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RESEARCH ARTICLE

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COTTON SEED SOWING MACHINE

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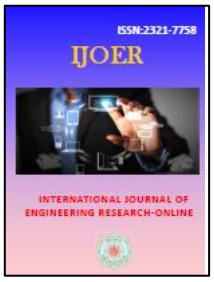

ABSTRACT

Seed plantation is the day to day work done in farm. The conventional method for seeding is manual one. It requires more time and the tendency of manual work is going on reducing. The man power shortage is faced continuously. The cost required for manual seed plantation is also increasing day by day. So, to tackle this problem we are trying to develop a system which is very economical and beneficial to the farmers. This project work focus mainly on Cotton seed plantation. As Cotton seeds are costly, farmers cannot afford wastage of such costly seeds. In traditional methods of cultivation of Cotton, processes like ploughing, sowing seeds and covering seeds with soil are done manually and each activity takes a lot of time separately. But with the proposed mechanism in this project, all these activities can be done simultaneously. Thus, this would save time and energy of farmers.

I. INTRODUCTION

Cotton, a natural vegetable fiber is of great economic importance as a raw material for cloths. Its widespread use is largely due to the ease with which its fibers are spun into yarns. Cotton's strength, absorbency, and capacity to be washed and dyed also make it adaptable to a considerable variety of textile products.

Cotton is produced by small trees and shrubs which bears the botanical name Gossypium. One or two weeks after sowing shoots appear and 50 to 80 days later flowering begins. First buds are formed. After three weeks blossoms appear. After blossoming the petals fall of and the off-springs or the balls develop. Fiber grows on the seeds. The plant has certainly been grown and used in India for at least 5000 years and probably for much longer. Cotton was also used by the ancient Chinese, Egyptians and North & South Americans.

Successful cultivation of cotton requires a long frost-free period, a plenty of sunshine and a moderate rainfall, usually from 600 to 1200 mm. Soils usually need to be fairly heavy, although the level of nutrients does not need to be exceptional. In general, these conditions are met within the seasonally dry tropics and subtropics in the Northern and Southern hemispheres. The area in United States known as the South Plains is the largest contiguous cotton-growing region in the world.

The sowing method for any seed is determined by the crop to be sown. The method of dibbling is used for sowing cotton seeds. Dibbling is the method in which small holes are made in the ground for seeds. It is preferred especially where the supply of seeds is limited.

II. LITERATURE SURVEY

Seed is one of the most expensive inputs for cotton growers, so it's important for growers to

plant the right amount of seed to minimize input costs and increase profitability. Seeding rate, plant population, and row spacing are tied together. If the population is too high, plants compete with each other and often lodge. If the population is too low, a producer is wasting growing space and lowering yield.

Experts suggest that uniform seed placement promotes uniform emergence, which is better than staggered emergence that can result in plant-to- plant competition. Many authors, like Joginder Singh studied the effect of farm mechanization on Indian economy. He concluded that Production and productivity cannot be enhanced with primitive and traditional methods. Thus, selective mechanization is the need of the future.

From the experts in Engineering and many other people, we enquired about existence of such a type of special equipment for sowing cotton seeds. We also surveyed the local market and the agro products dealers for any such kind of equipment. But we couldn't find any device that could overcome all the limitations of traditional cotton seed plantations. This inspired us to direct our attention on this project work. So, being Mechanical engineers, this project work is our sincere effort to apply our knowledge and skill in fabricating this equipment which would eliminate the drawbacks related to conventional cotton planting methods.

III. IDENTIFYING THE NEED OF THIS PROJECT

There are many reasons why we focused Cotton plantation as our main concern. After asking the farmers about conditions of farming we came to know that, for hard and dusty soil conditions, the seeds were placed too shallow while dibbling. Also, there may be clods and crusts in the land which prevent planting at a uniform depth and uniform distance. The black soils of India pose a special problem. It becomes very sticky when wet and hard when dry. Therefore there is an urgent need to develop a high efficiency sowing machines suitable for black soils.

IV. FABRICATION PROCESS PROJECT

In order to make the design come to reality, fabrication process needs to be done first. Many methods can be used to fabricate a product, like welding, fastening, cutting, drilling and many more methods. Fabrication process is a process to make only one product rather than manufacturing process that focus to large scale production. In this project, fabrication process is needed to make the framework. This include part by part fabrication until assembly to others component is done. Process involves dimensioning the raw material until it is finish as a desired product. Following processes are involved in the fabrication of our machine:

- Measuring: Materials are measured to desired dimensions or location.
- Marking: All measured materials need to be marked to give precise dimension.
- Cutting: Marked materials are then cut into pieces.
- Joining: Materials joined by the method of welding and using bolt nuts.
- Drilling: Marked holes are then drilled to make holes for bolts.
- Finishing: Any rough surface cause by welding spark were grind to give smooth and safe surface.

Mild steel is the most versatile and most widely used material for fabrication, available in a wider range of products, forms and finishes than any other. It has excellent forming and outstanding welding characteristics. This has made this material dominant in the fabrication process of the machine.

V. DESIGN CONSIDERATIONS

The design of COTTON SEED SOWING MACHINE is based on the following considerations.

- The ease of fabrication of component parts.
- The safety of the operator.
- Simplicity of the operation of the machine for small scale or rural farmers.
- Availability of materials locally used in the fabrication of the components.
- Cost of the materials for construction.
- Ease of maintenance of the machine.
- Less laborious to use and proper ergonomics.

VI. SPECIFICATIONS FOR FABRICATION OF COTTON SEED SOWING MACHINE

A. *16 gauge sheet (Tarafa sheet-2x3) [Mild Steel]*

Fig.1 Mild steel sheet

Knowing the proper size of your sheet metal can make it lot easier to use your sheet without breaking. Metal sheet's thickness is measured in gauge. As the gauge number increases, the thickness drops by 10 %. For mild steel, gauge number starts with 7. And as it increases to 16, it becomes comparatively thin. At 16, its thickness is 0.06".This dimension is appropriate for the making of seed hopper.

B. *1 inch square pipe (Heavy-20ft)[Mild Steel]*

Fig.2 Square Pipe

Square hollow sections are used for general engineering purposes. The material grade commonly used is IS:4923 and ASTM A 500 Gr.A or Gr.B. Mild steel pipes are not that hard in comparison to other Steel pipes as it has mild or less part of carbon in it. We've used it for the fabrication of main frame of the machine.

C. 3/4 inch PVC pipe

Fig.3 PVC Pipe

A standard pipe of this type has an actual diameter of 1.050 inch. Minimum wall thickness is 0.113 and 0.154 for SCHEDULE 40 & SCHEDULE 80, and inside diameter of 0.824 inches and 0.724 inches respectively. And its weight is 0.21 lb/ft and 0.27 lb/ft respectively for SCHEDULE 40 & SCHEDULE 80.Besides this, PVC is strong and rigid and are easily machinable.

D. Bevel Gear

Fig.4 Bevel Gear

Bevel gears are gears where the axes of two shafts intersect each other and teeth bearing faces of the gears themselves are conically shaped.

E . Pedestal Bearing (UCP 205)

Fig.5 Pedestal Bearing (UCP 205)

It is used to provide support for a rotating shaft with the help of compatible bearings and various accessories. This type of bearing consist of Cast Iron pedestal, Gun metal or brass bush split into two halves called "brasses", and a cast iron cap and two mild steel bolts. It weighs about 0.81kg.Recommended tightening torque for set screw is 5.5Nm.

F. Roller bearing (bearing no.6005)

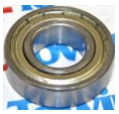

Fig.6 Roller bearing

These are the type of rolling elements that uses cylinders (rollers) to maintain the separation between the moving parts of the bearing. Its main purpose is to reduce rotational friction and support radial and axial loads. They can be operated to moderate to high speeds. Compared to ball bearing, roller bearings can support heavy radial loads and limited axial loads (parallel to shaft).For bearing no. 6005, the standard outer diameter for roller bearing is 47mm, internal diameter is 20mm and width is 14mm.

G. 14 teeth freewheel

Fig.7 teeth freewheel

Its a device in transmission that engages the drive shaft from the driven shaft when the driven shaft rotates faster than the driveshaft. In agricultural equipments , freewheels are chain driven and prevents the transfer of momentum in reverse direction through the drive when machine is halted. We've used a 14 teeth freewheel, which is best for single speed transmissions

H. 24 teeth chainwheel

Fig.8 teeth chainwheel

It is basically a wheel transmitting power by means of a chain filled to its edges. This is generally made up of aluminium or stainless steel. Since we are

dealing with single speed drive, a 24 teeth chainwheel will be more or less adaptable.

I. Chain set

Fig.9 Chain Set

It is the name given to a group of components that rotate when you turn your pedal to drive the chain. There are three types of chainsets namely single, double or triple speed chainsets. Here we've used a single speed chainset. These are generally used where there is only one gear sprocket.

J. 3/4 inch round pipe [Mild Steel]

Fig.10 Round Pipe

Finding a right size round steel pipe can be difficult. To make this task easier and for the purpose of standardizing pipe dimensions, the ANSI scheduled the standard pipe specifications. For a nominal pipe size of ¾ inch, the outside diameter (OD) is 1.05cm.We've preferred mild steel as it is the most easily available machinable material.

K. We've also used components like *1 inch shaft {Used in Rickshaw} [Mild Steel], 25/5 square strip(20 ft) [Mild Steel]* and *4 inch Tikli vicer.*

VII. ADVANTAGES

Advantages of proposed machine are:

1. It plants the seeds at specified distance.
2. This will prove the plantation to be very beneficial, effective & less seeds will be wasted.
3. Seeds can be dibbled at desired depth in the moisture zone.
4. Seed requirement is less than other methods of sowing.
5. As compared to traditional sowing methods time required is less.
6. Seed flow can be controlled.
7. Optimum plant population can be maintained.
8. Evenly spaced plants are in the best position to capture available sunlight.
9. Less manpower is required.
10. It will ultimately improve the financial condition of farmers.

Fig.11 Overall Layout

VIII. FUTURE SCOPE

It can be effectively used in the future Mechanized farming. Further development in it can be done by making it as fully automatic and remotely controlled. It can also be tried for plantation of variety of comparatively small seeds. It can also be tried to make self-propelled. Further advancement can be done by converting this machine into a seed-cum-fertilizers placing machine.

IX. CONCLUSIONS

After the completion of project we came to know that we can effectively use the machine to transplant the seeds at uniform distance. The seeds that can be transplanted effectively are cotton seeds and other seeds of same size too. While working on this project, we learnt various concepts. We've got knowledge of marketing skills. It has also enhanced our surveying skills and developed our project management skills. Moreover, comparing the different traditional seed sowing methods with the proposed machine and considering its limitations, it can be concluded that, seed flow rate can be controlled in addition to uniform seed spacing with minimum seed loss.

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