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# Elaborating The Importance of Manual Groundnut Shelling Machines in the Life of Farmer

**By**

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## Abstract

The use of groundnuts is expanding as a result of their high-fat content. Hand shelling groundnuts is a time-consuming process that causes hand discomfort and affects production in the hand shelling activity. There are multiple automatic and manual machines used only for groundnut shelling to achieve the complete groundnuts without damage, however, the cost of machines available on the market is high, so most people use a manual machine, which is time-consuming because they must individually blow the crush to acquire the groundnuts after shelling. However, because there is no manual option for blowing the crush, individuals utilize the same low-cost manual machine. With adequate analysis, the study focuses on analyzing the importance of such a machine that fits the requirements of small-scale manufacturers. The devices produced good results for dry and partly dried groundnuts. Therefore, it can be stated that the usage of a machine will expand in the next years because of the growing demand for peanuts in the market, thus people would use a machine that is inexpensive and provides additional benefits.

**Keywords:** Farming, Groundnut, Machine, Production, Shell.

## 1. Introduction

The majority of the people in India depend on agriculture as their primary source of income, making it the country's principal employment. Depending on the climatic circumstances, various crops are grown in various regions of the nation. Many different types of pulses, oilseeds, and grains are grown throughout the rabbi and Kharif seasons. Groundnut is the most often utilized oilseed among the several that are used in India to produce oil. Groundnuts are a source of oil, a staple item in the diet, and are utilized as snacks. No other seeds in the agricultural seed bank are as large as the peanut, which is similar in size to maize seeds. The groundnut's shell serves as both protection against environmental factors including insects, birds, excessive sunshine, and water, as well as a means of preserving its capacity for growth. The shell that is covering the groundnut seed must be removed before eating since it lacks flavor and can contain some dirt. Because the groundnuts' saturated fat is acquired by shelling them, they are a valuable source of oil [1]–[3].

Another agricultural semi-finished product is groundnut. In emerging nations like India, small-scale farmers cultivate groundnuts. The cost of a kernel is typically around double that

of a pod. One of the biggest issues with producing groundnuts, especially in our nation India, is the lack of processing equipment, particularly groundnut shellers. The employees initially separated the peanuts from their shells. Simply by using their hands, they decoct the groundnut and remove the peanuts from their shell. Due to the lengthy procedure, the production from this technology was relatively meager and could not satisfy market demand [4][5][6].

Since shelling groundnuts used to be a labor-intensive process that many people still execute, women in the family gather once a week to perform the work to obtain groundnut for usage on a weekly or monthly basis or to obtain the seeds needed for groundnut cultivation and manufacturing. People no longer have the time to sit down for a lengthy period and perform the manual shell removal task as a result of the way people live their lives changing with the times. The time-consuming job of removing the shell leads to the purchase of seeds from seed banks, and for daily use, it is purchased from the supermarket or food shop, where the labor of cracking groundnut shells and gathering groundnut seeds is done in a lot of tones. Therefore, the firm has large machines that perform the same task and sell such groundnuts to generate enormous profits. Because customers like groundnuts and their products more because of their flavor and characteristics, the factories that produce them are a lucrative portion of the groundnut industry [7][8].

Small automatic devices with good cooling systems [16]-[41] and divers alternative fuels [24], [34]-[35] that perform the same tasks that factories do for the brake shell are an alternative to factories. Depending on the needs of its engine or motor, the equipment is connected to an external power source that is linked to electricity, solar energy, or any fuel. The most farmer who had a big annual yield of groundnuts employed these automated devices. There are numerous models of these machines available on the market that are useful for small entrepreneurial shell-breaking work, but using such an automatic machine is out of the price range of the average person due to its high cost. As a result, there is a need for such a machine that is accessible to all. On the market, there is a device for manually removing groundnut shells without the use of an external power source [9][10].

**Figure 1.** *Represents the Manual Groundnut Shelling Machine [Source- Indiamart.com]*

The manual machine is tiny and compact, light in weight, and low maintenance, making it simple for the average person to purchase a machine that produces groundnuts of any size. [16]. This will allow the groundnut producer to increase productivity without experiencing hand discomfort, as illustrated in Figure 1. [17][18]. Groundnuts are separated from the collected shell using air that is either naturally blowing or being forced under a fan. The manual equipment is very simple to use, requires less time to complete the groundnut shell removal activity, and is utilized less frequently in such a procedure. [19][20]. Still, many people are unaware of this device and have experienced negative effects from using it. For example, some claim that the machine crushes the groundnuts as it processes them, reducing the rate at which they can be sown, while others claim that the machine improperly removes the groundnuts' shells, while still others claim that the machine's size is incompatible with a strainer.[21][22]. This study conducts extensive research and analysis on manual machinery to develop and construct a groundnut shell removal device. [23]

## 2. Review of Literature

Sheng et al., (2022) [11] stated that both ground nut shells (GNS) and coir are agricultural byproducts that are readily accessible in huge numbers at a cheap cost. Furthermore, both are resources that are sustainable and renewable. To increase the performance attributes of the gypsum-based fake ceiling tiles, shells and coir were used as reinforcement on their own and also as blends in the manufacturing process. Several different combinations of the shells and coir were mixed with gypsum and formed into tiles. The morphology of the samples, flammability, thermal and acoustic absorption, and flexural characteristics over a range of temperatures and humidity levels were evaluated. In comparison to pure gypsum, the addition of groundnut shells did not enhance the material's strength or modulus; however, adding 10% coir resulted in a 35% increase in the material's strength. As a result, hybrid gypsum composites were produced that include both shells and coir, resulting in improved characteristics in comparison to pure gypsum and commercially available gypsum boards. The hybrid composites exhibited distinctive sound absorption peaks and had a greater thermal resistance ranging from 0.092 to 0.150 m2k/W. Because of the reinforcement's ability to give a very high resistance to humidity, it seems that bio-based ceiling tiles will be suited for use in a wide variety of environments. The qualities of commercially used gypsum-based tiles that are comparable to hybrid GNS and coir-reinforced gypsum boards are matched or exceeded by those of the hybrid boards. Shells, coir, and other leftovers provide a sustainable and environmentally friendly alternative to gypsum that may be used to replace false ceilings, divider panels, and other purposes.

Pohane et al., (2020) [12] analyzed that the majority of attention in the world is now being paid to newly developed technologies and innovations, and everyone is working to bring themselves up to speed. Farmers are an essential aspect of any nation's economy and society; without them, daily life would look considerably different. On their farms, farmers tend to a wide variety of plant species and cultivars. One of them is called groundnut. The majority of groundnuts are farmed on a modest scale by the farmer. The primary obstacle facing groundnut production in countries like India is a deficiency in the number of peanut processing equipment that is made accessible to farmers. In the beginning, employees would physically remove the peanuts from their shells before moving on to the next step. The output of this technology was extremely low, and since it was such a time-consuming procedure, it was unable to satisfy the demand that was currently on the market. This project primarily focuses on eliminating barriers that arise during the removal of peanut shells. With the assistance of this device, the time required to remove shells from peanuts is cut down, and the amount of manual labor required

is also decreased. This idea makes it easier for the farmers to do their job and has the potential to cut down on both time and expenditure. It is significantly effective while also having the potential to be provided at a reduced price.

Hoque et al., (2018) [13] examined that the groundnut shelling process in Bangladesh is performed manually, which is a hard task that takes a significant amount of time and is expensive. The use of mechanical power to shell groundnut seeds is one potential solution to this challenge. The sheller was constructed out of several materials such as an angle bar made of mild steel (MS), a flat bar made of MS, a rod made of MS, a sheet made of MS, a sieve made of MS, a rubber pad, etc. The percentage of groundnut kernels that were broken was 2% on average when the moisture level was 7.5%. (wb). The power groundnut sheller has winnowing effectiveness of 99%, according to the testing that was done on it. When compared to using a manual groundnut sheller, the usage of a power groundnut sheller may result in a cost savings of up to 76 percent during the shelling process. It is advised to use this power groundnut sheller for shelling groundnuts in Bangladesh at the farm level and the small industrial level.

Elakiya et al., (2016) [14] obsevered that Andhra Pradesh, Karnataka, and Tamil Nadu are responsible for around 45–50% of the overall groundnut output in India, which totaled 7.54 million tonnes in the 2010–2011 fiscal year. These states are home to a significant number of groundnut oil-producing companies. It is challenging to burn discarded groundnut shells under air conditions, which makes it difficult to dispose of the biomass leftovers that are left behind. People are forced as a result of this circumstance to concentrate on using renewable energy sources for trash disposal. Gasification is one of the methods, and it is a thermo-chemical reduction reaction that permits the conversion of groundnut shells into producer gas, which can then be utilized for the production of electricity. This technique is one of the ones that may be employed. Shells from groundnuts have a lot of promise both as a raw material for large-scale companies and as a raw material for community-level businesses that generate electricity. In light of the information presented above on groundnut production, it has been determined that the production potential per tonne of trash is 4905 kWh/ton and that the energy generated from waste is 2013 MW. Within the downdraft gasifier, optimization has been performed to increase the specific calorific value of the producing gas.

Ejiko et al., (2015) [15] studied that the demand for groundnut products is growing, and the degree of cleanliness of the nuts is a critical factor in determining their applications. The process of separation is often a time-consuming and labor-intensive endeavor that demands a significant amount of effort. Equipment called a shelling machine was designed so that the nuts could be successfully removed from their shells. The machine utilizes an auger screw as the method of shattering the groundnut pod to accomplish this task. A shelling chamber, a separating chamber, and a motor make up the essential components of the machine (1HP). A compound belt of type B standard V-belt with a pitch length of 1694mm is used to link the various components that make up this configuration. According to the Von-Mies equation, mild steel is assumed to be the appropriate material for the shelling shaft. The components that go into the machine's construction come from the surrounding area, which helps to keep the final product low-cost, accessible, and simple to repair for the low-income farmers who use it. When shelling groundnut seeds that are 86.5% dry, the shelling efficiency is 84%, even though the material damage is 14%.

### *2.1 Comparison of reviewed techniques*

The following study expands on the previous Elaborating the Importance of Manual Groundnut Shelling Machines in the Life of Farmer; several researchers explain their findings as seen in table 1 below.

**Table 1.** *Comparison of reviewed technique*

| 0 | Technique | Outcome |
|---|---|---|
| Sheng et al., (2022) [11] | Mechanized Sheller method | The hybrid composites exhibited distinctive sound absorption peaks and had a greater thermal resistance ranging from 0.092 to 0.150 m2k/W. |
| Pohane et al., (2020) [12] | Groundnut Shelling machine | The output of this technology was extremely low, and since it was such a time-consuming procedure, it was unable to satisfy the demand that was currently on the market. |
| Hoque et al., (2018) [13] | Groundnut Shelling machine | The power groundnut sheller has winnowing effectiveness of 99%, according to the testing that was done on it. |
| Elakiya et al., (2016) [14] | Groundnut Shelling machine | Optimization has been performed to increase the specific calorific value of the producing gas within the downdraft gasifier. |
| Ejiko et al., (2015) [15] | Groundnut Shelling machine | When shelling groundnut seeds that are 86.5% dry, the shelling efficiency is 84%, even though the material damage is 14%. |

## 3. Discussion

Groundnut shelling machines have been the subject of much investigation because of their unique operating principles. The majority of factory equipment is large and expensive compared to other equipment since a factory's collection of equipment together forms a plant. Although automated machines are good at what they do, adding a motor or engine to boost performance raises the machine's price as shown in Figure 2. Despite the market's abundance of equipment, not everyone can afford to purchase them. Despite the existence of manual machines run by humans, it is time-consuming and impossible to remove groundnut shells.

**Figure 2.** *Represents the Manual Groundnut Shelling Machine for Small Scale Farmers [Source: shellermachine.com]*

A manual peanut sheller is intended for shelling peanuts and entirely separating the peanut seeds and husk. It is made to shell raw, sun-dried groundnuts and uses a specific construction to break the hard shell and peanut kernels. It has a small, sturdy design and produces little noise. The groundnut thresher has several benefits, including being efficient and

affordable. In some parts of Africa, groundnuts, often known as peanuts, are a significant cash crop and a significant protein source for rural residents. Numerous African farmers employ physical labor to cultivate peanuts on their plantations. This labor-intensive technique results in low revenue for farmers due to the low yield of the ground and the poor quality of the nuts. Many smallholder farmers shell groundnuts by hand, which requires a lot of labor and results in low productivity only just a few kilograms after many hours of shelling. However, one device that can support such farmers is the hand-operated peanut sheller. The tool is straightforward, effective, affordable, and simple to use.

Farmers benefit from the manual peanut sheller's reduction in processing time and costs both for commercial and seed shelling. Hand shelling the nuts results in 7–10 kg of skinned nuts each day, while the sheller can process 40–50 kg of nuts per hour. Because shelled nuts generate twice as much revenue as unshelled nuts, it may enhance farmers' profits. It is possible to quickly recoup the initial investment, frequently in the first year of business shelling. The manual peanut sheller is a piece of hand-operated agricultural equipment that promotes environmental protection and sustainable development while consuming no electricity. The machine experiences very little damage or wear and tear. People of all ages may operate the manual peanuts thresher with minimal trouble. Additionally, because it is manually driven, there are no fuel or electricity costs. The machine is just relatively large, so it doesn't take up much room. Long service life and reliable performance. The design of the peanut sheller device is straightforward, safe, and adjustable.

The manual sheller is an easy-to-use, rectangular device with a semi-circular core section that is covered by a hollow metal plate. This is where the shelling is done. The groundnuts are shelled by a moving shelling roller that is positioned above it and is supported with hinges on either side. When shelling groundnuts, it is recommended that the farmer lift the mobile sheller with one side to provide a spout through which the nuts can be emptied into the main circular shelling area. A farmer must first set up a tarpaulin just on the ground and underneath the shelling machine to catch the nuts and their shells.

So that everyone can acquire it, there is a requirement for a manual machine to operate at a reasonable cost and a shell-blowing device such as a blower or fan to extract the shell from the groundnut. Due to the high-fat content of groundnuts, their use is expanding daily. The laborious process of manually removing groundnut shells causes hand discomfort and decreases productivity when done by hand. The majority of people use the manual machine, which is time-consuming because after shelling, they must manually blow the crush to acquire the groundnuts. There are numerous automatic and manual machines being used for groundnut shelling to achieve the complete groundnut without destruction, but the cost of machines available on the market is high and everyone cannot afford them. However, because there is no option for manually blowing the crush, individuals utilize the same manual, inexpensive machine. Therefore, a manual device that not only breaks the shell but also blows it off the groundnuts is required.

## 4. Conclusion

The use of over-dried groundnuts is discouraged since they are less effective and crumble quickly under light pressure. Additionally, using wet groundnuts in the process should be avoided since they have soil on the shelling and increase the likelihood of groundnuts being damaged. The research focuses on creating a machine that meets the needs of small-scale manufacturers using accurate analysis. As there is less soil and the shelling is also able to blow

freely, the results of utilizing the machines for dry and partially dried groundnuts are reasonably satisfactory. As a result, it can be concluded that in the next years, individuals would use more machinery as a result of the market's rising demand for groundnuts, choosing models that are less expensive and offer more advantages.

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