

# Areca Fiber Extraction Methods

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Abstract Areca nut husk is a waste product and it constitutes to 60-80% of the areca nut fruit by volume. Fiber Extraction is the processes of fiber extraction are varied, and depend on the effectiveness of the wet processing such as bleaching and dyeing of coir and also varied end uses. Main objective is to extract the fiber from the waste areca husk by using mechanical process and to increase the farmer's income by supplying the fibers to the manufacturing industries. The comparative study of the existing systems with respect to the proposed project is discussed

**Keywords** —Areca husk, extraction, separation, coarse fibers, fine fibers, Powdered shell

## I. INTRODUCTION

The traditional production of fibers from the husks is a laborious and time consuming process. After separating of the nut, the husks are processed by various retting techniques generally in ponds of brackish waters (for three to six months) or in backwaters or lagoons. This requires 10-12 months of anaerobic (bacterial) fermentation by retting, the husks are softened and can be decorticated and the fiber is extracted by beating, which is usually done by hand. After hackling, washing and drying (in the shade) the fibers are loosened manually and cleaned. The remaining residual pith - which was previously considered a waste problem - has recently found new profitable markets as a peat moss substitute for horticultural production.

## II. PROBLEM DEFINITION

In early days to extract fiber, areca husk was soaked in water about 2 to 3 days, this wet areca husk is exposed to sunlight for drying. Effect of chemical treatment with sodium hydroxide, of Areca fiber on mechanical properties was studied. Fibers were soaked in 5, 10, 15, 20, and 25% NaOH solution for about 12, 24, 36, 48, and 60 hours. These fibers were further washed with water containing few drops of acidic acid. Finally, the fibers were washed again with water and dried. By doing this some biological activities takes place which makes areca husk soft and loosens fiber. These loosened fibers were extracted manually by hand. This way of extracting fiber from areca husk is time consuming and cannot be adopted in producing fiber in large scale. Also this method requires more labours and hard work.

## III. REVIEW

Y. Prashant, C. Gopinath, Vignesh Ravichandran, "Design and Development Of Coconut Fiber Extraction Machine" [1]. The scope of this project was to design and develop a coconut fiber extraction machine for farmers and small scale coir industries in India to provide an effective solution to the difficulties in existing process, reduce time and labour cost and to develop a compact coconut fiber

extraction machine which could be used in remote villages so that unutilized husks from such areas could be tapped and fiber could be made available to the Coir Industry directly. This project was taken up to develop a promotional strategy for a new innovation and generate public awareness regarding the availability of a coconut fiber extraction machine in the market at a reasonable cost.

Kishan Naik, R P Swamy, Premkumar Naik, "Areca Fiber Extraction Machine This paper focused on fabrication of areca fiber extraction machine" [2]. This is basically removing fiber from areca husk. The areca husk is outer cover of areca nut which consists of fiber. These fibers are being extracted manually. This has several problems such as time consuming, low production rate, human error, low quality fiber, more workers and skilled labors. This paper aims to overcome these problems by fabricating areca fiber extraction machine which automates the fiber extraction process. This machine consists of 3 phase ac motor which is directly coupled to driven shaft. The driven shaft is enclosed in a casing which is designed in such a way that only dust is removed and fiber comes out of rectangular duct at lower side of casing. The driven shaft is supported by two bearings and has blades which are designed by modifying the blade design of coconut husk decortivating machine. Thus this machine will be helpful for rural entrepreneurs and farmers.

Kiran K, Arun Kumar Govin, Manjunath Bandi, Shivasharanayya, "Design, Development and Testing of an Areca nut Dehusking Agri-machine" [3]. Areca nut has to be processed in dry condition by peeling the outer shell completely. Peeling of Areca nut is very difficult by hand. However it is being done manually by using a sharp knife with a production rate of 3kg/hr. So it is essential to develop an agri- machine which will increase the production rate and safety to laborers. Presently there are few machines available but these machines are not suitable for variety of sizes of Areca nut which leads into the insufficient removal of outer shell of Areca nut.

Srinivasa Chikkol Venkateshappa, Suresh Yalaburgi Jayadevappa, Prema Kumar Wooday Puttiah, "Mechanical

Behavior of Areca Fiber” [4]. In the present work, the mechanical properties of composites obtained by using areca fibers in epoxy matrix have been investigated. The areca fibers extracted from the areca husk are alkali-treated with potassium hydroxide to get better interfacial bonding between fibers and matrix. The test specimens are prepared with different values of weight ratio of fiber to matrix, the fibers being randomly oriented. The test specimens are cured for different periods of time to study the effect of curing time on the mechanical properties. The results of tests such as water absorption, tension, compression, bending, impact, and hardness conducted on the test specimens are herein reported.

*A Comparative analysis*

The comparative study of the existing systems with respect to the proposed project is discussed in the table 1 below.

**Table 1: Comparative Analysis**

Sl .No	Author(s)	Techniques	Performance Measures
1.	Y. Prashant, C. Gopinath, Vignesh Ravichandran	Manual technique.	85-90%
2.	Kishan Naik, R P Swamy, Premkumar Naik	Semi-automated	80-85%
3.	Kiran K, ArunKumar Govin, Manjunath Bandi, Shivasharanayya	Manual technique.	90%
4.	Akhila Rajan a & T. Emilia Abraham	Semi-automated	80-85%

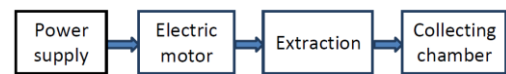
Literature study is carried on four papers were finalized which were the best among the others contributing to our project. Two of those papers was “Areca Fiber Extraction Machine” and “Design And Development Of Coconut Fiber Extraction Machine” which indicates that out based on the existing fiber extraction machines, study gives opportunity to develop a compact coconut fiber extraction machine which could be used in remote villages so that unutilized husks from such areas could be tapped and fiber could be made available to the Coir Industry directly. These studies helped in generating concepts. Benchmarking of existing products is also carried in existing Coir industries. Model making gave an opportunity to learn model making techniques, manufacturing process and difficulties involved during this processes. It helped to understand about each and every process that carried out from start to completion of the prototype work model of coconut fiber extraction machine.

Concepts were generated keeping benchmarked product. Five concepts are generated with different function and operating process for coconut fiber extraction machine. Final concept is selected by considering the user’s operating environment and method, which can be used in small scale

coir industries and in the farm. That means it should be easy to maintain. Considering the user’s buying capacity a true scaled product is fabricated.

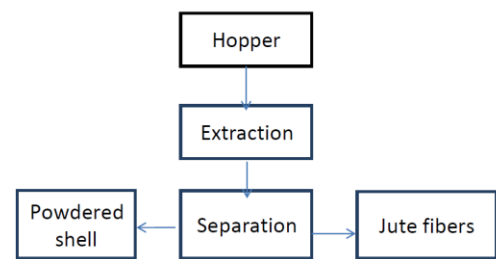
**IV. WORKFLOW FOR EXTRACTION SYSTEM AND OUTCOMES**

Collected areca husk is passed through the hopper for extraction of fibers. Then it is passed over the extensions, which is provided at the outer surface of the circular drum and also inner surface of the outer casing. That is the fiber from the rotted husks is extracted mechanically. Fibers and the powdered dust which is get separated and collected.



**Fig.1:Workflow of Extraction system**

As we see from the above figure,Extracting process consists of power supply which is used as source for electric motor,collecting chamber where seperated fibers are collected.



**Fig.2: Block diagram of Extraction system**

The rotary action of the blades breaks the husk and differentiates them into coarse fibers and fine fibers. The fibers and the powdered dust are segregated and collected. The fine fibers are the individual fibers and coarse fibers are the clusters of fibers.



**Fig.3: Outcomes of Extraction system**

**V. CONCLUSION**

Existing fiber extraction machines gave an opportunity to learn model making techniques, manufacturing process and difficulties involved during this processes. It helped to understand about each and every process that carried out from start to completion of the prototype work model of areca fiber extraction machine.

Literature study is carried out based on the available information about various types of existing fiber extraction machines, and it is observed that there are difficulties for remote village to supply unutilized husks to coir industries

directly. So there is a need to give solution to overcome their difficulties and to arrive at solution, importance is given towards users operating environment and mainly towards constrains like Safety, Function and reliability.

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