

Fertilizer Spreader Machine

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Abstract: In India, approximately 58% of the population depends on agriculture for their live hood. India is an agricultural based country. Our Indian economy is also depends on agricultural related product. In olden days the farmers are unable to grain more crop production by using conventional agricultural methods. This is a project based on manually fertilization process. A method is generated to spread the fertilizer over a fallow land by dropping the fertilizer over the rotating disc. The project mainly designed and divided into 3 stages, top stage, middle stage, bottom stage. The Top stage consists a Aluminium hopper. Middle stage consist a rotating disc, motor. The bottom stage consists a tires. The whole design is supported by pvc pipes. This project is very useful for traditional way of fertilization.

Keywords: Pvc pipes, Aluminium hopper, acrylic sheet, motor, disc and tires

I. INTRODUCTION

In India, approximately 58% of the population depends on agriculture for their live hood. Agriculture is the backbone of India. Indian economy also depends on agricultural products. Agriculture always contributes to India's GDP (The total Indian economy's real GDP increased by 9.2% in 2021–22) . Our indian economy also depends on agricultural products. Nowadays many changes have occurred in conventional methods of agriculture like seed plantation, irrigation system, pesticides and spray used. Nowadays, the spreading of fertilizers mostly (Dung manure) in the traditional way, which takes longer time, costs more and doesn't give the labourers any comfort. There are also some tractors that can spread fertilizer, but they are heavy and costlier. There are many problems faced by farmers and labourers, like back pain issues and other physical problems. For developing our Economic condition, it is necessary to increase our agricultural productivity and quality also. Farming process includes many stages, out

of which fertilization is one of the important stage and which is not exploded up to the mark up till now. Now-a-days, we are used to do spreading of fertilizer in traditional way which is time consuming, costlier as well as not provide comfort to the labor. Also, some tractor operated machines for spreading of fertilizer are available but they are very expensive for farmers. So, what we need is an alternative to the traditional as well as tractor operated fertilizer spreading machine which will fulfill all the requirements. So, we are going to design manually operated machine for fertilizer spreading by taking into consideration the user group and their needs which helps to them to work easy and functional.

Day by day the population of India is increasing and to fulfill the need of food modernization of agricultural sectors are important. Due to chemical fertilizers the fertility decreasing. Hence farmers are attracted towards organic farming. By mechanization in spraying devices fertilizers and pesticides are distributed equally on the farm and reduce the quantity of waste, which results in prevention of losses and wastage of input applied to farm. It will reduce the cost of production. It will reduce the cost of production. Mechanization gives higher productivity in minimum input. Farmers are using same traditional methods for spraying fertilizers and pesticides. Equipment is also the same for ages. In India there is a large development in industrial sectors compared to agricultural sectors. Conventionally the spraying is done by labors carrying backpack sprayer and fertilizers are sprayed manually. The efforts required are more and beneficial by farmers having small farming land. In India about 73% of population is directly or indirectly depends upon the farming. Hence it is said that India is an agricultural based country. But till now our farmers are doing farming in same traditional ways. They are doing seed sowing, fertilizers

and pesticides spraying, cultivating by conventional methods. There is need of development in this sector and most commonly on fertilizers pesticides spraying technique, because it requires more efforts and time to spray by traditional way.

The proposed concept deals with the Fertilizer Spreader Machine. As shown in the conceptual diagram, the machine consists of a 12v battery which is connected to a small motor. The machine consists of a hopper to store solid fertilizers. The hopper can be opened and closed by using valve. When the machine is started, fertilizers are dropped from the hopper through pipe and falls on a disc, here the fertilizers spreads uniformly upto 6 feet distance with the help of motor connected to disc, so this can reduce time.

There are different types of spreaders are used now a days, we are doing the project about the fertilizer spreader machine to reduce the production time. this machine works on the small motor and battery this requires less labour this is a modern technology so many are using this method to spread the fertilizers on the farms.

This is a small mechanism in the agriculture operation to spread the fertilizer in the farms by decreasing the labour need and time reduction.

As a farmer they need large production in the cultivation of crops so we are discussed with them about their problems and we designed this fertilizer spreader machine this consumes less time as compared to previous farming methods.

Now a days there are many farming machines are available but their cost is very high, so small scale farmers cant able to buy the higher price machines. So this will helps to the small scale farmers.

The conventional tractor-operated fertilizer spreading device needs to be replaced in India. About 70% of people are farmers in India. These factors led the author to build the machine, which has a lower initial investment than conventional fertilizing machinery. The major goal of this project is to meet the needs of farmers who are struggling with the rising cost of fertilizer, labor costs, and availability because it is only operated by one person. The fertilizer is dropped by the

rotating disc.

II. DESIGN CONSIDERATION

Design consists of application of different principles, technical data and for development of new or mechanism to perform a different function with maximum economy & efficiency. Hence a careful design approach has to be adopted. The total design work has been split up into two parts: System design and mechanical design . System design mainly concerns the various physical constrains and ergonomics, space requirement, arrangement of various components on main frame at system, man and machine interactions, no. of controls, working environment of machine chances of failure safety measures to be provided, servicing aid, ease of maintenance, scope of improvement, weight of machine from top level to bottom level, total weight of machine and a lots more. In a system design we mainly concentrated on the following parameters, system selection based on physical constraints. While selecting any machine it is going to be used in large scale industry or small scale industry in our case it is to be used by small scale industries. So space is amajor constrain. The mechanical design has directly norms with the system design. Hence the foremost job is to control the physical parameter, so that the distinction obtained after mechanical design can be well fitted into that.

III. CONSTRUCTION AND WORKING

This is based on manually fertilization process. A method is generated to spread the fertilizer over a fallow land by dropping the fertilizer over the rotating disc plate. The project mainly designed and divided into 3 stages, top stage, middle stage, bottom stage. The Top stage consists a Aluminium hopper. Middle stage consist a rotating disc, motor. The bottom stage consists a tires. The whole design is supported by pvc pipes.

This is very easy to assemble the parts and the weight is also very less, if any problem or damage occurs we can fix or change it easily and it is very reasonable price so this is very use ful to small scale farmers.

Hopper:

- Aluminium Hopper is used to keep fertilizer in a spreader machine.
- Aluminium Hopper is used to convey the fertilizer on the rotating disc.

- Aluminium is the metal used as hopper in this machine.
- Cross section of the aluminum hopper is circular.
- At the lower end of the aluminium hopper short PVC pipe is attached.
- Here a control valve is used to control the flow of fertilizer.
- Specification: Dimension of hopper Diameter = 6 inch =15.24 cm Height =6 inch =15.24cm

Rotating disc:

- Rotating disc plate is look like impeller.
- Rotating disc plate is fixed on the motor.
- When the hopper valve opens fertilizer falls on the rotating disc and spread in farm.
- Plastic cap is used for making a rotating disc plate.
- Specification: Diameter =6 inch =15.24cm, Thickness =1cm

Frame:

- In this project we used pvc pipes to design frame.
- In this project the frame can carry whole the motor and battery.
- The acrylic sheet is fixed on the frame as a base.
- At bottom of the frame wheels are attached.
- Specification: length = 2feet, width =1.5feet, height=3.5feet

Wheels :

- The wheels are attached to the base of the frame.
- According to the machine load wheels are selected.
- Four wheels are attached to the frame,so we can move the machine in any direction.
- When we apply some force on machine then it will moves.
- In our project we used 4 wheels with smaller size.

Motor:

- Motor is used to supply power to whole machine.
- In our project we used small size motor.
- In this machine motor is used to rotate a rotating disc plate.
- The motor is attached to battery.
- In this project we used 12V battery for spreader machine.

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project mainly designed and divided into 3 stages , top stage, middle stage, bottom stage. The Top stage consists a Aluminium hopper. Middle stage consist a rotating disc, motor. The bottom stage consists a tires. The whole design is supported by pvc pipes. This project is very useful for traditional way of fertilization. When we start the motor with the help of battery, the disc starts rotating. The fertilizer stored in the hopper is flow in downward direction through pipes and falls on the disc. As the fertilizer fall on rotating disc, due to force it spreads the fertilizer uniformly in every direction without any wastage.



Fig 1: working model



Fig 2 : working model



Fig 3: Working Model

IV.ADVANTAGES AND LIMITATIONS:

Advantages:

- This saves time to the farmers.
- Less labour is required
- High speed Fertilization process.
- This machine is very useful for small and medium farms.
- Here Battery is used to supply power to the motor.
- Very easy to operate, no skilled operator is required.
- Easy to fix if any problem occurs.
- No pollution to the environment.
- Maintenance cost is very low.

Limitations:

- This fertilizer spreader Machine requires more effort in hard soil.
- Operating force is different from person to person.
- Manually operated, so it is difficult to run continuously.
- Difficult to operate in muddy farm.

V. RESULTS

By taking trials on the field of our machine and gathering all information of other possible methods. There is no consistency between plantation methods, so the product can be used for all methods.

VI .CONCLUSION

As this application is used, the time necessary for fertilizer spreading is reduced when compared to the

conventional approach. Small land farmers are relieved since they do not need to invest more money in automatic machinery, and they do not need to carry heavy bags/pumps on their shoulders by utilizing this technique, and effective fertilizer spreading in all directions. The efficiency of work is boosted by utilizing this program. It also cuts down on fertilizer waste during the process.

- The labor cost is reduced in fertilizer spreader.
- The time fertilizing is reduced as compare to traditional method
- Less number of labors requires, only one person can operate the machine.
- The wastage of fertilizer is also reduced with comparison to tradition method.
- In the future this will becomes a modern technology for spreaders.

VII. FUTURE SCOPE

In the future we can research and develop the project as follows:

- A. Better control of discharge of fertilizer can be achieved by using flow control valves such as ball valve, butterfly valve, etc.
- B. As of now, it is manually operated, it can be made power driven by attaching a small battery
- C. The volume capacity of hopper can be increased so that it covers larger area with minimum refill requirement, without increasing weight of machine

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