IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 11 Issue 02, February 2024
ISSN (Online) 2348 – 7968 | Impact Factor – 6.72
www.ijiset.com

Fabrication of Solar Peanut Sheller

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ABSTRACT: Groundnut is the sixth most important oilseed crop in the world and it is belongs to beans family. Shelling is a fundamental step in groundnut processing and it can be done by hand or machines. Hand shelling process is labour intensive, slow and tiresome. Numbers of groundnut Sheller machines are available in the market but they are large in size, costly and not suitable for domestic applications, they are best suitable for industrial applications where mass production is required. Hence it is essential to design and fabricate a portable groundnut Sheller machine for domestic application.

KEYWORDS: Groundnut separation , solar power -renewable energy.

I. INTRODUCTION

The groundnut or peanut is one of the important legume crops of tropical and semiarid tropical countries, where it provides a major source of edible oil and vegetable protein. Groundnut kernels contain 47-53% oil and 25-36% protein. The crop is cultivated between 40ºN to 40ºS of the equator. Groundnut is a self pollinated crop whereby flowers are produced above ground and, after fertilization, pegs move towards the soil, and seed-containing pods are formed and developed underneath the soil. The productivity of groundnuts varies from 3500 kg/ha in the United States of America to 2500 kg/ha in South America, 1600 kg/ha in Asia, and less than 800 kg/ha in Africa. This is due mainly to various abiotic and biotic constraints. Abiotic stresses of prime importance include temperature extremes, drought stress, soil factors such as alkalinity, poor soil fertility and nutrient deficiencies.

II. SOLAR PANEL

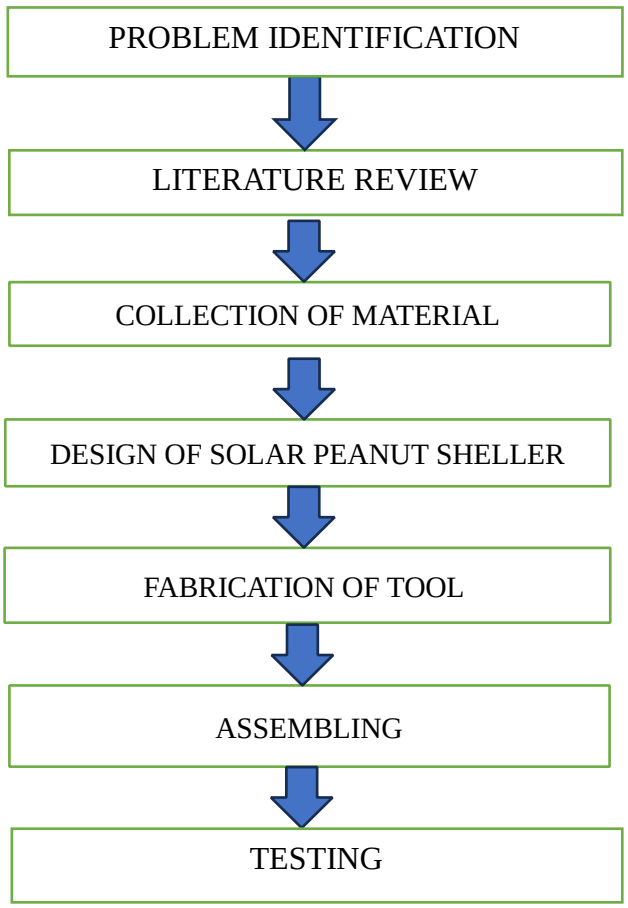
A solar panel (photovoltaic module or photovoltaic panel) is a packaged interconnected assembly of solar cells, also known as photovoltaic cells. The solar panel is used as a component in a larger photovoltaic system to offer electricity for commercial and residential applications. Because a single solar panel can only produce a limited amount of power, many

installations contain several panels. This is known as a photovoltaic array.A photovoltaic installation typically includes an array of solar panels, an inverter, batteries and interconnection wiring.

III. OBJECTIVES

1. To reduce wastage due to crack or crushed groundnut.
2. To separate the material into unshelled, edible sized peanut kernels, and oil stock.
3. To reduce the hard work and to reduced time to shell the groundnut

IV. METHODOLOGY



V. DESIGN AND ANALYSIS

We design solar peanut sheller to perform simultaneous process of seed separation for agriculture field for reduce time requirement and labour cost.

DC Motor Calculation

100 RPM

12 VOLT

18 WATT

TORQUE OF THE MOTOR

Torque = (P X 60) / (2 X 3.14 X N) Torque = (18X 60) / (2 X 3.14 X 30)

Torque = 5.72 Nm

Torque = 5.72 x 10^3 Nmm

The shaft is made of MS and its allowable shear stress = 42 MPa

Torque = 3.14 x fs x d^3 / 16 5.72 x 10^3 = 3.14 x 42 x d^3 / 16

D = 8.85 mm

The nearest standard size is d = 9 mm.

rpm – rotational speed in revolutions per minute; π – Mathematical constant pi (3.14). 60 – Number of seconds in a minute.

Efficiency of the motor is calculated as mechanical output power divided by electrical input power: E = Pout / Pin

Therefore

Pout = Pin * E

After substitution we get

T * ω = I * V * E

T * N * 2π / 60 = I * V * E

VI. LITERATURE REVIEW

V. K. Tewari et al (2013) said that, the majority of farmers use manually to remove the groundnut or by loop wire pedal thresher which can cost them more time and also labor. There were three independent variables used, viz, drum speed, loop to height and loop spacing were taken into consideration. They successfully used the application of RSM in conjuction with CCRD. They used some various methods like response surface methodology (RSM) and central composite rotatable design (CCRD) and which was complex by calculating all the variables. It was a complex method and time consuming.

From this literature, we design the solar peanut sheller for pressure compensating peanut to improve the efficiencies

Dr. S. Alagesan et al (2014) said that, It was very difficult to separate all pods from the shell and around 20-30 women were used to separate an acre of groundnut pods. So they made a machine which is in cylindrical type where all the sides are closed leaving three open, one will be open at the top which consist of spiked cylinder and other two will be open at bottom. The groundnut will enter the top opening and in other two openings where pods which are

broken and some dust with few other particles are moveout. When tested the stripping efficiency was found around 99% of pods and were clean and not broken.

From this literature, The groundnut will enter in single opening and pods are not broken

Pratima. G. Mungase et al (2016) said that, that used manpower instead of conventional energy resources. Like most of the people use bicycles and in agricultural fields screw conveyer are commonly used. By combining both they created a machine which is a peanut sheller. To rotate the shaft of screw conveyer they use the movement action of bicycle. The peanuts get squeezed in clearance between the shaft and casing of conveyer. Hopper is used to transport the peanuts. It doesn't need any expert. Gear pair usually used to rise the speed. This requires more amount of human effort which can be reduced by using our project as it doesn't consume much human effort and also involvement of renewable resources makes it better.

VII. PROPOSED DESIGN

Design is the process of creating a plan or specification for the construction or creation of something. It involves a variety of activities, such as researching, brainstorming, sketching, prototyping, and testing, to arrive at a final product or solution that meets specific objectives and requirements. The goal of design is to solve problems, improve functionality, and create a better user experience. Design plays a vital role in evolving field that requires creativity, innovation, and adaptability to keep up with changing trends and technologies. Once initial ideas are formed, sketching and prototyping come into play. Sketching allows designers to visually represent their concepts, while prototyping involves creating tangible models or mock-ups to test and refine ideas. These prototypes are then subjected to testing and evaluation to identify any issues or areas for improvement. Feedback obtained from testing is used to iterate and refine the design further, until a final product or solution is achieved.

VIII. RESULT&DISCUSSION

Efficiency Testing

S.NO	Method	Time taken for Peanut Shelling	How Many kg/g
1.	Manual Method	15 Mins	2 kg
2.	Solar Peanut Sheller	15 Mins	6 kg

Our project's initial stage was centered around the design and fabrication of an solar peanut sheller.Using techniques such as measuring, cutting, bending, and welding, we successfully created a model. Our subsequent step is to test the functionality of the solar peanut sheller within the primary field of solar peanut shelling process. We aim to observe its performance and efficiency, with the goal of developing a cost-effective and time-saving mechanism that

perfectly peanut sheller into the lateral lines. To evaluate the efficiency of the solar peanut sheller, we test solar peanut sheller in field. From these results,This indicates that the power is significantly more efficient and productive compared to the manual method, as it can almost twice the number of pods in the same amount of time. The use of the solar power can greatly enhance the speed and effectiveness of the solar power, potentially leading to increased productivity and improved results.

IX. CONCLUSION

This project is made with pre planning, that it provides flexibility in operation. Easiest operation is obtained by the control in the "Fabrication of Groundnut Sheller**"** The comparative gain that can be accomplished is the utilization of motor in control unit. This innovation has made the more desirable. This project "Fabrication of Groundnut Sheller**"** is designed with the hope that it is very much economical and help full to many agricultural areas. This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.

X. REFERENCES

1. **Akerele O. V. and Ejiko, S.O. (2015),** "Design and Construction of Oil Expeller", International Journal of Engineering And Computer Science, India, ISSN 2319-7242 Vol. 4, Issue 6, pp. 12529 -12538.
2. **Benham, P.P., Crawford, R.J. and Armstrong, C.G. (1998).** "Mechanics of Engineering material", 2nd ed. Longman publisher Ltd., Singapore, pp 301, 341-344.
3. **Bhandari, V.B. (2010). "Design of Machine Elements**", Tata McGrawHill Education, Pp 330-334.
4. **Ejiko S. O., Adelegan G. O. and Dirisu N. O. (2009):** "Development and Performance Evaluation of a wear Testing Equipment" Journal of ngineering & earth Sciences (JEES) Vol 4, No 2 pp 6-11Khurmi, R.S. and Gupta J.K. (2005). "A Textbook of Machine Design", Multicolourillustrative ed., Eurasia publishing house (PVT) Ltd. by S. Chand & Co. Ltd, India.

5. **Komolafe, M.F., Adegbola, L.A and Asgate, T.I. (1985).** "Agricultural Science for West African. School and Colleges", 2nd ed., University press Ltd., Ibadan
6. **Hall, A.S., Holowenko, A.R and Laughlin, A.G. (1983).** "Theory and Problems Of Machine Design", Schaum's outline series, McGrawHill Book co. NY.
7. **Hommons, R.O. (1994). "**The origin and history of groundnut In: The groundnut crop; A scientific basis for improvement": J. Smart, 1st ed. Champman and Hall, NY, pp5678.
8. **Maduako, J.N. and Hamman, M. (2004).** "Determination of Physical Properties of Three Groundnut Varieties". Nigerian Journal of Technology, Vol. 24(2), pp 12-18.
9. **Maduako, J.N., Saidu, RA, Matthias, P. and Vanke, I. (2006)**. "Testing of an Engine Powered Groundnut Shelling Machine". Journal of Agricultural Engineering and Technology, vol. 14, ppMilner, H.G (1973). "Traditional Extraction of Oil from Nigerian Food Stuff". Heinemann Education Books, Ibadan.
10. **Okegbile, O.J, Hassan, A.B, Mohammed, A and Obajulu, O. (2014)**."Design of a combined Groundnut Roaster and Oil Expeller Machine", International journal of science and Engineering Investigations, vol. 3, issue 26, pp 26-30.
11. **Olumide A.A. (1991**). "Design and Experimentation Of Auger screws". Unpublished Bsc Thesis, Department of Mechanical Engineering, Obafemi Awolowo University.
12. Rajput, R.K. (2006). Strength of Materials, Multicolor Illustrative ed.,S.chand&co.Ltd., New delhi.
13. **Rodriquez, M and Carruthers, I. (1985).** Tools for Agriculture: A buyers guide to appropriate equipment, 3rd ed. IT publications, London, pp 99,100,117.
14. **Shankarappa T., Robert, E.R and Virginia, N. (2003).** World Geography of groundnut: distribution, production, use and trade.