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Fresh-cut pear quality during storage: a NMR study of water transverse relaxation time

Fundo, Joana¹; Carvalho, Alexandra²; Feio, Gabriel²; Silva, Cristina L. M.¹; Quintas, Mafalda A. C.^{1,3}

¹CBQF – Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Centro Regional do Porto da Universidade Católica Portuguesa, Porto;

²CENIMAT-13N, Departamento de Ciência dos Materiais, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Caparica, Portugal;

³IBB, Centre of Biological Engineering, Universidade do Minho, Braga, Portugal

E-mail: jfundo@porto.ucp.pt

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Abstract

Fresh-cut fruits have become an important food market segment due to increasing demand for fresh, healthy and convenient foods. However, processing fruits promotes a decrease in its stability with a faster physiological deterioration, biochemical changes and microbial degradation. Recently, food stability is strongly attributed to molecular dynamics and “water availability”. Understanding cooperatively changes in location and mobility of water is particularly important, considering that water dynamics profoundly influences physico-chemical and microbiological quality of foods.

The aim of this study was to use nuclear magnetic resonance spectroscopy (NMR) as a tool to evaluate storage fresh-cut fruit quality. Recently, NMR has evolved to become a powerful methodology to probe the molecular dynamics of food constituents, which in turns is a fundamental parameter to determine the dynamic properties of food components and contributes to food degradation reactions comprehension.

In this work fresh-cut pear transverse relaxation time (T_2) was measured for a period of 7 days of storage at 5 °C. The relationship between the obtained values, microstructure and quality parameters was investigated. In general, results show the existence of one class of water fluidity in the system, the one present in cells after processing. T_2 , a measure of this fluidity, is affected by the processing and storage time. Also, it is possible to find a relationships between T_2 and the quality parameters: total colour difference (TCD), firmness and a_w . T_2 increases with a_w , while it decreases with TCD and firmness.

These results highlight the usefulness of NMR methodology application in food science.

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