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Agriculture Solar Sprayer Pump and Grass Cutter

Mr. Aniket Raut[1], Mr. Tejas Wankhade[2], Mr. Sachin Raut[3], Ms. Manisha Jambulkar[4]
Students, Department of Electrical Engineering[1,2,3]
Assistant Professor, Department of Electrical Engineering[4]
Nagpur Institute of Technology, Nagpur, Maharashtra, India

Abstract: *Agriculture is India's most popular economic sector and plays a vital part in the country's overall economy. Mechanization is required for the Indian economy to thrive. The primary goal of agricultural mechanisation is to increase overall productivity and output. Due to the socioeconomic realities of people living in villages in underdeveloped nations, such as India, human muscle power might be a useful alternative for meeting energy requirements for numerous activities like as water pumping and grass cutter.*

Keywords: Solar Sprayer

I. INTRODUCTION

Because of liberalisation and globalisation, the agricultural sector is transforming the socioeconomic environment of the population. Around 75% of the population lives in rural areas and is still reliant on agriculture. Agriculture has always been an important part of India's economy. Pesticide spraying is a critical duty in agriculture for protecting crops from insects. For this task, farmers typically employ a hand-operated or fuel-operated spray pump. Because of its bulky and heavy build, this traditional sprayer creates user fatigue. This inspired us to create a model that is essentially a trolley-based solar-powered Grass Cutter and Pesticide Sprayer in one unit. The utilisation of solar energy to power the pump and grass cutter will eliminate the need for a fuel-powered sprayer. Vibrations and noise will be reduced attributable to the pump and cutter. Our spraying system will become more environmentally friendly by eliminating the use of fuel. Solar-powered systems can reduce the cost of effective spraying and grass cutting. The solar panel, which contains photovoltaic cells, absorbs sun energy. These cells are responsible for converting solar energy into electrical energy. This converted energy is used to store voltage in the DC battery that powers the entire machine.

II. COMPONENTS OF SOLAR SPRAYER AND GRASS CUTTER

2.1 Solar Panel

Spraying and grass cutting were done with a photovoltaic (PV) or solar panel with a 12 V, 10 W capacity that was set to trap and transform the sun's energy into practical power. The Sprayer, Grass Cutter, and Battery Charger were all powered by a solar PV panel.

2.2 DC Motor

The spinning disc with 8000-8400 rpm was driven by a 12V D.C. motor. The D.C. motor was attached to the lance's end. The D.C. motor was used to spin the disc nozzle. To lower the weight, a compact size, rust-proof, easy-to-clean and maintain motor with low energy consumption was employed. Liquid enters spinning disc by revolving spinning disc nozzle, which adds velocity to the liquid and breaks it into fine droplets using centrifugal force.

2.3 Liquid Tank

The spray lance pipe with spinning disc nozzle was linked to a 16-liter capacity tank made of high-density polyethylene material.

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2.4 Battery

The sprayer was equipped with a 12V, 8Ah sealed lead acid battery that was utilised as a backup power source when the weather was gloomy (in rainy season).The battery was charged via a panel located on top of the sprayers. The battery provided the 6V regularised voltage required for motor operation.

2.5 Spinning Disc Nozzle

The sprayer lance was connected with a spinning disc nozzle. The spinning disc nozzle disperses the liquid into little droplets. The size of the output droplets is determined by the flow velocity and disc speed.

2.6 Lance

A fiber-reinforced lance with an extension rod was utilised to extend the lance's length. Mild steel was used to make the extension rod. At the further end of the lance, a battery housing constructed of HDPE (High Density Polyethylene) material was installed. On the lance, there was an on/off switch. The spinning disc was equipped with a motor on the front end of the lance. On the lance, there is a regulator. The speed of the motor is controlled by a regulator, which also controls the flow rate of water via the nozzle.

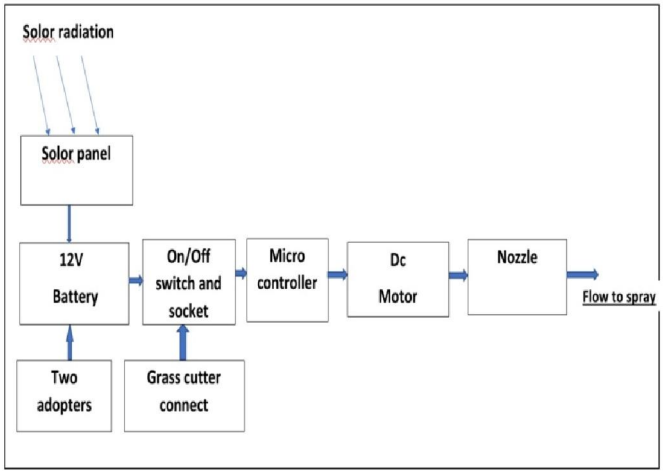
2.7 Dc Motor for Grass Cutter

The spinning disc, which spins at 8000rpm, is powered by a 6 V DC motor attached to the grass cutter's end. A DC motor was used to hold the metal plate in place. To decrease the weight, a small, easy to properly maintain motor with low power consumption was chosen.

2.8 Objective

- To minimize human efforts in the agricultural field.
- To perform two operation at a time srying Pesticide and grass cutter
- To increase production and save time of farmers
- No pollution problem

III. BLOCK DIAGRAM



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3.1 Working Principle of Solar Grass Cutter

The solar grass cutter works on the idea of having panels arranged in a specific layout at an angle that allows it to receive high-intensity solar radiation from the sun. Solar panels convert sunlight into electricity. With the help of a solar charger, this electrical energy is stored in batteries. The solar charger's main role is to increase the current from the panels while the batteries are charging; it also disconnects the solar panels from the batteries when the batteries are fully charged and reconnects them when the battery charging is low. Using connecting cables, the motor is connected to the batteries. A mechanical circuit breaker switch is installed between these three circuit breakers.It controls the motor's operation by starting and stopping it. The power from this motor is transmitted to the mechanism, which causes the blade to slide over the fixed blade, cutting the grass.

3.2 Working Principle of Solar Sprayer

Solar radiation can be turned directly into electricity using photovoltaic (PV) cells, which are semiconductor devices. When sunlight strikes the solar cell, a portion of it is absorbed and transformed into electrical energy, which is then stored in an acid battery. These lead acid batteries are attached to a 12V DC motor, which converts electrical energy into mechanical energy. The solar agro sprayer is made up of three basic components: 1.Solar panel unit 2.Battery storage unit and 3.Solar-powered pump The two-stroke petrol engine component of the power sprayer has been replaced by a combination of storage battery and solar pump in the solar agro sprayer pump.To charge the storage battery, a solar panel arrangement has been put at the top of the unit. The solar panel, storage battery, and solar pump units were all connected to one another.

The solar panels were arranged at a 45-degree angle to the vertical to allow the maximum amount of solar radiation to fall on the panels. Furthermore, it is capable of receiving maximum solar energy from the sun on a continual basis while the unit is in use in the field. To store the electrical energy from the panel, the output of the panel is linked in parallel with a 12 V storage battery. The 12 volt battery is linked to a 12 volt solar panel. A switch and regulator are used to control the operation of the solar pump. Energy obtained through application. Rotating the motor converts the stored electrical energy into mechanical energy. No traditional fuel, such as gasoline, is required for this mechanical operation.

3.3 Advantages

- The Solar spryaer and grass cutter are simple to maintain, and there is less vibration.
- The operation of a Solor spryer pump is more cost-effective.
- Costs of operation and maintenance are decreased.
- It has a lower environmental impact.

IV. Conclusion

This project's work has shown progress toward the development of a precision autonomous agricultural system in the future. This approach is intended to assist farmers in lowering the amount of time and energy they spend spraying pesticides and cutting grasses. This system may run on a rechargeable +12V battery. In the future, this technology will help to solve the labour shortage. As a result, this system will become the most effective substitute for present systems such as hand sprayers and tiller-mounted sprayers.

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