

## Seed Breeder

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**Abstract**— In India, sowing of root vegetables is very tedious process. The conventional method of sowing root vegetables takes lot of man power, money and also it is very time consuming. Here, in India there is no such equipment for the sowing of root vegetables. So, now-a-days it is necessity of every farmer to have equipment for sowing of root vegetables which can save money, man power and most importantly time. This paper explains the development and implementation of an automatic seed breeder system that will increase accuracy and will decrease the time required for planting of seeds. The seed breeder will able to have less interaction of humans. In addition to that, it has flange for seed sowing which can guide the seed to the field with proper sensing using magnetic read relay. This includes a chain sprocket between the two shafts for transmitting the rotary motion to the disc mounted on the frame for guiding the seeds. As this will be a fully automatic planting system no human resource is needed to control it the planting of seeds. This indeed will lead any farmer a step ahead to a smart one.

**Key words:** Seed Breeder, Farming, Automation, Design, Magnetic Read Relay

### I. INTRODUCTION

The success of any conservation plantings depends on several factors including but not limited to seed quality, using the proper site and seedbed preparation techniques, and using the proper planting method. Deciding on the best planting method depends on the type and condition of the site, equipment availability, and the type of seed being planted. Some species can be difficult to plant due to variability's in seed size, weight, and shape. Often conservation seed mixes include multiple seed types being planted on the same site. Taking the time to evaluate and address equipment needs prior to planting will greatly increases the success of any planting. The seeds need to be placed into the soil, to proper depth in order to allow the maximum survival rate of germination. If the sowing depth is too shallow, the seed will not get enough moisture for sprouting and if the depth is too deep, the seed does not have enough energy and oxygen to survive. The germination and beginning of the lifecycle of a plant depends also on the firmness of the soil and the soil temperature. Typical even if the optimal depth of seeds were known exactly, it is hard to guarantee the precise depth of seed placement in broad acre farming, as the requirements for operational efficiency try to maximise the field capacity with high driving speed. The relatively high speed means that the mechanical system is not able to follow the fine contour of the field and the burrow created by a hoe or a disc is irregular. Therefore, the depth where the seeds are placed varies naturally. The coulters, either discs or double discs, or hoes are used to create the furrows in the field where the seeds are placed; and later the furrows are covered with the soil. Each manufacturer has developed specific details of the coulters from different requirements. For one manufacturer, the high speed may be more important than the constant depth, while

the other puts more engineering efforts to cope with a wide range of soil types and conditions. Therefore, the variation of the depth where the seeds are placed depends on the model of the coulters. The idea of precision agriculture is to control the operations of farming based on site specific observations. The soil type varies within a field plot and it needs to be taken into consideration in tillage and sowing. To see significant differences in emergence rate compared to uncontrolled system. In the modern world, where field-space has become a very big problem, it has become very important to avoid the wastage of space in modern so the proper device for planting the seeds is important.

### II. SEED BREEDER

As we explain earlier seed breeder is a simple machine whose mechanism or working is also simple one. We just need an extra tractor to move the machine across the farm which is pre requisite of our project.

#### A. Component of Machine

- Solid and hollow shaft
- Rectangular plates
- Motor
- PLC programming
- Chain and sprocket
- Small diameter coins
- Square frame

#### B. Working

We need to attach our mechanism or machine to the tractor with the help of frame and screw mechanism given. Once the tractor starts moving, whole assembly will move with that tractor. The half part of machine is inclined on the land. The part of machine which is actually in contact with the soil is a disc which is placed on the first solid shaft. As the tractor will move on, the disc which is in contact with soil will start rotating because of the circular motion given to the disc. This disc is placed on the shaft so, as the disc rotate; shaft will also rotate along with the disc. Now an another chain and sprocket mechanism is also attached on shaft. Because of the circular motion of shaft the sprocket also rotate along with the shaft. The chain which is mount on sprocket now will start circulate which is attached on the next hollow shaft at the other end.

This whole mechanism is totally depends upon one another. One part is directly or indirectly depends on another. Now, because of the chain mechanism the second shaft will also start to rotate.

Now this second shaft is fixed at its both ends. On both the ends there is one 30 cm diameter circular disc is attached. On that disc there are four long hollow shafts or pipes are attached at an equal distance.

The hollow pipes attached on disc have a different structure. The ends of the pipes are cut at an inclined oval shape. The shaft has a weight of half kilogram and has 60cm in length. At some distance there is an 11cm patch or one side gap present from where we will send the seed to soil.

Just 5cm before the path there is another gap of 4mm is given for the up and down motion of coin.

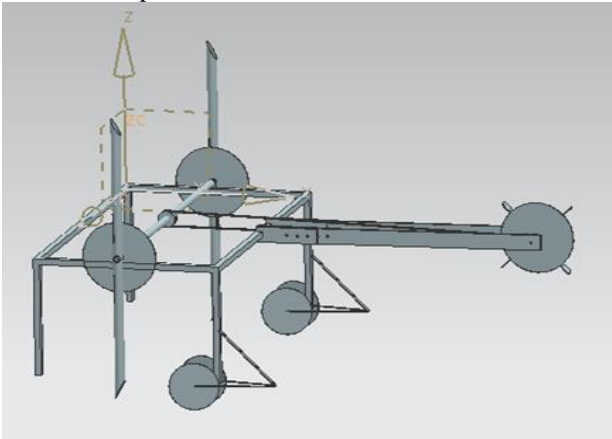


Fig. 1: Seed Breeder

A simple coin of 5cm diameter is attached on the shaft near the gap. The motion of the coin is driven by the helical gear motor which is also present on the shaft.[2]

As the disc on second shaft rotate which tend to give a circular motion to the four shafts attached on the disc. Two persons who are sitting near both the wheels of tractor will send the seed through the patch given to hollow pipes. On both the side of frame there is magnetic reed relay is attached on the strips which is fixed horizontally on both the base of frame in front of the motion of pipes. Every time the shaft comes in front of magnetic reed relay, reed relay sense that motion and send the signal to the motor. Now motor will start working and lift the coin. Because of the upward motion of coin the seed will move or laid down through the pipe and placed on the soil at a specific distance. Another part which is attached to the one of the base of the shaft will buried the seed by pushing soil on the seed. According to our convenience we can attach the magnetic reed relay to the three positions viz, on the extreme left, extreme right and at the middle. These positions will change the distance between two consecutive seeds. As the gear we used are same and we have a gear ratio of 1, In one complete rotation of disc we can plant the two seed at a specific distance. And this is how the machine work which is very simple and time saving and on the basis of this mechanism we can say that it is feasible to the Indian farmers who are in the search of such a machine which is automatic one.

### III. FEA ANALYSIS OF SHAFT BY HYPERWORKS

The three dimensional model of shaft prepared in solid edge modelling software is imported in HYPERWORKS workbench and load is applied and results are obtained.[5]

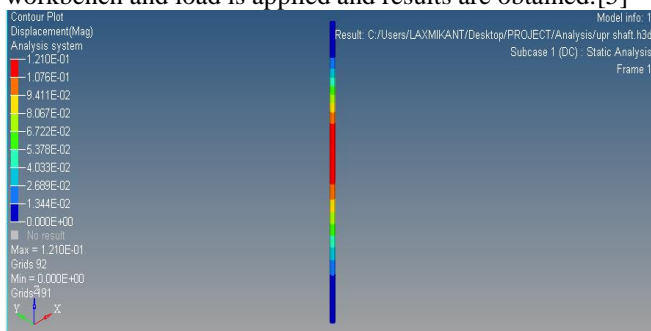


Fig. 2: Maximum Displacement in Shaft  
Maximum displacement in Shaft: 12mm

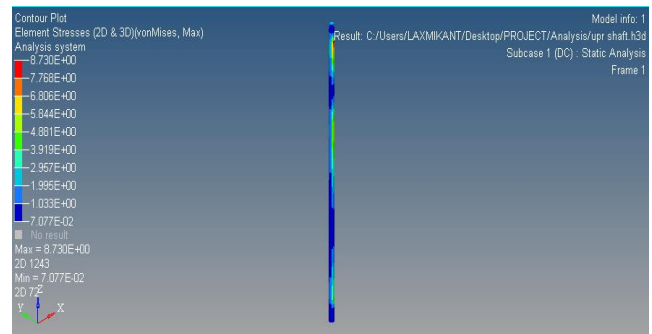


Fig. 3: Maximum Stresses in Shaft  
Maximum Stresses in Shaft- 8.7 N/mm<sup>2</sup>

### IV. MANUFACTURING

When it comes to the manufacturing, some more parts are added which were not shown in the Design, some parts are modified from the designs mentioned. These addition and modifications are done taking account into various factors such as:

- Lack of availability of very small readymade parts because of the scaling of model
- To reduce overall cost without compromising in its performance
- To increase overall strength and to attain maximum strength

All manufacturing or a working set up of seed breeder contains mainly two main parts:

- Mechanical System
- Electronic system

#### A. Mechanical System

In all the mechanical system mild steel is selected as a material for seed breeder.

First it is bought all equipments from a scrap market. This is because, the main aim of our project is to manufacture a machine in low cost as much as possible, so that any farmer of our country can easily afford it who mainly grows root vegetables. So we got all the equipment easily from the market in low price. After getting all the equipment the next step is to get all the equipment in a proper dimensions or a in a parameters that we want, so we found one of the workshop where we can do all our manufacturing.

So we have cut all the equipments in a proper shape and weld them in a proper way. Also we have attached two chains to each other as we wanted to increase our length of chain. After all the welding the main problem we found that; our chain that we have mounted on a gear and sprocket from main shaft to rear axle gets slipped when we rotate our disc. After wasting so much of time on the problem we got to know that the main reason behind the chin slip is that both of our gear and sprocket on the two shafts namely front and rear are not mounted from center to center. There centers are not in a one straight line, so we have adjusted the centers so that they both are in a straight line and that's what our solution was. We have clear our main problem with just mere adjustment of gear and sprocket.

In all this mechanical process or manufacturing the problem we have faced was the welding process as we are not used to for this process. Second one is that the time of

workshop as it is not work on holidays or for extra time. Also the different machines on which we have worked like cutting machine, drilling machine etc. are not so updated and because of this they are somewhat critical to handle. But the overall manufacturing process was quite experimental and it has given us a great experience.



Fig. 4: Mechanical System of project

### B. Electronic System

For the automation of our project or for the main attraction of our paper "Seed Breeder" we wanted an electronic system as the whole automation of seed breeder works on electronic parts. For that we needed a help of electronic person as we are the student of mechanical engineering.

First we have bought all the equipment like register, magnetic reed relay, battery, bread board, solder gun etc from the market. Then according to the circuit diagram we have solder all the equipment on a bread board and make the circuit on which our system will going to be work. But only making circuit is not necessary. We needed program in order to run that system in a proper way and for that we need microcontroller and a person in a field of electronic engineering. So with help of our project guide and an another person from a electronic field we have created the program in a software called "Arduino".

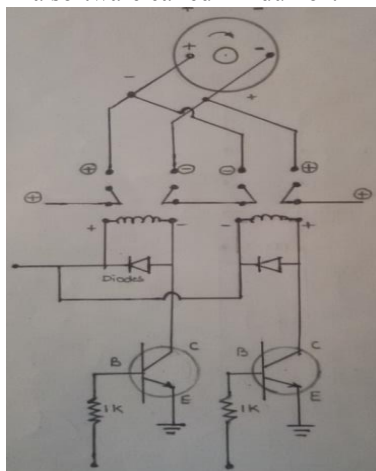


Fig. 5: Electronic circuit

We define a program in such a way that we get all the system work in a proper way like the opening and closing of the flap which open and close the notch on the main pipe. The time limit for which it will open and after how much time it will close, sense of a reed relay with the help of proper magnet and all the other things. For all this

program we have chosen an microcontroller @ mega 328 which far advance and better than 8051.

#### 1) Pre-Requisite

- The land should be very soft in order to carry this set up.
- Two men are required to carry the seeds.
- One tractor is also required for the movement of machine.

#### 2) Advantages:

- It is the first mechanism for the sowing of root vegetables.
- It is far better than conventional method of sowing.
- It is time saving and accurate.
- It also requires very less man power.

#### 3) Disadvantages:

- It is only useful for roots vegetables.
- We can't use such a seeds which are too small like in crops wheat, bajara, cotton etc.
- It requires a very soft soil.

We have design these machine in such a way that, the farmer in India can afford that. It required very less amount of money and which is also a one-time investment, so from every point of view it is feasible to farmer.

#### 4) Application:

- In agriculture field.
- We can use this machine for the process of sowing of root vegetables.
- Areas where root vegetables are the main source of earning.

### V. CONCLUSION

From this paper, we can conclude that the time consumption of an old sowing process for a root vegetable is reduced to a great extent. Also, it saves our money and man power. With the help of seed breeder we can also have a convenience for variable distance between two successive seeds.

Because of the new automation in this instrument, we can do our work with a great speed which will help our farmers to do work in a precise time with a more convenience and with the help of much advance instrument.

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