

Title Development of Thai Mango Wholesale Packaging
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Abstract

Exporting fresh mango by means of typical wholesale packaging still suffered mechanical bruising. Knowledge of mechanical properties of Thai mango relating to packaging is unavailable. This affects design and commercial packaging practice. The purpose of this research was then to a) determine mechanical properties of mango of the popular Nam Dokmai cultivar and b) comparatively conduct performance test of the typical exporting and the developed wholesale packaging of the mango. Methodology comprised i) determination of mechanical properties of intact mango fruit under plunger compression by means of the Universal Testing Machine (INSTRON 5569); ii) vibration simulation with three kinds of wholesale packagings (typical export package; foam net cushioned mango, piled up 2, 3, 4 layers in corrugated box; mango with shredded paper cushioning pad and piled up 2, 3, 4 layers in corrugated box. Vibration test was carried out at the frequency of 4 Hz for 1 hour according to the ASTM standard. Results showed that maturity stage significantly affected the mechanical strength of mango at the significance level of 5%. For the fully mature mango point of loading application significantly affected mango mechanical strength. Green mature mango was about 10 times stronger than the ripe mango regarding rupture force and the slope of the force-deformation graph. The top edge and the tail of green mango fruit were the strongest ($S = 16 \text{ N/mm}$) and the weakest ($S = 9.6 \text{ N/mm}$) points. Packaging conditions of cushioning type and number of fruit stacking layer significantly affected fruit bruising. The mango packaging of foam net with four fruit stacking layer was mostly proper because it could save more than 50% of bruised fruit and more than 90% of packaging cost, and carry 50% more of mango per package than the present export package.