

Title An NMR study on internal browning in pears
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Abstract

Internal browning in pears (*Pyrus communis* L. cv. Blanquilla) has been studied by NMR and MRI in order to develop a non-destructive procedure for on-line disorder identification. For NMR relaxometry, disordered tissue shows higher transverse relaxation rates compared to sound tissue, especially at higher magnetic field strength and for long pulse spacing. Membrane alteration and therefore tissue disintegration, as well as water evaporation, appear to be the main causes of this response. Correlation between relaxation times and diffusion showed that the proton pools in disordered tissue are grouped into a smaller number of populations compared to sound tissue, also highlighting cell compartmentation in disordered tissue. At a macroscopic level, fast low angle shot MR images, effective transverse relaxation-weighted (TR 11 ms and TE 3.7 ms) and proton density-weighted (TR 7.6 ms and TE 2.5 ms), were acquired for pears at a rate of 54 mm/s. Images have been discriminated for internal breakdown according to histogram characteristics. Up to 94 and 96% of pears, respectively, were correctly classified in the former and the latter type of images. In this study a minimum value of 12% of tissue affected by breakdown was always clearly identified.