I. ABSTRACT

The Visco-elastic, Creep Behaviour of the St. Julian Mango (Manifera Indica L, Var. Julie) During Ripening.

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An investigation into the visco-elastic behaviour of the St. Julian mango during ripening and senescence was conducted under ambient conditions (avg. temperature; 28.2°C: rh. 75-85%). Such behaviour was related to ripening. The research sought to develop relationships between the visco-elastic behaviour in fruits and that of maturity, eating quality and shelf life.

Quasi-static, constant-load tests on intact mango samples were conducted over an eight-day period. Measurements on certain physiological changes such as pH, percentage soluble solids, colour of the pulp were performed on the individual samples. Daily measurements of the rate of respiration on the test samples were also conducted.

The response of the St. Julian mango to creep loading was visco-elastic and was best represented by the Burgers model.

Correlation was obtained between the mechanical parameters in the model and that of certain physiological changes. The best correlation was observed ($p<0.05$) for that of the instantaneous shear constant (G_1) and the viscous constant (η_1) against the parameters of pH, percentage solubility solids, colour, maturity and shelf life. By the step-wise regression analysis technique, two equations were developed and accepted based on the high R^2 value and the F statistic.

a) $G_1 = 3472292 - 148417 \pm 41384 TSS (p \leq 0.001) - 187596 \pm 5496 Mat (p < 0.005)$

b) $\eta_1 = 9108070 - 40067 \pm 88590 TSS (p < 0.005) - 387869 \pm 181948 Mat (p = 0.0036)$

These two equations could be used to develop a field device that would be able to measure maturity or eating quality in fruit and indirectly, their shelf life.

Keywords: Robert Anderson Birch; Visco-elasicity; Creep; Burgers model; ripening; maturity, eating quality and shelf life.