

Design and Fabrication of Battery Operated Insecticides Sprayer pump

N.U. Kakde¹, Akshay A. hirudkar², Akshay D. Vairagade³, Gaurav D. Kunghatkar⁴

¹Assistant Professor of Mechanical Department, Dr. Babasaheb Ambedkar College of Engineering & Research, Nagpur

²Students of Mechanical Engineer, Dr. Babasaheb Ambedkar College of Engineering & Research, Nagpur

Abstract- In the agriculture field, in order to have good harvest of the particular crops it is necessary to spray fertilizers, insecticides etc. We are spraying the above mentioned things by charging the battery with the help of solar energy. In this project, we are going to use the cheapest method by adopting the solar energy. The solar energy is used to charge the battery for pumping the particular items to the agriculture field. We have designed and developed a system called solar agro sprayer. The solar sprayer has many advantages. The farmer can do the spraying without engaging labour, thus increasing spraying efficiency. This system is also made portable. The solar Agro sprayer is mainly used for spraying liquefied pesticides and with some arrangements we can spray the powered (dust) pesticides. A Solar Operated Pesticide Sprayer is a pump running on electricity generated by photovoltaic panels or the thermal energy available from collected sunlight as opposed to grid electricity or diesel run water pumps. The operation of solar powered pumps is more economical mainly due to the lower operation and maintenance costs and has less environmental impact. GYT6 Solar pumps are useful where grid electricity is unavailable and alternative sources (in particular wind) do not provide sufficient energy. As India is agriculture based country and 70% people do farming and related work. Agriculture is required to be boomed to enhance the Gross Domestic Product (GDP) of the country by improving the productivity. The productivity of the crops can be increased with the help of pest control. Pesticide spraying is the necessary procedure in cultivation of the crops.

I. INTRODUCTION

The Indian is an agricultural country about 85% of people in India fulfill their daily need on the income of agricultural jobs. The main thing is that about 86% of sun power is going waste every day and rest of sun power is utilized by the plant, animal and human

beings. The growing concern to control plant diseases, insects and weeds for qualitative yield of agricultural products is increasing speedily in developing countries and crops spraying are Employed for various varieties of purpose in traditional farming system. We produced a line of pressure sprayer of 16 liters. Sprayers designed of, convenience and ease of use. Our farmers are using the same methods and equipment for the ages. Indian agriculture is a diverse and extensive sector involving a large number of actors. It has been one of the remarkable success stories of the post-independence era through the association of Green Revolution technologies. Generally mechanization of small forms are very difficult and non-affordable but Japanese make it happens. One of the most common forms of pesticides application, especially in conventional agriculture, is the use of mechanical sprayers. 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, of one 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 conditions are required.

II. LITERATURE SURVEY

We search in market and find out various type of sprayer pump existed in agricultural field for spray the insecticides to kill insect which harms the crop.

Types of existing sprayer pump

- Manual operated sprayer pump.
- Engine operated sprayer pump.
- Powder sprayer pump

Design Features & Analysis To know the Characteristics And Its Uses Solar Operated Sprayer Pump Equipments & Technology

III. WORKING PRINCIPLES

Sun radiations are incident on the solar panel. Solar panel consist of photovoltaic cells convert this solar energy in to the electric energy. Further this current generated by the solar cells is supplied to the battery via electric wires. One controller is placed between the solar panel and the battery which control the current which is supplied to battery. This battery is removable so after fully charged it can be removed and placed in the sprayer. In this way charging is done. When battery is connected in the sprayer, it supplies the current to the DC motor and it runs at required speed. Motor has two opening one inlet and one outlet. Motor develops the suction and lift the pesticide from the tank and via connecting pipe supplies to the nozzle. Nozzle generates the spray pattern .After the in this way the pesticide is spray on the crops.by the switch on the board which closes the circuit and allows the flow of current to the motor which in turn drive the blade used for mowing. The battery recharges through the solar charging controller. safe to use, efficient to use, and environmentally friendly. It can save significantly on labour cost.



Fig:Working Model

COMPONENTS USED

SOLER PUMP

A solar panel is asset of solar photovoltaic modules electrically connected and mounted on a supporting structure. A solar panel (also solar module, photovoltaic module or photovoltaic panel) is a packaged, connected as assembly of photovoltaic cells. Specifications:

Panel Capacity= 24 Watt

Open circuit Voltage= 43.2 V

Short circuit Current= 0.63 IOC

SIZE:

Length=22.68" (576mm)

Width= 14.66"(357mm)

Depth= 1.18" (30mm)

WEIGHT:

6.17LB=2.87 Kg

Cell Type – polycrystalline Frame

Frame Type-Solar Junction Box

The solar panel can be used as a component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications. Each panel is rated by its DC output power under standard test conditions . Solar radiation can directly converted into electricity using semiconductor devices, which are known as photovoltaic (PV) cells. When Sunlight falls upon the Solar cell a part of the light is absorbed and it is converted into Electrical Energy by means of Electron Movements. This Solar Panel is connected to 12V lead acid battery for storing the electrical energy.

IV. BATTERY

Battery is the heart of our sprayer pump, which provides power to operate DC Booster pump. We used 2 six volt batteries which are connected in series having six cells each cell produce 2 volt. In our project we use dry cell battery having life 3 – 4 years.In the battery the electrical energy is stored in the form of chemical energy.The battery consists of positive and negative plate, the positive plate grid is filled with lead oxide and negative is filled with spongy lead.which enclosed case.

$6V \times 2 = 12 V$

V. DC BOOSTER PUMP

Pump is a device which convert electrical energy into hydraulic energy through mechanical energy.the

function of pump is to pressurize the fluid which enter through suction port of the pump and delivered through delivery port.the pump which is used in our project having 1.25 inch suction line and having 0.5 inch delivery line so this pump deliver insecticides with high pressure.

Specification

Weight = 150

Dimension of inlet& outlet 15mm and 5mm

Working Voltage = 12volts DC

Working Current = 0.1A - 0.5A

Lift =130cm (At 12V DC)

Flow rate = 300 L/H

VI. PESTICIDE STORAGE TANK

In our project we use tank which is used to store the insecticides solution which is made up from pvc pipe which is chemically inert and does not react insecticide solution stored in tank

Specifications :

Capacity= 10 lit

Pressure Chamber = Plastic

Fibre Tank = HDPE

Power Source = Automatic/ Pump

VII. SPRAYING GUN

Spraying gun is a device which is used to spray the insecticides solution. which consist of adjustable nozzle. The straight range of spraying gun is 20-25fits if we adjust the nozzle of the spraying gun

Specification:

Manufacture= Hypro

Weight (lbs) =3.65

Connection =112 mpt

Maximum Pressure= 850 psi

ADVANTAGES

- light in weight as compare to existing pump(12.5kg)
- zero operating cost of the sprayer.
- Zero noise pollution.
- Vibration free operation.
- Smoke free hence ecofriendly pump.

VIII. CONCLUSION

The testing of the project has been done, it is found that this project can be easily and effectively be operated in any weather and any condition. While testing of the project, it is found that it's all specification is full fill the requirement and it is economical than existing sprayer pump. Any farmer in rural area can use this sprayer pump all over the year and it can be used for domestic purpose. In Now days where world is moving towards the finding the ways for the energy requirement, it can be a better option for the convention sprayer. As India is a developing country, this product can be become more popular in rural areas.

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