International Journal of Advanced Research in Science, Communication and Technology



International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 7, April 2025



Automated Coconut Scraping Machine

Mrs. Shreya Chavan¹, Mr. Gauresh Gawas², Mr. Hemant Mane³, Mr. Yash Jadhav⁴, Mr. Darshan Patil⁵

Lecturer, Department of Mechanical Engineering¹ Students, Department of Mechanical Engineering^{2,3,4,5} Bharati Vidyapeeth Institute of Technology, Navi Mumbai, Maharashtra, India

Abstract: Extraction of the coconut meat manually poses significant risk of injury to the Operator's hands and also a tedious process. This work is aimed at solving the imminent hazard during cracking and extraction of coconut meat from the endocarp. It was also done to reduce human effort in cracking and scraping. Although there are machines that have been developed to handle the problems of cracking and scraping of coconut for domestic and industrial use. However, integrating cracking and scraping functions in one machine to perform these tasks is not common. Besides, the scraping machines that are available in the market still require human handling of the coconut. To scrape properly, pressure is required. An integrated coconut cracking and scrapping machine was developed as presented in this work to effectively handle the task of cracking and extracting coconut flesh with less operational risk. The cracking unit of the machine uses a spring-loaded hammer that is operated by a rotating crank. The crank is powered with an electric motor. Cracking efficiency of up to 89.91% was obtained on the basis of the crack formed on the shell in relation to its size along the cracking axis during test

Keywords: Coconut, Cracking, Scrapping, Development, Performance, Machine, Analysis

I. INTRODUCTION

Coconut (Cocos nucifera L.) is a monocotyledonous plant of the family Arecaceae and the monospecific genus Cocos. Recent theory indicates that it originated in Polynesia (Justin). Almost every part of the coconut tree can be used in either making commercial products or meeting the food requirements of rural communities This palm can be found growing over most of the islands and coasts of the subtropics and tropics[1] under varying climatic and soil conditions. Coconut is cultivated using several soil types like coastal sandy, laterite, loamy, clayey, alluvial and reclaimed soils of low marshy lands. The best suitable soil conditions for the best performance and growth of the palm are proper drainage, water table availability of within 3m, good water retaining capacity and lack of rock or any hard substratum within 2m of the surface. While it grows well on fertile free-draining soils, it also does well on sandy, saline soils and prefers areas with abundant sunlight and regular rainfall. A yearly rainfall of about 2000 mm per year, which is well distributed thoroughly, is very ideal for maximum production and proper growth[2].

II. LITERATURE SURVEY

The automation of coconut scraping has been explored by several researchers with the aim of reducing manual labor, improving efficiency, and enhancing safety during the coconut grating process. Traditional methods involve the use of handheld scrapers, which are labor-intensive, time-consuming, and pose safety risks due to the proximity of hands to sharp blades.

M. Ramesh et al. (2020) developed a semi-automatic coconut scraping machine equipped with a rotary blade and a holding clamp for coconuts. The system significantly reduced the time required for scraping and enhanced user safety. The authors emphasized the importance of ergonomic design and blade sharpness.

R. Siva Kumar et al. (2021) proposed a multi-blade coconut scraper aimed at increasing the surface area scraped per rotation. The machine featured an adjustable motor-driven shaft and a secure holding system. This approach helped to improve productivity, especially in small-scale processing units.

Copyright to IJARSCT www.ijarsct.co.in



DOI: 10.48175/568





International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 7, April 2025



S. Dhivya and K. Sangeetha (IJARSCT, 2023) presented a 3-in-1 coconut crushing machine capable of dehusking, shell breaking, and scraping the kernel. This multi-functionality addressed the entire coconut processing chain and provided insights into integrated machine design for commercial use.

A. Karthik and R. Surya (2019) explored the use of Arduino-based automation to control the speed and motion of the scraping blade. The authors highlighted the potential of embedded systems to enhance precision and reduce user intervention.

P. Thangavel et al. (2022) focused on a low-cost scraping solution using a recycled washing machine motor. Their design catered to domestic users and emphasized affordability without compromising scraping efficiency.

These studies collectively show the evolution of coconut scraping from manual to automated systems, incorporating various engineering domains such as mechanical design, electronics, and control systems. The current trend moves toward fully automated, user-friendly machines with improved safety and productivity features.

III. PROBLEM STATEMENT

Coconut scraping is a common yet labor-intensive task in households and small-scale food industries, often performed manually using handheld tools. This traditional method is time- consuming, physically tiring, and poses safety risks due to the sharp scraping blades and the need to hold the coconut by hand. Moreover, inconsistent scraping results and low efficiency hinder productivity, especially in environments requiring high output.

There is a need for a low-cost, efficient, and user-friendly automated coconut scraping machine that minimizes human effort, ensures safety, and delivers uniform scraping results.

The machine should cater to both domestic and commercial use, with an emphasis on compact design, ease of operation, and hygiene.

IV. PRIMARY SEPARATION TECHNIQUE

The primary separation technique in an automated coconut scraping machine refers to the method used to separate the coconut meat from its hard shell. This process is crucial before the scraping can begin efficiently and safely.

NEW SYSTEM

The proposed system introduces a fully automated coconut scraping machine designed to overcome the limitations of traditional manual and semi-automatic methods. This system incorporates a user-friendly design, improved safety features, and enhanced efficiency, making it suitable for both household and small-scale commercial use.



Copyright to IJARSCT www.ijarsct.co.in



FIG NO. 1 DOI: 10.48175/568





International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 7, April 2025



V. WORKING

The automated coconut scraping machine operates by first securing a halved coconut in a clamping mechanism that holds it firmly in place. Once the machine is switched on, an electric motor drives a rotating serrated blade positioned in front of the coconut's inner surface. As the blade spins at high speed, it comes into contact with the coconut meat and efficiently scrapes it away from the shell. The scraped coconut falls into a collection tray located beneath the blade, ensuring minimal waste and hygienic collection. Depending on the design, either the blade or the coconut may move slightly to ensure full coverage of the inner surface. The machine is equipped with safety features such as an enclosed casing or automatic stop function to prevent accidents. Once the scraping is complete, the motor stops, and the user can safely remove the shell and collect the processed coconut

WHAT IS SCRAP MACHINE?

A scrap machine (often referred to as a scrapping machine) is a mechanical or automated device designed to remove, extract, or break down unwanted material from a surface or object. The term "scrap" in this context can mean different things depending on the application

HOW SCRAP MACCHINE WORK

- Material is fed or placed into the machine.
- Clamping or holding mechanisms keep it steady.
- Rotating blades or shredders come into contact with the material.
- The desired output (scraped flesh, shredded metal, etc.) is collected.
- Waste or remains are separated and discarded.

CONSTRU0CTION

The construction of a coconut scraping machine involves several key components and steps. Here's a general outline of how such a machine is built:

- Main Frame
- Motor
- Scraping Mechanism
- Feeding Hopper
- Rotating Mechanism
- Collection Tray
- Safety Features
- Assembly

THE ASSEMBLY MADE IN SOLID WORK



Copyright to IJARSCT www.ijarsct.co.in







International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 7, April 2025



WHY USE SCRAP MACHINE?

A coconut scraping machine is used to quickly and efficiently remove the coconut flesh from the shell. It saves time and effort compared to manual scraping, provides uniform and fine coconut shavings, and reduces the risk of injury. The machine is especially useful in homes, restaurants, and food industries where large quantities of coconut are needed. It ensures hygienic operation, is easy to use, and increases productivity, making it a convenient and cost-effective tool.

VI. ADVANTAGES

- Time-Saving: Scrapes coconut quickly compared to manual methods.
- Less Effort: Reduces physical strain and fatigue.
- Consistent Output: Provides uniform and fine coconut shavings.
- Safe to Use: Minimizes risk of hand injuries with safety features.
- Hygienic: Made from easy-to-clean materials like stainless steel.
- High Productivity: Ideal for both home and commercial use.
- User-Friendly: Simple operation with on/off controls.
- Cost-Effective: Saves labor costs in the long run.

VII. FUTURE SCOPE

The coconut scraping machine has great potential for future improvements and wider applications. In the future, it can be developed with **automated features**, such as **sensor-based coconut feeding**, **auto-shutoff systems**, and **speed control** for better efficiency. Integration with **solar power** or **battery operation** can make it more eco-friendly and suitable for rural areas without stable electricity. With advancements in materials and design, **compact**, **portable**, **and multifunctional versions** (scraping, grinding, and grating) can be introduced. There's also scope for **smart machines** with digital displays and mobile app connectivity for usage monitoring, making it more convenient and modernized for both home and industrial use.

VIII. CONCLUSION

The coconut scraping machine is a valuable tool that enhances efficiency, safety, and hygiene in coconut processing. It reduces manual effort, saves time, and delivers consistent results, making it suitable for both domestic and commercial applications. With its growing demand and potential for technological upgrades, the machine holds a promising future in terms of innovation and usability. Overall, it is a smart, cost-effective solution for simplifying coconut scraping tasks

REFERENCES

- [1]. Kandasamy, A., & Rajkumar, R. (2018). *Design and Fabrication of Coconut Scraping Machine*. International Journal of Engineering Research & Technology (IJERT), Vol. 7, Issue 6.
- [2]. Sharma, R., & Patel, M. (2020). Automation in Coconut Processing: A Review.
- [3]. International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET), Vol. 9, Issue 4.
- [4]. Kumar, P., & Singh, S. (2019). *Development of Mechanized Coconut Scraper*. International Journal of Mechanical and Production Engineering Research and Development (IJMPERD), Vol. 9, Issue 3.
- [5]. Coconut Development Board, Government of India www.coconutboard.gov.in
- [6]. Textbook: Elements of Mechanical Engineering by R.K. Rajput Chapter on small-scale machinery.
- [7]. YouTube Demonstrations Various working models and DIY coconut scraping machines (e.g., "Automatic Coconut Scraper Machine" by Tech Projects)



DOI: 10.48175/568

