



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

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International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 4, April 2021

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

**Impact Factor: 7.512**



9940 572 462



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# Design and Development of Portable Areca Nut De-Husking Machine

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**ABSTRACT:** The primary processing of green betel nut is peeling the outer shell completely. This process is called husking of green betel nut. However, it is being done manually by using a sharp knife with a production rate of 3kg/hr. The husking is difficult with Knife and hand. Presently there are no devices available for green betel nut husking. The nut is very soft that a higher pressure on it will break in to pieces. So it is essential to develop a De-husking machine which can peel efficiently and economically. The device is simple in design, portable, weightless, low cost and easy to operate by person. The parameters affecting the areca nut husk removal is speed of the cutter, depth of cut, hook angle of cutter and the condition of areca nut. The main purpose of this machine is eliminates the skilled operators involved in de husking the areca nuts. The loading of areca nut is manually processed through the hopper. The husk removal action is achieved by the rotating shafts which consists blades on its periphery. The motor rotates the rotating shaft with the help of belt and pulley. The blades are attached on the driving shaft in a perfect angle for peeling the areca nut.

**KEYWORDS:** Areca-nut, Rotating shaft, Hopper, Production rate.

## I. INTRODUCTION

In Today's environment to start areca cultivation one should have patience, commitment, perseverance, team of labors and ability to invest lakhs of rupees. Preparation of land layout for planting, fencing, digging and opening of drains, digging of pits for areca planting, cost of areca seeds, fertilizers, irrigation materials and expense of plant protection measures, mulching and shading expenses, crop operations, cleaning of drains, application of fresh soil and management of intercrops are the major components of cost involved in the cultivation of areca nut. Now a days areca cultivation by buying plain land calls for substantial investment.

Mainly in the field of areca processing problems arises even prior to harvesting and ends before it is marketed. Commercial processing will be done by the intermediaries involved in the secondary market. The methods of preparation of nuts to be sold in the market is the subject matter of processing.

Besides climate conditions, the time of harvesting areca nut determines the quality of nuts to be prepared. When red variety nuts are to be prepared, it is plucked while the husk is still green or at the gentle stage. In case of matured nuts, the color of the husk indicates the stage of maturity. The bunches are plucked when the color of the husk becomes pinkish red. When matured nuts are plucked, it could be used for preparing white variety (Chali). By October end, ripening of nut starts and it lasts up by the end of January, in case of coastal regions of the District. However, in Malnad regions, this period is from November to February end.

The bunches of areca nut appear near the top close to leaves. Climbing up an areca palm and plucking the bunches is considered to be a special art, skill and technique. Only specialized and experienced labors can perform this task. One climber can deal with around 300 to 400 areca trees in a day. Generally, the climber takes with him a long rope and after cutting the bunch smoothly keeps the bunch on the rope from the top and lets it come down, where another person holds the rope at the another end and collects the bunch so coming down. Long bamboo hook is often used to draw the palms together for cutting the bunches without climbing trees. He bends and pulls other tree with the help of bamboo hook and leaps on it and similarly removes the bunches from the other trees to which he has access. Generally, it is a practice that climber will test the nuts whether it has matured or not before exterminating the bunches. He is called as 'konegowda' in local language. areca bunch is called "Kone"

## II. LITERATURE SURVEY

Kiran K, Arun Kumar Govin, ManjunathBandi [2014] designed and developed a machine to de-husk dry Areca nut. It is portable and compact in design. The journal presents the Dry areca nut peeling machine. This machine contains 3 types of blade to de-husk different size of nut. They got efficiency of 65% with single cutter at 125rpm after conducting 3 experiments. Dr. RajashekharPatil, Shubhakaransurywanshi “Development of millet De-husking machine” [IJERT], ISSN: 2278-0181, NCERAME-2015 Conference Proceedings. The journal explains de-husking of millet crops like paddy, wheat. It is useful to millet growers in many ways it doesn't need skilled labor, rapid, safe operation and simple maintenance. It can be easily assembled and disassembled and it can be carried from one place to another. We are adopting this to make our machine as multi de-husking machine. The journal explains dry areca nut peeling. It can be operated by semi-skilled persons also. This machine has three active shafts to de-husk the areca nut. This paper explains design of blades for dry areca nut peeling. Sadashiv bellubbi, Umesha, Shivaling Y. Argi, Shantkumar, and Manjunatha DV, “Pedal Operated Areca Nut Peeling & Crops Dehusking Mechanism,” International Research Journal of Advanced Engineering and Science, Volume 3, Issue 2, pp. 222-223, 2018. The journal presents the pedal operated crop de-husking machine. The mechanism consists of two rotating shaft with blade, another additional supporting shaft is maintained. potential energy of human is converted into kinetic energy of the rotating shaft, the pedaling mechanism has a one sprocket with chain connected to the driving shaft consist of spur gear which rotates the driven shaft and supporting shaft. When the crop undergoes the rotating elements it gets crushed up and segregated seeds and shells and collected at bottom

## III. METHODOLOGY

Peeling of Areca nut is one of the labor intensive processes. Presently it is being done manually by using a sharp knife with a production rate of 3kg/hr. normally a single labor will process 24 kg in a day at max. This work is done only by skilled labor. Shortage of labor is a major problem which almost every village and farmer faces, during the harvest season. It is necessary to develop a machine which can help to upgrade the rate of production and decrease the time and also eliminate the risk of labor injury during the production manual peeling method.

Now a day's there are many types of machines are available in the market. These existing machines are costlier and are complex in design. The main problem is that they are heavy in weight and not portable and size of machine is also more. Some machines may cause damages to the Areca nut and not easy to operate. For operating existing machine skilled labors are required.

Therefore it is necessary to develop Portable, High efficiency, low cost, Compact Areca nut de-husking machine.

## IV. EXPERIMENTAL RESULTS

Initial Design consist of two blades called upper and lower blade. Upper blade used to remove the husk from areca nut and Lower blade used to rotate the areca nut during peeling. It helps to complete peeling of areca nut. By replacing lower blade with soft material, We can use it for dry areca nut also. The machine consists of 2 active shafts or live shaft.

- One is upper shaft which consist of 16 Blades with 3mm gap between each blade
  - - Which helps to remove Husk from areca nut
- Another one is lower twisted shaft. This is twisted about 100mm in middle of shaft.
  - - Which rotates areca nut for continues contact with upper shaft
- Material used for fabrication is mild steel.

UCFL 204 Bearing with holder holds the two shafts while it is rotating

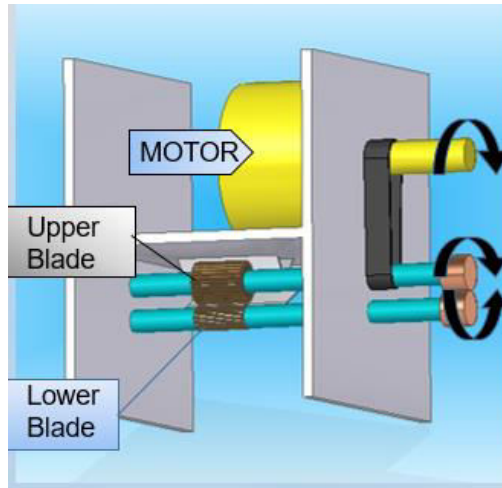


Figure 1: Pictorial view of the system planned.

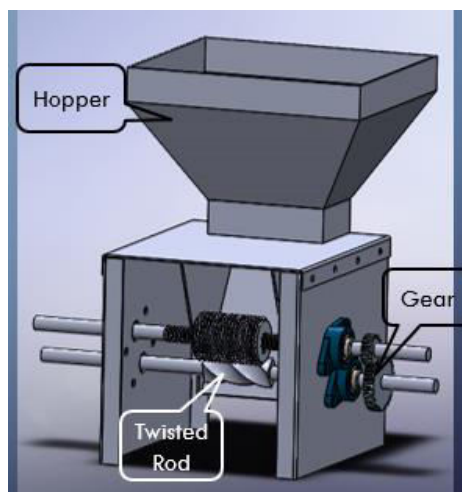


Figure 2: Completed model with working mechanism.

## V. CONCLUSION

In order to overcome the problems of labour shortage and difficulties associated with the arecanutdehusking process, an effective model is developed. The designed model is tested for various conditions and the results obtained indicates that this system can be effectively used for the arecanut harvesting for small acsle and medium scale farmers. The Overall cost if the equipment is also under economical considerations and can be suitable for both dry and areca inputs. The average production cost of this device was around 4 to 5 kg per hour and it is estimated based on the compounded average.

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