

Research Paper :

## Performance evaluation of sapota fruit grader

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### ABSTRACT

The experiments were conducted to study the performance of sapota fruit grader. The effect of three machine parameters viz., roller speed (111 to 334 rpm), roller inclination (0 to 6°) and gap between the rollers (35 to 67 mm) on capacity, efficiency and performance of fruit grader was studied. The optimum capacity at maximum efficiency (89.48%) found was 1440 kg/hr. The performance index of 13.42 was seen for best operation of the machine. The ratio of cost for manual to mechanical grading was 20.8:1

**Key words :** Fruits, Sapota, Grader, Performance, Efficiency

Sapota (*Manilkara archras* (Mill) Forsberg) is an important fruit crop in India. It is mainly consumed as table purpose fruit. In India area under this crop is estimated to be 64,400 ha with annual production of 8,03,000 tonnes. The average productivity in India is 12.46 t/ha. In Maharashtra, the area under this crop is nearly 14,897 ha with a production of about 1,57,430 tonnes and average productivity of 10.57 t/ha (Singhal, 1999). The sapota grading is an important operation for quality market price trading and commercial purpose. Grading of sapota fruits is done manually either by hand picking or through sieves. Both methods are time and labour consuming. The efficient grading operation on the basis of physical dimensions of the sapota can be made with the help of mechanical sapota grader. Different types of grader have been developed for different fruits and vegetables such as mechanical grader, electronic size and grader, divergent belts, perforated belts, divergent rollers, weight cups etc. Roller grading is fast, accurate and causes little damage to the fruits as compared to other grading machines. The continuous rotation of rollers gives an opportunity to individual fruits to register its maximum dimensions with the spacing between the rollers. Keeping this in view a divergent roller type sapota fruit grader was developed.

### METHODOLOGY

A divergent roller type sapota fruit grader was designed and developed in the department of Agricultural Process Engineering M.P.K.V., Rahuri. The main components of the grader are grading unit, feeding unit, collection unit and power transmission unit (Plate 1).

Grading unit consists of main frame, grading rollers and guiding channels. The main frame of the grading unit was fabricated in rectangular shape with an overall dimension of 1220 mm x 1000 mm x 560 mm on which all the accessories are mounted. The frame is made up of 30 mm MS angles. Mild Steel pipe (OD = 30 mm and ID = 26 mm) was used for grading rollers. The overall length of grading rollers was kept 1400 mm. The guiding channels are made of 20 gauge GI sheet. The overall dimensions of guiding channels are 1160 mm x 90 mm. The feeding hopper is fabricated trapezoidal in shape. The feeding



Plate 1 : Grading machine