

# Fabrication of Solar Operated Multipurpose Agriculture Machine

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## **Abstract -**

India is an agriculture based country where 70% of people depend on agricultural produce. But if we notice that as the population increases, the farm is divided among the families and therefore the average farmer in India had only two acres. Financially, the farmers are also very poor because they cannot afford tractors and other expensive equipment, so they use traditional farming. Basically, many farmers in India also use ox, horse and buffalo for farming. It does not meet the energy needs of agriculture compared to other countries in the world. So we think that human and animal efforts can be replaced by some advanced mechanization that suits the small farmer economically and laboriously. So we develop this device to meet all this need and solve the problem of manpower.

**Keywords:** *Solar Energy, Agriculture Machine, Pesticide sprayer, watering, Seeding etc.*

## **1. Introduction**

Agriculture is the backbone of India. Paddy and Wheat is one of the new fields of agriculture where there is still not much involvement of scientists and producers. There are problems in this field, such as how to maximize, how to increase productivity and how to reduce costs. There are two types of agricultural equipment used in India, manual method (traditional method) and mechanical type. Mechanization means the use of a hybrid device between the energy source and the work. This hybrid device typically transfers motion, such as rotary, to linear, or provides many mechanical advantages, such as increasing or decreasing speed or gain. Agricultural machines are machines used in agriculture or other agricultural activities. Mechanized agriculture is the use of agricultural machinery to mechanize agricultural work, which greatly increases the productivity of agricultural workers.

Agriculture is the backbone of India. The history of agriculture in India dates back to the period of the Indus Valley Civilization and in some parts of South India even earlier. Today, India is second in the world in terms of agricultural production. Special vehicles play an important role in various fields such as industry, medicine, military applications, etc. The special vehicle sector is gradually increasing its productivity in the agricultural sector. The biggest problems facing Indian agriculture are rising input costs, availability of skilled labour, lack of control over water resources and crops. Automation techniques have been used in agriculture to solve these problems. Agricultural automation can help farmers reduce their efforts. The vehicles are developed for sowing, seeding, leveling and water spraying processes. All these functions have not yet been accomplished in one vehicle. Here,

robots are developed for effective focus and are also expected to perform functions independently. The proposed idea applies the vehicle to tasks such as seeding, cutting and pesticide spraying. These functions can be integrated into a single vehicle and then launched.

## **2. Problem Identification**

Design and development of an agricultural robot capable of cutting and distributing seeds in an agricultural field. Spraying with pesticides also works effectively. The control unit of this agricultural system must be wired and can be used to display digging and seeding operations. Create a controllable model that can demonstrate functions such as threshing and seeding with a solar panel. Also, design and analyze a real-time system for this system to provide a solution and propose a model that can be used in real-time.

- Lack of agricultural mechanization
- Additional efforts are required for various processes.
- More manpower needed.
- Too much time to execute one process.

## **3. Objective**

- To reduce human labor in the agricultural field with a small machine.
- Perform all key functions simultaneously, increasing production and saving time.
- Doing a large amount of work in a shorter time.
- Solar energy can be used to charge the battery. As the machine works in the field, the sun's rays can be used to generate solar energy.

- Provide universal agricultural machinery such as seed spreader, pesticide spraying and irrigation.

#### 4. Literature Survey

- **Joshua et al. (2010)** developed a power sprayer with two stroke petrol engine. Since the operating cost was found high they suggested a solar operated sprayer.
- **Rao et al. (2013)** reported the performance of a multiple power supplied fertilizer sprayer, which could be able to spray 580 litre of pesticide in about 5-6 acre land using a fully charged battery.
- **Khan (2014)** designed a spray jet which can be operated by a DC pump run by PV panels.
- **Chavan et al. (2015)** developed a prototype solar powered agricultural pesticide sprayer using a 20 Wp PV module and a brushless DC motor (12 V, 2.2 A). Apart from these, detailed reports on few different types of solar PV powered pesticide sprayer are available in literatures (**Kulkarni et al., 2015, Lad et al., 2015; Patil et al., 2014; Sawalakhe et al., 2015**).
- With an aim to reduce human drudgery while spraying in field carrying conventional sprayer on user's back, few researchers have also designed and developed vehicle for carrying the sprayer (**Kshirsagar et al., 2016**). In this study, it was aimed to design and develop a solar PV sprayer, which can be moved in field with the help of manually drawn vehicle.
- **J P SINHA et. al. Jan 2018**, Development of solar powered knapsack sprayer , This paper The small and marginal farmers in India are 83% with land holding of 46.1% and contribution of 51.2% in the production. On Indian farms, knapsack sprayers are very commonly used by small and marginal farmers for pest control because of affordability and ease of operation but with lower outputs. An attempt was made to develop a solar powered sprayer which had higher output (0.3 ha/hr) with lower physiological energy consumption and discomfort. An electronic control had been embedded for protection against deep discharge and over charging of battery for longer operational life. The system could be fully charged by solar energy within two hours of irradiation and can be operated continuously for six hours. This ensures quality spray with uniform droplet size in the swath. Anti-clogging filter had also been installed before the nozzle in nozzle head for trouble free operation as well as longer service life of nozzle.
- **Kumawat Mukesh M et. al. May 2018** , Solar operated pesticide sprayer for agriculture purpose, In this paper , The solar sprayer has many advantages. Besides reducing the cost of spraying, there is a saving on fuel/petrol. Also, the transportation cost for buying petrol is saved. The solar sprayer maintenance is simple. There is less vibration The operation of solar powered pumps is more economical

mainly due to the lower operation and maintenance costs and has less environmental impact than pumps powered by an internal combustion engine (ICE). Solar pumps are useful where grid electricity is unavailable and alternative sources (in particular as compared to the petrol sprayer). The farmer can do the spraying operation by himself without engaging labour, thus increasing spraying efficiency.

- **Ms. . Avhad Jayshri et. al. 2019**, Solar Operated Spray Pump System , Sprayers are mechanical devices that are specifically designed to spray liquids quickly and easily. They come in a number of different varieties. In this project we'll take a look at solar operated spray pump. A sprayer of this type is a great way to cover large areas such as lawns quickly and easily. A sprayer typically consists of a tank for carrying the liquid to be sprayed, a solar panel, a motor for pumping out this liquid, spray nozzles on automatically disperse the liquid in a downward direction over an appreciable area, ball valves, a chassis with wheels on which the sprayer is mounted, and a hose attachment for spraying. The device is mechanically pushed from behind and as the supply to the pump is switched on, the liquid is sprayed. This type of sprayers is typically used for spraying lawn chemicals such as pesticides including herbicides, insecticides and fungicides.

#### 5. Block Diagram

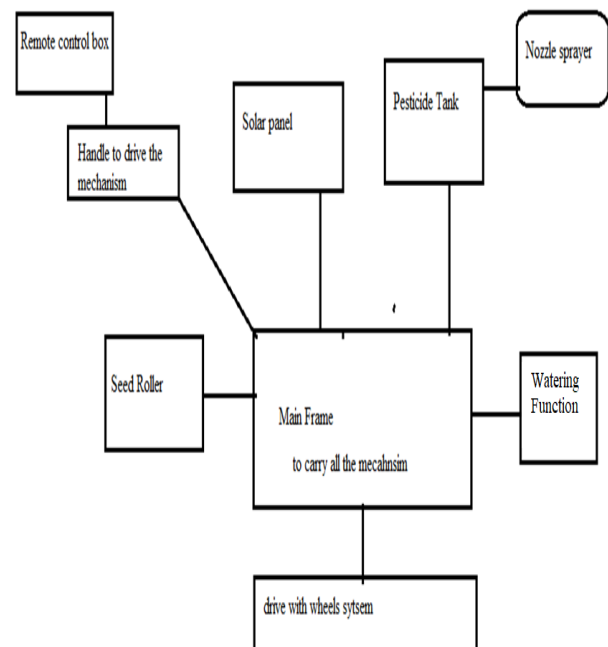


Fig. 1. Block Diagram

## 6. Working Principle

The whole machine is drive with handle system through manual pressure. Two big wheels is arranged , so that whole machine can run efficiently. There is pesticide spraying , seeder roler and water arrangement etc. is attached to frame..

The whole system is so portable that we can easily attached and detached all the function.

The power source use here is solar energy. Solar panel (12v 10w) collect the solar energy and convert into electrical energy. This electrical energy is stored in battery.

The stored energy in battery (12v 5Amp) is used for various other function like, seed spreading , watering and pesticide spraying function.

DC liquid motor is attached on frame with input pipe in tank. And out pipe is used for watering function. For pesticide spraying function just attached nozzle for spraying on crops.

Whole function like, watering , pesticide spraying , Light are control with control box present at handle. In this way all system we connected to make it multifunction agriculture machine.

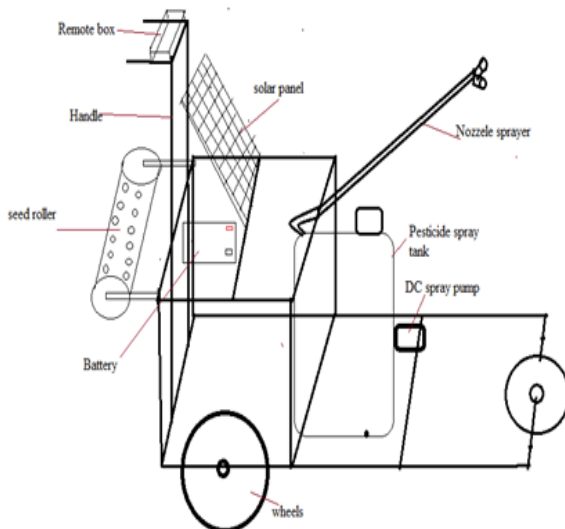


Fig. 2. Functional Diagram

## 7. Advantage

The solar agriculture machine has many advantages :

- The developed system used for spraying the fertilizer, pesticides, fungicides and insecticides.
- It is also use as water pumping on solar energy.
- It is used to seed spreading function.
- Easy in construction
- More economical
- Easy to clean and maintain
- It is a renewable energy powered
- It does not create air pollutant & noise

- Easy to handle
- Do not require fuel hence cost reduce & Light in weight.

## 8. Disadvantages

- Each formers cannot offered the solar spray system because the cost, if government helps to formers to reach such equipment to formers then it is helpful for them.
- How to use ? is questions for formers. Formers must be trained about such mechanism before used.
- Adjust solar panel to spray mechanism accurately otherwise panel may damage.
- It only works when sunlight is there or in clouded season it can't work properly.

## 9. Conclusion

After the manufacturing and trail on the “Solar powered Multipurpose Agricultural Automobile (Farm Machine)” conclusion which we made are as follows:

- Based on the overall performance of the machine we can definitely say that the project will satisfy the need of small scale farmer, because they are not able to purchase costly agricultural equipment.
- The machine required less man power and less time compared to traditional methods, so if we manufacture it on a large scale its cost gets.

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