

**Title** A comparison of cell wall degrading enzymes, degree of methyl-esterification at different stages of maturity in 'Kaek Dum' and 'Red Maradol' papaya

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### **Abstract**

A comparative study on the cell wall degrading enzymes [i.e. Polygalacturonase (PG), Pectin-methylesterase (PME), and b-galactosidase ( $\beta$ -gal)] and degree of methyl esterification (DME) was conducted in papaya (*Carica papaya*) cultivars "Kaek Dum" and "Red Maradol" at different stages of maturity (i.e. green, ripe, and over-ripe). Papaya fruits of these cultivars at color-break were allowed to ripen in uniform storage conditions and regularly monitored for maturity using degree of yellowing as indicator. Green (<10% yellow), ripe (50-75% yellow), and over-ripe (80-100% yellow) fruits were sampled for texture, cell wall degrading enzyme assay, and DME. Firmness progressively decreased with maturity in both cultivars. Pulp softening was observed to set in earlier in "Kaek Dum" relative to "Red Maradol". Softening was coupled with increased activities of the cell wall degrading enzymes, specifically PG and  $\beta$ -gal. We note that these enzymes have markedly higher activities in "Kaek Dum" which produced a softer pulp at the ripe and over-ripe stages. PME activity also registered a modest increase with ripening in both cultivars - indicating that the role of this enzyme in pulp softening could not be entirely discounted. Upon DME analysis using different solvents (i.e. water, EDTA and  $\text{Na}_2\text{CO}_3$ ), our results showed that the water-soluble fraction was indistinguishably low in both cultivars at the ripe and over-ripe stages, while EDTA and  $\text{Na}_2\text{CO}_3$ -soluble fractions were not detected. We note decrease in DME value with maturity and softness of the fruit which merit further investigation.

Our results suggest that PG and  $\beta$ -gal are the major cell wall degrading enzymes that determine the texture profiles of the papaya cultivars "Kaek Dum" and "Red Maradol". As such, the apparent higher activity of these enzymes in ripe and over-ripe "Kaek Dum" papaya rationalizes its softer texture profile compared to the "Red Maradol" cultivar.