



Design and Modification of Ground-Nut Decorticator

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ABSTRACT: Decortication of groundnut is a tedious and time consuming process. Commercial available hand operated decorticators require more energy with less output. An attempt was made to develop and evaluate pedal operated groundnut decorticator. The study revealed that, the pedal operated decorticator gave an output of 25-30 kg/hr which was more than hand operated decorticator hand shelling. The difference in unit cost of operation for the unit was appreciably less than that of hand operated decorticator. By considering less fatigue to the operator and higher output, the pedal operated decorticator could be advantageously used for decortication of groundnut.

Decortication of groundnut in which the pods is pressed between the thumb and first finger. This process is a “traditional methods”. This method is mostly used in rural areas. This method is very tiresome. It has been observed that the efficiency and productivity with hand operated groundnut decorticator and the traditional method is less. Due to this tiresome working operation, Commercial available hand operated decorticators require more energy with less output. By considering this pedal operated groundnut decorticator is beneficial for decortications of groundnut pods.

KEYWORDS: Decordication, groundnut, productivity, efficiency, traditional.

I. INTRODUCTION

India is an agriculture country. In India 70- 72% of the population are farmers. In India mostly farming is done with help of traditional equipment's and methods. Due to that traditional equipment and methods the earning of farmer is reduced. In India most of the rural population is engaged in agricultural land. Hence this project can of great use. So the project is decided to carry out on cycle like layout.

Groundnut is a major oilseed crop grown in the state, it occupies about 10.8 percent of the total cultivated area and 56.5 percent of the total area under oilseed crop in Karnataka contributing 73 percent of total oilseed production in the state (anonymous 1987). Groundnut is a valuable source of edible oil (43-55%) and protein (25-28%) for human beings, and of fodder for livestock. About two thirds of world production is crushed for oil and the remaining one third is consumed as food. As the groundnut seed is contained in pod, which is usually developed underground, the pod is harvested by pulling or lifting the plant manually or by using a hoe as the mechanization system. The pods are stripped from the haulms, dried stored and processed. Shelling is a fundamental step in groundnut processing as it allows the kernels and hull to be used as well as other post harvesting technologies to take place such as oil extraction or in hull briquetting. Shelling can generally be done by hand or machine. Hand shelling is the process in which the pod is pressed between the thumb and first finger so that the kernel is released. It is the most predominantly used method in India's small holder agriculture while hand shelling keeps the rate of kernel breakage low, it is labour intensive, energy requirement is high and leads to “sore thumb syndrome” when large quantities are handled.

In traditional method, only one person can decorticate 2 to 4 kg of groundnut per hour that rate of production reduces the number of workers are increased. So we have an idea to create equipment for help of the farmers. This machine can remove up to 8 to 10 kg of kernel from groundnut. This is a simple mechanism machine, which can be made easily, and we have tried to reduce the cost on less as possible. In groundnut decorticator

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machine the role of removal of kernel is high which is equal to 2-3 worker per hour which reduce the machining cost and increase the rate of production.



Fig: Traditional Decortication Method

A decorticator is a machine for stripping the husk off kernels in preparation for further processing, storage or use as food. The machine can dramatically reduce the labour costs associated with decortications, cleaning and preparing groundnuts for further processing.

Decorticators are basically classified as manual or motorized, manual decorticators are powered by human hand while motorized decorticators are powered by a motor or an engine optimizing the performance of a manually operated groundnut decorticator is important so that the shelling efficiency is set at maximum possible and kernel breakage set at minimum possible.

II. REVIEW OF LITERATURE

AUTHOR NAME: V. THIRUPATHI, R. VISWANATHAN K. THANGAVEL

TITLE NAME : INTENSIVE EVALUATION OF POWER OPERATED GROUNDNUT DECORTICATOR

In this research paper it is reported that based on the shelling action they can be divided into two category. Hand operated and pedal operated, a hand operated groundnut decorticator 50-75 Kg per Hr capacity was evaluated. Where as a pedal operated groundnut decorticator was found to have capacity of 72 Kg per Hr.

AUTHOR NAME: A.N. GITAU, P. MBOYA, B.N.K. NJORGE, M. MBURA

TITLE NAME: OPTIMIZING THE PERFORMANCE OF A MANUALLY OPERATED GROUNDNUT DECORTICATOR.

From above research paper, we have studied the hand operated groundnut decorticator and reported that groundnut receives less power to be broken and it is a tiresome process. Another view we have taken that, the smaller the hole size of the sieve, the greater the pressure, thus most pods are broken, however, the size should not be so small that the kernels are broken in the process of shelling. So from above view, we have taken these parameters.

III. DESCRIPTION OF THE PRIMARY PROCESSING EQUIPMENT FOR GROUNDNUT

a) Sitting type groundnut decorticator

The unit consists of a steel frame, arch shaped perforated screen and three peg type shoes attached to operating arm. The shoes are casted, arranged in arch fashion and joined to the operating arm. Groundnut pods are placed in the hopper and with reciprocating motion of the operating arm decortications takes place. The Kernels and shells pass through the screen and could be cleaned separately.

b) Power operated groundnut stripper

If consists of a rotating spiked tooth cylinder and a blower powered by 1 HP electric motor. Stripping is done by holding the pod portion of the groundnut vine, over the spiked cylinder. The stripped pods fall below and are



International Journal of Innovative Research in Computer and Communication Engineering

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Vol. 3, Issue 12, December 2015

collected separately. Chaff and the lighter pods are blown out with the help of the blower. It can be operated by two to three persons.

c) **Manually operated groundnut stripper**

The equipment consists of a square frame of four vertical pegs and a horizontal strip of expanded metal fixed on each side of the frame in the form of a comb. Stripping is done by drawing a handful of vines across the comb with a slight force. The structure facilitates its use by four women simultaneously. Small stools are also provided as an additional facility for comfortable sitting posture while stripping the pods.

It consists of two types according to driven operation is:-

- (a) By using handle
- (b) By using pedal.

GROUNDNUT HARVESTING METHODS USED IN VILLAGES

SR. NO.	Village Name	Method Used	Rate/trunk (in Rs.)
1	Warud	Traditional	50
2	Hingani	Traditional	55
3	Dhamangaon	Traditional	58
4	Tulajapur	Traditional	53

Table 1.1: Groundnut Harvesting Methods used in nearby villages.

According to survey, we have found that people are still using traditional method that is “by hand” and doing laborious work over a long time period for small quantity of groundnut.

IV.WORKING PRINCIPLE

Groundnut decorticator is operated on the shearing action blowring action and separating action. Firstly the inputs i.e. the groundnut are fed to the machine. Then groundnuts come in contact with the two members, one is semi-circular net and another is roll shaft having soft wooden core. Semi-circular net is a stationary member while the roll shaft of wood is rotating member. When the groundnut comes in contact with these two members then the shearing action takes place there. Due to shearing action (crushing) the groundnuts gets shelled and divided into two parts. i.e.in the kernels and outer shell of the groundnuts. There clearance is provided between the net and roll shaft. The clearance provided is depends upon the size of the groundnuts which is to be decocoted. After shelling the groundnut the kernels and shells of the groundnut gets dropped from the semi-circular net, in downward direction then a centrifugal force is applied by a fan on the kernels and shell of the groundnut. Due to more weight, the kernels gets moved downward and collected in the separator. But due to lighter weight the shell of the groundnuts are thrown outside the machine and which are collected from the backside of the machine. From the shelling chamber the unshelled groundnuts also gets dropped in the tray (7% to 10%). This groundnut gets dropped from the clearance made among the grill. The three kinds of the nets can be used with different size of capsule slots, size vies small, medium and large for various sizes of groundnuts. In this way the “GROUNDNUT DECORTICATOR” works.

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 12, December 2015

V. CAD MODEL

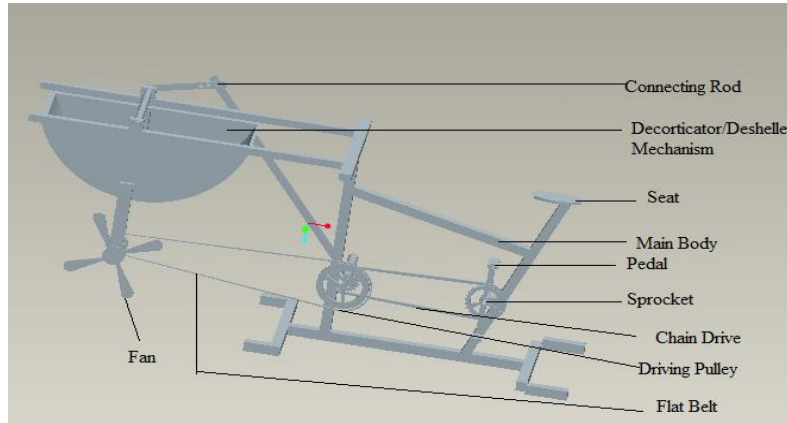


Fig. : CAD Model

VI.RESULT

As explained we have designed and fabricated manually operated groundnut decorticator which is peddle driven. For this the detail analysis of the mechanism and the fabrication of the above said model is designed and developed. We have successfully tested this model and found the fare results as compare to the existing hand operated groundnut decorticator. The efficiency is around 25% more as compare to hand operated groundnut decorticator.

TABLE 1: Result of Traditional Method

Sr. No.	Weight of groundnut seeds fed in trunk (kg)	Weight of peeled groundnut seeds (kg)	Weight of Unpeeled groundnut seeds (kg)	Effective time of peeling (min.)	Peeling Efficiency (%)
1	1.5	0.78	0.72	50	32
2	1.0	0.55	0.45	35	28
3	1.0	0.50	0.50	35	28

International Journal of Innovative Research in Computer and Communication Engineering

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Vol. 3, Issue 12, December 2015

TABLE 2: Result of Pedal Operated Groundnut Decorticator

Sr. No.	Weight of groundnut seeds fed in decorticator (kg)	Weight of peeled groundnut seeds (kg)	Weight of unpeeled groundnut seeds (kg)	Effective time of peeling (sec)	Peeling Efficiency (%)
1	1.5	0.90	0.57	578	62
2	1.2	0.8	0.4	554	66
3	1.0	0.57	0.43	549	57

VII. CONCLUSION

We decided to minimize the drawbacks of traditional methods of groundnut decorticator. By designing a decorticator from which the seeds do not get damaged and it can be used for plantation. We have tried to reduce the cost of machine in this way the cost of production. The project is manual so that there is no energy consumption which helps to reduce the cost of production.

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