

## Automated Baby Plant Planting Machine

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**Abstract** -The primary goal of the study is to design and development of a Planting machine to facilitate planting in the agricultural sector. At present the planting process is done manually by the labours. So in order to avoid manual and to solve the problems related in this field it is essential to have planting machine. Though India is an agricultural country and majority of the population depends on agriculture for their lively hood, there is shortage of labor in some of the agricultural sectors. Nowadays this labour problem is more acute. Thus innovative methods are to be adopted to solve the problem of shortage of labour.

**Key Words:** Cam disc, conveyer.

### 1. INTRODUCTION

Planting machine is a device which helps to put the baby plants in the desired position hence assisting the farmers in saving time and money. The agricultural industry has always been the backbone of India's sustained growth. As the population of India continues to grow, the demand for produce grows as well. Multiple cropping on the farms and this, in turn, requires efficient and high-capacity machines. Mechanization of the Agricultural industry in India is still in a stage of infancy due to the lack of knowledge and the unavailability of advanced tools and machinery. In traditional methods planting is done by broadcasting manually. The agricultural has always been the backbone of India's sustained growth. As the population of India continues to grow, the demand for produce grows as well. Hence, there is a greater need for multiple cropping in the farms and this, in turn, requires efficient and time-saving machines.

In the agricultural field, planting operation is very time consuming in farming process. Also more labours are required for seed planting. Hence the total cost of the farming increases. But to reduce the risk of draught due to unpredictable rainy season and for irrigation purpose farmers accepts ridge and furrow method. Here in this study efforts are taken to design and develop a planting machine which overcomes the problem of ridge and furrow method and also planting at specific distance with specific quantity and reduce inaccurate positioning in the field under dry or wet condition in the beginning of rainy season. This method of plantation requires minimum labour and well suited for upland farms.

### 1.1 Literature Review Summary



Fig -1: Plants in trays



Fig -2: Manual planting

Initially plants are grown in trays by providing proper environmental conditions for several days depending on the type of plants and the plants inside trays is shown in Fig -1. After that plants are taken to the agricultural field where we want to grow them. Now it is necessary to feed those plants into the ground by a suitable process. Currently everywhere including India we are carrying manual process to do that, the manual process of planting is shown in Fig -2. Here in manual process the cavities are made initially after that the plants will be placed in those cavities up to a certain depth. In this method it is difficult to maintain the depth and height of the plants same throughout the land. The worker has to bend to do this process also it is very tedious operation.

### 2. DATA COLLECTION AND ANALYSIS

#### 2.1 Product study

Detailed product study has been conducted to find out the available products used in the planting process field for harvesting peppercorns. At present no specific planting machine is available. Generally planting is done manually. It is done by manually as shown in the Fig -2.

## 2.2 Summary of product study

From the detailed analysis it is clear that no specific equipment for planting is available. Only indigenous methods like manually putting plants into the soil is followed. Therefore the necessity of designing and developing a planting became a felt need.

## 2.4 Problem statement

The importance of the product and the user requirement is clearly understood from the Customer survey. So it is essential to define the problems faced with these customer requirements. And many problems including availability of labours, health disorders, human errors and time consumptions were found during the survey.

## 2.6 Study objectives

- To manufacture a planting machine which can be operated by a single person.
- To level the ground in small extent
- To enable the machine to put the plants like tomato, chilly etc.
- To reduce the human risk over manual operation
- To reduce the time consumption in operation
- To manufacture planting machine in lower cost
- To maintain the same distance between row and row.
- To validate the device in front of the customer

## 2.7 Methodology

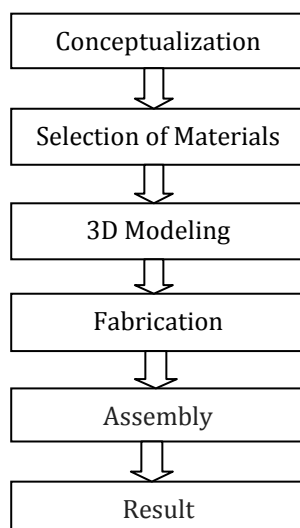


Fig-3: Methodology

## 2.8 Product design specification

Product design specification is a statement showing that what a not-yet-designed product is intended to do. It is the

process that helps us. The product design specification serves as an initial frame work in the development process, design considerations and the needs. PDS helps to understand all the specified data with improved information.

## 3. WORKING PRINCIPLE

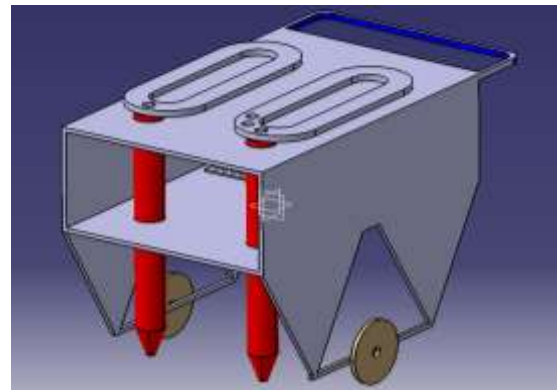


Fig-4: Planting machine

The planting machine works on the principle of slider crank mechanism. It converts rotary mechanism from the ground wheels to the reciprocating motion of the cylinders which are present at the front end of the machine which are used for making cavity on the soil surface to feed the plants.

A conveyer mechanism is used to place the plants and to feed them into the field. Power to this conveyer is also taken from the ground wheels.

## 3.1 Manufacturing process

### 3.1.1 Drawing preparation and material selection

First of all two dimensional drawing of the proposed model have been prepared. Material procurement is the initial stage of any manufacturing process. Based on the drawing, the required aluminum pole, plastic materials, rubber materials, cable wire, tin sheet etc have been selected.

### 3.3.2 Fabrication and assembly

After collecting all the required materials the manufacturing of the model started. Firstly, the assembly of frame was carried out. The assembly of frame is done by welding the frame rods. The assembly of the frame is shown in Fig -6.



Fig-5: Fabrication

Next fabrication of the individual component was taken for work. The different processes were undertaken to make these components like creating holes on the disc using laser cutting and assembly of spring mechanism on the cylinders. After the collection of every component we assembled every component one by one using different techniques like welding, fastening them on the frame which is the main component. Fixing wheels to the frame along with the bearings is done by the wheel shaft. The conveyor belt is fixed on the rotating shafts present in the machine. Handles at proper point were built which help to move the machine easily.

### 3.2 Components of the planting machine



Fig-6: Frame



Fig-7: Ground wheel



Fig-8: Rotating circular disc



Fig-9: Cylinders



Fig-10: Chain



Fig-11: Bearing



Fig-12: Sprocket



Fig-13: Spring

### Machine assembly



Fig-14: Final assembly

The final assembly of the planting machine is shown in Fig-14. The handles are used to move the planting machine. When the machine is moved the cylinders which are provided at the front portion of the machine start to reciprocate taking rotation from the back ground wheels. In the same way the conveyor shafts rotate at the same time taking rotation from the front ground wheel.

The reciprocating speed of the cylinders depends on the pointer location used in the rotating disc which provides movement. Different pointer locations can be used for varying speed of the cylinders and finally results in vary of



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time cycle of the opening assembly of the cylinder. When the opening assembly of the cylinder is about to active the conveyer provides the plant which has to be planted. The plant which has fed will fall down through the cylinder and lands on the ground on the cavity which has created by the cylinders.

3.3 Advantages

- By using planting machine we can cover more area with less labour.
- Reduces the burden of farmers
- It can reduce the production time
- Reduce the impact on the ecosystem and non-pollutant.
- It can be operated by a single person
- Maintains the uniform spacing between rows while operation.
- Avoids the human error

3.4 Disadvantages

- The weight of the planting machine is slightly higher.
- Minor manual operations are still required

3.5 Result and discussion



Fig-15: Working model

After completing the assembly and manufacturing process the model was taken to the user environment and subjected to usability. The planting process with this equipment has been tried by the different labors. It was found that they can conveniently and easily do the planting process. The users said that it is good equipment for planting and everyone should have this sort of equipment with them.

A planting machine is a farm implement, usually pulled by a former, and sows plants in rows throughout a field. Planting machine lay the baby plants down in precise manner along rows. Planters vary greatly in size, from one row to one. In a mechanical drive system the unit works by a small suspended wheel being driven by another which is in contact with the ground (driven) wheel. As the operator lowers the planter the two tires make contact and the planter is engaged. When the driven wheel begins to turn it then turns a series of bearing that determine the

population of the seed produced. The gears can be changed by the operator in order to change the planting population.

The ground wheel is in contact with ground, and its act as a drive system. Using sprocket the conveyer is connected through chain to the ground wheel, the sprocket connected to the conveyer acts as a driven. When the baby plants are placed on the conveyer when the operator starts to push the machine the ground wheel starts to moving using sprocket and chain conveyer is connected. So conveyer starts to rotate, due to gravity the plants are fall down to the planter cylinder. Other wheels are connected to the planter cylinder using slider crank mechanism using rotating circular disc. Using this mechanism the circular motion is converted into linear motion. At the time of fall down of plants to the planter the planter cylinder plucks the soil in the field, and planting the baby plants in the agricultural field, and maintains distance between plant to plant and row to row.

3.5.1 Results

Table-6.1: Result

Sl. No	Dimension	No. of Plants		Time Taken	
		Manual work	Planting machine work	Manual work	Planting machine work
1	33x33 feet	204	204	24 min	12 min
2	1 acre	8160	8160	16 hrs	8 hrs

3.5.2 Discussion

The planting machine was taken to the real working field, the planting process was carried out on 33x33 feet area of land using the planting machine and it is found that it took 12min to complete this area and nearly it completes one acre of land in about 8 hours where in the manual operation needs at least of 15 hours to complete the same land (1 acre). It nearly the plants 204 plants on 33x33 feet area which is as same as the number of plants that are planted over manual operation. So, it can be seen that planting machine is worthy over manual operation.

4. CONCLUSION

The planter machine has considerable potential to greatly increase productivity. The main task now is to promote this technology further more using other mechanisms and

to make this much more easier. The Planter machine can be readily made from local components in workshops. By using this machine, we can achieve flexibility in work and we can maintain distance and depth accuracy for different type of plantation.

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