

Title Non-destructive determination of the optimum eating ripeness of pears and their texture measurements using acoustical vibration techniques

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Abstract

We investigated the time-course changes in the elasticity index (EI) and texture index (TI) of pears (*Pyrus communis* L. cv. La France) during the postharvest period. EI was determined using a formula $EI = f_2^2 m^{2/3}$, where f_2 is the pear sample's second resonance frequency and m is the sample mass. A non-destructive vibrational method using a laser Doppler vibrometer (LDV) was used to measure the pears' second resonance frequency (f_2). Changes in the EI of the pears showed bi-phasic decay. Along with sensory testing, we determined the period of optimum eating ripeness of the pears in terms of their EI to be 8.1×10^4 – $1.5 \times 10^5 \text{ kg}^{2/3} \text{ Hz}^2$. Pre-determined EI of pears enables consumers to predict the time range of optimum eating ripeness. An improved device for texture measurement was used for measuring time-course changes in the texture of pears. The texture was quantified with TI, which was determined for 18 frequency bands through integration of squared amplitudes of texture signals multiplied using a factor of a frequency band. The TI declined gradually over a wide frequency range as the pear samples ripened.