

Title Metabolomic investigation of fruit flesh gelling of papaya fruit (*Carica papaya* L. 'Golden') by nuclear magnetic resonance and principle component analysis

Author J. Schripsema, M.D. Vianna, P.A.B. Rodrigues, J.G. de Oliveira and R.W.A. Franco

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Abstract

Fruit flesh gelling in papaya fruits is a typical post-harvest disorder. The aspect of the fruit flesh changes to more rigid and translucent, and also turns darker. It occurs close to the seeds and therefore the external appearance of the fruit is not changed. No information about this disorder is available in the literature. For the metabolomic investigation of the disorder, the juice of affected and non-affected fruits was compared by Nuclear Magnetic Resonance (NMR). Also a comparison was made with fruits which initiated the degradation process. Analysis of the data by Principle Component Analysis (PCA) revealed that all three types of fruits displayed a specific profile. Healthy fruits were characterized by the presence of malic acid and the absence of ethanol. Both fruits with fruit flesh gelling and fruits which started to degrade, contained no detectable levels of malic acid and variable levels of ethanol. Furthermore, increased levels of lactic acid, acetic acid and succinic acid were encountered. In comparison with fruit which initiated degradation, the fruits with fruit flesh gelling showed higher levels of especially asparagine. These data point to an early fermentative process going on in the fruits with fruit flesh gelling, similar with degradation. However, the high asparagine levels indicate that nitrogen availability plays a role.