

# Remote Controlled Pesticide Sprayer

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**Abstract :** India is an agriculture-based country. Agriculture has a significant role in the socio-economic fabric of India. An Engineers always focus on development and reduction in human efforts. So many inventions and development have been done in different fields including machinery, constructions, nanotechnology etc. It is now important to focus on agriculture field. Machine becomes an integral part of human being. Automation helps to give high production rate than manual production rate in the competition market. Engineer accepts the challenges and makes the design into reality. Remote controlled pesticide sprayer is one of the best innovative products that reduces human efforts. It is actually physical design that show how sprayer uses solar energy instead of conventional energy to spray pesticide on crops. The experimental result shows that the theoretical analysis is approximately same and valid for the prototype as per given specifications. It reduces up to 30-40% of total cost.

**Keywords:** Automation, pesticide sprayer, Remote control.

## I. INTRODUCTION

Today India ranks second worldwide in farm output. Agriculture like forestry and fisheries accounted for 13.7% of the GDP (gross domestic product) in 2013, about 50% of the workforce. The economic contribution of agriculture to India's GDP is steadily declining with the country's broad-based economic growth. Still, agriculture is demographically the broadest economic sector and plays a significant role in the overall socio-economic fabric of India. So, increase the productivity is main aim of the pesticides. Proper techniques of application of pesticide and equipment used in applying pesticides are vital to the success of the productivity. A sprayer is a device used to spray a liquid. In agriculture, a sprayer is a piece of equipment that is used to apply herbicides, pesticides, and fertilizers on agricultural crops.

### Types of sprayers:

The following are the different types of the pesticide sprayers:

- 1) Knapsack Sprayers: loaded on the back of the worker during operations. Tanks may be plastics or metal. Common knapsack sprayers are:
  - 1.1) Hydraulic
  - 1.2) Manual pneumatic
  - 1.3) Motorized pneumatic
- 2) Foot sprayers/ pedal pump sprayers
- 3) Traction pneumatic sprayers
- 4) Tractor mounted sprayers
- 5) Aerial sprayers

Solar energy is the non-conventional energy source. The energy which is available from the sun are free of cost and non-polluting. Solar operated pesticide sprayer is based on solar energy. In this project solar energy is converted into electrical energy and stored in battery. Pump is used to spray the pesticide through nozzle by use of battery.

## II. Literature Survey

Many researches were conducted in the field of solar sprayer for increasing the efficiency and their uses, various papers were presented and any many of these were written in the field of development of solar pesticide sprayer. Some of the literatures are listed in support of development solar pesticide sprayer.

Virendra Patil, et.al., published the paper on the "Solar Pesticide Sprayer" on 2015 from this paper we get the knowledge of dc water pump. 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 wind) do not provide sufficient energy. The solar panels make up most (up to 80%) of the systems cost. The size of the PV-system is directly dependent on the size of the pump, the amount of water that is required (m<sup>3</sup>/d) and the solar irradiance available.

Mr. Arunkumar, et.al., published the paper on the "Solar Pesticide Sprayer" on 2015, from this paper we get the knowledge on the discharge rate of the sprayer. The hand operated sprayer gives a discharge of about 0.8 to 1.5 lit/min it needs the operator to operate the sprayer till the pesticides are deposited by a sufficient amount. However, the fuel operated sprayer gives a discharge about 6 to 8 lit/min which leads to wastage of pesticides. These problems are eliminated in the proposed sprayer system.

Kamarajar et.al., published the paper on the "Solar Pesticide Sprayer" on 2015, from this paper we get the knowledge on the power conversion efficiency. The solar cell Power Conversion Efficiency can be calculated by using the relation,

$P = \text{Incident Solar radiation} \times \text{Area of the Solar Cell}$

The output power (P) = V \* I out.

## III.OBJECTIVES

Make it to run with green energy and vibration free equipment

1. To minimize the cost of the equipment and human efforts
2. To design the equipment for compact size

#### IV. Methodology

The aim of this project is to design and develop a multipurpose semi-automated machine which will help in reducing time and human effort. Spraying operation is performed by using the battery and solar power.

Components of semi-automated spraying machine are:

- a) Spraying fluid tank
- b) Batteries 12 volt 7 ahc
- c) Frame
- d) Solar panel
- e) Spraying pipe
- f) Motor Switch & Toggle
- g) Ground wheel
- h) Remote controller

#### Specification

##### 1. DC Pump

Figure 1 represents the DC motor that is used in the work and its specification are as follows:

- Power Capacity: ¼ HP
- Speed: 200 RPM
- Type of motor: DC Shunt Motor
- Operating Volt: 12 V
- Current on full load: 1 amps



Figure1 DC Pump



Fig 2 Lead acid battery

##### 2. Lead Acid Battery

Figure 2 shows the Lead acid battery which gives maintains free and more efficient then compared to any other type of battery's. The specification of the Lead Acid Battery is as follows:

- Capacity: 13.5 V
- Current: 7.5 ahc

##### 3. Solar Panel

The specification of the Solar Panel are as follows:

- Capacity output voltage: 18 V
- Power: 10 W
- Size: 1x1 Feet

##### 4. Selection of Electric Motor

The selection of electric motor is made considering the following specifications:

- DC motor speed: 100 RPM
- Voltage: 12 V
- Power: 18 W

##### 5. Micro controller

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. Table 1 represents the specifications of the Micro controller used in the work.

Table1 Specifications of Micro controller

Microcontroller	ATmega328P
Architecture	AVR
Operating Voltage	5 Volts
Flash Memory	32 KB of which 2 KB used by Bootloader
SRAM	2KB
Clock Speed	16 MHz
Analog I/O Pins	8
EEPROM	1 KB
DC Current per I/O Pins	40 Milli Amps
Input Voltage	(7-12) Volt

### 6. 3D Model:

3D Model is done by using CATIA software for better understanding of the problem and easy to make any modifications before fabrication of proto type model. It is as shown in the figure 3.



Fig 3 CATIA Model of equipment

## V. RESULTS AND DISCUSSION

The proposed design is successfully fabricated. Thus, the obtained conclusion of the equipment that we have designed is as follows:

1. “Solar Operating Devices” are more efficient alternatives for “Fuel Operating Devices”.
2. It is more economical and suitable for farmers.
3. It is portable and easy to operate.
4. No use of electricity or fuel.
5. The consequence is that we may face energy crisis in future if we are not careful today.
6. It is cheaper than other available method.

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