

A review paper on “design and development of lab scale pineapple fruit juicer”

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Abstract

This review is based on small scale motorized pineapple juice extractor will be design and fabricat, using locally-available construction materials. The essential components of the machine include Feed Hopper, Slicing Blade, Shaft, Juice Collector, Perforated bag, Sieves, Electric Motor, Outer Cylindrical Chamber, Gear box. It is also required to be cheap and easily manufactured. It can be easily operated and its efficiency is very high. Automatic pineapple juicer machine can done all the process required to produce the pineapple pulp, that means core of the pineapple can be crushing by the machine. By using the automatic pineapple juicer machine the production time and the labor cost can be reduced. The automatic pineapple juicer machine can be used in the small and medium entrepreneurs (SME). The aim is based on the design and fabrication of fruit juice extracting machine, this machine has the ability to slice and extract juice from fruits and vegetable such as pineapple, orange, mango, apples, passion fruit, tomato, aloevera, awla and grape with the help of the slicing blade, squeezing method.

Key Words: Design and Fabrication, Pineapple, Juicer machine.

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INTRODUCTION

Extraction is a process by which substance are removed for their original component or raw state. Hence, Extraction of juice may be defined as the removal of juice from fruits; the juice is separated from the skin or chaff. The pineapple fruit needs more force than other fruits for extraction because of its thickness of fruit skin. Fruits like banana need lesser force because of it light skin nature. The main advantage of the automatic pineapple juicer is the machine can process the pineapple with automatic operation. Automatic pineapple juicer machine can done all the process required to produce the pineapple pulp, that means core of the pineapple can be crushing by the machine. By using the automatic pineapple juicer

machine the production time and the labor cost can be reduced. Designed, fabricated and tested a small scale mango juice extraction machine. The major components of the machine included hopper, perforated drum, screw conveyor, juice outlet, waste outlet, main frame, electric motor and motor stand. Other components included screw shaft, the juice collector, top cover and the transmission system. The screw conveyor conveys and presses the mango fruits against the perforated roughened drum.

NUTRITIVE VALUES

- Pineapple contains calcium, potassium, magnesium, fiber, and vitamin c.
- It is low in fat and cholesterol.
- It is also a good source of vitamin, B1, vitamin B6, copper and dietary fiber.

Table 1: Chemical composition of pineapple

Nutrients	Value per 100 g
Water	86.00 g
Protein	0.54 g
Total Lipid	0.12 g
Ash	0.22 g
Carbohydrate	13.22 g
Fiber	1.4 g
Glucose	9.85 g
Fructose	9.85 g
Vitamins	

Vitamin C	47.8 mg
Vitamin A	58.0 IU
Other	
Carotene	35 mg
Source: USDA Nutrient Database	

LITERATURE REVIEW

A manually operated cashew juice extractor operating on screw press principle was designed, constructed and tested. Apple crushing was by pressing a wooden piston against a steel reinforced end plate. Juice output was 1.02 litres/hr and the average juice extraction efficiency was 85.38 %. Three samples of the juice (fresh juice, juice stored under ambient conditions for 24hrs and refrigerated juice at 5°C) were tested for sensory evaluation. The results indicated a significant difference ($p < 0.05$) between the colour, taste and general acceptability of juice under ambient storage when compared with fresh juice; but there was no significant difference in the mouth feel. A device of this nature can be manufactured in small machine shops in the cashew producing developing countries for village level applications. (Ogunsina. *et al.*2008). A multi-fruit juice extractor was designed, constructed and evaluated for performance using pineapple, orange and melon fruits. The machine was designed to operate on the principle of compressive and shear squeezing force exerted through an auger conveying system. Materials used for construction were locally available and cheap. Performance tests were carried out to investigate the extent to which the extractor can extract juice from selected tropical fruits. The machine was found to be efficient in extracting juice from water melon, pine apple and orange. Extraction efficiency was respectively 96.9%, 94.3%, and 96.6% for peeled pineapple, oranges and water melon, and their respective unpeeled value was 83.6%, 84.2 %, and 97.1%.(Aviara. *et al.* 2013). A manually operated multipurpose juice extractor was designed and constructed for use in rural and urban areas for extraction of juice from tropical fruits. The machine is cost-effective, simple to operate and maintain and causes less discomfort to the users, it is therefore recommended for small local fruit processors and rural dwellers. The evaluation included anthropometrics and physiological measurement of the subjects in relation to performance evaluation of the machine. (Ademola *et al.*2015). A pineapple juice extractor was developed and tested. The juice extractor was effective, portable, can easily be reproduce, repair and maintain. The material selection was to meet good hygienic standard. It was powered by a 2 hp single phase electric motor. This shows remarkable improvement of that reported by Olaniyan *et al.* The pineapple juice extraction Machine was able to produce

18lts/s. (Aju *et al.*2016). Pineapple a tropical fruit contains a proteolytic enzyme bromelain, which helps in the digestion of protein prevent blood clot formation. Pineapple's nutrients include calcium, potassium, fiber, and vitamin C. It is low in fat and cholesterol. It is also a good source of vitamin B1, vitamin B6, copper and dietary fiber. Pineapple is a rich source of ascorbic acid supplement to our diet. Pineapple pulp waste showed maximum amount of reducing sugars (30.5mg/100g) and ash (1.8mg/100g) respectively. The edible parts of the pineapple fruit (pulp and core) are rich in soluble carbohydrates and relatively poor in antioxidants and minerals. (Kapil *et al.*, 2016). Pineapple peeler and coring machine is a machine used to core and peel the pineapple to form the cylindrical shape pulp. The main aim of this project is to develop a pineapple peeler and coring machine to solve the problems faced by Small and Medium Enterprise industries, where the machine developed can reduce the time taken for pineapple processed. In this project, the design of the pineapple peeler and coring machine has two cylindrical blades to remove the skin and mid core of the pineapple simultaneously. In order to operate the machine, a pineapple is initially located at the machine holder. Then, the first cutter will cut the leaves and root of the pineapple. After that, the skin and the core of the pineapple will be removed by using two cylindrical blades. (Shinde *et al.*2017).

TYPES OF FRUIT JUICE EXTRACTOR

Continuous Crushing Process: In order for the continuous crushing process machine to extract juice from orange or pineapple, it exerts impact shear and compressive force. The metal crusher incorporated in the machine crushes continuously the fruits that are fed into the machine by crushing it against a metal surface which separates the juice which is collected through a special opening. The wastes are forced out through the waste collector.

The Basket Press: The basket press consists of a horizontal perforated cylinder, a hinged cover, piston with circular plate, paddle, a hydraulic system or mechanical press and a power unit. The basket press needs to exerts impact shear or compressive force in order to extract juice, the incorporated paddle exerts both impact and shear force on the fruit. This is achieved as the paddle agitates the fruits, it hits and rotates them continuously, introducing a shear and impact force on the fruit. The mesocarp is then softened and separated from the skin. Compressive force can now be exerted by the hydraulic system. The piston force the fruits against the basket and the result is the juice being compressed out of the mesocarp.

CONCLUSION

A pineapple juice extractor was developed and tested. The juice extractor was effective, portable, can easily be reproduce, repair and maintain. The material selection was to meet good hygienic standard. It was powered by alhp single electric motor; good for small and medium scale juice production in both rural and urban areas. Functional and highly efficient low cost fruit juice extracting machine by minimizing local technique of squeezing and sucking of fruits, hence improving the hygienic and health condition of individuals and maintain fluid balance in the body.

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