

“Design and Fabrication of Pedal Operated Groundnut Decorticator Machine”

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ABSTRACT : In India, groundnut is grown on a small scale by farmer. The major problem in groundnut production in our country like India is the lack of groundnut processing machines available to farmers. The main aim of this project is to design and fabricates a low cost groundnut decorticator machine which will help small farmer to decorticate finished groundnut instead of unfinished groundnut. This groundnut decorticator machine works on quick return mechanism main working of this project. In which we made a pendulum with rubber pad is fitted on a shaft. The rubber pad is used for free crushing of groundnut and to reduce the damage of groundnut. If we go on continuous work we get greater output in very short time. The study reveal that pedal operated groundnut decorticator gave an output of 49 kg/hour which was more than hand operated decorticator. This machine requires less effort to decorticate groundnut with higher output. The performance of machine was evaluated in terms of throughput capacity, decorticating efficiency and damage percentage. By keeping this point in our mind we think that we should make such machine whose production capacity is more and machine get pedal operated. The small scale farmers and can start their business by investing less capital.

Keywords: Efficiency, Fabricate, Decorticator, Groundnut.

I. INTRODUCTION

Groundnuts are a high value crop that can be marketed with little processing but are extremely versatile and can be used in a wide range of products. The oil can be used for cooking, it can be used as a shortening or as a base for confectioneries and to make peanut butter. There are two type's groundnut, a bush and a runner. Hybrids of the two varieties have been developed and are commercially available. The pods of the bush variety contain one or two kernels in a thin shell. The runner variety has one to three kernels in a thicker shelled pod. Groundnut decorticator is a device that shells groundnut pods and separate kernels by rubbing action. Groundnut is major oil seed crop in india and it plays a major role in bridging the vegetable oil deficit in the country .India is second largest producer of groundnut in the world. India is agriculture country. In india near about 70-72% of the population living in rural areas. Their occupation is farming.in india farming is done with the help of traditional methods. Groundnut is a major oil seed crop grown in the state; it occupies about 10.8% of total cultivated area and 32.5% of the total area under oil seed crop in Tamilnadu.Contributing 53% of total oil seed production in the state. Groundnut is avaluable source of edible oil (43-55%) and Protein (25-28%) for human beingsand fooder for live stock. About two third of world production is crushed for oil and one third is consumed as food.

Decorticating of groundnut can generally be done by hand and machine. In hand operated method only one person can decorticate 2 to 4 kg of groundnut per hour that rate of production reduces and the number of workers are increased. Hand operated groundnut decorticator require more energy and output got from this method was very less. It does not fulfil market demand because it was very time consuming process. This new pedal operated machine can give higher output than hand operated machine. This is a simple mechanism machine which can be made easily from sourced material and we have tried to reduce the cost on less as possible.

II. TYPES OF DECORTICATOR

2.1 Hand Operated

Hand operated groundnut decorticator consists of curved 'L' angle frame and four legs. A perforated sieve in a semi circular shape is provided. Seven cast iron peg assemblies are fitted in an oscillating sector. The

groundnut pods are shelled between the oscillating sector and the perforated concave sieve. The kernels and husk are collected at the bottom of the unit. The clearance between the concave and oscillating sector is adjustable to decorticate pods of different varieties of groundnut. The sieve is also replaceable according to the variety of groundnut pods. [8]

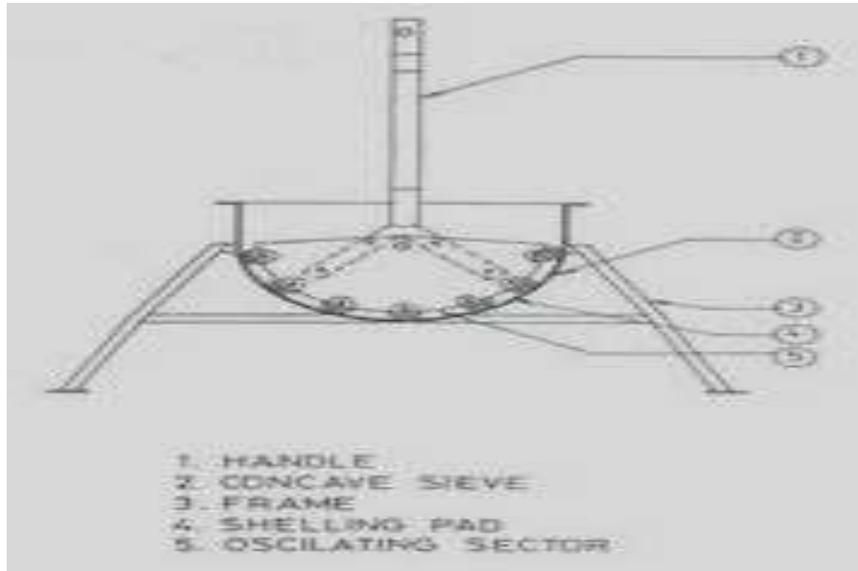


Fig1: Hand operated groundnut decorticator [8]

2.2 Power Operated

The unit consists of a hopper, double crank lever mechanism, an oscillating sector with sieve bottom and blower assembly, all fixed on a frame. A number of cast iron peg assemblies are fitted on the oscillating sector unit. The groundnut pods are shelled between an oscillating sector and the fixed perforated concave screen. The decorticated shells and kernels fall down through the perforated concave sieve. The blower helps to separate the kernels from the husk and the kernel are collected through the spout at the bottom. The shells are thrown away from the machine. [8]

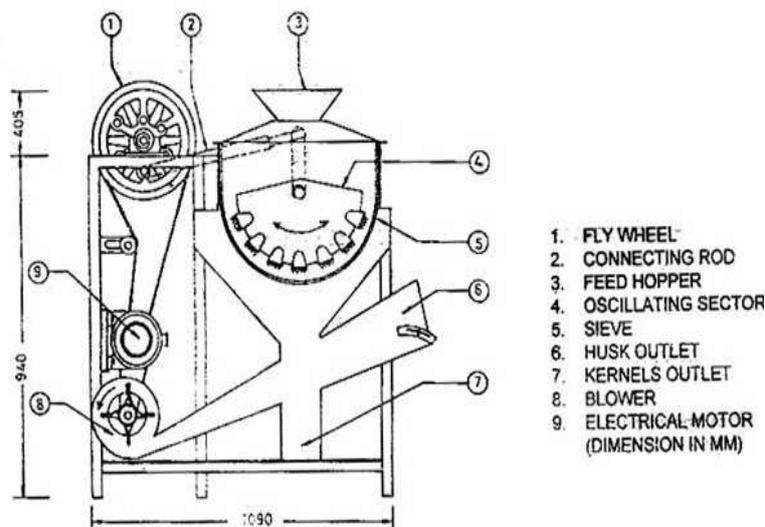


Fig 2: Power operated groundnut decorticator [8]



Fig 3: Actual model of pedal operated groundnut decorticator machine

Existing Machine



Fig 4: Actual model of hand operated groundnut decorticator [7]

III. TRIAL AND OBSERVATION

S.N	Total weight of groundnut in kg (Qt)	Weight of decorticate groundnut in kg (Qs)	Weight of undamaged groundnut in kg (Qu)	Weight of damaged groundnut in kg (Qd)	Time to decorticating operation in sec (Tm)
1	2	1.184	1.074	0.110	147
2	2	1.182	1.072	0.112	145
3	2	1.181	1.07	0.114	142

Table 1.: Trial for pedal operated groundnut decorticator

Sample is bought from market. It is sun dried for one day to remove moisture content. Sample contains undecorticating groundnut and some oil adhered to decorticate. We decide one sample and trialing can do for three samples. In trial table following parameters are mentions Total weight of groundnut in kg (Qt),Weight of decorticate groundnut in kg (Qs),Weight of undamaged groundnut in kg (Qu),Weight of damaged groundnut in kg (Qd) and Time to decorticating operation in sec (Tm).

From trial we observed that we can save time, money and increase in efficiency by using pedal operated groundnut decorticator machine. In this if we put 2kg of groundnut in machine then we got output of 1.184kg of kernels or decayed seeds. If we put input in large amount then we got the output from machine with minimum wastage.

IV. RESULTS AND DISCUSSIONS

Calculations for sample of groundnut

- 1) Decorticating efficiency = $(Q_s/Q_t) \times 100$
= $(1.184/2) \times 100$
= 59.2%
- 2) Material efficiency = $(Q_u/Q_u+Q_d) \times 100$
= $(1.074/1.074+0.110) \times 100$
= 90.70 %
- 3) Mechanical damage = $(Q_d/Q_u+Q_d) \times 100$
= $(0.110/1.074+0.110) \times 100$
= 9.29 %
- 4) Throughput capacity = (Q_s/T_m)
= $(1.184/147) \times 100$
= 48.32 %

The pedal operated groundnut decorticator is ready for decorticating of groundnut. The above results show that our machine can decorticate 59.1 % groundnut with 9.29 % damage. The pedal operated groundnut decorticator machine capacity is 48.32 kg per hour.

Advantages

- 1) Cost of machine is less as compared with automated machine.
- 2) Simple maintenance
- 3) No need of skill labours.

V. CONCLUSION

Based on it is concluded that, the pedal operated groundnut decorticator machine is better option to use farmer instead of hand operated. The machine is pedal operated so that there is no energy consumption which will help to reduce the cost of productions. This machine also saves time and manpower. If we go on continuous work we get a higher output in very short time. The operating procedure of this system is very simple, so there is no skill labour required to operate a machine.

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