induction of fruit tolerance appeared to be mediated through production of heat-shock proteins.