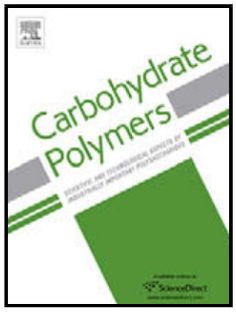

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Structural, mechanical and enzymatic study of pectin and cellulose during mango ripening

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Highlights

- An integrate study of mango ripening was carried out by AFM, XRD and CLSM
- Changes on cell wall stiffness during mango ripening were revealed by AFM
- Correlation between Young´s modulus and RPI has a linear fit
- Enzymatic degradation of the mango pectins were elucidated at nanoscale level
- X-ray diffraction and CLSM provided data to use cellulose from mango wastes

Abstract

Mango is an important crop worldwide, with a postharvest loss that is huge due to its climacteric behaviour. This study evaluated the softening of Tommy Atkins mangos during the ripening process. Ripening index (RPI) shown a decrease from 9.18±0.14 to 4.75±0.47. The enzymatic activity agreed with physicochemical parameters and with the structural and mechanical changes. Three pectin fractions were isolated from the mango cell wall: water soluble (WSP), chelator soluble (CSP) and diluted alkali soluble (DASP) pectin. The Young´s modulus (E) of the primary cell wall was evaluated, it decreased from 1.69±1.02 to 0.39±0.16 MPa, which could be attributed to the softening of the fruit. A linear fit correlation between E and RPI was found. X-ray and confocal laser scanning microscopy analysis showed the changes occurred in the mango cell wall structure during maturation. Novelties of current study can be helpful in the use of mango wastes to obtain cellulose.

Keywords: Mango ripening, pectin fractions, stiffness, cell wall, nanoindentation