

Literature Review of Corn Sheller Machine

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Abstract

Corn is grown on small scale by farmers in developing countries like India. Corn is sold by farmers with cob. The average kernel price is approximately twice the price of cob. Hence, more income can be generated by farmers if corns are decorticated and kernels are sold by themselves in the market. But this requires a cheap, manually operated and efficient corn Sheller. Lack of corn processing machines i.e. corn Sheller, is a major problem of corn production, especially in our country India. A study designed, fabricated, and performance of a corn Sheller consisting of feed hopper with a flow rate control device, shelling unit, separating unit and power system. The performance of the machine was evaluated in terms of throughput capacity, shelling efficiency, material efficiency and mechanical damage. Regression models that could be used to express the relationship existing between the Sheller performance indices, moisture content and feed rate were established.

Keywords: Corn, Sheller Machine, Design, Fabricated, Efficiency

I. INTRODUCTION

In India, Corn is emerging as the third most important crop after rice and wheat, and it has significance as a source of a large number of industrial products besides its use as human food and animal feed. Corn is also a versatile crop, allowing it to grow across a range of agro-ecological zones. In our country, most of land use for agricultural purpose which produces semi-finished products. Corn also is one of the agricultural semi-finished goods. Every part of Corn has economic value as the grain, leaves, main crop stalk, tassel and cob can all be used to produce a large variety of food and non-food products. In India Corn is grown in all the seasons, i.e., kharif, Rabi and summer. After harvesting with sickle and plucking of cob manually, dehusking of cob is done by hand to remove its outer sheath and further grain is obtained by shelling the cob traditionally, i.e. by beating the dehusked cobs with sticks or with fingers or sickle, etc. This activity is mostly done by farmer women.

In our country, most of the farmers shell corn by mainly three methods namely shelling cob grain by hand; hand operated corn Sheller and beating by stick method were carried for removing corn kernel from the cob. The Corn shelling was designed and built to improve the standards of living of people living in villages of developing countries. There are several electrical operated Corn shelling machines for mass shelling. Mostly farmers used to take their unshelled Corns to such industries where they get their final product that is shelled Corn and then they used to sell this product to the market. This incurred the cost of transportation between farms to machine industry increase the cost of product. Most of contractor used to give less cost for unshelled Corn and they got the profit of shelled Corns. The problems are similar and manifold. Part of the solution to these problems lies in the evolution of an Intermediate Technology i.e. Low capital, labour-intensive, locally based. This concept of a technology more appropriate to the needs of developing countries can be applied equally well to agricultural mechanization. The problems of underdevelopment are particularly acute in the rural areas of countries, where the poorest people live and where agricultural underproduction and migration has most effect. This synopsis on the design and fabrication of motorized operated Corn shelling machine that will remove corn from corn kernel.

II. LITERATURE REVIEW

Corn shelling is always a typical job as it needs precision and carefully shelling of Corn, so as the Corn wouldn't break while shelling. Shelling manually is inefficient process. We are trying to make a power operated machine which can improve productivity and aids of profit of shelled Corns and reduce effort. So following literatures were studied for designing of our project model.

A. Y.V. Mahatale and V.P. Pathak "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 than shelling cob grain by hand and beating by stick Method.

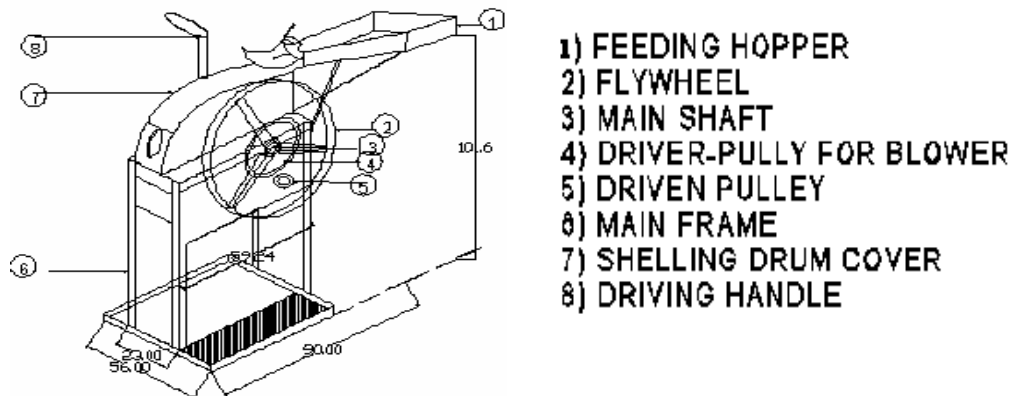


Fig. 1: Corn Shelling

B. Ilori T. A., Raji A. O and O. Kilanko "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.

C. B. Ashwin Kumar and Shaik Haneefa Begum "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 other, 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.

D. Pratima Pandey, Jwala Bajrachrya and S Pokharel" 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, labours and other resources. The corn sheller could be used for maize processing and conditioning.

E. Oriaku E.C, Agulanna C.N, Nwannewuihe H.U, Onwukwe M.C and Adiele, I.D “Design and Performance Evaluation of a Corn De-Cobbing and Separating Machine”

Here the author told that, Agricultural products like maize, soya bean, millet and rice, when processed into quality forms not only prolongs the useful life of these products, but increases the net profit farmers make from mechanization technologies of such products. One of the most important processing operations done to bring out the quality of maize is de-cobbing or threshing of maize. Consequently, a de-cobbing and separation machine was designed, fabricated and its performance evaluated. Corn at moisture content of 15.14% db sourced locally was used in the experiment and the data collected were analyzed. Results showed that for a total 20kg of sample tested, the average feed and threshing time were 2.37 and 2.95 minutes respectively. The average feed and threshing rates were 2.06 and 1.65 kg/min with an average threshing efficiency of 78.93 %. The average separation efficiency was 56.06 %. These results indicate that threshing and separation can be performed out satisfactorily with the designed machine and it can be used to process about 1 tonne of maize per nine-hour shift.

III. CONCEPT

Introducing low cost automation was to overcome problems with the current manual traditional method. In mechanism there are a numbers of uncertain shelling machine such as hand operated corn. The concept of the work is,

- 1) Observe the manual methods to identify the important process variables.
 - 2) Quantify the important method.
 - 3) Develop a prototype automation system which could control over all of the process.
 - 4) Investigate all areas of automated forming.
 - 5) Produce a specification for a low cost automated system.
 - 6) Refined design of the machine & fabricate the machine, as this plays a major role in rural area.
- The above considering point we design the semi-automated machine which replace manual process

IV. OBJECTIVE

The main aim of this project is to overcome the traditional method.

- To increase the efficiency.
- To reduced the hard work.
- To reduced time to shell the CORN.
- To develop a low cost machine which can be used by farmer to convert their semi-finished (CORN) into finished product (Corn)
- It satisfies the need of village people to earn more money.

V. CONCLUSION

There is a lack of automatic operated, efficient and cheap Corn Sheller machine in market, which can be afforded by poor and marginalized farmers in developing countries. Performance of Sheller machine depends on moisture content in Corn, material feed rate and speed of blade. Sheller is design based on physical and mechanical properties of Corn

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