

Design and Development of Custard Apple De-Seeding Machine

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Abstract: To designed and developed semi-automatic machine to extract the seeds from the flakes. The scope in custard apple processing is deseeding of pulp and pulp- flakes extraction. Hence there is need of effective machine which can separate pulp and seed from custard apple. The research was conducted to evaluate the performance of custard apple pulp-flakes extractor. The machine consists of constructional parts such as rotating inner cage, outer frame, inner cage mounted on shaft, outer perforated casing, housing with seeds/pulp flakes outlet, seed outlet, pulp-flakes outlet, A.C. induction motor, frame on which all the parts assembled. The effect of rotation of cage and pulp removal from the cage, working capacity and seed separation was studied.

Keywords: Custard apple, Cage rotation, pulp, pulp extraction

I. Introduction

Custard apple is used in human diet for ages due to its nutritional and medicinal values. The pulp is used for the preparation of ice-cream. Custard apple is rich in protein, carbohydrates. Custard apple is mostly grown fruit in Maharashtra, Rajasthan state etc.

The main problem in custard apple processing is to separate the seed from the pulp. Presently, seeds from the pulp are separated by manually which is complicated and time taking job. The requirement of custard apple for extraction of seed and pulp hence there is a requirement of such effective machine which can separate seed and pulp. Therefore, the seed extraction machine for custard apple pulp is developed.

Now the projects mainly consist of designing a suitable operating machine. To maintain simplicity and economy in the design the locally fabricated unit has been used. Our project achieves higher safety, reduces human effort, increases the efficiency, reduces the work load, and reduces maintenance cost.

II. Literature Review

P. H. Bakane and et al., [1] they presented the main constraint in custard apple processing is deseeding of pulp. Hence, there is demand for small size machine which can separate pulp and seed from custard apple. Therefore, deseeding machine for custard apple pulp was developed which was consist of rotating cage, discharge chutes, cover a rigid base supporting the frame and transmission unit. In order to evaluate the performance of the machine, experiment was conducted.

V. Eyarkai Nambi and et al., [2] they studied the Custard apple, popularly known "sitaphal" in India is a most delightful taste, flavor and high nutritional value. Extraction of pulp is a major constraint in processing of custard apple fruits. The machine consists of fruit cutting mechanism, fruit extraction mechanism and pulping mechanism. Performance evaluation of the developed custard apple pulper machine was done with different pulping shaft speeds (100, 300, 500, 600 and 800 rpm), different pulping chamber inclination (19°, 23°, 27° and 29°) with two types of beater along with 3 type of pulping sieve. The higher amount of coarse pulp recovery has been observed with inclined slotted sieve with the shaft speed of 600 rpm along with 29° pulping chamber inclination.

Bakane P. H and et al., [3] They research how custard apple fruit is delicious in taste and nutritive values. The pulp is used in preparation of ice-cream. Custard apple fruit is excellent source of carbohydrates, minerals, and protein. It is also a good source of vitamin A and C.. The pulp has a pleasant texture and flavor. It is sweet. It is a tropical fruit, ripening starts soon after it detached from the tree. It is short shelf life fruit of 1-2 days after ripening.

S. B. Solanke and et al [4] they studied the life of custard apple fruit will be up to 12 days and is stored in modified climate at 10 degree c. The pulp is stored up to six month with potassium meta-bisulphite. A no of product like ready to serve like ice-cream, squash and toffee can be prepared and adding a new tests in the market hence this outline is finding on especially harvesting, value adding, storage of fruit.

Sonali C. Khanbarad and et al, [5] they research the mechanical and physical properties changes according to the shape and size of custard apple fruits. Therefore physical and mechanical property of custard apple fruit and seed size is important for providing the data for the design of handling, storing and processing equipment. Variation in seeded pulp for different size of fruits is important for deciding the appropriate size of rotating cage

H. L. Kushwaha and et al, [6] they develop extractor for extracting the okra seeds. Study where conducted on different types of cylinder speed. It contains moisture 12.3, 15.8. They used three types of extracted drummed namely square head bolted, rubberized and rasp-bar. The performance depends on extraction efficiency, cleaning efficiency. For all crops cleaning efficiency was found on the range of 97.9 to 99.6%.

N. G. Bhadle and et al, [7] they studied physic morphological and rheological properties of custard apple fruit and seed as well as pulp flakes and flakes are important for determining the unit operations during the processing of custard apple for design of seed extracted. in the study physical and morphological properties of custard apple fruit such as length, breadth, thickness, size found to be 42.56, 36.74, 12.87% respectively. It is important to study the separation of custard apple seeds and pulp. Rheological properties of custard apple share force required to separate pulp and seed .

III. Materials and Methodology

Working: Custard apple pulp can be deseeded by rubbing, squeezing or combination of both. As the custard apple seeds are toxic in nature precaution was taken that seeds should not break during operation of machine. Hence in this machine deseeding was mainly carried out by rubbing action in the inner drum. The inner drum rotates at the higher speed and in the drum generates the centrifugal action, due to this action pulp goes to the outside.

The pulp along with flakes comes out through in the outer drum opening and collected at the pulp outlet.

Material selection: Name of the parts and specification used in the project as per following:

- Motor: single phase A. C. motor, 230 Volts, power 550 watt, speed 2000 RPM.
- Bearing: Flange bearing F205, Ball bearing type
- Shaft: Mild steel. 25mm diameter
- Outer drum, supporting frame & inner drum: Mild steel.

Drawing:

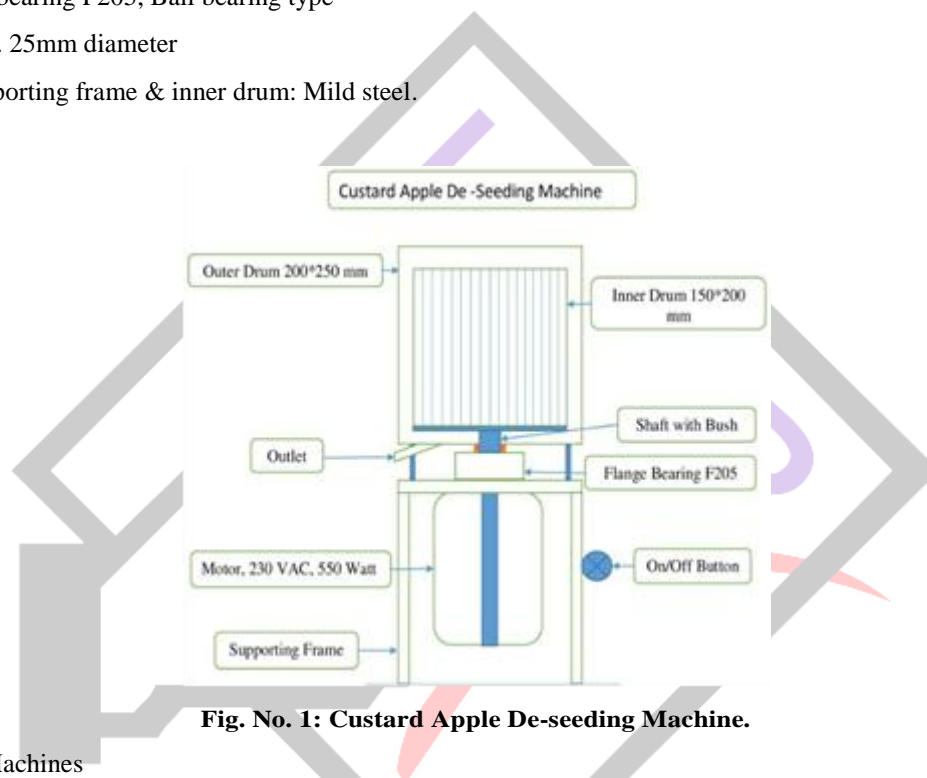


Fig. No. 1: Custard Apple De-seeding Machine.

A. Advantages of Machines

- No conventional grid electricity required.
- Long operating life.
- Highly reliable and durable.
- Easy to operate and maintain.
- Eco-friendly.
- No need skilled operator.
- Quality of pulp separated by machine is higher than manual operated.
- Faster separation of pulp.
- Extraction of pulp by machine is clean than manual.

B. Limitations of Machines

- Maintenance cost high.
- Operating cost is high.

C. Applications of Machines

- Industrial purpose.
- Domestic purpose.
- Commercial purpose.

IV. Concluding Remark

The machine has been designed and all the component parts in it have been manufactured and assembled. The developed de-seeding machine for custard apple pulp gives better performance in terms of efficiency, capacity and pulp loss. From the present investigation it could be concluded that quality of pulp separated by machine was same as that of pulp separated by manual. Therefore, for faster separation of pulp, machine can be recommended.

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