

## Design & Development of Aonla Fruits Seed Removal & Shredding Machine

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### ABSTRACT:

Traditionally, Aonla stones are removed manually using manual punching, crushing machine, and boiling machine. Manual process is time and labour consuming, tedious, unhygienic and uneconomical. Hence a continuous flow, power operated machine for production of Aonla stones removal has to be design. In which whole production can be done on single machine. Production rate also can be improved and fatigue to the worker can be reduced.

### KEYWORDS:

Aonla punching machine, Design & Development, Economical manufacturing.

### INTRODUCTION:

Aonla is one of the most important non traditional Indigenous fruits of India. Botanically, it is classified as *Phyllanthus Emblica L.* or *Embllica officinalis G.*, belonging to the family Euphorbiaceous. Aonla is thought to be native of India, Srilanka, Malaysia and China. It thrives well through tropical India and is cultivated in regions extending from the base of Himalaya to Srilanka and from Malaysia to South China. In South India, the tree grows wild at an elevation upto 1,500 Meters. Aonla is grown as commercial crop in Uttar Pradesh. The fruits are born on the branch lets of the tree. Aonla cultivars have not been standardised. However, they are classified according to their fruit size, colour or named after place of growing. The cultivars classified according to their fruit colour are green tinged, red tinged, pink tinged, white streaked and Banarasi red. Some important cultivars recommended for commercial Cultivation in North India is Banarasi, Bansi Red, Chakaiya, Desi, Hathi Jhool and pink tinged.

The cultivar Chakaiya is not for its heavy and regular bearing habit, while Banarasi is reported for its large size fruits. Aonla is normally propagated by seed but it can be propagated by vegetative means, however, in arch Grafting shows better results. The Aonla fruits get ready for harvesting in November-December. However, fruits may be allowed to remain on the tree till February without much fruit drops. The optimum stage of harvesting falls between the periods extending from the second week of December to the third week of January in Northern plains. However, at some places in Southern India the fruit is available throughout the year. A fully mature Aonla tree may yield 2.5-3.0 quintals of fruit annually.

Aonla fruit is valued for nutritional and medicinal properties. The fruit is a rich source of ascorbic acid and contains about 20 times more vitamin C than the citrus fruits. The fruits contain ascorbic acid 450-682 mg/100 g, moisture 81.2 %, reducing sugars 5.5 %, starch 3.05 to 7.23 % and small quantity of calcium phosphorus, iron, nicotinic acid, thiamine and tannin. Aonla is valued as an antiscorbullic, diuretic laxative, Alternative antibiotics and is used in treating chronic dysentery, bronchitis, diabetes, fever, diarrhoea, jaundice, dyspepsia and cough.

It is useful in Ayurvedic and Unani system of Indian medicines. Aonla is not consumed much as fresh fruit (in rare states) as it is highly acidic and astringent in taste. It can be processed into various products such as preserve, juice, murrabha, pickles, concentrates, squash, and syrup candy and dehydrated Aonla. Besides this, manual capacity of Aonla processing is about 6 kg/h only. Non availability of adequate skilled labours for this job in time is another problem. Dependence on human labour for Aonla processing results in delay of separating pulp from stone and increased cost of production.

The present study will help to undertake the objectives to develop a suitable machine for Aonla stone Removal from mature Aonla fruits and to evaluate its performance.

## Fruit Structure & Varieties:

Three varieties of aonla available in the market viz. Kanchan, Chakiya and NA-7 were in India. Matured fruits without skin cracks and surface injuries were chosen for the study. Fruits were washing with potable water to remove any extraneous matter adhering to the fruits. Among the selected varieties, geometric mean diameter of Kanchan, Chakiya fruits varied from 35 mm to 47 mm while NA-7 varied from 28 mm to 40 mm. Hence NA-7 was manually graded and the fruits of less than 35 mm diameter were named as NA-7a and fruits of more than 35 mm were named as NA-7b. The fruits were wash, air dried, stored under ambient conditions. To get the physical properties of the fruits for storage and product prepared.

## Machines present for aonla seed extraction

1. Manual punching machine
2. Shredding machine
3. Boiled aonla breaking machine

### Manual punching machine

#### Description

Aonla Seed Remover is hand operated equipment to removed seed from Aonla. A rod connected to the handle punches the fruit with a shock load, which makes the seed portion of the fruit to move down through the hole provided at the centre of the seat. After every punching the seed is removed and the fruit has a hole at the centre.



### Manual punching m/c

As seen it require manpower due to which capacity of the machine also decreases as per requirement.

### Shredding machine

#### Description

In Aonla Shredding machine, seeds are separated without cracking. Both Small and Big size Aonla can be processed. It requires an extra dye set for seed outlet. It can have a Capacity around 250 Kgs Aonla/Hr.



### Shredding machine

During shredding some aonla seed get shred by which it is really hard to find the shred seed.

### Boiled Aonla breaking machine

This equipment is used for breaking the Boiled Aonla in to slices, without breakage of the seed.



### Boiling machine

Only completely boiled cultured Aonla in hot condition be used and fed into machine. Seeds and Aonla slices come out together and can be separated by hand easily. As to extract seed boiling is needed so more energy gets wasted therefore not reasonable to use.

## New Machine Design Model Descriptions

By comparing the three existing machine available in market so come to a new machine design in which whole process should be done in continuous way. A continuous aonla seed removing machine will consist of a hopper, a pneumatic punching machine, a conveying system, and an electronic control unit in a master frame. A moving circular conveyor disc with holes at the equal distances would design to convey the fruit to the deseeding position where the fruit platform was fixed at the disc which also has a centre hole. Above the fruit platform, a pneumatic punching machine with some extra power was fixed concentrically. The seed removing operation was carried out by a pneumatic type controller which moves the punching plunger up and down with the help of compressed air. At every punching, the seed was removed and collected in the seed collecting tray. Then the deseeded fruit was conveyed to the discharge end.

## Results and discussion

As per study the information needed for developing a new design in continuous manner will be get done. The capacity of the machine with respect to time will calculate in further work.

## Effectiveness of machine

Depend upon the three machines the effectiveness of the machine for manual, shredding type and boiling type punching machine Effectiveness can be carries out.

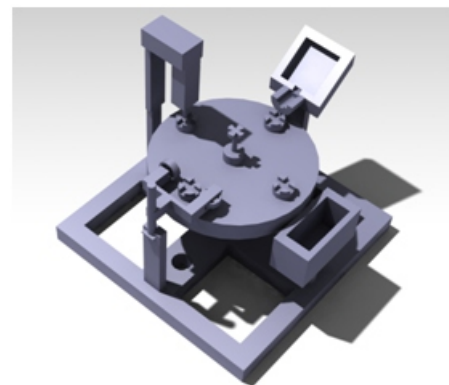
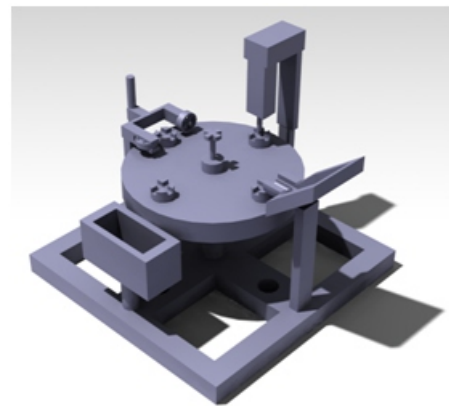
## Comparison with existing methods

Presently, deseeding of aonla fruits is carried out manually by cutting the fruit into small pieces, which is a Time and manpower consuming process. By considering these new operations maximum output can be acquired.

## Conclusions:

A continuous flow aonla seed removing machine have to be develop and also evaluate. The effectiveness of the machine and fruit pulp wastage varied with the size of fruit.

## Overview of the design



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A pneumatic assisted electronically controlled continuous aonla seed removing machine

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### **Physical and mechanical properties of aonla fruits**

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### **Performance Evaluation of a Forced Convection Solar Drier with Evacuated Tube Collector for Drying Aonla**

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Evaluation of aonla (PHYLLANTHUS EMBLICAG.) segments-in-syrup

prepared from stored fruits  
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Effect of processing methods on keeping quality of aonla (Embllica officinalis Gaertn.) preserve  
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