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ON-FARM GRADING OF FRUITS FOR VALUE ADDITION

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Introduction

After harvest, grading is required to fetch prices for the produce. Grading of fruit is not a common practice in our country. With increasing quality consciousness among consumers, grading is becoming an important unit operation. If the fruits are graded according to their size, weight, colour and maturity, both the producer and consumer are benefited. Fruit grading is also an important step in processing and marketing of fruits. Graded fruits are more attractive and acceptable by the consumers. Grading improves the quality of the fruit and also fetches good prices. The practice of systematic grading on scientific grade standards is not still followed. The manual grading into two or three grades based on size of fruits is commonly adopted which involves much of the labour costs. To overcome the problems of manual grading a more efficient on-farm grading system is a need of hour, In view of this on farm fruit grading machines viz., Sapota fruit grader and Mango fruit grader have been developed and tested in the Department of Agricultural Process Engineering, Mahatma Phule Krishi Vidyapeeth, Rahuri.

Sapota Fruit Grader

A Prototype machine is developed. This grader is based on the divergent roller principle. The roller diverges from feed end to the discharge end. The fruits are carried out on and between the rollers. The gap between the rollers increases towards the discharge end. Due to which the smaller fruits drop at/near the feed end, the medium fruit drop intermediate and the larger fruit drop at/near the discharge end. The machine consists of grading, feeding, collection and power transmission units. The overall dimensions of the machine are 1220 mm 1000 mm 1195 mm. The roller diameter and the length are 30 mm and 1400 mm, respectively. The feeding hopper is designed trapezoidal in shape. The collection unit provided on both the sides of the machine for collecting the fruits. The grading pattern of sapota fruit is given in Table 1. The fruits are graded into three grades. The roller speed of 224 rpm, roller inclination of 4.5° and roller gap of 38 to 64 mm gave best performance of grading.

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The optimum grading capacity is 1440 kg/hr with 90% grading efficiency. The cost of machine is Rs. 16250/- and the cost of grading is Rs. 9.60 per tonne.

Table 1. Grading pattern of sapota fruits

Grade	Size (mm)	Sphericity (%)	Unit Weight (g)
Grade I	60.3	94	104.4
Grade II	51.1	95	70.2
Grade III	43.2	96	44.6

Mango Fruit Grader

A lowcost prototype mango grader based on conveyor belt principle is developed. The conveyor belt is a main grading part of the machine convey the material as it travelsfrom feed end to discharge end. The fruits are carried out on and between conveyor belt and idler. Since the gap between conveyor belt and idler increases towards discharge end, the smaller fruits will drop at the beginning of the travel and larger fruits will be carried further upto suitable clearance between belt and idler. The grading unit consists of main frame (1500 mm 610 mm 440 mm), conveyor belt with roller frame 91300 mm), idler and flap/guide. The collection unit (platform) is portioned into three compartments at a distance of 320 mm, 480 mm and 360 mm for small, medium and large sized fruits, respectively. The conveyor belt is driven by 1 hp, single-phase elector motor. The machine is operated at a speed of 45 rpm for its better performance. The mango fruits are graded into three grades based on their average size and weight. The grading pattern is given in Table 2. The optimum capacity of the machine is 740 kg/hr with a grading efficiency of 77%. The cost of the machine is Rs.15430/ - and the cost of grading is Rs. 21 per tonne.

Table 2. Grading pattern of mango fruits

Grade	Size (mm)	Sphericity (%)	Unit Weight (g)
Grade I	85.9	90	300.0
Grade II	76.7	91	216.4
Grade III	62.0	89	125.0

Conclusion

The simple and high capacity on-farm grading systems (fruit graders) developed is suitable for efficient grading of sapota and mango fruits. This will help for value addition and fetching higher market prices for producer and processor.