

MULTIPURPOSE FERTILIZER SPREADING MACHINE: DESIGN AND FABRICATION

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ABSTRACT

The paper provides information on the different types of new developments in manure dispenser which are available these days. Fertilizer spreading machine is an important tool in the agriculture part. The modern era is marching towards rapid growth in all sectors including the agricultural sector. Meet the next meal Demands, farmers must adopt new strategies that will not interfere soil texture however will increase overall crop production. This paper is interactive with various throwing of the fertilizer methods used in India to distribute the fertilizer machine. Comparison between traditional dumping of the fertilizer method and proposed new machine, which can make a price simultaneous operation and has a number of benefits. Fertilization of land is one of the important and common procedure before the cropping of seeds this work is carried out mostly by the machineries and labours which will include the cost for fertilization process for big and large farms it also become costly and time required to do also more. The main objective of our multipurpose fertilizers spreading machine is to reduce time and cost for fertilizers process by reducing the human efforts. Along with Fertilizers we can spread seeds as well. As daily activity availability becomes a major

concern for farmers and labour costs are higher, this machine reduces the total effort and cost of composting the throwing of fertilizer and manure. In this work, we are discussed about multipurpose fertilizer spreading machine.

Keywords: Hopper, Bevel Gear, Wheel, Chain sprocket, Flexible Pipes.

Introduction

Agriculture has always been the backbone of India's continued growth. As the population of India continues to grow, so does the demand for production. Therefore, there is a great need to grow more crops on farms and this requires efficient and time-saving equipment. This paper discusses the different types of fertilizer spreading machines that will help the agricultural industry to move forward with the use of mechanical gadgets. A multipurpose fertilizer spreading machine is a tool that helps to dispose of manure and seeds in the farm. The desired position thus helps farmers save time and money. Basic the purpose of throwing a fertilizer operation is to put seeds and fertilizers in rows the desired depth and the seeds to the seed holes, cover the composting with the soil once give proper density over seeds. The paper discusses various aspects of a spreading machine that will help the agricultural industry move forward machine. The agricultural industry has always been the backbone of India continued growth. As the Indian population continues to grow, the demand for productivity is growing too. Therefore, there is a great need for more cutting in farms and this sequence requires highly efficient and powerful equipment. The machine India's agricultural sector is still in the growth phase due to shortages knowledge and unavailability of state-of-the-art equipment and equipment. According to tradition ways the fertilizers are spread by manually by labours.

Literature Survey

Mahesh R. Pundkar and A. K. Mahalle [1] presented the review provides a brief overview about the different types of innovations made in the manure spreading machine available planting machine. It is an important part of agriculture. Device performance has a dramatic impact on the cost and profitability of agricultural products. Right now there are many ways to see what it is the application of seed fertilizer application fertilizer. Sowing depth is shown an important factor affecting seed strength and crop yield. The seed measuring device is the heart of a fertilizer distribution machine tested for seed grade, seeds size between seed varieties. High precision air containers are made in many species of plants, in many species of seed sizes, which leads to matching throwing of fertilizer distribution along the way, in separating seeds. Laukik P.Raut [2] studied to meet the nutritional needs of growing population and industrialization rapidly, agricultural development is inevitable. The use of equipment allows you to save inputs with precision meter to ensure better distribution, reducing the amount required for better turnaround to prevent the loss or damage of installed items. Using equipment reduces unit costs for high productivity and input saving. Farmers use the same methods and equipment for years.

Objectives

1. To investigate various types of fertilizer distribution machine.
2. To develop a solar fertilizer spreading machine.
3. To experiment the developed solar fertilizer spreading machine in the agricultural farm.

Methodology

Following steps are followed for designing and fabricating the multipurpose fertilizer spreading machine:

Research

In our country, farming is done in the traditional way, be aware of the fact that there is a great development in industry and the resource sector compared to agriculture. Fertilizer spraying is traditionally done by carrying a backpack sprayer that requires a lot of human effort. Cultivation is usually done with the help of Bulls which results in high costs for farmers who have a small amount of arable land. So in order to overcome the two problems above, we have tried to eliminate these problems and designed tools that will be helpful to the farmer in the process of throwing and plowing.

Selection of Spreading of Fertilizer and Planting Machines

Various fertilizer distribution projects improved crop manure disposal. The basic difference between the machine and the human work is the accuracy of the work and saves time and cost in the work. Therefore, it is important to choose a machine with a unit for measuring the plant and soil conditions.

Selection of Components

On the basis of above study, we selected the components required to hopper, bevel gear, wheel, chain sprocket, flexible pipes etc. Further we worked on the selection of specification of component which is required to run the project.

Manufacturing Process of the Machine

- Measurement of the material required dimension
- Cutting operation as per dimension
- Machining operation on required parts
- Welding the material as per dimension
- Assembling the parts of machine

Rotating Disk:

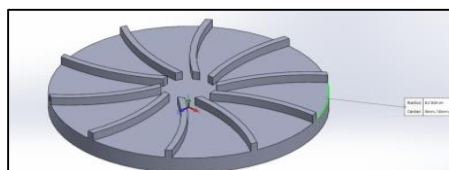


Figure 1: Rotating Disk

Fertilizer spreader is a piece of agricultural equipment people can use to apply even, aerated coats of fertilizer to lawns, beds, and fields. Fertilizer spreaders can come in the form of tractor attachments or standalone devices and are readily available through agricultural suppliers and gardening stores.

- Rotating disc is look like impeller.
- Rotating disc is mounted on motor shaft.
- Hopper opens on rotating disc eccentrically and due to centrifugal force fertilizer spread in farm.
- Wood is used for making a rotating disc.

Hopper:

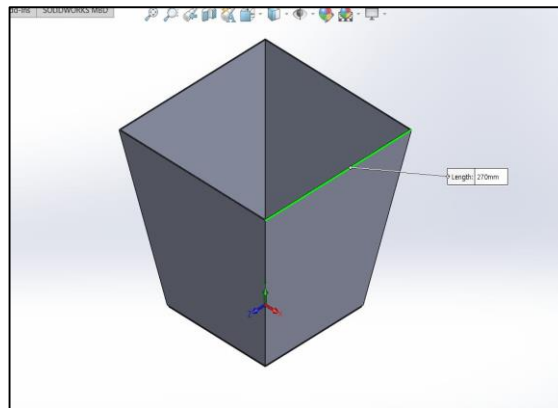


Figure 2: Hopper

Hoppers are used for the temporary storage of materials. It is having storage capacity up to 20 kg which is loaded on the frame and hole is provided at bottom in which ball valve is fitted for controlling flow of Fertilizers.

- Hopper is used to keep fertilizer.
- Hoper is used for convey the fertilizer to the rotating disc.
- In this machine material used for hopper is PVC.
- At the lower end of the hopper short PVC valve is attached
- Flow control mechanism is provided in hopper.

Chain and Sprocket Mechanism:

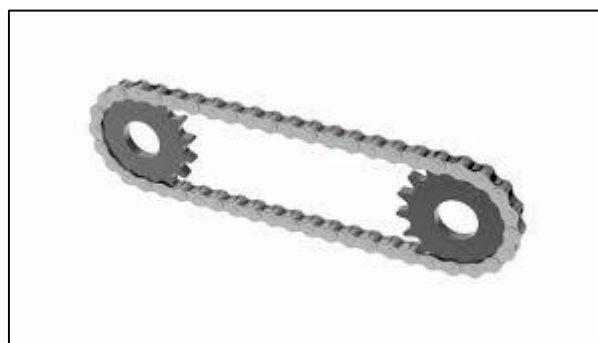


Figure 3: Chain and Sprocket Mechanism

Chain and sprocket mechanisms perform the same task as a belt and pulley system, i.e. they transfer motion and force from one shaft to another. A belt can slip on a pulley but the teeth on the sprocket prevent the chain from slipping. Chain and Sprocket Mechanism connected with Bevel gear mechanism.

Bevel Gear Mechanism:



Figure 4: Bevel Gear Mechanism

Bevel gears can be used in mechanisms to change the axis of rotation. Although they can be designed to work at other angles, they are most often used to change the axis of rotation by 90 degrees. Similar to spur gears, bevel gears may also feature straight or helical teeth. Bevel gear connected between chain sprocket and rotating disk.

3-D Model

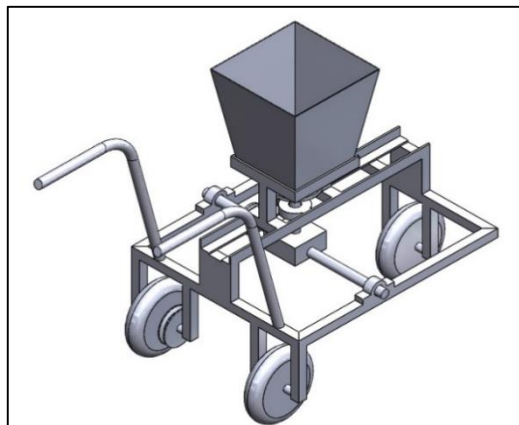


Figure 5: 3-D Model

CATIA V5 (Version 5) is primarily a CAD software used for parametric and non-parametric modelling. It is capable of working alongside products with different brands. CATIA V5 is modular, meaning customers can buy as much or as little functionality as required. We have designed the total model of our project on CATIA V5 Software.

Actual Fabricated Model

After fabrication of each part, we started to assemble all the components.



Figure 6: Actual Assembly

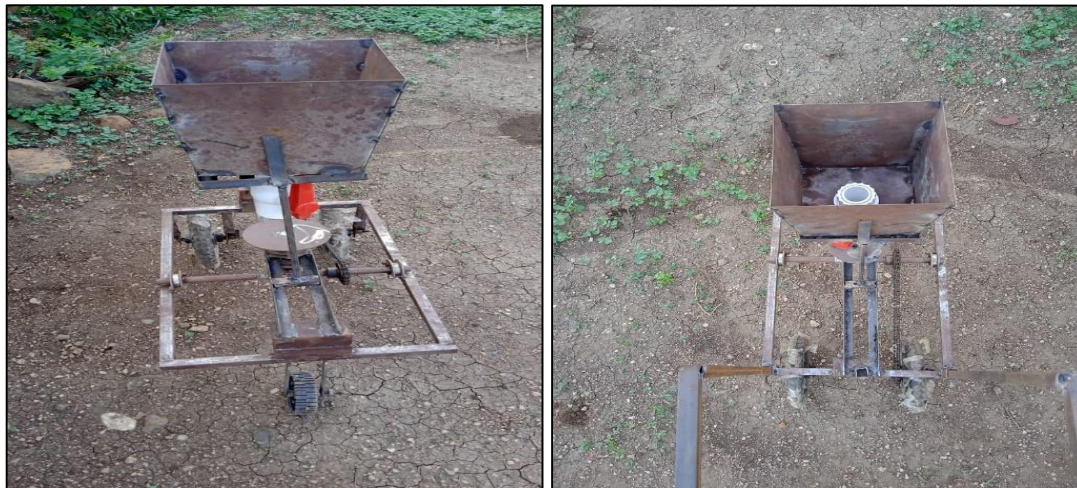


Figure 7: Front & Top View of Fabricated Model

When the equipment is push forward by using handles, the rotary motion of the horizontal bevel gear is transfer to vertically due to this arrangement. Front wheel rotates and the gear is mounted at the rear axle of wheel is start to rotate and its rotation is then transferred to the vertical bevel gear. A circular disk with impeller pattern mounted on vertical bevel shaft which will start rotating and plastic ball valve will control flow of fertilizers falling on

circular disk from hopper then it will be drop on the disk. Disk will spread it. Spreading speed depend on operating speed and opening of valve.

Components and Their Specification

Table.1: Component and specification

| Component | Purpose | Specification |
|--------------------|--|----------------|
| Hopper | Fertilizer storage bucket | 20 kg |
| Bevel Gear | Power transmission to rotate spreader mechanism | 12:20 |
| Wheel | Spread mechanism loaded and connected with chain drive for moving forward and backward | Diameter 25 cm |
| Chain and Sprocket | transfer motion and force from one shaft to another shaft | 1:1 |

Conclusions

Our project has been successfully implemented for a fertilizer distribution application. The machine is designed with the intention that farmers with small plots of land say 5-6 acres. It is ready to be distributed at low cost to the farmer so that he can afford it. The equipment will be of great benefit if it is placed in wet soil for the purpose of planting it, due to the wet soil the weed cutter can easily penetrate and dig the soil thus easily completing the fertilization process. The efficiency of the machinery will increase if it is operated on a smooth surface or in an uneven area and will work best when used on plants of about the same height and with less space between the two plants.

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