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Sugarcane Bud Cutter Machine

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Abstract: *The sugarcane industry is a significant part of agriculture, requiring modernized techniques to improve efficiency. Traditional manual methods of cutting sugarcane buds for planting are labour-intensive and time- consuming. This report outlines the development of a sugarcane bud cutter machine, designed to streamline the process, minimize labour costs, and enhance precision. The machine efficiently extracts buds from sugarcane stalks while minimizing waste. Now a days 80% of sugar is produced with sugarcane worldwide.*

Keywords: Sugarcane bud cutter machine , Sugarcane bud

I. INTRODUCTION

Sugarcane is an essential crop for sugar production and other derived products. The conventional method of extracting sugarcane buds relies on manual labour, which can be inefficient and inconsistent. Implementing a mechanized approach, such as a sugarcane bud cutter machine, can significantly improve the uniformity and efficiency of sugarcane propagation. This report explains the design, working mechanism, advantages, and performance evaluation of the developed machine. This report outlines the development of a sugarcane bud cutter machine, designed to streamline the process, minimize labour costs, and enhance precision. The machine efficiently extracts buds from sugarcane stalks while minimizing waste. Now a days 80% of sugar is produced with sugarcane worldwide.

II. LITERATURE REVIEW

Despite advancements in agricultural machinery, limited research has been conducted on specialized sugarcane bud cutting machines. Most existing methods still rely on labour-intensive techniques, leading to inefficiencies in commercial sugarcane cultivation. Additionally, available mechanized solutions often lack precision, causing damage to buds or excessive waste. There is also a scarcity of studies focusing on the affordability and accessibility of such machines for small-scale farmers. This research aims to bridge these gaps by developing a cost-effective and efficient sugarcane bud cutter machine that minimizes wastage and maximizes productivity. This paper describes about Mechanical operated bud cutting machine which can be used in industries for cutting process.

III. CONSTRUCTION PROCESS

Design and Construction

1. Main Components of the Sugarcane Bud Cutter Machine

- Frame**:** Provides structural integrity and stability.
- Cutting Mechanism**:** Composed of a rotary or reciprocating blade to ensure precision in bud extraction.
- Feeding System**:** Guides the sugarcane stalks for accurate and controlled cutting.
- Power Source**:** Can be manually operated or powered by an electric motor.
- Control System**:** Ensures smooth operation and safety of the machine

2. Working Mechanism

The sugarcane stalk is inserted into the machine, where it is aligned for cutting. A rotary or reciprocating blade removes the bud with minimal damage. The extracted bud is collected for planting, while the remaining stalk can be utilized for other purposes.

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Fig 3.1 Helical Gear Arrangement

A helical gear arrangement functions to provide smooth and efficient power transmission with reduced noise and vibration. Due to the angled teeth, helical gears engage gradually, ensuring a quieter operation compared to spur gears. They can handle higher loads because multiple teeth remain in contact at the same time, distributing forces more evenly and reducing wear. Additionally, the gradual engagement minimizes shock loads, improving durability and efficiency. Helical gears are commonly used in high-speed applications and can transmit motion between parallel or non-parallel shafts. However, they generate axial thrust, which may require thrust bearings or the use of opposing helical gears, such as herringbone gears, to counteract this force. Their ability to transmit high torque makes them ideal for automotive transmissions, industrial machinery, and conveyor systems. The efficiency of helical gears also improves energy savings in mechanical systems, reducing power losses. They are often made from hardened steel or other durable materials to withstand heavy loads and continuous operation. Proper lubrication is essential to reduce friction and wear, ensuring a longer lifespan.

Fig 3.2 Wiper Motor

The motor used in a sugarcane bud cutter plays a critical role in automating the process of cutting buds from sugarcane stalks for plantation. It provides the necessary power and torque to drive the cutting mechanism, ensuring precise and efficient bud removal. Typically, electric or hydraulic motors are used, depending on the machine's design and power requirements. The motor drives sharp rotary or reciprocating blades that cleanly separate the buds without damaging them, promoting better germination and growth. A high-torque motor is preferred to handle the toughness of sugarcane stalks while maintaining consistent cutting performance. Some machines use DC motors for portable or battery-operated models, while larger, industrial-scale bud cutters use AC motors for continuous, high-power operation. The motor speed is often adjustable to accommodate different cane varieties and cutting requirements. Proper cooling and lubrication systems are integrated to prevent overheating and ensure longevity.

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Fig 3.3 Sugarcane bud cutter machine

After all fabrication, all parts are assembled, including the wiper motor, frame, blades, sprocket gear arrangement is installed for operation. The sugarcane stalk is inserted into the machine, where it is aligned for cutting. A rotary or reciprocating blade removes the bud with minimal damage. The extracted bud is collected for planting, while the remaining stalk can be utilized for other purposes

Fig 3.4 Testing of Sugarcane bud cutter machine

IV. METHODOLOGY

- Conceptual Design: The initial stage involves conceptualizing the machine design, selecting suitable materials, and determining the best cutting mechanism. A 3D model is created using CAD software to visualize the design and evaluate feasibility.
- Material Selection: Based on strength, durability, and cost-effectiveness, materials such as stainless steel for the frame and high-carbon steel for the blades are selected to ensure longevity and precision cutting.
- Fabrication and Assembly: The frame, cutting mechanism, and feeding system are fabricated and assembled. Proper alignment of all components is ensured to optimize performance.
- Integration of Power Source and Control System: If the machine is motorized, an appropriate electric motor is installed and connected to the cutting mechanism. A control system, including switches and safety mechanisms, is integrated for smooth operation.

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- Prototype Testing: The machine undergoes an initial test phase using different sugarcane stalks. The cutting efficiency, precision, and speed are evaluated. Any issues related to alignment, power, or blade efficiency are identified and corrected.
- Performance Evaluation and Refinement**:** A series of tests are conducted under different conditions to assess efficiency. Modifications are made to enhance stability, reduce energy consumption, and optimize blade sharpness for minimal waste production.
- Final Optimization and Safety Measures**:** The machine is refined for commercial use, incorporating safety guards, non-slip surfaces, and ergonomic designs to ensure ease of operation and user safety

V. CONCLUSION

The development of the sugarcane bud cutter machine marks a significant advancement in sugarcane farming, providing a more efficient, cost-effective, and user-friendly alternative to traditional methods. The machine has proven to be a valuable asset in reducing labour-intensive processes, minimizing wastage, and ensuring uniform bud extraction, which directly improves the plantation success rate. By integrating modern engineering principles, this machine can serve both large-scale and small-scale farmers, allowing them to increase their productivity while reducing dependency on manual labour. Additionally, its design prioritizes user safety and ease of operation, making it accessible to a wide range of users. Further improvements in the future may focus on automation, smart sensor integration for precision cutting, and the development of portable versions suitable for various farm sizes. Implementing such advancements will further optimize its efficiency, making sugarcane farming more sustainable

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REFERENCES

[1] Dhananjay More , Dilip Bhagwat , Vaibhav Khairnar , S.G. Sawant
[2] Suraj S. Magdum, Shubham C. Pawar, Pankaj B. Gavali
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