946/E1

Non-destructive analysis of monitoring the ripeness in mature lime fruit by pulse excitation technique

Bashini K. Mahaarachchi and Ramal V. Coorey*

Department of Physics, University of Colombo, Colombo 03, Sri Lanka

This study describes the design and construction of a mechanical device providing a non-destructive measurement of propagation times of pulsesthrough lime fruits, which monitor the states of ripeness of the fruits.The design has two rigid vertically mounted Perspex plates where a lime fruit was placed on the soft bed in between the two plates. When a pulse-excitation is given to one plate in contact with the fruit, the excitation propagates through the fruit, and the response is detected by a piezo sensor attached to the other plate. Both signals were acquired by a PC for time measurements. Measurements were taken on fruits labeled as A (initial mass 29.41 g), B (initial mass 53.62 g) and C (initial mass 60.08 g) for 8 consecutive days.Average values of stiffness index $S = \rho r^2 / \Delta t^2$ (where ρ - densityof fruit, Δt - the propagation time of a pulse, r - average radius of fruit) were computed. The plot of S (in Pa) *vs*. storage time (in days) (Fig. 1) showed a negative slope in relation to the ripening process of each fruit, confirming S could be used as an indirect parameter to monitor the states of ripeness of fruits. Fig. 1 further shows that fruits having a lower mass are ripening more rapidly than the ones with a higher mass. Investigations are being carried out to confirm this observation.

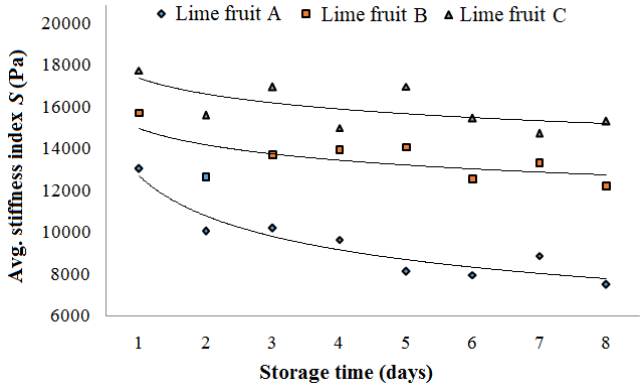

Fig.1: The stiffness index S (in Pa) *vs*. storage time (in days) of lime fruits

rvcoorey@gmail.com Tel: +94 719279436