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Design and Development of One Row Hand Seeder Machine

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Eco-friendly farming

Abstract

Manual seed planting often results in insufficient seed placement, poor spacing and causes significant physical strain on farmers, limiting the size of fields they can cultivate. Additionally, high cost of imported planting machine make then affordable for most farmers reducing the physical effort required for planting could enable small scale farmers to significantly increase food production, especially for grains.

INTRODUCTION

This project aim is designing and development affordable, manually operated seed planter that is easy to use, maintain and suitable for planting a variety of crop seeds. The multi crop is designed and suitable for planting a variety crop seed. The multi crop planters are designed to deliver seeds with the season, ensuring uniform depth and spacing in the soil. The planters consist of key components including a main frame, adjustable hand, seeder planters, seed hopper, seed metering device, adjustable furrow opener and closer, power transmission, seed tube, and ball bearing. Most part is made of durable mild steel, except for the seed metering mechanism and seed funnel tube. Seed metering device is interchangeable to accommodate different types and sizes of seeds. This single or one row planter is simple to operated, allows easy to adjustment for various planting conditions, and required minimal maintains limited occasional lubrication of the bearings for smooth wheel movement. The one row hand seeder machine is the significant advancement design to address the challenges of traditional, labor intensive seed sowing technology. Manual planting has been the standard of countries, obtain involving consider labor cost and inconsistency of seed placement. As, mechanization in agriculture develop during the 19th and 20th centuries various seed sowing tools emerge to increase the efficiency and

accuracy. However typically expensive and out of reach for small scale farmers. In response, the one row hand seeder machine was developed has affordable, easy to use holders farmers particular in developing region.

This project was created with focus on simplicity, cost effectiveness, and precision agriculture productivity. The machine is design to streamline the seed planting process by ensuring that seeds are place accurately and space evenly.

LITERATUREREVIEW

The numbers of review explores research on one roe hand se der machine, highlight advancement, challenges, and reaps for improvement. Here we finding some key in review form exiting literature

Manually operated single row multi crop planters: The field efficiency can be improvement by reducing seed loss and optimizing the seed metering mechanism. The support wheels should provide better traction on various soil types, ensuring smooth movement in field adjustable feature such as row spacing, depth and seed rate control should be incorporated to make the machine more versatile for different farming conditions.

Performance of single row planter: To enhance the efficiency of manually operated push type maze planter. The seed metering system should be refined to ensure metering system should be refined to refined ensure accurate seed placement, which will help achieve uniform spacing and minimize seed waste. Improving the design of the wheel and power transmission system with light yet durable material can enhance traction and operational efficiency. Incorporating an adjustable and ergonomics design handle while reducing the overall weight can make the planter easier to operate

Manually operated single row plant for ground nut seeds: the benefits of seed metering mechanism can be enhance by increased yard number of seed cells or optimizing the metering device diameter to ensure precise seed placement and reduce waste. The seed hopper design by increasing its capacity and transparent or marked feature can helps farmers monitor seed levels more effectively

Manually operated planter: Studies have emphasized the benefits the seed metering benefits is expanding crop compatibility by designing an adaptable seed metering device and depth control system will enable farmers to use the planter for various crops throughout the year . The seed metering system should be upgrade to allow easy adjustment for different seed types

Case studies and demonstration: A one row hand seeder manually operated machine designed to improved seed planting efficiency for small scale farmers. It's typically feature a light weight, seed hopper and ground wheel for precise seed placement and minimum seed waste. Development focus on cost effective, durable machines reduce labor cost and improving seed spacing. Case studies shoe these seeder save time, increase plant accuracy, and result better germination and crops yields.

METHODOLOGY

The primary objective of seed sowing is to ensure that seeds and fertilizers are planted in straight row at correct depth and spacing. After the placement, the seeds are covered with soil and gently pressed to promote proper germination. The ideal planting depths and spacing vary depending on crop type and climate condition to achieve optimal growth.

The several mechanical factor influence seed germination and plant development. Consisting planting depths is essential for uniform growth, while even seed spacing along plant development. Seed should be remain in their design position without shifting sideways, and the soil beneath them shield be firm to enhance root established. Proper soil coverage ensure seed received adequate moisture and protection

Handle: the length of handle design based other average standing elbow height of male or female operator to ensure ergonomics comfort and east to use. This allows reduce the strain and improve the control while operating the seeder the. The angle of inclination with the horizontal is calculate by using specific formula ensuring optimal working posture. Main frame: the main frame is constructedusing a mild steel plate bar measuring 750 mm in length, 50 mm in width, and 5 mm in thickness ensuring the necessary strength and stability. A handle is designed to allow the operator to apply force, enabling smooth movement of the planters during sowing process. This setup ensures efficient seed placement while maintaining ease to use of the operator Metering mechanism: is a crucial component machine seed evenly at the desired planting rate. In seed planters, it also ensures proper seed spacing within row. The metering system may need to accommodate a wide range on the type of crop rates depending on the type of crops being planted. The design of the seed metering system is influence by the seed size and the required spacing between seeds. In this setup the seed metering wheel picks up seeds from the hopper using cells, then transfer them into a seed funnel. From there, the seed are directed into open furrow through a seed tube

for planting. The working width of a manually operated planter is determined by the number of furrow openers and the row-to-row spacing. The formula used is:

W = Z ×a

Where:

W = Working width of the planter (cm)

Z = Number of furrow openers

a = Row-to-row distance (cm)

Hopper: It is typically made from durable, lightweight, and corrosion resistance plastic ensuring long term usability. Its smooth interior surface helps reduce seed damage ensures efficient operation.

Adjustable furrow opener: Most seed planter is equipped with a pointed tools creates a narrow slit in the soil to facilities seeds are planted at the optional depth for each specific crop. In this design, a pointed bar type furrow opener is used, making it wheel suited for cutting through soil and planting at moderate depth. The opener craft from thin mild steel and shaped like a shoe to efficiently slice through the soil. It is securely attached to the frame using nutes and bolts, alloweing for easy adjustment to the sowing depth, catering to the requirement of different crops.

Adjustable furrow closer: In this design, the furrow closer is adjustable to ensure proper soil coverage over the seed. A shoe type furrow closer is empoloyed, which is especially designed to effectively close the furrow and compact the soil over the seed. This helps to secure the seed in place and improve seed to soil contact, promoting better germination and growth.

Wheel: the ground wheel of the planter acts as the primary source of power. Its rotation is transmitted to the metering cone through bevel gears and sprockets. For smooth and efficient movement, a light weight, tubeless bicycle tire is used as the ground wheel. The tire is equipped with a sprockets, allowing it to effectively drive the planters components while ensuring ease of operation across various surface

Chain and sprockets: the planter uses a chain and sprockets system to transfer power. When the front wheel turns, it drives small sprockets, which transfer motion to layer andmarginal farmers.

Problem solution: To address these issues, the development of a one-row hand seeder machine provides an effective solution. This machine ensures precise seed placement, promoting uniform plant growth and higher yield. By reducing the physical effort required for seeding, it makes the process less labor-intensive while increasing efficiency. A controlled seed metering mechanism minimizes seed wastage, ensuring optimal seed usage and cost savings. The machine also allows for consistent depth control, improving germination rates and plant establishment. Additionally, it significantly enhances productivity by enabling farmers to cover larger areas in less time compared to traditional manual sowing. By integrating key components such as a seed metering system, furrow opener, and covering mechanism, the one-row hand seeder offers an affordable and practical solution to small-scale farmers, improving both efficiency and crop output.

sprockets on the seed metering wheel. This causes the metering wheel to rotated, evenly spacing the seeds into individual's cells. The seed are then directed through a discharge tube and deposited into the soil by the planting shoe. The small sprockets 18 teeth, and the larger one has 48 affecting the speed and power transmission ratio.

Problem faced: Traditional manual seeding methods present several challenges that affect both productivity and efficiency in farming. One of the primary issues is uneven seed placement, which leads to irregular plant spacing, affecting crop growth and yield. Additionally, manual sowing requires significant physical effort and time, making it a labor-intensive process that limits the area a farmer can cover in a day. Another challenge is the wastage of seeds due to uneven distribution, increasing input costs. Furthermore, inconsistent depth control during sowing results in poor germination rates, leading to lower crop establishment. These challenges collectively reduceoverallagricultural efficiency and profitability for small-scale.

Sr. No.	Parameter	Specifications	Material
1	Length	155cm	
2	Width	65cm	
3	Height	100cm	
4	Seedmeteringdevice	Conewithslots,4cmtopdiameter,13cmbottom diameter,15cmheight,4grooves	Aluminum
5	Furrowopener	Flatdisctype,30cmdiameter,0.4cmthickness	HighCarbonSteel

6	Runnerwheel	40cmdiameter	elesscycletyre
7	Seedhopper	12cmwidth,15cmlength,20cmheight	Plastic
8	Seedtube	2.3cmoutsidediameterand40cmlength	
9	Nut&bolts	24number	
10	Powertransmission	Chainandsprockets	
11	Transmissionratio	1.1	

CONCLUSION

Small-scale farmers with limited financial resources often depend on manually operated seed planters to effectively sow seeds in their fields. However, since different crops require specific planting conditions, single-crop planters lack adaptability. This limitation has led to a growing need for manually operated multicrop planters.

This research focuses on the design and development of a single-row, manually operated multi-crop planter that is affordable, easy to use, and simple to maintain. The introduction of such device can help improve agricultural efficiency and make farming more convenient.

The planter is mainly constructed from mild steel, with certain components made from alternative materials for enhanced functionality. The seed metering mechanism is fabricated from high-quality nylon, while the seed funnel and tube are made of rubber. The metering system features a nylon wheel with evenly spaced cells along its perimeter. In this design, the drive shaft is directly connected to the seed metering mechanism, eliminating the need for complex power transmission systems. This streamlined approach reduces production costs while increasing overall efficiency.

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