

# Pneumatically Operated Automatic Seed Sowing Machine

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## ABSTRACT

In the nurseries, often used conventional seeding operation takes more time and more labour. The seed feed rate is more but the time required for the total operation is more and the total cost is increased due to labour, hiring of equipment. The conventional seed sowing machine are less efficient, time consuming. To meet the future demands, we have to implement the new techniques will increase the overall production. As day by day the labour availability becomes the great concern for the farmers and labour cost is more, this machine reduces the efforts and total cost of sowing the seeds and fertilizer placement. Theoretical studies regarding pneumatic equipment for sowing small seeds in cups, highlighting the advantages of this type of equipment with superior parameters obtained from the considered crops. Equipment can be used in narrower spaces, being easily to handle and use, of driving the vacuum generator can be done electrically. By using this equipment, the productivity will increase, the space of establishing the seedlings will reduce, and the seeds norm will diminish. The germinating, rising and development space of plants is assured, equipment can be automated and built by minimum costs.

**KEYWORDS:** Seed sowing machine, Seed, Nurseries, Pneumatic

## I. INTRODUCTION

The advent of green revolution, more emphasis is laid on the quality of the agricultural product along with the quantity of production to meet the ever-growing food and nutritional requirements. Both these demands can be met when the environment for the plant growth is suitably controlled. The need to protect the crops against unfavourable environmental conditions led to the development of protected agriculture. Greenhouse is the most practical method of achieving the objectives of protected agriculture, where natural environment is modified by using sound engineering principles to achieve optimum plant growth and yield. Our country is self-dependent on food grain production but to fulfill the nutritional security, the gap between increasing demand of horticultural produce has to be filled. This gap cannot be filled by the traditional horticulture which required large area under horticulture to increase the production for the ever growing population. Green house technology has potential to produce more produce per unit area with increased input use efficiency. Though India have 2nd largest man-power in the world, it is very difficult to find

the workers for planting seeds in nursery as well as in Farm. Also there is loss of seed while sowing it in seed planting tray; it leads to loss of self property and ultimately loss for nursery as well as for farmers. The existing sowing machine is too costly. It is not abundantly available in India. It has a complex design. In India traditional farming is prevalent but now new farming technology like poly house farming provides better income in a short period of time with fewer labours. Polyhouse farming is an alternative new technique in agriculture gaining foothold in rural India. It reduces dependency on rainfall & makes the optimum use of land and water, seed resources. Polyhouse farming can help the farmer generate income around the year growing multiple crops with an efficient machine called “SEED SOWING MACHINE”

## II. OBJECTIVE

- To optimize the cost the seed sowing machine in comparison with the imported seed sowing machines.

- To design and fabricate the seed sowing machine that reduce the over all time required by the labours to do the same work.
- Uniformity in the distribution of seed placement.
- Reduction in Man-Power
- Design the model of seed sowing machine.
- Fabricate the design using materials and accessory components that has been selected.
- To fabricate the Seed sowing machine which can fill more trays in less time.
- To design and fabricate the seed sowing machine that can sow the seeds accurately in the seed tray.

Utilization the equipment proposed for sowing small seeds in seedbeds decreases the volume of manual force required to do the work, decreases the amount of seed per surface unit, eliminates the execution of works thus reducing costs for obtaining seedlings. It is also ensured the sowing depth and emerging uniformity of plants. To achieve the equipment plastic products or existing components of some installations and equipment that can be reused, are used. Studies and experimental tests relating to the production index, consumption standard, the emerging degree and the plants percentage obtained will be continued. Based on the rules relating to the influencing factors for achieving optimal density can be established by species, the crop nature, the crop schemes implicitly expressing the productivity.

### III.LITERATURE SURVEY

G. L. Suryawanshi et al [1]: In the Indian nurseries often used conventional seeding operation takes more time and more labour. This feed rate is more but the time required for the total operation is more and the total cost is increased due to labour, hiring of equipment. The conventional seed sowing machine are less efficient, time consuming. Today's era is marching towards the rapid growth of all sectors including the agricultural sector. To meet the future demands, we have to implement the new techniques will increase the overall production. As day by day the labour availability becomes the great concern for the farmers and labour cost is more, this machine reduces the efforts and total cost of sowing the seeds and fertilizer placement. Theoretical studies regarding pneumatic equipment for sowing small seeds in cups, highlighting the advantages of this type of equipment with superior parameters obtained from the considered crops. Equipment can be used in narrower spaces, being easily to handle and use, of driving the vacuum generator can be done electrically. By using this equipment, the productivity will increase, the space of establishing the seedlings will reduce and the seeds norm will diminish. The germinating, rising and development space of plants is assured, equipment can be automated and built by minimum costs.

Conclusion:-The conventional seed sowing machine are less efficient, time consuming. Today's era is marching towards the rapid growth of all sectors including the agricultural sector.

Olimpia Pandia et al. [2]: The paper presents theoretical studies and laboratory experiments regarding pneumatic equipment for sowing small seeds in cups, highlighting the advantages of this type of equipment with superior parameters obtained from the considered crops. Equipment can be used in narrower spaces, being easily to handle and use, of driving the vacuum generator can be done electrically or thermally. By using this equipment, the productivity is increased, the space of establishing the seedlings is reduced, and the seeds norm is diminished. The germinating, rising and development space of plants is assured, equipment can be automated and built by minimum costs. Studies and experimental tests relating to the production index, consumption standard, the emerging degree and the plants percentage obtained will be continued.

Conclusion:-Driving the vacuum generator can be done electrically or thermally; Depression in installation does not require greater values, because of the seeds small mass; Nozzles holes should represent 0.5-0.6 out of the smallest size of seed. By using this equipment, the productivity is increased, the space of establishing the seedlings is reduced, the seeds norm is diminished; The germinating, rising and development space of plants is assured; Equipment can be automated and built by minimum costs.

Joshi et al.[3]:This paper presents a system with high speed of operation for an advanced agriculture process which includes cultivation based on robotic platform. The robotic system is an electromechanical (conveys a sense that it has agency of its own) and artificial agent which is steered by DC motor which has four wheels. The farm is cultivated by the machine, depending on the crop considering particular rows & specific columns. The infrared sensor detects the obstacles in the path and it also senses turning position of vehicle at end of land. The seed block can be detected and solved using water pressure. The machine can be controlled remotely and solar panel is used to charge DC battery. Assembly language is used in programming the microcontrollers. The microcontroller is used to control and monitor the process of system motion of vehicle with the help of DC motor. The result of implemented unit is also presented.

Conclusion:-This paper has presented the requirements and progress made towards achieving a future precision autonomous farming system. The assembly is developed for cultivating ploughed land automatically i.e. less power is required. The blocking of seed problem is eliminated with the help of water pressure. So this project increases the efficiency and accuracy. The project consists of two different mechanisms. The first mechanism contains making an assembly of vehicle and its motion, whereas second mechanism is preparing a seed bed on ploughed land. The microcontroller is used to control and monitor the process of system motion of vehicle. It is controlled with help of DC motor and servo motor.

Marode A et al. [4]:This research paper represents "Design & Implementation of Multi Seed Sowing

Machine". In this paper gives types sowing machine. The following are the three different types of seed sowing are broadcasting: A field is initially prepared with a plough to a series of linear cuts known as furrows. The field is then seeded by throwing the seeds over the field, a method known as manual broadcasting. The result was a field planted roughly in rows, but having a large number of plants. When the seeds are scattered randomly with the help of hand on the soil, the method is called broadcasting. Dribbling: Drill sowing and dribbling (making small holes in the ground for seeds) are better method of sowing the seeds. Once the seeds are put in the holes, they are then covered with the soil. This saves time and labour and prevents the damage of seeds by birds. Another method of sowing the seeds is help of a simple device consisting of bamboo tube with a funnel on it attached to a plough. As the plough moves over the field the tube attached to it leaves the seeds kept in the funnel at proper spacing and depth.

**Conclusion:** It is concluded that the multi-purpose seed sowing machine can maintain row spacing and controls seed and fertilizer rate. Control the seed and fertilizer depth and proper utilization of seeds and fertilizers can be done with less loss.

#### IV. COMPONENTS AND MATERIALS

Sr.No	Name of the component	Quantity	Material
1	Frame	1	Mild Steel
2	Pulley	2	Stainless Steel
3	Seed Tray	1	Acrylics
4	Nozzles	5-6	Stainless Steel
5	Pneumatic Pipes	3	Nylon
6	Vaccum pump	1	-
7	Stepper motor	1	-

Table 1: Components and Materials

#### V. DESIGN AND SPECIFICATION

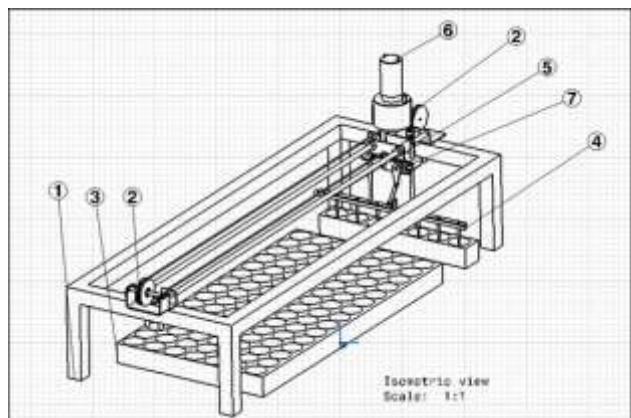


Fig. 1 Isometric View of Assembly

CAD model and Calculations of important part of Automatic seed sowing machine:

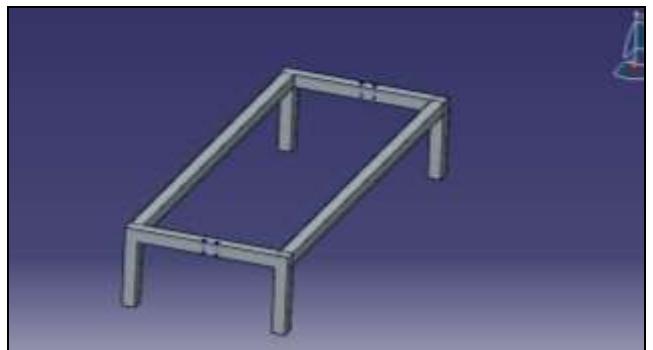


Fig 2. Frame(Catia Model)

The frame is made by welding mild steel rectangular pipes. Electric arc welding technique is used for all the manufacturing of frame.

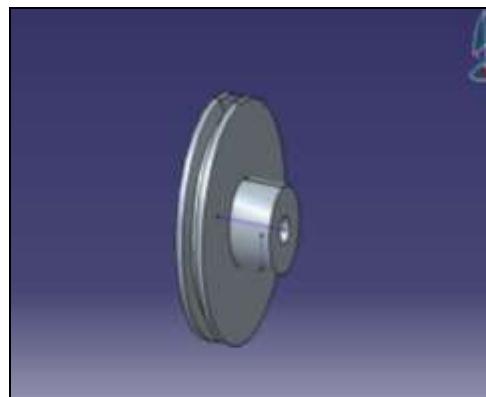


Fig 3. Machine Pulley (Catia Model)

A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a taut cable or belt along its circumference.

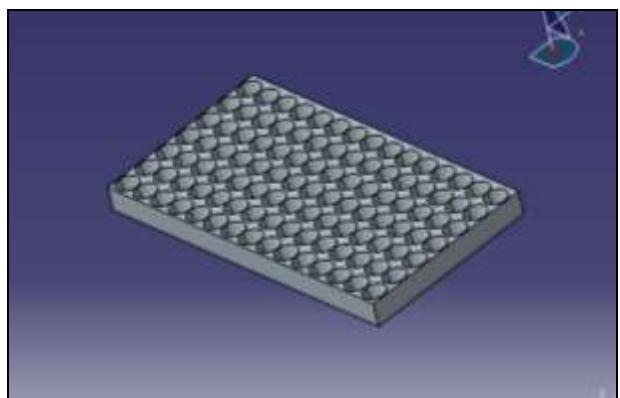


Fig 4. Seed Tray (Catia Model)

Seed tray is specific container which is used for holding the seeds before it gets placed in proper planting tray. Seed tray can be of any shape such as circular ,rectangular etc ,but for it's convenience in handling in seed sowing machine , seed tray of following shape is selected, designed and manufactured.

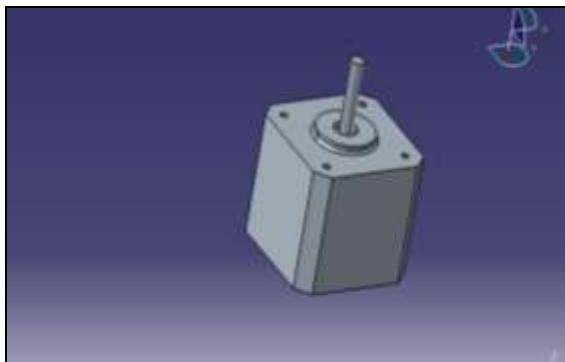


Fig 5. Stepper Motor (Catia Model)

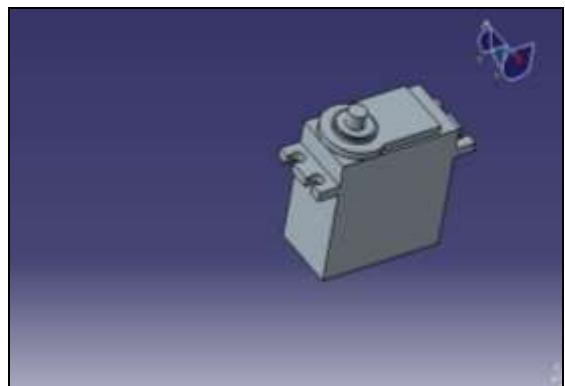


Fig 6. Servo Motor Catia Model)

## VI. BLOCK DIAGRAM

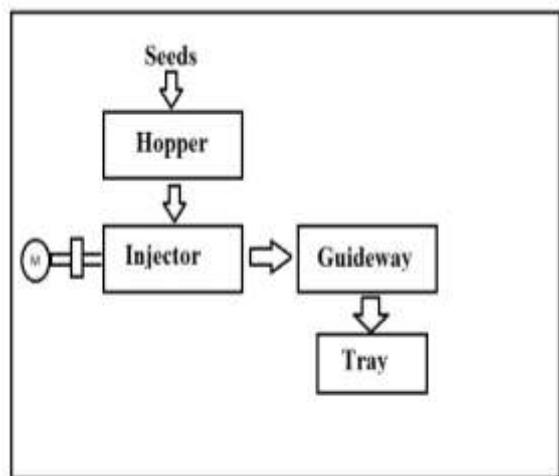


Fig 7. Block diagram of automatic seed sowing

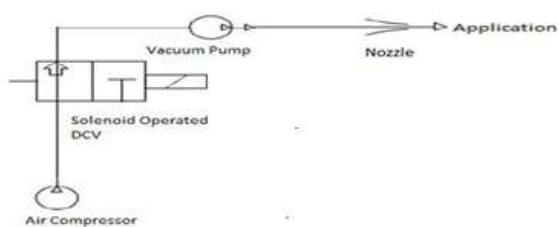


Fig 3: Pneumatic circuit for automatic seed sowing machine.

Fig 8. Circuit diagram

As whole assembly is mounted on the frame hence it should be rigid and having more strength to withstand forces. Frame consists of rectangular structure. For that purpose four strips are welded on the frame. For roller and bearing assembly. By using nut & bolt, saddle the roller and bearing assembly attached to the frame. Bearing and belt are mounted on roller before the frame.

Upper part consist of Injector, motor and Guide ways. Lower part of frame consists of tray. On the tray is mounted through the pulleys, motor & guideway. This is the simple construction of automatic seed feeder.

When power is given to the stepper motor its starts the main pulley via the rubber belt which in turn will move the nozzle assembly of the machine. The nozzle assembly slides on the 2 sliding bars provided. The nozzles are controlled and operated by the servo& stepper motor and vacuum pump. Both the motors, Servo and Stepper motors are controlled by the ARDINO circuit, which always knows the precise location of the nozzle assembly and moves it according to the required motion and speed.

## VII. CONCLUSION

As the existing problem regarding the availability of machine at low cost, worker's availability and wastage of seeds in agriculture sector are eliminated with the help of Automatic seed sowing machine. Seed picking and placing of seed at the proper seedling tray is achieved with this machine. Also, area consumed by Automatic seed sowing machine is very less that allows the machine to work easily. Precise placing of seed also helps in proper growth of plant. Variety of seeds can be easily placed by adjusting the nozzle inlet diameter.

The major advantage is that it could be used in case of seed diameter variation with the simple mechanism changes.

The cost of our seed sowing machine is almost one fourth of the imported seed sowing machine used mostly in nursery's as seen in the results.

This project provides the knowledge about the manufacturing process and different designs, power transmission with the use of belt drive mechanism and seeds their shapes, sizes and also a good knowledge of agricultural seed planting process.

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