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Solar agro sprayer with night vision

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Abstract -In India the demand for energy is more and this is one of the large problem for our India. Finding solutions, to meet the "Energy -demand" is the great challenge for Engineers, Social Scientist, and Industrialist of our Country. According to them, applications of renewable energy are the only another solution for conventional energy demand. Now-a-days the Concept and Technique employing this renewable energy becomes very exclusive for all kinds of development activities. One of the large area, which finds number of applications are in agriculture. Solar energy plays an important role in agriculture products and for irrigation system for pumping the water from well in villages without electricity. Use of this Technology on solar energy can be applied for Fungicides, spraying pesticides, and Fertilizers etc., using Solar Sprayers. This paper explain how the 'Power Sprayer' which is already in use and how it works with fossil fuel can be converted into solar sprayers works without any fossil fuel. The machine, Solar Agro Sprayer, we introduce through our project is majorly useful for Agricultural purpose. It works under renewable energy which is the ultimate source for all living beings. It is introduced first to replace the Engine run under petroleum product which increase the pollution and also helpful in saving fuels for coming generation. Solar energy is converted into electrical energy with the help of solar panel. The converted electrical energy is completely deposited in the battery. A D.C. Motor is run by utilizing this electrical energy. A liquid pesticide is sprayed with the help of sprayer unit. This machine is also used to spray not only the liquid substance and also powder particles

Index Terms— **Solar panel, DC motor, impeller type blower, LED light, sprayer**

1.INTRODUCTION

Renewable energy resources are the most preferable resources for generation of electrical energy because of environmentally friendly. Of all the renewable energy resources, solar energy is the most resource mainly because it is free, unlimited and free from pollution. The contribution of these sources in the total consumption of energy in the world is about 15%. The solar energy is usually harvested through solar panels that are made up of photovoltaic cells. Approximately 80% of all photovoltaic systems are mended into a standalone system.

Solar energy is most simple and the energy produced directly by the sun and collected elsewhere, normally the Earth. Agriculture Plays the very important role in sustainable development – and energy is a major driver in this process. Agriculture, as a production-oriented area, requires energy as an important input to production. Pesticide sprayers are mechanical devices that are specifically designed to spray chemical easily and quickly and. They come in a number of different varieties. In this project we'll take a look at solar operated pesticide sprayers. A sprayer of this type is a better way to use solar energy. Solar based pesticides sprayer pump is one of the very improved versions of petrol engine pesticide sprayer pump. It is widely used in the agriculture field & also used for many agriculture purposes. This concept having more advantages over petrol engine sprayer pump. It uses the solar energy to run the motor. So it is leads to a pollution free pump compared to petrol engine sprayer pump. In this charged battery can also use for home appliances like glowing of CFL bulbs, mobile charging etc.

II. EXISTING SPRAYERS

A. Hand Driven Sprayer

The existing hand driven sprayer consist of a flexible diaphragm made of synthetic rubber and connected to the pump handle with the help of crankshaft mechanism, a rigid diaphragm chamber and either ball-type or flat inlet and outlet valves. The outlet valve is connected to a pressure chamber, which in many hand driven pump

sprayers has a variable pressure setting valve. These are the pumps which typically operate between pressures of 1 and 3 bars and it is suitable for application of weed killer where large droplets are required to minimize spray-drift.

B. Fuel Operated Sprayer

The sprayer consists of an integrated or external spray tank; The piston pump with high pressure usually powered by two stroke petrol engine and pressure can be with the help of regulating valve and a hose of up to 50 m of length. Since the Spray tanks are too big to be carried as a knapsack. The power sprayer is produced in a number of versions. Flow regulation can be varied with the help of a pressure regulating valve and the size of the nozzle. At the other end of sprayers is mounted on wheels, equipped with pressure regulators. Technically, this sprayer has a lot in common with the motorized knapsack-sprayer. The unit is usually set for high volume spraying, the liquid droplets with high pressure. Generally Hallow cone nozzles are preferred .

III. BLOCK DIAGRAM

The block diagram of proposed system is as shown in figure It consists of six units namely: solar panel, tank, battery, switch , DC motor , impeller

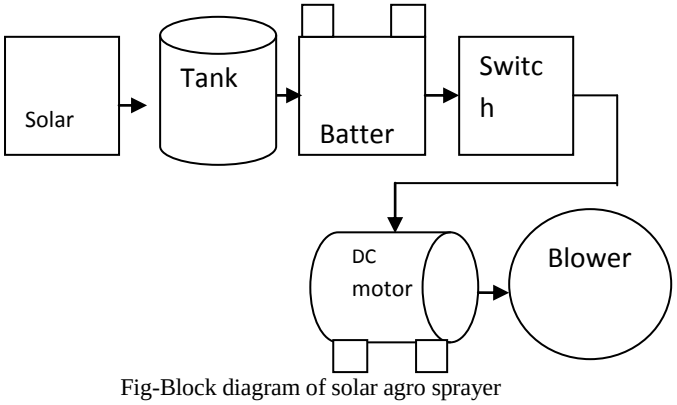

Fig-Block diagram of solar agro sprayer

2. Working

The blower fan is made to rotate by using a 12 V DC motor. The supply of the current is been given from the 12 V battery provided. The chemical liquid provided in the tank may reach the nose for spray by the gravitational force. The air produced in the blower unit is supplied one part to the chemical tank through a filter tube. The panel board is fixed by providing the Mild steel, The board can be adjusted to any angle by a tilting mechanism (Manual). The board is made to rotate by providing a bolt and nut. During the sunshine the panel board absorbs the heat energy from the sun and it converts it to the electrical energy and sends the current to the battery for the storage provision. The stored energy from battery is supplied to the motor for operating the blower fan. The discharge of the electrical energy from the battery will be equal to the charging of the battery by the solar photo voltaic cell.

Before filling the pesticide in chemical tank, please ascertain that the throttle control valve is closed. The capacity of chemical tank is even though it is more than 10 liters. Liquid chemical should be placed into it only 10 liters. Remove the cup from the filler hole. A strainer cup is placed in the filler hole. A PVC tube connected with the bottom of the tank is attached to the filter cup from under it, which brings in a jet of air from the blower for correcting air cushion over the liquid chemical for creating air cushion. The liquid chemical for ensuring free flow of the liquid to the nozzle one end of the PVC tube is fitted with a socket which should be inserted tight into the cavity at the bottom of the chemical tank.

In case of adjust the dosage scale for required type of spraying. Load the tank with previously well strained liquid through the strainer provided in the filler hole of tank. It is advisable not load the tank to its full capacity. It recommended allowing about 0.5 liter space for air cushion. For efficient performance, replace the cup tight.

Before mounting the machine on your back, start the motor. Engage the left hand shoulder strap in the hook at the base of the frame. Insert your left arm in the sling keeping the padding on your shoulder.

As we are included the LED light and mobile charging circuit to our model with the help of LED we can operate our model to pesticide the chemicals at night times at a same time he can use the LED light for home application. The cost of the fuel increases day by day. It should be reduced by the modified model which works on the principle of solar energy. The operating cost of power sprayer for one hour operation is calculated and its value is compared with the operating cost of solar sprayer.

Table.1 Technical specifications of different components required for multiple power supplied fertilizer sprayer system

S.no	Parts	Specification
1	Tank	PVC, 10 lit, 1 kg
2	Solar panel	12v10watts, 1kg
3	Battery	12v 7.5ah, 1.5kg

4	DC motor	Capacity: 12 V,1.5Ah RPM :0-2500
5	Pipe	Diameter:11 mm Length : 2 m

3.Calculation

Following are the general calculations:

Solar panel:

Solar 17.60V, 0.57A current

Power generated by solar panel (p) = V*I

= 17.60*0.57

= 10 Watt

Battery:

Battery 12V, 7.5Ah current

Battery Power = V*I

= 12*7.5

= 90 Watt

Time required charge the battery (T)

Charging time (T) was computed by taking the battery ratio rating in ampere hour (Ah)

to the total current consumed by the solar panel.

T= (battery rating in ampere hour)/(total current consumed by the solar cells)

T= 7.5/0.57

= 13 hours

The model of the designed fertilizer sprayer is shown in figure

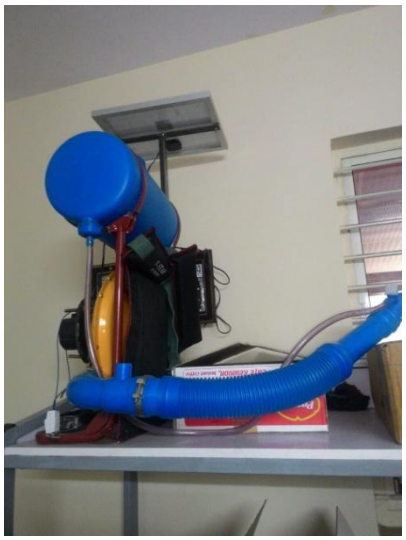

Figure 3: Working model of multiple power supplied fertilizer sprayer

4. CONCLUSION

The proposed system was tested with DC charging as well as solar charging. From the results it was found that the current and time needed for charging the full battery with solar 4 hrs and with manual charging by 3 hrs. The fully charged can be used to spray 10 liters of fertilizer, which approximately spray 2 acres of land**.**

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