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Design and Fabrication of Seed Sowing Machine

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Abstract: Sowing machine should be suitable to all farms, all types of crops, robust construction, also it should be reliable, this is basic requirement of sowing machine. Thus we made sowing machine which is operated manually but reduces the efforts of farmers thus increasing the efficiency of planting also reduces the problem encountered in manual planting. For this machine we can plant different types and different sizes of seeds also we can vary the space between two seeds while planting. This also increased the planting efficiency and accuracy. We made it from raw materials thus it was so cheap and very usable for small scale farmers. For effective handling of the machine by any farmer or by any untrained worker we simplified its design. Also its adjusting and maintenance method also simplified.

Keyword: Seed, Sowing, Planting, agriculture, efficiency

1. INTRODUCTION

Cropping is important and tedious activity for any farmer, and for large scale this activity is so lengthy also it needs more workers. Thus agriculture machines were developed to simplify the human efforts. In manual method of seed planting, we get results such as low seed placement, less spacing efficiencies and serious back ache for the farmer. This also limited the size of field that can be planted. Hence for achieving best performance from a seed planter, the above limits should be optimized. Thus we need to make proper design of the agriculture machine and also selection of the components is also required on the machine to suit the needs of crops.

The agriculture is the backbone of India. And for sustainable growth of India development of agriculture plays vital role. The India has huge population and day by day it is growing thus demand of food is also increasing. In agriculture we saw various machines. Also there traditional methods are there. Since long ago in India traditional method is used. Also India has huge man power. This manual planting is popular in villages of India. But for large scale this method is very troublesome. The farmer has to spend his more time in planting. But time available is less for him. Thus it requires more man power to complete the task within stipulated time which is costlier. Also more wastage happens during manual planting. Hence there is need of developing such a machine which will help the farmer to reduce his efforts while planting. This process of using machines is called as mechanization. Along with mechanization automation also helps to increase the efficacy of the process.

Here is the block diagram of the machine and working of it. It also tells the hardware implementation, selection of components and controllers. This system is nothing but 4-wheel robot system on which seed tank, sowing mechanism and metering device is installed to turn it into automatic operated vehicle.

This article represents the advanced system for improving the agricultural processes such as cultivation on ploughed land, based on robotic assistance. We developed a vehicle having 4wheels and operated by DC motor. The machine will cultivate the farm by considering particular column at fixed distance depending on crop.

2. PROPOSED WORK

This machine has very less cost. This planter is very simple to use hence, unskilled farmer is also able to handle this machine. We simplified the design also made it cheaper and affordable to every rural farmer. We made various adjustments and simplified it from controlling and maintaining point of view. In this design we connected drive shaft to metering mechanism which eliminates the attachments such as pulleys and belts system. DC motor drives the shaft of motor which is coupled with battery bank. As motor starts it moves this robot as well as operates the metering mechanism. Seed storage tank is connected at the top of the robot near rear wheels. The sensor is fitted to it which senses the level of seed in it and gives the alarm when the tank is empty. Front sensor serves the function of guiding the robot. As any obstacle comes in front of robot it gives the signal to the robot and diverts the path of robot. For every rotation of the wheel according to the adjustment it allows the definite seed to fall into the hopper so that there is no wastage of the seeds also the sowing process does smoothly. When the robot reaches at other end and when it completes task it creates an alarm so that we can provide required facility.

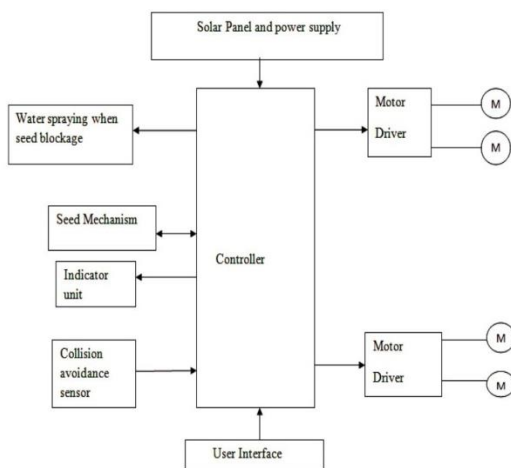


Fig 1. Outline of the project

3. FACTORS AFFECTING SEED EMERGENCE

Mechanical factors, which affect seed germination and emergence are :

- Its depth should be uniform with regard to placement of seed
- It should be distributed uniformly along the rows.
- Its transverse displacement with regard to row also considered.
- Loose soil getting is also prevented.
- Soil is covered uniformly over the seed.
- Fertilizer is mixed with seed during placement in the furrow.

By fulfilling above factors we get best performance of the seed drill or planter. To improve the performance we need to optimize the above factors also so that we get desired efficacy from the system in economical way. Its design is simplified and components are selected to suit the need of the corps. In the working of the robot seed drill or planter also plays vital role in manipulating the physical environment. The metering system allows the metered or required quantity of the seed in the farm. This system also serves the seed so that seed should not be damaged while working.

Table 1 Diameters of different seed

Seed name	Diameter(mm)
Arugula	2.5
Beet	7.5
Broccoli	3.5
Cabbage	3.5
Carrot	3.5

Cauliflower	3.5
Corn	13.5
Cucumber	9
Lettuce	6
Okra	7.5
Onion	6
Pea	10
Radish	4
Sun flower	2.5

Table 2 Details for planting seed

Vegetable	Distance between Plants (cm)	Planting depth (cm)
Asparagus	30	2.5-4
Beet	3-5	1.5
Broccoli	45-60	0.5-1.5
Cabbage	45	0.5-1.5
Carrot	3-5	1.5
Cauliflower	45-60	0.5-1.5
Corn	15-25	2.5
Okra	30	2.5
Onion	5-8	1.5-3
Pepper	60	1.5
Potato	25-30	10
Radish	2.5	1.2

4. DESIGN OF SEED SOWING MACHINE

Following figure shows the complete drawing of the sowing machine. While designing the mechanism physical conditions as well as the requirements both are considered. Hence this machine is able to plant the seeds in the required way.

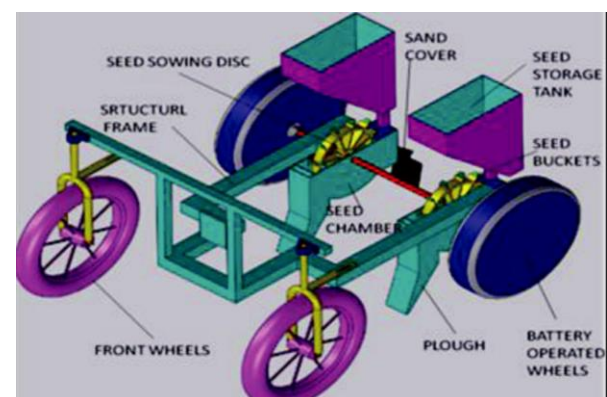


Fig 2. CATIA drawing of the project

Following are the major parts which are used in this machine.

1. Structural frame
2. Battery powered wheels
3. Seed storage tank.
4. Seed sowing disc
5. Seed bucket.
6. Seed chamber.
7. Plough.

5. SAND COVER ARRANGEMENT

5.1 Seed storage tank:

Storage device is one of the important device of the system. And is designed according to weight sustained by the robot as well as the required capacity for planting. This component is stationary. To the bottom of this tank seed sowing disc is arranged. This disc serves the function of distribution of the seeds, as for each complete rotation of the rotating wheel, only one seed falls from the tank. Also number of seeds falling from tank is varied according to requirements. This disc evenly opens the way to seed hence planting is done smoothly and accurately.

5.2 Seed sowing disc & seed bucket:

Disc which is attached at the bottom of the tank allows one seed during one rotation of wheel. In the above fig seed sowing disc is also included. The buckets are screwed on the disc. These buckets are very similar to half shape of pelton buckets. As these are screwed to disc its size is varied according to diameter of the seed and required distance between the seeds.

5.3 Developed Seed Mechanism:

Seed metering device meters the quantity of the seed which is going into the farm. It also maintains the required level of the sand in the tank. Mostly metering is necessary to track the amount of seed also determine the when the seed tank is again filled. It gives the length or the distance which can be sowed. Thus only required seed falls for every rotation of the wheel.



Fig 3. Actual wheel

5.4 Seed meter mechanism

Functional requirements of seed metering devices:

1. Metering of the seed should be done at a required rate. (e.g. kg/ha or seeds/meter of row length).
2. Metering should be accurate as per the requirements.
3. There should not be any damage to the seeds during metering.

6. RESULTS

Table 3 Results for planting

Vegetable	Obtained Distance between plants (cm)	Obtained Planting depth (cm)
Asparagus	26-34	2-5
Beet	3-7	2-4
Broccoli	40-55	1-3
Cabbage	40-50	1-3
Carrot	3-6	1-3
Cauliflower	44-55	1-3
Corn	12-25	2-4
Okra	28-32	2-4
Onion	4-8	2-4
Pepper	55-65	1-3
Potato	25-30	5-12
Radish	3-5	1-3

7. ADVANTAGES OF MACHINE

Following are the advantages of manual seed planter machine are

- Improved efficiency in planting.
- Increased yielding and reliability in crop. Increased cropping frequency.
- Increased speed of seed planting.
- Seed planting accuracy.
- Durable and cheap as low cost materials are used.
- Less maintenance cost.
- Since seed can be poured at any required depth, the plant germination is improved.
- Dependency on labor also decreased. Also it saves time of sowing.
- Uniform placement of seeds in row with required distance.
- Proper compaction over the seeds is provided.

8. CONCLUSIONS

This seed plantation machine has great potential for increasing the productivity of the planting. Till now tractor was the main traction unit for nourishment in farming. With the adaptation of this seed planting machine its purpose will be done. Hence there is need to promote this technology and made available to even small scale farmers with affordable prices. This machine can be made by raw materials also which saves the cost of whole project and is easily manufactured in available workshops. The only cost is of metering device and sensors. Hence by using this machine we can achieve flexibility of distance and control depth variation for different seeds.hence usable to all seeds.

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