

Title Firmness Changes of Pear Fruit before and after Harvest with the Acoustic Impulse Response Technique

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### Abstract

The non-destructive acoustic impulse response method was evaluated for monitoring firmness changes of Conference and Doyenné pears on the tree. The correlation between firmness and meteorological factors was investigated during two successive years. In both years, the firmness showed a sudden reduction between three weeks and one week before harvest to about  $23 \text{ kHz}^2 \text{ g}^{2/3}$  for Conference and on average  $31.5 \text{ kHz}^2 \text{ g}^{2/3}$  for Doyenné pears. Afterwards the firmness decrease could be described by a first order model, which allows to estimate the optimum harvest date, corresponding to a firmness of about  $20\text{--}21 \text{ kHz}^2 \text{ g}^{2/3}$  for Conference and  $26\text{--}27 \text{ kHz}^2 \text{ g}^{2/3}$  for Doyenné. Especially for Doyenné pears the correlation between the non-destructive firmness and the destructive penetrometer firmness was high (correlation coefficient  $\rho = 0.82$ ). Also the soluble solids contents was reasonably well (negatively) correlated with the firmness measures ( $\rho = -0.60$  to  $-0.79$ ). Pears that were harvested too early never reached an acceptable quality for consumption. Especially Conference pears stored at a low relative humidity developed weak necks. On the other hand, when pears were picked late, the rates of firmness degradation and weight loss increased. None of the measured meteorological parameters (temperature and rainfall) consistently provided a significant improvement of the predictive firmness model.