

Rice Cutter Machine

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Abstract:

Agriculture is a major source of livelihood, and rice harvesting is still performed manually in many rural areas, making the process time-consuming, labor-intensive, and physically demanding. Traditional tools such as sickles cause fatigue and reduce productivity, while modern harvesting machines are often expensive and unsuitable for small farmers. To address these challenges, this paper presents a low-cost rice cutter machine designed to reduce manual effort and improve harvesting efficiency. The proposed system consists of a DC motor, quick return mechanism, circular cutting blade, 12V battery, and a wheeled frame with a control switch. The motor drives the blade to perform fast and uniform cutting, while the lightweight structure allows easy movement in the field. The battery-powered operation eliminates fuel dependency and reduces maintenance costs. Overall, the machine provides an economical, easy-to-use, and efficient solution for small and medium-scale farmers.

I. INTRODUCTION

Agriculture is the backbone of India's economy, and paddy cultivation plays a vital role in providing food security and employment to millions of farmers. However, harvesting of paddy is still largely performed using traditional manual tools such as sickles, which require continuous bending and repetitive motion. This process is labor-intensive, time-consuming, and physically exhausting, often leading to fatigue, back pain, and reduced productivity. Moreover, the shortage of agricultural labor and rising wages further increase the burden on small and marginal farmers.

To overcome these challenges, this project proposes the development of a low-cost Rice Cutter Machine designed to reduce manual effort and improve harvesting efficiency. The machine uses a DC motor-driven cutting blade along with a quick return mechanism to ensure effective and rapid cutting of paddy crops. Powered by a 12V rechargeable battery, it eliminates fuel dependency and reduces operational costs. The lightweight, portable design with wheels and a handle makes it easy to operate in small and uneven fields, promoting affordable mechanization and supporting sustainable agricultural practices.

II. LITERATURE REVIEW

In recent years, agricultural technology has developed rapidly to reduce manual labor and improve the efficiency of harvesting operations. Traditional paddy harvesting methods require a large amount of human effort and time, which makes the process difficult and tiring for farmers. To overcome these challenges, researchers have focused on designing mechanical harvesting machines that can cut crops quickly and efficiently. Many studies

highlight the importance of developing low-cost, portable, and easy-to-operate machines that can be used by small and medium-scale farmers. The use of battery-powered systems and simple mechanical mechanisms has also become popular because they reduce fuel consumption, operating cost, and environmental pollution. These advancements aim to provide farmers with affordable and efficient solutions for modern agricultural practices.

Paddy Cutting Machine Development: Researchers have developed various paddy cutting machines to reduce manual labor and increase harvesting efficiency. These machines use mechanical blades and motor-driven systems to cut crops quickly and uniformly.

Reciprocating Blade Mechanism: The reciprocating blade mechanism is widely used in harvesting machines. It converts rotary motion into reciprocating motion, which allows the blade to move back and forth for effective crop cutting.

Battery-Operated Agricultural Machines: Modern agricultural machines often use rechargeable batteries and DC motors. These systems reduce dependency on petrol or diesel and make the machines more economical and eco-friendly.

Portable Harvesting Equipment: Many researchers have focused on designing lightweight and portable harvesting machines. Such machines are easy to move in small fields and reduce the physical strain on farmers.

III. OBJECTIVE

- Design and fabricate a low-cost Rice Cutter Machine
- suitable for small farmers.

- The project also focuses on improving cutting efficiency and saving time
- No required fuel
- Rechargeable battery

1. To Design and Fabricate a Low-Cost Machine The main objective of this project is to develop an economical rice cutter machine that can be easily afforded by small and marginal farmers. The machine should be simple in construction and easy to maintain using locally available materials.

2. To Reduce Manual Labor and Physical Strain Traditional harvesting methods require continuous bending and physical effort. This project aims to minimize farmer fatigue and health issues by introducing a mechanized cutting system.

3. To Improve Cutting Efficiency and Speed

The machine is designed to provide faster and more uniform cutting using a motor-driven reciprocating blade mechanism. This helps in saving time and increasing overall harvesting productivity.

4. To Ensure Portability and Easy Operation

The objective is to develop a lightweight and balanced structure with wheels for smooth movement in small and uneven fields, making it easy for farmers to operate.

5. To Promote Eco-Friendly and Fuel-Free Operation By using a rechargeable battery system, the machine eliminates fuel dependency, reduces operational costs, and supports environmentally friendly agricultural practices.

IV. METHODOLOGY

The methodology of this project focuses on the design, fabrication, and testing of a low-cost Rice Cutter Machine. Initially, the concept and design of the machine are planned based on the required components such as a DC motor, quick return mechanism, cutting blade, frame structure, and rechargeable battery. The objective is to create a lightweight, portable, and efficient machine suitable for small agricultural fields. After the design stage, the fabrication process is carried out. The frame is constructed to support all components, and the DC motor is mounted securely on the structure. The rotary motion produced by the motor is transmitted to the quick return mechanism, which converts it into reciprocating motion. This reciprocating motion drives the cutting blade, allowing it to move back and forth to cut paddy crops efficiently. A rechargeable battery is connected to supply power to the motor, making the machine fuel-free and environmentally friendly. Finally, the machine is tested under practical conditions to observe its performance and cutting efficiency. During testing, factors such as cutting speed, smooth operation, and ease of handling are evaluated. The results confirm that the fabricated rice cutter machine reduces manual effort, saves harvesting time, and provides an economical solution for farmers.

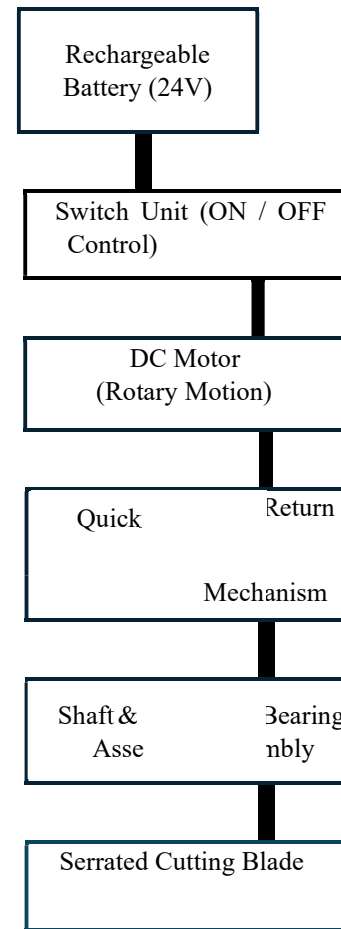


Fig 2.1 flow chart of rice cutter machine

The Rice Cutter Machine is fabricated using a strong metal frame to hold all components securely. A DC motor is connected to a quick return mechanism that converts rotary motion into reciprocating motion to operate the serrated cutting blade. Bearings are used for smooth shaft movement, and wheels are provided for easy field mobility. The system runs on a rechargeable battery and is tested to ensure efficient and safe paddy cutting.

Components Used:

- DC Motor
- Rechargeable Battery (12V)
- Quick Return Mechanism
- Cutting Blade
- Frame Structure
- Shaft and Bearings
- Handle

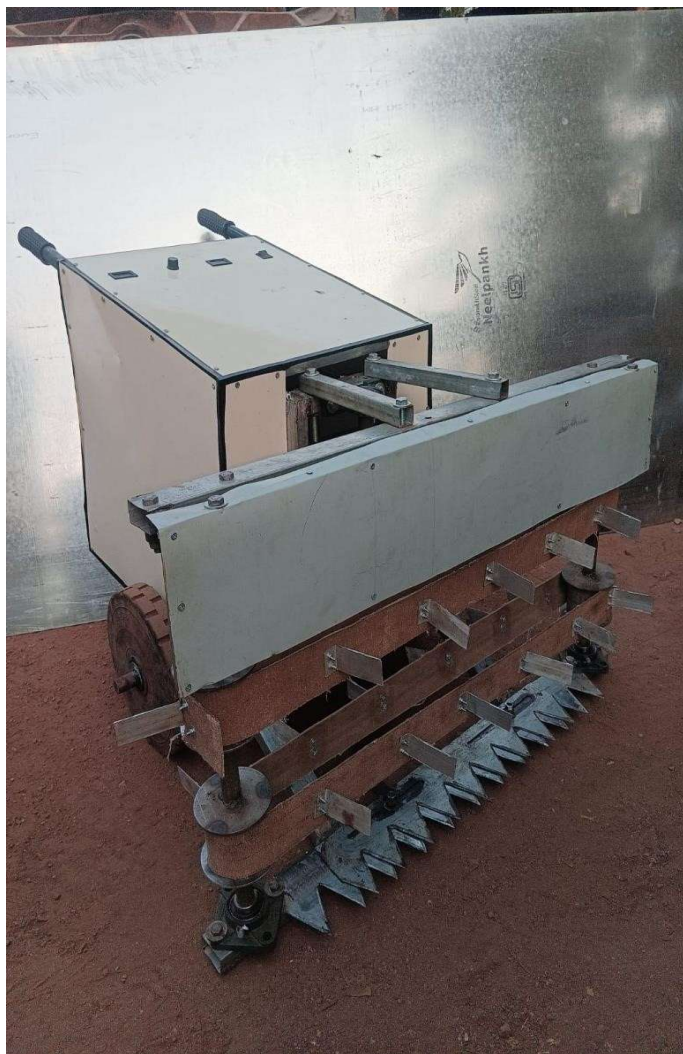


Fig. 2: rice cutter

V. DISCUSSION

The fabricated Rice Cutter Machine was developed to reduce the difficulties faced by farmers during traditional paddy harvesting. Manual harvesting requires significant physical effort and time, which often leads to fatigue and lower productivity. By introducing a motor-driven cutting mechanism, the machine helps simplify the harvesting process and improves efficiency in agricultural operations. During the working process, the DC motor provides rotary motion which converted into reciprocating motion through the quick return mechanism. This motion drives the cutting blade to move back and forth, allowing effective cutting of paddy crops. The use of a rechargeable battery eliminates the need for petrol or diesel, making the machine more economical and environmentally friendly. The lightweight design and the presence of wheels make the machine easy to move across agricultural fields. It reduces manual effort and allows farmers to harvest crops more quickly compared to traditional methods. The simple structure of the machine also makes maintenance easier and reduces overall operational cost. Overall, the rice cutter machine demonstrates that a low-cost, battery-operated solution can effectively support small and

medium-scale farmers by improving harvesting efficiency and reducing labor requirements.

Another important aspect of the machine is its battery-operated power supply. Unlike conventional harvesting machines that depend on petrol or diesel, this machine uses a rechargeable battery to operate the motor. This reduces fuel consumption, lowers operational costs, and minimizes environmental pollution. The battery-powered system also makes the machine more suitable for rural areas where fuel availability may be limited.

The structure of the machine is designed to be simple, lightweight, and portable. The frame provides strength and stability to hold all the components, while the wheels allow easy movement in agricultural fields. The handle helps the operator guide the machine comfortably during harvesting. Because of this design, the machine can be easily operated by farmers without requiring advanced technical knowledge. Maintenance is also simple since the system uses fewer complex components. Overall, the rice cutter machine demonstrates that a low-cost, battery-operated solution can effectively support small and medium-scale farmers by improving harvesting efficiency and reducing labor requirements.

V. CONCLUSION

The Rice Cutter Machine has been successfully designed and fabricated to provide a practical, economical, and efficient solution for paddy harvesting. The project addresses the major problems faced by farmers, such as labor shortage, high harvesting costs, and physical strain caused by traditional manual cutting methods. By incorporating a DC motor and quick return mechanism, the machine effectively converts rotary motion into reciprocating motion to achieve fast and uniform cutting of paddy crops. This significantly reduces harvesting time while improving overall productivity.

The machine is built using a strong metal frame, supported by bearings and wheels to ensure smooth operation and easy mobility in agricultural fields. The use of a rechargeable battery eliminates fuel dependency, reduces maintenance costs, and promotes eco-friendly operation. Its compact and portable design makes it suitable for small and medium-scale farms, especially in rural areas where large harvesting machines are not affordable. In conclusion, the Rice Cutter Machine demonstrates that low-cost mechanization can greatly benefit farmers by increasing efficiency, reducing manual effort, and improving crop harvesting performance. With further improvements and technological advancements, this machine can become a reliable and widely adopted solution for modern agricultural practices.

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