

# RICE SEED SEPARATION MACHINE

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## ABSTRACT

In this project Portable Paddy Cleaning Machine is designed to remove foreign materials and impurities such as sand particles, stones, paddy straws and foreign seeds from paddy. This machine provides farmers an alternative replacement of current conventional method should the farmers want to extract the paddy seed in small scale amount. Currently, they only use a traditional winnow technique as to obtain the seeds to be used next season or before processing paddies to become rice. The performance of this machine is very efficient where the percentage of clean paddy is observed to be at 95%. It helps farmers improvise their traditional method, reduces purchasing cost of paddy seed and utilizes the cleaning process at low cost and less maintenance. Generally, the hand threshing and the traditional handling used in most developing countries case a larger percentage of foreign matter with the paddy. Thus, more efforts are required. At this point a rice mill separator removes any remaining foreign material that could damage the milling machinery and eliminates foreign material from the milled rice.

**Keywords:** Rice Dehusking, Corn shelar, Scotch Yoke Mechanism, V belt pulley

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## I. INTRODUCTION

Rice is one of the most important grains in India. It is the staple food of the people in the eastern and southern parts of the country. India is one of the world's largest producers of white and brown rice and produces 20% of the world rice production. As rice is the basic food crop and being a tropical plant, it flourishes comfortably in hot and humid climate. It is mainly grown in rain fed areas that receive heavy annual rainfall and thus it is fundamentally a Kharif crop in India. It demands temperature of around 250 Celsius and above and rainfall of more than 100 cm. Rice is used in manufacturing of alcohol, starch, glucose, acetic acid, vinegar, acetone, oil and pharmaceutical products and diet foods.

## II. RICE DEHUSKING PROCESS

Rice dehusking is a process of removing the husk and bran from the paddy rice and producing head white rice grains that are sufficiently milled, free from impurities and contains minimum number of broken grains. First process is of Harvesting. It is a process of cutting and gathering of

ripened rice crops. The rice crops are generally cut with the help of sickles and are then stacked at one place so as to allow them to dry in the sun for some days. The next step is separating the grains from the stock (culm). This process is called as Threshing. Threshing is done by beating the crop with the sticks so as to separate the grains from their stock or the straw. In big fields, it is done with the help of threshers.

## III. AIM AND OBJECTIVE

### Aim:

India has the highest production rate in production of rice in the world. But in India most of the seed separation methods are still using the traditional ways for separation, which requires more time as well as more man power.

So the Aim of our project is "To design the machine prototype which helps the separation of rice seed with minimum human effort and to increase the production rate

**Objectives:**

- To design and develop a machine which
- Takes less time for separating.
- Utilizes less man power.
- Is easy to operate.
- Is economical

**IV. LITARATURE REVIEW**

**Y.V. Mahatale and V.P. Pathak et al [1]:** “Physiological Evaluation of Different Manually Operated Corn Shelling Methods” Corn is the Third largest cereal produced in the world with a trend of rising production in India. The normal area for Corn in India was 77.27 lakh hectares with production about 150.91 lakh tones in the year 2007. Rajasthan has the largest area 10.62 lakh hectares under cultivation among all states with total production of 21 lakh tones. Four method of Corn shelling namely shelling cob grain by hand, octagonal Corn Sheller, hand operated Corn Sheller and beating by stick method were carried for removing Corn kernel from the cob. For ergonomically evaluation ten male agricultural subjects of 25-35 yr. age group were randomly selected for study. Present traditional method of shelling Corn has proved to be inefficient, laborious, time consuming and low output. The energy expenditure rate was highest for beating by stick method (3.84 kcal/min) and lowest for octagonal Corn Sheller (1.52 kcal/min). Traditionally Corn is threshed by shelling cob grain by hand and beating the cob by stick. At present Corn shelling has been improved by the use of tubular Corn Sheller and hand operated Sheller. The energy expenditure rate was highest for beating by stick method (3.84 kcal/min) and lowest for octagonal Corn Sheller (1.52 kcal/min). Energy expenditure rate for shelling cob grain by hand and octagonal Corn shelling operation could be scaled in “Very light” category of work load. Whereas the hand operated Corn Sheller and beating by stick method could be scaled as in “Light” category of work load. For Corn shelling operations octagonal Corn Sheller and hand operated Corn shelling are superior to shelling cob grain by hand and beating by stick Method.

**Ilori T. A., Raji A. O and et al [2]:** “ Modeling Some Ergonomic Parameters with Machine Parameter using Hand Powered Corn Sheller” In this paper the author studied about the economic situation in most developing countries have left farmers and processors operating at the small scale, hence the use of automated and electric power driven equipment is limited to the few large scale industries. The effect of the ergonomic parameters namely; weight, age, height and arm length in relation to the resulting efficiencies; shelling efficiency, cleaning efficiency, mechanical damage and percentage loss of a hand powered Corn Sheller were studied It was observed by the author that age is more correlated with weight than arm length. From the results obtained in this study, the following conclusions were drawn; the shelling efficiency increase with increases in weight of the operator and significantly with age and arm length. The weight of the operator has a great influence when driving the machine. The mechanical damage

observed from the performance evaluation has very low correlation with the ergonomic parameters

**Ashwin Kumar and Shaikh Haneefa Begum et al [3]:** “Design, Development and Performance Evaluation of a Hand Operated Maize Sheller” The author conducted a research on design, development and evaluation of hand operated Corn Sheller in College of Agricultural Engineering during the year 2012-2013. The traditional shelling methods are rubbing the Corn cobs against each another, rubbing on bricks or stone and by using iron cylinder consisting of wire mesh inside. These methods are time consuming involves drudgery. In view of this, the study was undertaken to design, development and evaluation of hand operated Corn Sheller. The Corn Sheller consisted of a cylinder and a concave. The cylinder made up of high carbon steel of size diameter 21 cm. The cylinder length 86 cm, having beaters which rotates along the cylinder and separates grains from the cobs. While the concave was fabricated using 5 mm size mild steel rods. The length of concave was 91 cm with slotted opening size of 30.3cm×2.5cm. It was observed by the author that for hand operated Corn Sheller at a moisture content of 12% w.b. and at a feed rate of 130kg/h, the shelling efficiency, unshelled percentage and visible damage was found to be 99.56%, 0.44% and 1.07%, respectively.

**Pratima Pandey, Jwala Bhattacharya et al[4]:** Influence of Corn Seed Processing with a Locally Produced Sheller on Seed Quality and Their Damage” The author says that corn is one of the most important staple crops in the world. It is also the second important food crop in Nepal, that more than 45% of the population in mid-hill and high-hills considers maize meal to be their survival food. Community Based Seed Production (CBSP) is a sustainable agricultural phenomenon implied in hill and high- hills of Nepal under the Hill Maize Research Program in collaboration with Nepal Agricultural Research Council (NARC); CIMMYT, Nepal; Directorate of Crop Development (CDD), with the objective to produce quality seeds of maize at local level and to increase the use of improved quality seeds and eventually increase the crop production. Maize kernels are in general shelled from the cob manually using hands. Manual shelling of maize is labor intensive and typically takes weeks and months for shelling the manual harvest. The mechanized alternatives to shelling maize by hand are available but they are often unaffordable for subsistence farmers. Wooden corn Sheller is a simple but traditional device made locally for shelling the maize kernels and distributed to CBSP farmers group. All data observed and analyzed in the present study reveals the corn Sheller is equally efficient and saved the time, labors and other resources. The corn Sheller could be used for maize processing and conditioning.

**V. DESIGN STRUCTURE**

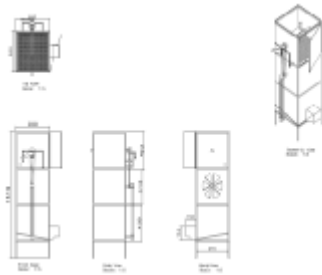


Fig1. Design model

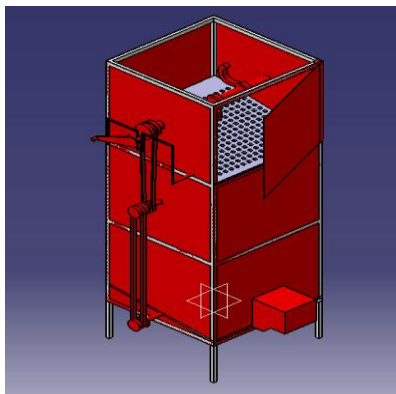


Fig 2. Catia design

**VI. RESULT**

- The design of this machine is such that a single operator can do the cleaning operation with ease.
- The main concern of the grain getting damaged in the existing cleaning machines is reduced considerably by this machine. Hence grain loss is minimized.
- This machine has a limited number of moving parts and hence requires less maintenance.
- The filtered paddy is collected directly in a gunny bag using a hopper and hence no scattering takes place as in the case of conventional method.
- The machine is cheap and easily affordable by the farmers.

Test no	Conventional System	Designed System
1	Human time for separation - 3 min	Clamping time -10 sec
		Rotation time for 4 rotation -50 sec
		Total time -60 sec = 1 min
2	Human time for separation - 3 min 30 sec	Clamping time - 8 sec
		Rotation time for 4 rotation - 45sec
		Total time - 53sec

Table 1. Result

**VII.CONCLUSION**

Quality seed is one of the most important input for enhancing crop production and productivity. The gap between the availability and the requirement of quality seed is quite high in the country and therefore needs proper attention. Hence, the efforts of central government to encourage the farmers/entrepreneurs for quality seed production and processing by providing subsidy is time driven and would prove to be a worthy exercise in meeting the country’s need in the agricultural sector.

The project has been proposed with the aim to establish a 2 kg per hour capacity seed Separation plant. As is evident from the financial analysis that the project is sound and estimated results are encouraging and hence the project may be considered for boosting seed Separation rate in private sector.

**REFERENCES**

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[3] B. Ashwin Kumar and Shaikh Haneefa Begum, “Design, development and performance evaluation of a hand operated Maize Sheller”

[4] Pratima Pandey, Jwala Bhattacharya and S Pokhare”Influence of corn seed processing with a locally produced Sheller on seed quality and their damage”