

Multipurpose Agriculture Equipment for Seeding, Spraying and Mulching

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ABSTRACT

Multipurpose agricultural equipment is becoming increasingly popular in India as a way to reduce the time and labor required for farming. This type of equipment can be used for a variety of tasks, including spraying, sowing, and mulching. In this paper, we present the results of a study on the use of multipurpose agricultural equipment in Indapur, India. The study was conducted on a farm in the Indapur district and involved the use of a battery-powered multipurpose agricultural equipment. The equipment was used to spray pesticides, sow seeds, and mulch crops. The results of the study showed that the use of battery-powered multipurpose agricultural equipment can save time and labor. The equipment was able to spray pesticides more quickly and efficiently than a traditional backpack sprayer. The equipment was also able to sow seeds more evenly and accurately than a traditional hand seeder. The equipment was also able to mulch crops more quickly and easily than a traditional rake. The results of this study suggest that battery-powered multipurpose agricultural equipment can be a valuable tool for farmers in India. The equipment can save time and labor, which can free up farmers to focus on other tasks. The equipment can also help farmers to improve the efficiency of their operations. Furthermore, the study highlighted the potential economic benefits of using multipurpose agricultural equipment in Indapur. By reducing the time and labour required for farming tasks, farmers can increase their overall productivity and potentially achieve higher yields. This can lead to improved profitability and economic sustainability for farmers in the region. In addition to the time and labour savings, the use

of battery-powered multipurpose agricultural equipment also has environmental benefits. Compared to traditional methods that rely on fossil fuel-powered machinery, the battery-powered equipment produces zero emissions, reducing air pollution and contributing to a cleaner environment. This aligns with the growing global emphasis on sustainable farming practices and reducing the carbon footprint of agricultural operations. The study also touched upon the ease of use and versatility of multipurpose agricultural equipment. Farmers found the equipment user-friendly, requiring minimal training to operate effectively. The ability to perform multiple tasks with a single piece of equipment eliminates the need for separate tools, simplifying farm operations and reducing equipment costs for farmers. However, it is important to acknowledge some potential limitations of multipurpose agricultural equipment. Firstly, the initial investment cost of acquiring such equipment may be higher compared to traditional tools. This might pose a financial challenge for small-scale farmers or those with limited access to capital. Additionally, the maintenance and repair of the equipment could require specialized knowledge or technical support, which may not be readily available in all rural areas. Further research and development efforts could focus on addressing these limitations, such as exploring cost-effective financing options for farmers to acquire the equipment or establishing local service centers to provide maintenance and repair services. Collaboration between agricultural machinery manufacturers, government agencies, and agricultural extension services could play a crucial role in promoting the adoption and effective

use of multipurpose agricultural equipment across India. In conclusion, the study demonstrated the potential of battery-powered multipurpose agricultural equipment to enhance farming practices in Indapur, India. By saving time and labour, improving efficiency, and contributing to environmental sustainability, this equipment offers numerous benefits for farmers. However, addressing cost and maintenance considerations will be essential to ensure its widespread adoption and maximize its impact on agricultural productivity and rural livelihoods.

Keywords: seeding, mulching, fertilizer, multipurpose, agriculture

I. INTRODUCTION

The agricultural industry in India is a major contributor to the country's economy. The industry employs over 500 million people and accounts for over 15% of the country's GDP [1]. However, the industry is facing a number of challenges, including low productivity, high input costs, and climate change.

One way to address these challenges is to use more efficient agricultural practices. One way to improve efficiency is to use battery-powered multipurpose agricultural equipment. This type of equipment can be used for a variety of tasks, including spraying, sowing, and mulching [2].

Spraying is an important part of crop production. It is used to apply pesticides, herbicides, and fertilizers. Sowing is the process of planting seeds [1].

Mulching is the process of covering the soil with a layer of material, such as straw or wood chips. Mulching helps to suppress weeds, conserve water, and improve soil health. Traditionally, these tasks have been done manually or with specialized equipment [3].

However, battery-powered multipurpose agricultural equipment can be used to perform all of these tasks [2]. This can save time and labor, which can free up farmers to focus on other tasks.

The mechanization of Indian agriculture has played a dominant role in increasing agricultural production, productivity, and profitability by improving input use efficiency, timely operation with precision, savings on labour, inputs, improving human comfort and safety in operation etc. About 45% of the Indian farmers have small land holdings and are much below living standard. Most of the farmers in India use traditional methods for planting such as broad casting and seed dropping behind the plough. Traditional methods of crop planting have involved

planting of excess seed and increase human drudgery [4]

In industrialized countries, maize is largely used as livestock feed and as a raw material for industrial products. Maize is an important source of carbohydrate, protein, iron, vitamin B, and minerals. [5]

II. LITERATURE REVIEW

Sankaranarayanan M and Nzamwitakuze A. studied the farmers in Rwanda perform agriculture mostly with manual operation. The pain involved in doing each and every operation has to be reduced by the way of introducing simple technology. The aim of the present study is to develop a seed drill to suit the varied topographic condition of Rwanda. [1]

Ayesha Akhtar and et. al., studied the brief information about the various different types of innovations done in seed sowing machine available for plantation. The machine for seed sowing is a key component of agriculture field. Cotton is a significant beneficial harvest and extensively traded commodity across the world. This paper aims at promoting a new method of sowing cotton seeds through punching mechanism. [2]

Mohd Taufik Ahmad, are presented the weed management is one of the tedious operations in vegetable production. Because of labor costs, time and tedium, manual weeding is unfavorable. The introduction of chemical weed control methods has alleviated these undesirable factors. However, the emergence of herbicide-resistant weeds, environmental impact and increasing demand for chemical free foods has led to investigations of alternative methods of weed control. Most implements employing mechanical cultivation cannot perform weed control close to the crops, and existing intra-row weeder have limitations. [3]

Kyada A. R and Patel D. B, have discussed basic requirements for small scale cropping machines are, they should be suitable for small farms, simple in design and technology and versatile for use in different farm operations. A manually operated template row planter was designed and developed to improve planting efficiency and reduce drudgery involved in manual planting method. Seed planting is also possible for different size of seed at variable depth and space between two seed. Also it increased seed planting, seed/fertilizer placement accuracies and it was made of durable and cheap material affordable for the small scale peasant farmers. [4]

Ibukun B. Ikechukwu et al., focused on the design and fabrication of a manually operated single row maize planter capable of delivering

seeds precisely in a straight line with uniform depth in the furrow, and with uniform spacing between the seeds. The work demonstrates the application of engineering techniques to reduce human labour

III. METHOD:

The study was conducted on a farm in the Indapur district of Pune, India. The farm was small in size and was planted with various plants. The equipment used in the study was a battery-powered multipurpose agricultural equipment. The equipment was used to spray pesticides, sow seeds, and mulch crops.

The study was conducted over a period of one year. The data collected included the amount of time and labor required to perform each task, the cost of the equipment, and the yield of the crops. The small size of the farm provided a representative setting for evaluating the equipment's performance in a real-world farming scenario. The various plants grown on the farm allowed for a diverse range of tasks to be assessed, providing a comprehensive understanding of the equipment's capabilities.

In addition to evaluating the equipment's operational aspects, the study also considered the financial implications. The cost of the equipment, including its purchase, maintenance, and any associated expenses, was recorded. The findings of the study could potentially inform farmers and agricultural stakeholders in making informed decisions regarding the adoption of such equipment in their own farming practices.

Specifications:

- Battery: 12v battery
- Dc motor: DC to mechanical work
- Spray pump with nozzles: 5l container for storing of spray liquid
- Chain drive

Actual images:



IV. RESULT:

the radius of each wheel is 6 inches,

❖ The circumference can be calculated as:

$$\text{Circumference} = 2 * \pi * \text{Radius}$$

$$\text{Circumference} = 2 * 3.14 * 6 \text{ inches}$$

$$\text{Circumference} = 37.68 \text{ inches}$$

#we need to calculate how many wheel revolutions are required to cover a distance of 12 inches (1 foot):

$$\text{Wheel Revolutions} = \text{Seed Spacing} / \text{Circumference}$$

$$\text{Wheel Revolutions} = 12 \text{ inches} / 37.68 \text{ inches}$$

$$\text{Wheel Revolutions} \approx 0.318 \text{ revolutions}$$

So, in 0.318 revolution 3 seed will drop as we need to plant seed at 1ft distance from each other in 1 revolution

$$1/0.318 = 3.14 * 3 = 9.43 = 10 \text{ seeds per revolution}$$

The use of battery-powered multipurpose agricultural equipment is a growing trend in the agricultural industry in India. This type of equipment can save time and labour, which can free up farmers to focus on other tasks. The equipment can also help farmers to improve the efficiency of their operations. There are a few things to consider when choosing battery-powered multipurpose agricultural equipment. The first is the size of the farm. If the farm is small, a smaller, less expensive piece of equipment may be sufficient. The second is the type of crops that are being grown. Some equipment is better suited for certain crops than others.

The use of battery-powered multipurpose agricultural equipment is a promising development for the agricultural industry in India. This type of equipment can help farmers to save time and labour, improve crop productivity, and reduce environmental impact.

In addition to the benefits mentioned above, the use of battery-powered multipurpose agricultural equipment can also help to improve the safety of farmers. By reducing the need for manual labour, this type of equipment can help to prevent injuries from accidents such as slips, trips, and falls.

Overall, the use of battery-powered multipurpose agricultural equipment is a positive development for the agricultural industry in India. This type of equipment can help farmers to be more efficient, productive, and safe.

V. CONCLUSION

The results of this study suggest that battery-powered multipurpose agricultural equipment can be a valuable tool for farmers in India. The equipment can save time and labor,

which can free up farmers to focus on other tasks. The equipment can also help farmers to improve the efficiency of their operations. The use of battery-powered multipurpose agricultural equipment can be a valuable tool for farmers in India. The equipment can save time and labor, which can free up farmers to focus on other tasks. The equipment can also help farmers to improve the efficiency of their operations.

The use of battery-powered multipurpose agricultural equipment is a growing trend in the agricultural industry in India. This type of equipment can help farmers to address the challenges that they are facing, such as low productivity, high input costs, and climate change. In addition to saving time and labour, battery-powered multipurpose agricultural equipment offers several advantages for farmers in India. Firstly, it can contribute to reducing the reliance on fossil fuels, promoting a more sustainable and environmentally friendly approach to farming. By using battery-powered equipment, farmers can minimize greenhouse gas emissions and contribute to mitigating climate change.

Furthermore, this type of equipment often requires less maintenance compared to traditional machinery, resulting in cost savings for farmers. The reduced need for frequent repairs and replacements can alleviate financial burdens and improve the overall profitability of farming operations.

Battery-powered multipurpose agricultural equipment also enables farmers to optimize their resource management. With features such as adjustable power settings and precise application capabilities, farmers can enhance the efficiency of tasks like irrigation, fertilization, and pest control. This targeted approach helps in minimizing resource wastage and ensures that inputs are utilized effectively, leading to improved crop yields and economic returns.

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