

# Fabrication of Multi-purpose Agricultural Hybrid Machine

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**Abstract** As on today the whole world is facing a problem of energy crisis. This project is a multipurpose agricultural hybrid machine which can perform multiple operations like ploughing, fertilizing and pesticide spraying. These operations are performed in series, at first cutting of unwanted plants or grass is performed then ploughing is performed with the help of ploughing tools and the next task is fertilizing and then pesticide spraying is done. So it can perform four operations at a time. To run the machine we need electrical energy which is difficult. In place of electrical energy solar energy can be used to save electricity. So we have placed a solar panel to run the equipment by storing the solar power in battery. Solar energy can be obtained from sun and that energy is stored in the battery. From that stored energy we can run the equipment which is eco-friendly. The time taken to perform these operations is less. This project is useful for small farmers with minimum cost.

**Keywords** - Ploughing equipment, fertilizer tank, pesticide tank, solar panel, battery.

## 1. 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 such as cutting unwanted plants, ploughing, seed sowing, fertilizing and pesticide spraying. Now-a- days, we are used to do ploughing, spreading of fertilizer and pesticide in traditional way which is time consuming, costlier as well as not provide comfort to the labour. Also, some tractor operated machines for ploughing, 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 fulfil all the requirements. So we are going to fabricate a manually operated machine for grass cutting, ploughing, fertilizer and pesticide spreader equipment by taking into consideration the user group and their needs which helps to them to work easy and functional.

## 2. LITRETURE REVIEW

M.V. Achutha et al studied the factors that influence the performance of a agro machine which performs operations such as sowing, fertilizing, spraying and inter cultivation. Based on this study a plug matrix selection criteria was used to select best among the concepts developed by them, the primary reason to reject other concepts was that it had mechanisms like chain-sprocket, gears etc. which would increase the complexity in manufacturing . The concept that was selected had a single frame used to mount all the equipments like chemical sprayer at the front of the wheel, a cylinder to store the liquid, a hopper placed near the operator to monitor the seed and fertilizer flow rate. [1]

Narode R.R et al developed a method to spread the fertilizer uniformly over a fallow land by dropping the fertilizer over the impeller disc. The system consists of a three wheels, two at the front and one at the back. These two wheels at the front are used to impel the fertilizer. The two hoppers are used to store the fertilizer; these hoppers are placed at some height from the wheel axle so that the fertilizer falls on to the impeller. The hopper is provided with flow controller using a Spring Mechanism. In normal conditions spring is not in tension and hopper is closed. As operator apply tension on the spring, the control plate moves backward and hopper gets opened, below which there is an impeller which spreads fertilizer. [2]

Rajesh et al studied the materials of solar cell which affect the overall efficiency and discussed about the trends to harvest solar energy and they developed a solar pesticide sprayer which is beneficial in terms of cost of spraying, less vibration, saving of fuel etc. over fuel engine pesticide sprayer. [3]

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 labourers 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. [4]

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 for spraying fertilizers. [5]

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. [6]

### 3.PROBLEM IDENTIFICATION AND PROBLEM DEFINITION

**Problem Identification:** We identified the problem by looking agricultural lands and the cost of keeping for each crop. From our research we got to know that fertilizers are in granules and pesticides are solvents. The motors used to run the tank shaft are powered by battery which needs to be charged regularly. Due to cost of electricity and scarcity we use solar energy to run the machine. So we fabricated our equipment so that it should satisfy all benefits of farmers like grass cutting, ploughing, fertilization, spraying pesticide and storing of solar energy in battery. It can decrease the cost 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 and the cutter is fitted where unwanted plants are removed. Tail part is used to carry the weight of the equipment. The ploughing equipment is welded to the chassis and at the bottom of the plough blades are fastened. . 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. The motor is powered by battery where the battery stores solar energy from the solar panel. Top of the hopper we fixed a 25 litre pesticide tank and pipes are fixed 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.

### 4.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 ploughing of land, spreading the fertilizer and pesticides from plant to plant through nozzles and to run the fertilizer tank solar energy is converted into electrical energy and stored in batteries. . We are not depending on the labor and we are not wasting fertilizer and pesticide where we are spreading plant to plant.

### OBJECTIVES

1. We used to build a system which is efficient to perform a various applications with manually ploughing, pesticide and fertilizer spreader machine.
2. The main objective of this project is to fulfill 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. Since we are using solar panels to store solar energy in the battery it is a great advantage to the farmers from charging the battery periodically.
4. Fertilizing process should be less time consuming
5. It can be driven manually or can be fitted to mini vehicles.
6. By undergoing all this discussions and undergoing all the factors associated with grass cutting, ploughing, fertilization, pesticide spraying and using solar energy this machine will best suitable for agricultural use.

### 5.METHODOLOGY

1. Literature survey.
2. Deciding material of structure, type of nozzle, type of tank, type of wheels.
3. Deciding type of material for ploughing, cutter.
4. Survey of solar panel and type of solar panel needed to store power.
5. Fabrication of the model.
6. Testing and evaluating in working condition.

TABLE 1: List of components

NO.	COMPONENTS
1	Chassis
2	Wheels
3	Pulley
4	DC motor
5	Hopper
6	Nozzles
7	Battery
8	Fertilizer and Pesticide tank
9	Plough tool
10	Solar panel
11	Solar controller unit

Preparation of 3D model

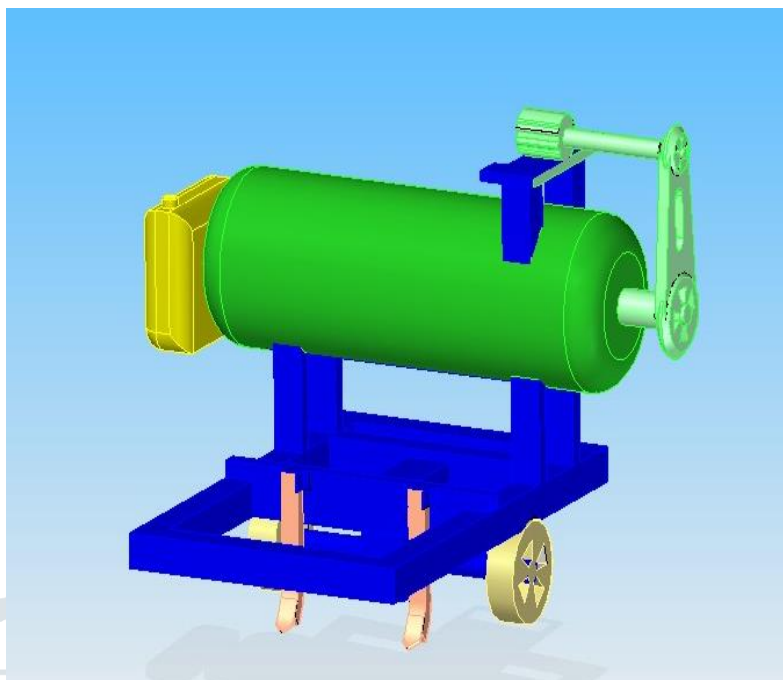


FIGURE 1: 3D Model of the Machine

## FINAL MODEL



FIGURE 2: Final view of Machine

## WORKING

Our equipment is the combination of ploughing equipment, fertilizer and pesticide tanks, solar panel, batteries. First the ploughing equipment is fed in the soil to a certain height and the sand is digged to remove all weeds and make space for sowing the seeds. 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. Solar panels are used to run motors directly or to store the solar power in batteries which is very helpful in future. Motor is used to run by using battery power where the battery is charged by solar panel and the motor is driven by a 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 is connected to the back of model and the pipes connected 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.

## 6.CONCLUSION

Since our project is a Multi-purpose Agricultural Hybrid Machine it will be very useful for farmers very much. The ploughing, Fertilizing, Pesticide spraying all these equipments are fitted in one machine which will make the work easy. We even use solar panels which is naturally available. This solar energy will be stored in battery. The machine is eco-friendly and is portable. All in one mechanisms and multiple operated machines. Even an unskilled laborer can work this machine.

## REFERENCES

- [1] MV Achutha, Sharath Chandra N, Natraj (NIE Mysore) concept design and analysis of multipurpose farm equipment [issue 2, volume 3, Feb 2015].
- [2] Narode R R, Sonawane A B, Mahale R R (university of Pune) manually operated fertilizer spreader [issue2, volume 5, Feb 2015]
- [3] Rajesh R, Vimal Kingsley, M Selvapandit, Niranjana (Dhanalakshmisrinivasan college of Engineering) Design and fabrication of solar pesticide sprayer [issue 8, volume 5, May 2016].
- [4] Clifford h. Snyder, in March 1967 "Fertilizer spreader" Patent No: - US32236527
- [5] W.H. STILITER, in July 1965 "Fertilizer spreader machine" Patent No: - US2522693
- [6] DIENER ROBERT, in March 1953 "Belt fertilizer spreader" Patent No: - US3746256

