DESIGN OF SEED SOWING MACHINE

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ABSTRACT

Manual method of seed planting, results in low seed placement, spacing efficiencies and serious back ache for the farmer which limits the size of field that can be planted. The cost price of imported planters has gone beyond the purchasing power of most of our farmers. Pleasant farmers can do much to increase food production especially grains, if drudgery can be reduced or totally removed from their planting operations. To achieve the best performance from a seed planter, the above limits are to be optimized by proper design and selection of the components required on the machine to suit the needs of crops. This project work focused on the design of a manually operated planter sowing for different crop seed that is cheap, easily affordable by the rural farmers, easy to maintain and less laborious to use. The 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.

KEYWORDS: Seed planting, efficiency, drudgery, etc

INTRODUCTION

The history of Agriculture in India dates back to Indus Valley Civilization and even before that in some places of Southern India. India ranks second worldwide in farm outputs. As per 2019, agriculture employed more than 50% of the Indian work force and contributed 17–18% to country's GDP. The Indian food industry is poised for huge growth, increasing its contribution to world food trade every year due to its immense potential for value addition, particularly within the food processing industry. Mechanization in agriculture holds the key for sustainable development in the terms of increasing the production by timely farm operations, reducing losses, reducing the cost of operations by ensuring better management of costly inputs and enhancing the productivity of natural resources besides it helps in reducing drudgery in farm operations. Mechanized agricultural practices and operations have been adopted by the farming community at varying level of adoption, which represents the varying scenario across different regions in the country. Conventional seed sowing method is available but it have lot of disadvantages like no control over the depth of seed placement, no uniformity in the distribution of seed placement, loss of seeds, no proper germination of seeds. Conventional seed sowing machines are not suitable for ridge and furrow method and large quantity of seed is necessary. In this study focus is on to reduce the disadvantages of manual and conventional method and develop a seed planting machine which is suitable to plant seed at specific interval and also useful to plant seed in ridge and furrow method.

METHODOLOGY

Concept of Project:

The sowing operation is to put the seed and in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed.

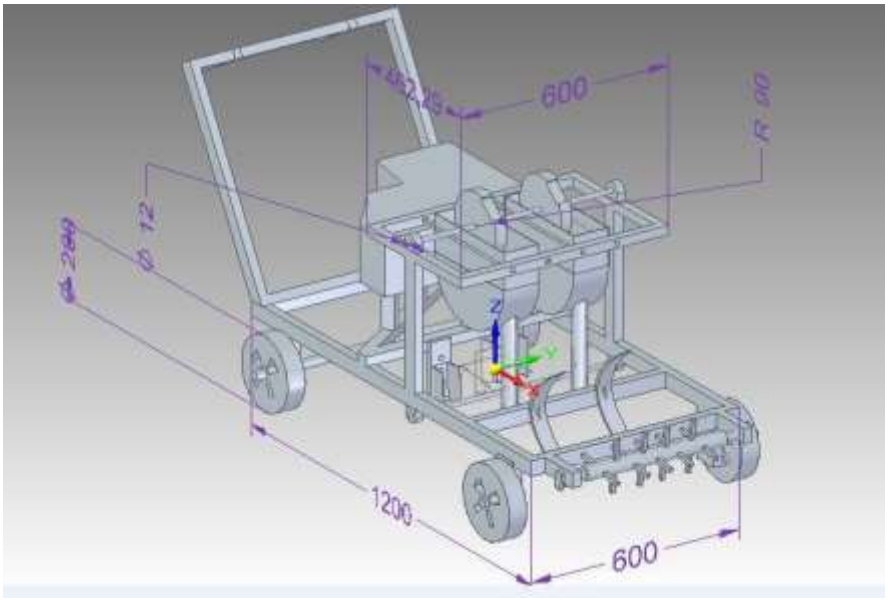
Steps Taken Out for Selecting The Project:

1. The first step is to go to the farmers and find the problems faced by them.
2. The second step is to choose a problem.

3. The third step is to visit to agriculture firms.
4. The fourth step is to analyze the problem& their solution.
5. The fifth step is the selection of materials.
6. The sixth step is to find which mechanism is to suitable in lowest cost.
7. The seventh step is to find all components we require in proper dimension.

Crop planting operations may involve placing seeds or tubers (such as potatoes) in the soil at a predetermined depth, random scattering or dropping of seeds on the surface (broadcasting), or setting plants in the soil (transplanting). Machines that place the seed in the soil and cover it in the same operation create definite rows. If the rows or planting beds are spaced far enough apart to permit operating ground-engaging tools or other machinery between them for inter tilling or other cultural operations, the resulting practice is called row-crop planting; otherwise, it is considered to be solid planting. Thus, grain drilled in rows 15 to 36 cm (6 to 14 in) apart is a solid planting, whereas sugar beets, with rows commonly 51 cm (20 in) apart, are grown as a row crop

CAD MODEL OF MAIN COMPONENTS



3D view of CAD model

PART NAME
SOIL SOFTENING BLADE
FURROW OPENER
HOPPER
CIRCULAR PLATE
SHAFT
SEED TUBE
SOIL CLOSENING BLADE
GROUND WHEELS
MAIN FRAME

	COMPONENTS	QTY	SPECIFICATION

1	FRAME	1	MILD STEEL DIMENSION: 40X20 mm
2	SOFT SOILENINGBLADE	1	MILD STEEL SHAFTDIAMETER:30mm LENGTH:560mm BLADE LENGTH: 90mm,WIDTH:30mm
3	FURROWOPENER	2	FORGED STEEL LENGTH:320mm WIDTH:60mm THICKNESS:2mm
4	SEED HOPPER	2	GI WIDTH:100mm LENGTH:300mmDEPTH:105mm
5	CIRCULARPLATE	2	MATERIAL = WOOD DIAMETER =180mm
6	SHAFT	2	MILD STEEL DIAMETER =12mm LENGTH= 600mm
7	SPROCKETS	6	Z1 = Z2 = Z3= Z4 = Z5 = 32TEETH Z6 = 48 TEETH
8	CHAIN	3	BICYCLE CHAIN PITCH OF CHAIN =15mm
9	GROUNDWHEEL	4	SOLID TYRE DIAMETER = 200 mm

Working:

The working principle of model will start by model is pushed forward by using handles chain and sprocket arrangement mechanism. Here chain sprocket mechanism is connected to rear axle of the wheel where it produces the torque produces movement of the vehicle

Simultaneously another sprocket of same size in rear axle is used to maintain the same speed to provide the rotational effect to the another shaft which is below the seed sowing machine equipment the shaft rotates at the same speed as that of rear axle rotates. Here another larger teeth sprocket is used to provide rotational effect to seed sowing machine shaft. As this shaft consists of two circular plates and made a slot atspecified distance to easily pick the seeds from the hopper as the rear axle wheels turns due to power transmission of chain sprocket mechanism the seed are dropped by the circular plate. The circular plates are turned in clockwise direction as the rotational effects provided by shaft and seed are dropped into ground. We are maintaining the speed of the machine very low so it produces maximum amount of torque. Hence the model can be run smoothly on agricultural land.

RESULTS

Comparison three types of sowing methods

Sr. No.	Parameter	Ox Operated	Manual	Tractor
1	Man Power	Less	More	Less
2	Time Required	Moderate	More	Less

3	Sowing Technique	Automatically	Manually	Automatically
4	Distance Between Seed	Fixed	Not Fixed	Fixed
5	Wastage of Seed	Less	Moderate	Less
6	Pollution	No	No	More
7	Cost of Machine	Moderate	Less	Very High

1) Cost Comparison

Sr. No.	**Parameters**	**nventional Method**	**ed Sowing Machine**	**Tractor Mounted Sowing Machine**
1	Cost per Acre	Rs. 600-700/-	Rs. 100-150/-	Rs. 900-1000/-
2	Time per Acre	3hrs	2 hrs	0.5 Hrs
3	No. of Labours	6-10	1	1

By taking trials on the field of our machine and gathering all information of other possible methods we have got following results.

1) The goal was to build a system which is efficient to perform a various applications with the help of Manually Operated Seed Sowing Machine. With the scope of improvement, the project is done to fulfill the demands of agricultural applications. The main objective of our project was to fulfill the need of farmers suffering from the problems of increasing cost of Fertilization, labor cost and availability as it is operated by single person. With this machine, percentage reduction in time required for Sowing was observed to be 50%. And reduction in labor cost as compared to conventional method was 80%.
2) It has solved the problem of traditional way of Sowing. Since the capital cost is essential factor while selecting type of equipment for farming. This machine has very less capital cost as compared to other type of machines and also principal advantages of having Eco friendliness and easy troubleshooting.By undergoing all this discussion and undergoing all the factors associated with Sowing, this machine will be great boon for the Indian Agriculture.

Advantages:

1) Less maintenance cost
2) Dependency on labour also decreased. Also it saves time of sowing.
3) Uniform placement of seeds in row with required distance.
4) Proper compaction over the seeds is provided.
5) Easy to operate, as no skilled operator required
6) Easy to assemble
7) Improvement in planting efficiency

Disadvantages:

8) Difficult to operate in moist condition.
9) Machine requires more effort in hard soil.

10) Operating force varies from person to person.

CONCLUSION

Current methods of sowing of cotton seed, cultivation of crops and some traditional existing equipment were studied. Also some new technology aspects implemented. Overall the project was very enriching in terms of technical fabrication and design process along with mechanical knowledge. The knowledge gained during progress of project by solving and understanding the complexities, concepts, etc helps in professional life. At thestart of this project, first priority is gives to research over the methods of sowing the cotton-seeds and to studyon existing equipment for sowing process. And then move towards the requirement like frame, wheels, hopper, seed container, seed metering device, etc. and their assembly. After forming groups various designs comes in front of but best suitable design chosen which is easy to fabricate and efficient by costly to small farmers.

Scope:

1. After installation and establishing successful working of the machine, it is proposed toconcentrate on value engineering to increase the future value of the machine in all aspects.
2. Presently, full focus is given only to design modification in seed metering mechanism for the benefit of the small farmers.
3. At present, seed metering mechanism is used for sowing different types of seeds with single metering mechanism.
4. We can use separate metering mechanism for every seeds. Thus, we can increase the value of the machine in future.

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