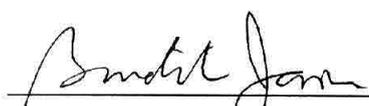


Supakit Sayasoonthorn 2007: Test Method to Evaluate Bruising During Impacts to Apples and Compare Cushioning Materials. Doctor of Philosophy (Postharvest Technology), Major Field: Postharvest Technology, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Bundit Jarimopas, D.Sc. 112 pages.

This research was to develop the appropriate cushioning materials wrapping fresh apple instead of Foam Net for distribution and selling. The study including a) development of ballistic pendulum impact testing device with 2 sizes of imported Fuji apple from China (count no. 80 and 100) wrapped with environmentally non-destructive cushioning material, b) impact test with ballistic pendulum impact testing device such as Banana string, Water Hyacinth, Single Face Corrugated Paper, New and Used Double Wall corrugated paper and the popular cushioning material but not easily degradable that was Foam Net. Impact test were divided into two section i.e. impact testing below and beyond threshold, c) selection of potential cushioning material to protect apple from impacting results showed that impact testing device including 1) 3.8 rectangular steel mass, 2) base, 3) incidence angle distance plate 4) laser diode 5) 0.45 m. long rope and 6) frame can be measure both Impact and Absorbed energy, can be adjust energy to 0.05 Joule, for beyond threshold impact testing bruise volume ( $V_B$ ) of bare apple very well varies proportionally as impact energy ( $E_i$ ) ( $R^2 = 0.98$ ), for below threshold impact testing probability of bruise varies proportionally as energy of bare apple and apple wrapped by corrugated paper ( $R^2 = 0.94$ ). The Energy at bruising beginning (Threshold Energy, Probability = 1) of bare apple, foam net, single face corrugated paper with liner inside, single face corrugated paper with liner outside, new double wall corrugated paper and used double wall corrugated paper giving 0.105, 0.475, 0.725, 0.75, 0.7, 0.7 joule for both sizes of apple. The best cushioning material was achieved with the single face corrugated board with flutes on the outside that give highest threshold energy and highest absorbed energy at 0.11 joule as a results of quasi - static compression. The bruise resistance, identified by slope of the  $E_i$ - $V_B$  graph, was 1595.3  $\text{mm}^3/\text{joule}$  and 1877.5  $\text{mm}^3/\text{joule}$  for apple size 100 and 80 respectively. Banana string and Water Hyacinth that weaving as a net can not be protect an apple because of the weaving characteristic made a knot bring about the plunger impacting and easily to bruise and several bruise from one time impacting.

  
Student's signature

  
Thesis Advisor's signature

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