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RESEARCH ARTICLE

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Design and evaluation of electronic weight grader for sapota [*Manilkara achras* (Mill).Fosberg] grading

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ABSTRACT

The investigation was carried out to develop weight grader for sapota [*Manilkara achras* (Mill).Fosberg]. Weight grader fitted with singulation unit is found to be more precise than any other. Since singulation unit will feed the fruits individually to electronic balance, single fruit grading can be achieved. The singulation unit fed the fruits to the load cell individually, where in fruits were weighed and carried to the grading unit, which actually consists two gates which were operated electronically using the signal generated by the load cell depending on fruit weight.The overall separation efficiency of the grader was found to be 93.8%.Separation fficiency of W3 grade (>120g) was found to be best .The speed was optimized for 20 rpm,which gives best overall efficiency.The cost of grading for cricket ball was found to be low *i.e.* Rs.0.06 / kg in comparison with cost of manual grading (Rs 0.4/kg).

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Key words : Electronic Weight grader, Singulation unit, Overall Separation efficiency

INTRODUCTION

Sapota [*Manilkara achras* (Mill).Fosberg] is a native of tropical America, having originated in Mexico of Central America. It is a delicious fruit, also known as chikoo, zapota etc.Sapota belongs to the family of Sapotaceae. Sapota is a good source of digestible sugar, protein, fat, fibre, calcium, phosphorus, iron and other minerals. India is the largest producer of sapota with 30 to 40 thousand hectares. The average yield per tree is 2500 to 3500 fruits weighing around 150 to 300g under Bangalore condition.Vyas and Shah (2004) have developed on farm sapota grader. The grader was capable of fruit grading to 3 sizes. The overall grading efficiency was found maximum at 14rpm, which was about 90%. Advantages of mechanical grading are Systematic grading can be achieved, a continuous mechanical fruit grader can be integrated with any other processing operations like fruit packaging, peeling etc. Saves time and energy utilization to process the individual produce and reduces produce handling time and thus reduces post harvest losses. An objective of the work is to develop and evaluate weight grader for sapota.

MATERIALS AND METHODS

A mature sapota (Cricket ball -variety) was purchased from market. Sapota fruits were separated manually by weighing into three groups according to their weight. Fruits were choosen from each group for the determination of physical parameters using procedures suggested by Mohensin (1996) has been followed.Size was determined by Digital vernier calipers, to find major, minor and intermediate diameter of sapota fruit. Shape was evaluated by following the chart given by Mohensin (1996).The grader is evaluated at 4 different speeds *i.e.* 10,15,20,25 rpm and separation efficiency was calculated by the formula (Singh, 1982).

$$E_s = \frac{W_t - W_u - W_o}{W_t} \text{ where}$$

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