

Design and Fabrication of Fertilizer and Pesticides Spreader

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Abstract- *The use of organic fertilizer and pesticides forms the back bone and basic necessity of a poor farmer. The traditional methods of using chemical fertilizers and pesticides are not sufficient and satisfactory for increasing productivity of crop and to maintain the fertility of soil. Whereas the chemical fertilizer and pesticides are more costly in market, so it becomes difficult for poor farmers to purchase it. The project is based on modern technique used to spread the fertilizer and pesticide over the agriculture land. Now days, there are many types of pesticide sprayer already in market. For the different types of pesticide sprayer there are have a different shapes, sizes, method to carry it but the function are same. The current idea on sprayer in our project is to utilize effectively for reducing time of spraying, human efforts and cost of spraying. The project design divided into three levels top level, middle level, bottom level. Top level consists of pesticide tank and motor. Middle level consists of hopper and blades. Bottom level consists of 4 nozzles. The whole design is based on chassis where the pesticide sprayers are fixed.*

Keywords- Battery, fertilizer tank, hopper, pump, pesticide tank.

I. INTRODUCTION

India is agriculture based country. Near about 70% people of our country are farmers. Our economy also depends on agricultural products. Nowadays tremendous changes have occurred in conventional methods of agriculture like seed plantation, irrigation system and spray used. For developing our Economic condition, it is necessary to increase our agricultural productivity and quality also. Farming process includes many stages, out of which fertilizer and pesticides are the important stages and which is not exploded up to the mark up till now. Now-a- days, we are used to do spreading of fertilizer and pesticide 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 and pesticide are available.

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 a manually operated machine for fertilizer and pesticide spreader equipment by taking into consideration the user group and their needs which helps to them to work easy and functional. The project design divided into three levels top level, middle level, bottom level. Top level consists of pesticide tank and motor. Middle level consists of hopper and blades. Bottom level consists of 4 nozzles. The whole design is based on chassis where the pesticide sprayers are fixed.

II. PROBLEM IDENTIFICATION AND PROBLEM DEFINITION

Problem Identification: We identified the problem by looking agricultural lands and the cost of keeping for each crop. We measured plant to plant wide and altitude of the plant. Researched every agricultural lands and organic products like fertilizers and pesticides. From our research we got to know that fertilizers are in granules and pesticides are solvents. We designed our equipment so that it should satisfy all benefits of farmers like fertilization and spraying pesticide. So that he can decrease the cost of spending fertilizer and pesticide to plant where these are heavy burden to farmers.

Problem Definition: By observing every agricultural land we designed our equipment should satisfy their crops. So, by considering all problems we designed a chassis where it has been divided into two parts front and tail. The front part is handle part we can pull or can connect to mini vehicles. Tail part is used to carry the weight of the equipment. We designed a hopper where the mixer blades are fixed inside, it used to mix the fertilizer granules and the blades are welded to shaft this shaft is connected to pulley and pulley is connected to motor by using v-belt. Top of the hopper we fixed a 25 lit pesticide tank and pipes are fixed to a designed model which is arranged behind the chassis. Pesticide pipes can be adjusted depends on the plants wide and plant altitude. We can assure that it is very easy to handle and spending cost is low comparing to modern equipment's which are available in market now a days.

III. LITRETURE REVIEW

1) Backpack (Knapsack) Sprayer:

One type of backpack sprayer is a compressed air sprayer with a harness that allows it to be carried on the operator's back.

Another type of backpack sprayer has a hand-operated hydraulic pump that forces liquid pesticide through a hose and one or more nozzles. The pump is usually activated by moving a lever. A mechanical agitator plate may be attached to the pump plunger. Some of these sprayers can generate pressures of 100 pounds per square inch (psi) or more. Capacity of both these types of backpack sprayers is usually 5 gallons or less.

Hydraulic sprayers consist of a tank, a pump, a lance (for single nozzles) or boom, and a nozzle (or multiple nozzles). Sprayers convert a pesticide formulation, often containing a mixture of water (or another liquid chemical carrier, such as fertilizer) and chemical, into droplets, which can be large rain- type drops or tiny almost-invisible particles. This conversion is accomplished by forcing the spray mixture through a spray nozzle under pressure. The size of droplets can be altered through the use of different nozzle sizes, or by altering the pressure under which it is forced, or a combination of both.

Large droplets have the advantage of being less susceptible to spray drift, but require more water per unit of land covered. Due to static electricity, small droplets are able to maximize contact with a target organism, but very still wind conditions are required. But, in this type of spraying, the labor has to carry all the weight of the pesticides filled tank which causes fatigue to labor and hence reduces the human capacity.

2) Motorcycle Driven Multi-Purpose Farming Device

In 1994, Mansukhbhai Jagani, developed an attachment for a motorbike to get a multi-purpose tool bar. It which addresses the twin problems of farmers in Saurashtra namely paucity of laborers and shortage of bullocks. This motor cycle driven plough (Bullet Santi) can be used to carry out various farming operations like furrow opening, sowing, inter-culturing and spraying operations. Mansukhbhai's intermediate-technology contraption proved efficient and cost-effective for small-sized farms.

3) Lite-Trac:

Lite-Trac is a trading name of Holme Farm Supplies Ltd, a manufacturer of agricultural machinery registered in England and based in Peter borough .The Lite-Trac name comes from "lite tractor", due to the patented chassis design enabling the inherently very heavy machines manufactured by the company to have a light footprint for minimum soil compaction.

Holme Farm Supplies Ltd agricultural products, sold under the Lite-Trac name, include tool carriers, self-propelled lime and fertilizer spreaders, sprayers, granular applicators and tank masters. Lite-Trac is currently the manufacturer of Europe's largest four-wheeled self-propelled crop sprayers. The company's products are identifiable by the combination of unpainted stainless steel tanks and booms with bright yellow cabs and detailing. A Lite-Trac crop sprayer, or liquid fertilizer applicator, mounts onto the SS2400 Tool Carrier centrally between both axles to maintain equal weight distribution on all four wheels and a low center of gravity whether empty or full. The stainless steel tanks are manufactured in capacities of up to 8,000 liters, whilst pommier aluminum booms of up to 48 meters can be fitted, making these Europe's largest four-wheeled self-propelled sprayers.

4) Aerial Sprayer:

Aerial sprayer is another type of spraying; it is beneficial for the farmers having large farms. This technique is not affordable by farmers having small and medium farm. It is modern technique in agricultural field. In aerial spraying the spraying is done with the help of small helicopter controlled by remote. On that sprayer is attached having multiple nozzles and sprayed it on the farm from some altitude. It is less time consuming and less human effort required to spray fertilizers.

5) Mini Tractor | Urea Fertilizer Spreader:-

The tractor contains container at its back .Where the container is connected to the spinning rotor with blades attached to its periphery. When the fertilizer comes out from the container the spinning blades are used to spread over the field. The equipment is cost effective for small sized farmers.

SCOPE OF WORK: We can increase our Indian economy by increasing agricultural lands it can be achieved by making farmer work in an easy way. Our equipment will make work in a simple way by spreading the fertilizer and pesticides from plant to plant through nozzles. We are not depending on the labor and we are not wasting fertilizer and pesticide where we are spreading plant to plant.

IV. OBJECTIVES OF PROJECT:

1. We used to build a system which is efficient to perform a various applications with manually pesticide and fertilizer spreader machine.
2. The main objective of this project is to fulfil the need of farmers suffering from the problems of increasing cost of fertilization, labor cost, availability as it is operated by a single person.
3. With this machine, percentage reduction in time required for fertilization and pesticides is observed to be 50% and reduction in labor cost as compared to conventional method was 80%.
4. It has solved the problems of traditional way of FERTILIZATION and PESTICIDES.
5. Since the capital cost is essential factor while selecting equipment for farming. This machine has very less capital cost as compared to other conventional equipment.
6. By undergoing all this discussions and undergoing all the factors associated with pesticide and fertilization, this machine will be the back bone for the agriculture.

V. METHODOLOGY Design Concept

This design concept encompasses the following:

- a) It should be easy to pull in the fields or can connect to any mini vehicles.
- b) The capacity of the fertilizer tank should be 30-35 kg and the capacity of the pesticide tank should be 20-25 liters.
- c) Main part of the equipment is chassis where it should carry the equipment load without producing any vibrations when the model is in field.
- d) Mixer should provide inside the cylinder so that it should mix the granules and the mixed granules can pass plant to plant through pipes.
- e) Pesticide sprayers should cover every plant and pesticide pipes should be adjustable depends on the plant wide and plant altitude.

VI.WORKING

our equipment is the combination of both fertilizer and pesticide tank. Fertilizer tank has shaft inside where the mixer blades are welded and the shaft is connected to the pulley and the pulley is connected to the dc motor. Motor is used to run by using battery power and the motor used to drive the pulley by using v-belt where the shaft is connected to pulley. The fertilizer granules are mixed and sent out through nozzles from pipes to plant. Pesticide tank is placed above the hopper and the pipes are fixed in the tank. The pipes from the tank connected to pump where the pressure is created and the pipes connected to the designed model where the pipes can be adjusted depends on the plant wide and plant altitude. So that we can save time and can spread fertilizer and pesticide plant to plant to without wastage.

Preparation of CATIA model:

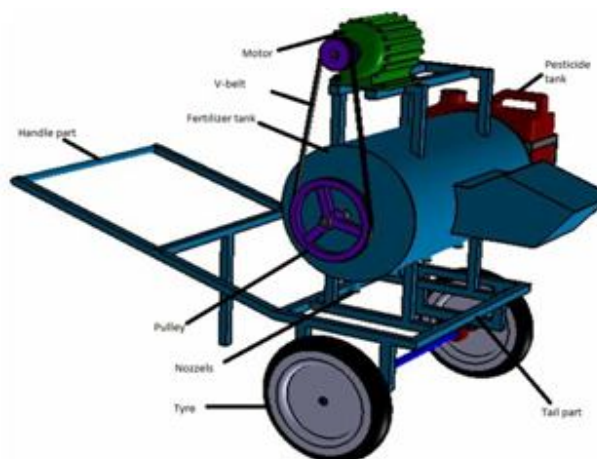


Fig 1: Project Model

| NO | COMPONENTS |
|----|----------------|
| 1 | Chassis |
| 2 | Wheels |
| 3 | Pulley |
| 4 | Dc motor |
| 5 | Hopper |
| 6 | Nozzles |
| 7 | Battery |
| 8 | Switches |
| 9 | Pesticide tank |

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FINAL MODEL:

