

A MANUALLY OPERATED ARECANUT HUSKER

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ABSTRACT

An arecanut husker to husk dry arecanuts has been developed. The operation of husker is done by leg and feeding of nuts by hand. The husker performs the function of loosening the husk which is easily peeled off by hand. An unskilled labourer in a day (8 hours) can make about 40 kg husked nuts.

INTRODUCTION

Arecanut, one of the important commercial crops of South India plays a prominent role in the religious, social and cultural life of people. It is cultivated in 1.93 lakh ha. distributed over South and North Eastern India and accounts to about two-thirds of world arecanut production. The total production is estimated to be 1.66 lakh tones, of which two-third is processed as ripe nuts and about one-third as tender nuts. The two processes are illustrated in Fig. 1. While the husking of nuts is done immediately after harvest in the case of tender nut processing, the same is done after drying in the case of ripe nut processing. The husking of dry nuts is presently carried out by skilled persons with the help of a country tool (Fig. 2). The turnout varies from 40 to 100 kg. per day (8 hours) depending on the efficiency of the skilled labourer. In other words, the present method of husking operation is highly skilled and prone to injuries. The device described here can be used by an unskilled labourer for husking dry nuts.

The dried arecanut of commercially grown varieties is generally oval or oblong in shape. The portion of husk above the nut (chali) and towards peduncle is the most soft portion the of husk in the nut. The weakest point in the husk lies just above the nut (chali) towards peduncle. If a husking tool is used at this point it will require least force for husking.

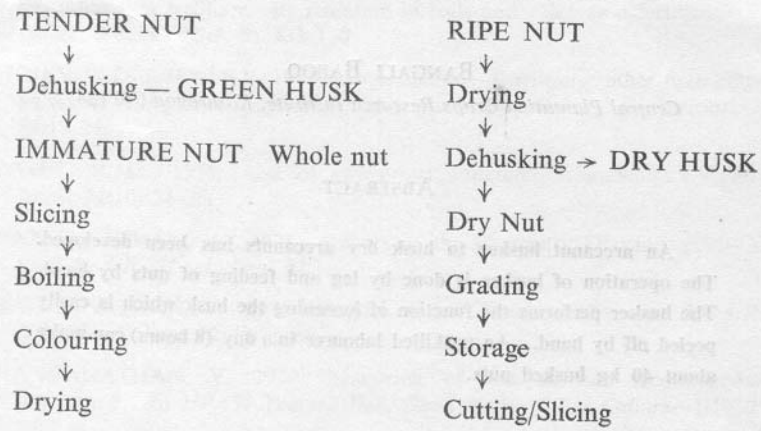


Fig. 1. Flow diagram of arecanut processing.

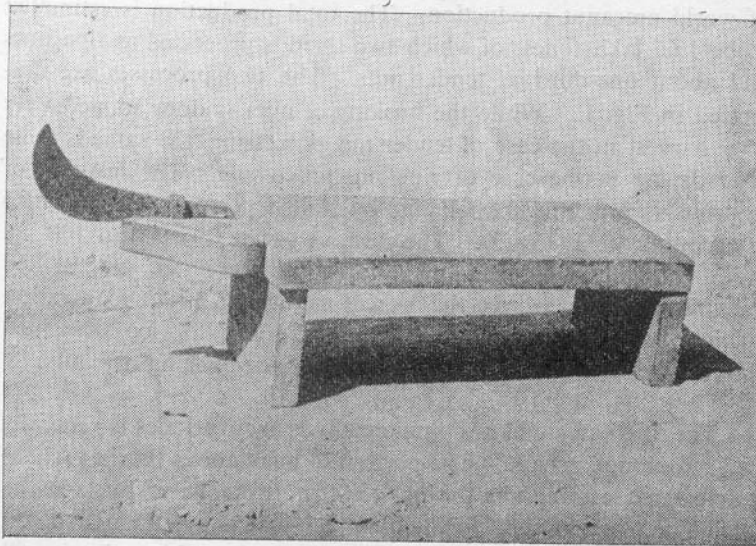


Fig. 2. Country husking tool

The cross section of tender nut and dried nut are shown in Fig. 3.

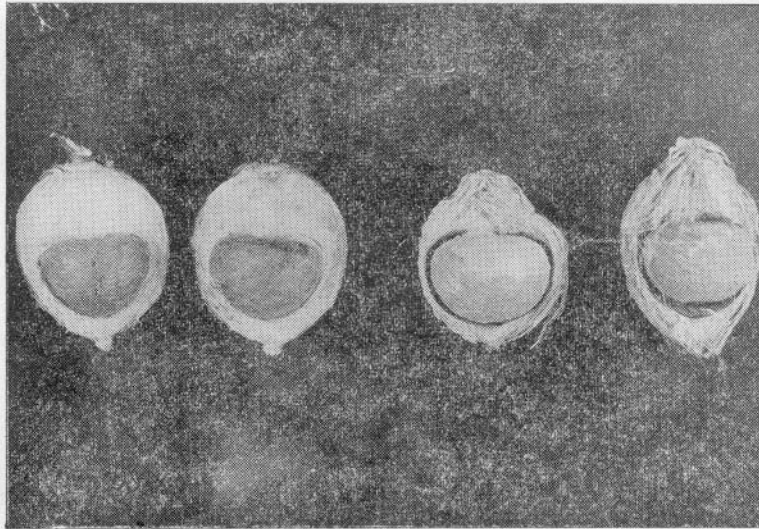


Fig. 3. Cross-section of tender and dried arecanuts

Work done

No published work on the development of a husker for dry arecanuts is available excepting two patents taken on arecanut husking/shelling machine (Patent No. 92C(I)3 Oct. 1973 and personal communication). However, the patented machinery on arecanut husking/shelling is not in use or available in the market.

The design

In India most of the arecanut growers have small holdings. An average land holder having 1 ha. under cultivation with intensive management practices may harvest about 2,000 kg. of arecanut per annum. The machine which does not need mechanical or electrical power is designed for use even by such a small areca growers.

There can be two types of mechanisms for husking arecanut viz. (1) a mechanism by which the husk is loosened by way of rubbing and crushing or (2) the husk is made to split into two halves. In the present design the first mechanism was considered and made use of with a view to increase out turn.

Components of the model

Each component of the areca husker is discussed here.

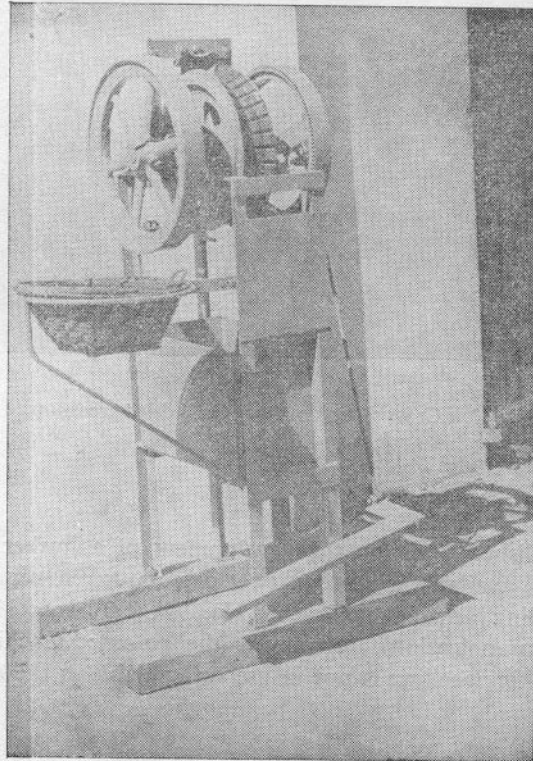


Fig. 4a. Arecanut husker

Pedal mechanism

The pedal mechanism has been adopted to run the husker as a source of power, for the convenience of the operator. Moderate operations results in an approximate speed of 125 rpm.

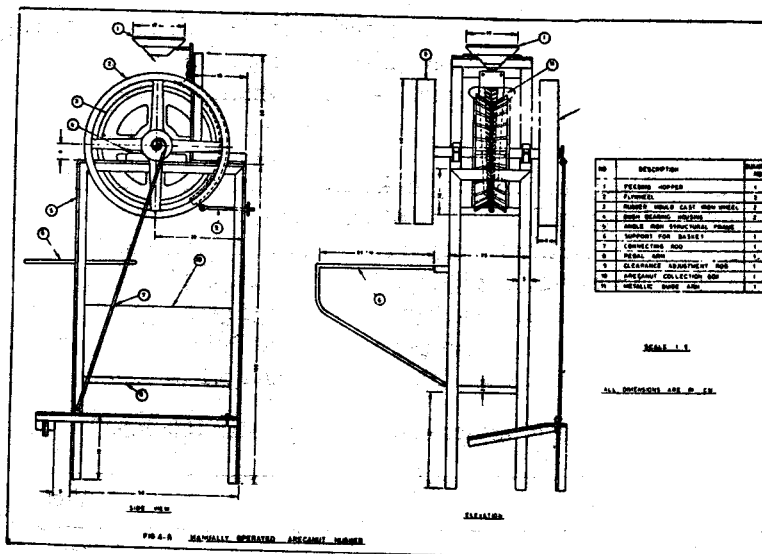


Fig. 4b. Components of arecanut husker

Fly wheels

Two fly-wheels each of 45 cm diameter and 25 kg. weight are employed in the husker and are mounted on the main shaft. The wheels keep the machine and main shaft balanced and store adequate energy for husking the nut when fed. With this operation the husker becomes easy and smooth.

Rubber-mould cast iron wheels

Two cast iron wheels of 35 cm diameter and 5 cm. width at periphery are rubber moulded with 2cm. thick rubber. The rubber mould reduces scratching and breaking of nuts and helps in easy operation of husker.

Metallic guide arms

The metallic guide arms which help in crushing and shearing of the nut husk is fixed in the back half of rubber-mould cast iron wheels. The arm is provided with hard steel teeth both sides join in a sharp edge in the centre. The angled teeth and sharp edge in the centre makes the crushing and shearing action more effective. The arm is attached to a clearance adjustment rod for use with

various sizes of nuts. The rod is spring loaded which provides minor adjustments of clearance while nut is passing through the metallic arm and cast iron rubber-mould wheels.

The Grader

The nuts vary in size (length 4.0 to 6.3 cm. and width 2.2 to 4.3 cm.) as shown in Table-1. To avoid breakage and scratching of nuts (chali) the clearance between metallic guide arm and rubber-mould cast iron wheels is adjusted for small range of size. Grading of unhusked nuts is done by this grader (Fig. 5) by allowing the nuts to fall from higher end. The nuts that fall are grouped in three different sizes of 2.2 to 4.0, 4.1 to 5.0 and 5.1 to 7.5 cm.

Table 1. Size of dry arecanuts (sample size 100 nuts)

<i>Dimension</i>	<i>Range</i>	<i>Mean</i>
Length	4.0 to 6.3 cm.	5.1 cm.
Width	2.2 to 4.3 cm.	3.2 cm.

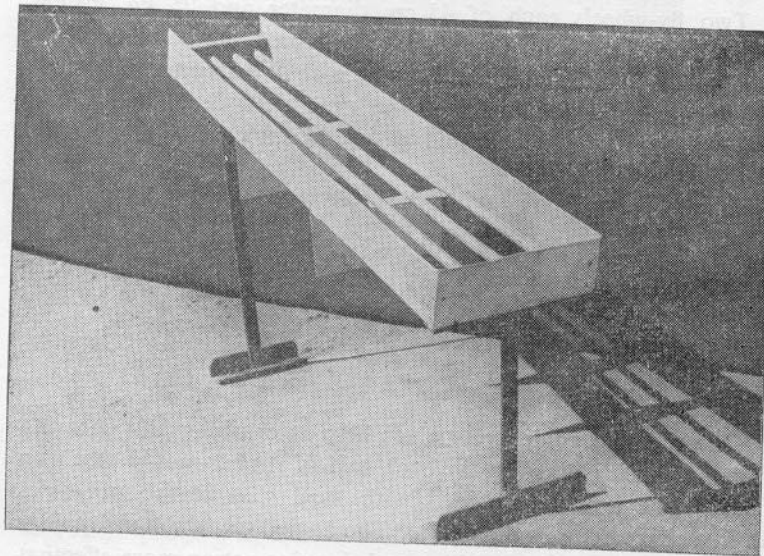


Fig. 5. Arecanut grader

Operation

The husker works by operation of pedal mechanism which rotates the fly wheels towards metallic guide-arm. When the wheels pick up momentum (in about 5 seconds) the feeding of unhusked nuts start. The operator takes the nuts from basket by the left hand and exchanges it to right hand and then feeds into the feeding hopper. The nuts are fed one after the other only after the earlier one has come out. The operator thus could feed approximately 8 kg. of nuts in about 20 minutes. The loosened husk of nuts from the collection box could then be peeled off by hand while resting. Peeling of the husk of the above 8 kg. nuts take about 20 minutes during which process the operator gets also some rest. Only 80% nuts could thus be peeled in the first attempt. The balance of 20% nuts are fed again with the next set of nuts as it would other wise be difficult for hand peeling.

By employing two persons, operation of the husker and peeling could be done faster and simultaneous for the advantage.

RESULTS AND DISCUSSION

Test trials were conducted with the husker with one and two persons separately for 6 hours of daily operation. The data is presented in Table 2. It is seen from this table that the time required for grading 100 kg. unhusked arecanut by a single person is about 60 minutes and that for two persons it is only 40 minutes. Similarly one man operating the husker for 6 hours could husk 41 kg of husked nuts whereas the out turn increased to 92 kg with two persons, working for the same period. Again, one man in a day (6 hrs.) could completely husk (grading and husking) on an average 36 kg. (husked nuts) where as two could husk 87 kg. It is seen that if two persons work jointly the operation becomes faster and less tiring.

At the end of operation 5% nuts were found to be broken ones, of which about, 4% were infested nuts called Patcha or Dagi Patcha (Table-3).

The husker when operated normally runs at a speed of 125 rpm. during the actual operation. This safe and simple machine for husking arecanut could also be motorised, if necessary.

Table 2. Observations on testing of the dehusker

<i>No. of persons</i>	<i>Time required for grading 100 kg. unhusked</i>	<i>Out put per day (6 hrs.) (husking operation only Kg.)</i>	<i>Out put per day (6 hrs.) (grading and husking) Kgs.</i>	<i>Average</i>
One	60 min.	40	35	
One	60 min	42	37	36
Two	40 min.	90	84	
Two	40 min.	94	90	87

Table 3. Percent breakage of nuts (random sample size) 100 unhusked nuts

<i>Sample</i>	<i>Broken (infested nuts)</i>	<i>Broken (good nuts)</i>
I	4	1
II	5	1
III	3	2

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