

Krawee Treemnuak 2011: Development of Mechanical Sizer for Rose Apple Fruit and Non-Destructive Techniques for Evaluation of Thai Young Coconut Maturity. Doctor of Engineering (Agricultural Engineering), Major Field: Agricultural Engineering, Department of Agricultural Engineering. Thesis Advisor: Assistant Professor Siwalak Pathaveerat, Ph.D. 155 pages.

The objective of this thesis are development and testing of the rose apple sizing machine prototype and relational study of physical properties, acoustic response and light properties in non-destructive techniques in evaluation of Thai young coconut maturity.

The velocity and inclination angle of sizing belt; feeding belt velocity and the fruit orientation significantly affects the sizing performance at  $p < 0.05$ . The optimum conditions for continuous mechanical sizing depended on the variety. The optimum sizing performance was characterised by contamination ratio or error of 10.8-16.5 %, the throughput capacity of 149.7-195.1 kg hr<sup>-1</sup> with no significantly noticeable damage to the sized fruits. Manual sizing of the exported rose apple had error ratio of 27.9%.

The specific gravity, diameter and height of young coconut fruit were significantly different between immature stage and the group of mature and over-mature stage ( $p < 0.05$ ). The acoustic response was significantly different in each maturity stage. Absorbance spectra in a range of green and yellow on the ridge close to the stem of young coconut could be potentially used in maturity evaluation. The classification functions calculated from non-destructive variables can identify maturity stage of young coconut. The model which analyzed by Discriminant analysis in selected samples gave 88.7% of corrected classification of over-mature stage from a group and 89.2% of immature stage and mature stage classifying in test set samples of young coconut.

---

Student's signature

---

Thesis Advisor's signature