

A RESEARCH ON PEELING-SHELLING COMPACT COMBO MACHINE

Mr. Abhijeet Y. Kedge [1] **Mr. Arjun B. Mane** [2] **Mr. Nadeem H. Nadaf** [3]
Mr. Rahul A Devarshi [4]

*U.G. Students of Mechanical Engg, PVPIT
Sangli - Vita Road, Budhgaon, Sangli, Maharashtra 416304*

Prof. Pradip V. Kadam

Asst. Professor, Mech. Engineering Dept, PVPIT

Prof. N. V. Hargude

*Associate Professor, Mech. Engineering Dept, PVPIT
Sangli - Vita Road, Budhgaon, Sangli, Maharashtra 416304*

-----***-----

Abstract: *This paper is an attempt to focus mainly on reducing human efforts and time saving owing to minimum manufacturing cost. This paper also focuses on research of corn peeling and shelling compact combo machine which helps to all common farmers, industrialist to minimize cost and rate of manufacturing of corn kernels and also the attempt is to make a machine which is compact in size and more reliable.*

Keywords: Maize, Peel, Shell, Compact, Combo

1.INTRODUCTION:

In India, Corn is 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.



Fig - 1 Maize or Corn

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.

2.LITERATURE REVIEW:

2.1 Girish Karikatti et al^[1] This paper focuses on a “Crank Operated Maize Sheller” using ergonomic and mechanical considerations for dehusking and shelling. Traditionally most of the shelling work was done by hand. There were hand operated maize shellers which were cumbersome to use. Traditional shelling is time consuming and there is a problem of laborers and their wages.

2.2 S. B. Patil et al^[2] This paper focuses on a pedal operated maize Sheller design, developed and built by using locally available material with overall dimensions of 1270×760×1150 mm. The driver of the machine started pedaling by sitting on the seat provided and the driver started pedaling the four shelling units started rotating. The driver and other worker were picking up the cobs from the buckets placed on either side and put them into the rotating shelling units by their both the hands. The rotating motion of the shelling unit shell out the kernels and detached kernels fall on the kernel collection trays from where they got collected through collection chute in the bag or container placed below the collection chute.

2.3 Earl Milton Ladd et al^[3] This paper focuses on the primary function of the pickup conveyor which is to remove the whole and partial ears of corn from the ground and place them on the combine header. The primary function of the pickup conveyor is to remove the whole and partial ears of corn from the ground and place them on the combine header. Through field testing, it was found that for a pickup conveyor to be versatile enough to adapt to the different operating conditions

2.4 Anant J. Ghadi et al^[4] This paper focuses on the existing methods of corn de-husking in agriculture industry. The existing methods of corn de-husking in agriculture industry consist of breaking the grains by hand or by using large machinery for deseeding, both of which are not effective for a developing economy like India where farmers have little money for investment. Hence there is a need for an innovative idea or product that is feasible, safe, cost effective and productive for the Indian farmer.

2.5 Adewole, C. A. et al^[5] This research work evaluates some locally fabricated maize shelling machines. The shelling efficiency ranged between 85.9 and 89.7 % with an average value of 88 %. The throughput capacity ranged from 318.4 kg/h. The machines used for shelling maize were constructed without any prior design or consideration of engineering properties of the input materials.

2.6 Anirudha G. Darudkar et al^[6] This review mainly focuses on various sources to increase the income of farmers. The average kernel price is approximately twice the price of cob. Hence, more income can be generated by farmers if cobs are shelled and kernels are sold by themselves in the market. 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 aids of profit of shelled Corns and reduce effort.

2.7 Praveen Kiran Mali¹ et al^[7] This literature report is review on human powered machine, the survey proved to system which shows cost effective and functional viable. The Pedal Operated Energized Flywheel Motor has been adopted for many designs of rural Applications in the last two decades In recent past a pedal powered process machines has been developed for wood turning.

1. LITERATURE GAP:

By referring to above various research papers we found that there is no any such machine available which both the peeling and shelling and which is compact in size.

2. PROBLEM DEFINITION:

One of the major economic issues faced by the country is agriculture as this is the sector which is source of livelihood for about 54% of Indians till date. Still today this sector is not well developed and faces lots of problems resulting into low productivity of crops. As 43% of land in India, is used for farming but contributes only 18% of the nation's GDP. The poor condition of agriculture in the country is the point of concern for Indians. The rural farmers in India suffer from poverty and most of them are illiterate so there is lack of good extension services.

Now a day's workers are not available for agricultural work on time. And working capital of agriculture process is increased. Hence, increase in production cost will increase for final price for end customer.

In today's industrial world man's innovative ideas has taken him towards all directions concerning about the production and safety in industrial establishments. Some instruments are of sheer excellence where as others are the result of long research and persistent work, but it is not the amount of time and money spend in the invention of device or the sophistication of it operation is important, but its convenience, utility and operational efficiency that are important in considering the device.

In spite of the large scale mechanization of agriculture in some parts of the country, most of the agricultural operations in larger parts are carried on by human hand or by using simple and conventional tools. Little or no use of machines is made in peeling and shelling or deseeding the maize. This is specially the case with small and marginal farmers. It results in huge wastage of human labour and in low yields per capita labour force.

3. AGRICULTURAL SCENARIO:

There is urgent need to mechanize the agricultural operations so that wastage of labour force is avoided and farming is made convenient and efficient. Agricultural implements and machinery are a crucial input for efficient and timely agricultural operations, facilitating multiple cropping and thereby increasing production.

So by considering all the points mentioned above it is a need to develop a machine which is compact in size, affordable to all and used to increase the productivity of crops. Hence we have tried to make an automatic corn she 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 establish.

4. CONSTRUCTION AND WORKING:

6.1 Construction:

Both the mechanisms are mounted on the steel frame. The peeling mechanism is located on top of the frame where as the shelling mechanism is located at bottom of the frame. A hopper is provided on the top to safely feed the corns for peeling. The process starts with the peeling mechanism which consists of four rollers. The two central rollers are feed rollers and the outer rollers are provided with spikes for peeling. The mild steel rod of 8mm diameter is wound on central rollers to provide feed mechanism as well to push the corn on adjacent rollers. The all the four rollers are supported with the pedestal bearing at both the ends. For smooth and continuous running of the machine a opening door is provided on the top in case if any corn is stuck between the rollers. A gear pair is used for driving both the central rollers and the power to one of the gear is transmitted form motor and intermediate shaft-pulley attachment. A outlet is provided at the bottom of the peeling mechanism for the shell of the corn to fall off.

After the peeling operation it is necessary that the corn should be properly fed to the shelling mechanism. A passage in provided for this purpose. The passage is a converging one so that only one corn passes at a time to the shelling mechanism to avoid any blockage in shelling.

The shelling mechanism consists of roller for feeding the corn. The roller is wound with mild steel bar same as that in peeling mechanism. The area between the covering and the roller goes on decreasing gradually. Teeth are fitted inside the shelling mechanism. The teeth are cut on a semi cylinder. A plate is provided for resistance which helps for deseeding. Due to the friction between the corn and the teeth the seeds of the corn are deseeded.

6.2 Working:

When the machine is switched on the rollers start rotating. Then the corn is fed through the hopper. The center rollers function as the feeding rollers as well as they help peeling of the shell by pushing the corn on adjacent spiked rollers. It also supports the corn and keeps it between the rollers. After peeling the corn moves forward and falls in the second hopper. The second hopper is provided with a passage which leads the corn to the shelling machine. The passage is a converging one so that only one corn passes at a time to the shelling mechanism to avoid any blockage in shelling.

For the ordinary corn Sheller machine, its working principle and inner structure has always been in focus.

Corn Sheller machine mainly consists of the shelling cylinder. The shelling cylinder has tooth form like structure and the spike tooth has short and thick cylinder or spiral column shape.

When corn Sheller machine is working, corncob is fed through the feeding hopper. Then the roller spike tooth kneads and removes the corn kernels. Corn kernels drop through the sieve and corn kernels are discharged through the grain discharging outlet. Then the corncob moves forward along with the roller axial direction, until discharged out of the corn Sheller machine.

In deseeding sector of machine, shelled corncob from shelling mechanism of machine is given for deseeding process. The tooth picked like structure of circular plate causes corncob to deseed as it starts to rotate. This circular plate causes deseeding process and after deseeding of corn unuseful corncob part is removed away from machine and useful corn seeds are collected in tray.



Fig- 2. Working Model

5. CONCLUSION:

The proposed work aims to develop a machine which helps to reduce the human effort and cost of the machine and also suitable for small scale industries. Simple machine construction and better features developing a machine in compact size which peels the shells of the corn and also deseeds the corn in less time.

6. FUTURE SCOPE:

The corn peeling and shelling combo machine can be converted into a pedal operated machine

Provision for peeling and shelling of fresh corn can be made.

References:

1. Girish Karikatti¹ Jangali Satish J² Anjali Kathani³ Roopa Lokeshwar⁴ Sameer Sattur⁵, "Crank Operated Maize Sheller" Vol. 3, Issue 04, 2015 | ISSN (online): 2321-0613
2. S. B. Patil, A. D. Chendake, M. A. Patil, S. G. Pawar, R. V. Salunkhe, S. S. Burkul, "Development And Performance Evaluation Of Pedal Operated Maize Sheller", Volume 2, Issue 9, 561-567.
3. Earl Milton Ladd, Jr., B.S., "A Mechanical Design For Recovery Of Corn From Field Residue", A Thesis In Agricultural Engineering Submitted to the Graduate Faculty of Texas Technological College May, 1969 AC 805 M(7. 29)
4. Anant J. Ghadi and Arunkumar, "Design, Development and Fabrication of a Low Cost Corn Deseeding Machine", Volume: 03 Issue: 08 ISSN: 2319-1163 | ISSN: 2321-7308 | Aug-2014
5. Adewole, C. A., Babajide T. M, Oke, A. M., Babajide, N. A. Aremu, D. O. and Ogunlade, C. A., "Critical Evaluation of Locally Fabricated Maize Shelling Machine", Volume 4, Issue 2, ISSN: 2319-5967 March 2015
6. Anirudha G. Darudkar Dr. C. C. Handa, "Literature Review of Corn Sheller Machine", Volume 2 | Issue 01 | June 2015 ISSN (online): 2349-6010
7. Praveen Kiran Mali, Dr. C. N. Sakhale, S. D. Shelare, "A Literature Review On Design And Development Of Maize Thresher", Volume 3 (9): 9-14, ISSN: 2319-507