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SOLAR POWERED AGRICULTURE SPRAYING MACHINE

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Abstract: *Solar-powered pesticide sprayer is designed and manufactured in the present work. The framework was structured and created by considering parameters like wanted splashing limit, low weight, ease, easy to use nature, high working time, and for quicker inclusion of territory. In this way, the Solar sprayer was created to be an incentive for cash items in the farming area. For structuring the model, the traditional sprayer framework was concentrated to comprehend the system for the showering process. Scientific models were created after receiving reasonable presumptions for the count of the intensity of the engine required for showering a known amount of liquid. This technology on solar energy can be extended for spraying pesticides, fungicides, and fertilizers, etc., using solar sprayers in this product we are using non-convention energy is used to run the sprayer. Nonconventional energy means the energy is renewable and available unlimited and pollution-free energy. In this Solar Pesticide Sprayer, a pump running by using electricity which is generated by solar panel or the photovoltaic cell is collect solar radiation. This pesticide sprayer we are replacing the conventional engine by DC pump. Here the non-conventional energy source is solar energy.*

Keyword: *Design, Solar Panel, Battery, DC pump, Pesticide Tank*

1. INTRODUCTION

Agribusiness is the most significant division of the Indian Economy. Indian farming division represents 18 percent of India's total national output (GDP) and gives work to half of the nation's workforce. India is the world's biggest maker of heartbeats, rice, wheat, flavors, and zest items. Farming assumes a pivotal job in the economy of creating nations, and gives the primary wellspring of food, pay, and work to their country populations. However, enhancements in agribusiness and land use are central to accomplishing food security, neediness lightening, and generally economical turn of events. Advancement is a significant instrument in the social and financial turn of events; particularly, eco-accommodating development invigorates creation as well as effective utilization of normal assets also. Thus, the utilization of innovation in agribusiness quickens development and advancement with successful creation through said forms. This complex agrarian creation framework has developed after some time through logical revelations and different advancements. It is this dynamic nature that will furnish farming to adapt to the contending difficulties of tending to food and sustenance security, improving employments, combatting environmental change, and reasonably overseeing normal assets. Cultivating has been constantly changed by advancements since the time it was first developed. These developments have remembered hereditary changes for harvests and creatures, actualizes, for example, furrows and seed drills, procedures, for example, turn and manuring, and present-day innovation, for example, tractors, sprayers, and PCs.

Sprayers are commonly used on farms to spray pesticides, herbicides, fungicides, and defoliants as a means of crop quality control. There are many kinds of machine-operated sprayers, the most common of which are low-pressure, high-pressure, air-carrier, and fogger types. The best ideal opportunity to utilize a pesticide is the point at which the dirt is

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respectably dry and no downpour is normal, on a shady day when temperatures are moderate. Never apply pesticides when there is wind to keep the synthetic from floating to non-target areas. Applying a fluid bug spray around the edge of your home or structure in any event once like clockwork. If you realize you have high vermin populaces on your property, or you live in a region with periods of exceptional warmth, we suggest splashing once every month.

2.MOTIVATION AND OBJECTIVES

Motivation

As indicated by the study directed by the World Health Organization was broke down that every year 3,000,000 worker's region unit tormented by harming from pesticides from that 18000 kick the bucket. This comes means to beat the unwell Effects of the synthetic concoctions on populace individuals by and large people gatherings of individual's people characters and conjointly wont to splash compound over enormous regions quickly period time contrasted with conventional showering by a programmed airborne pesticide sprayer. This item is fundamentally a plan and advancement of quadcopter outline structure and showering instrument to decrease the time human endeavors. Environmental change produces hotter temperatures and builds CO_2 gases, precipitation, and a dry season that improve sickness, irritations, and weeds. Better information and comprehension of nuisance conduct under distinctive anticipated situations is required to embrace and grow new advances to react to dangers coming about from environmental change. The farming gears for multi-crops manure showering isn't accessible. Just for pesticide spraying pesticide sprayer is accessible in advertise however if we make separate manure sprayer it cost will be high so here we are giving two applications that is compost and pesticide spraying in one item which will have the option to splash compost for different kinds of harvests with double manure sprayer.

Objectives

The main objective of this project is to develop a solar-powered agriculture sprayer. This innovation targets some of the objectives listed below.

- To spray Fertilizer or pesticides aerially on Crops.
- To decrease the operational cost by further introducing new mechanisms.
- To consume zero electricity.
- It should able to spray both fertilizer and pesticide
- To eliminate environmental pollution by using a natural energy source.
- To complete the work with solar energy

The academic goal of this project is to develop an innovative, renewable energy source, reduced electricity bills, diverse applications, low maintenance costs, technology advancement.

3. LITERATURE SURVEY

Energy-demand is one of the major thread for our country. Finding solutions, to meet the energy demands are the great challenge for Social Scientist, Engineers, Entrepreneurs, and Industrialist of our Country [1]. It has been presented that various types of knapsack sprayers produce different impacts on agriculture in terms of protection. These parameters describe their advantages and disadvantages. Solar operated knapsack sprayer using a 37-watt solar

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panel facilitates to operate it on both modes [2]. Spraying of agricultural chemicals (herbicides, pesticides, etc.) is an important field activity to protect crops from different insects, pests, and diseases. Conventionally, knapsack sprayers are most commonly used in crops [3]. In the later years, a brief review of the utilization of solar power and other developments have been presented [4]. Agriculture is a profession of many tedious processes and practices, one of which is spraying of pesticides in the crops. A solar pesticide sprayer is a useful machine which is ergonomics have been presented [5]. Much researches have been attempted towards the stability, improvement of surface characteristics, process parameter study but very limited work carried out on the sustainability issues. Environmental sustainability and energy efficiency factors are key factors for the better utilization of the resources [6]. Solar energy is usually harvested through solar panels that are the system. The advent of photovoltaic modules and arrays or simply solar panels corroborates these features. This can be operated using solar energy during the presence of the sun [7]. The design and fabrication of solar sprayers have been discussed in recent years. The project succeeded with positive productivity features [8]. Productivity is an average measure of the efficiency of production. It can be expressed as the ratio of output to inputs used in the production process. High productivity can lead to greater profits for businesses and greater income for individuals. For businesses, productivity growth is important because providing more goods and services to consumers translates to higher profits [9]. The sprayers, discharge can be done for a minimum period of 4 to 5 hours. By changing the battery, discharge can be continued for further more hours. Charging can be done by separate Solar Panel attachment [10]. With continuing price decreases of PV systems, other applications are becoming economically attractive and growing experience is gained with the use of PV in such areas as social and communal services, agriculture and other productive activities, which can have a significant impact on rural development [11]. The system enables the use of electric backpack sprayers in remote locations or locations not supplied with electricity. Determination of the optimum tilt angle of solar collectors for building applications. Design and Development of Solarised Agro Sprayer for Rural Applications have outperformed the conventional sprayer [12]. The main advantages of the suggesting system are the running cost reduces to a minimum and consumes less time. Most often the device can have used at various locations such as farms, gardens, etc. and also they are more popular in rural areas as well.

4. METHODS AND METHODOLOGY

The structure includes sun situated board, charging unit, battery, siphon, and sprayer as showed up in Fig.1. The solar board passes on yield in the solicitation of 12 volts and 20 Watts capacity to the charging unit. The charging unit is utilized to support the sign from the sun based board. The charging unit passes on the sign which charges the battery. As indicated by the charged unit, the siphon works, with a definitive goal that the sprayer works. Sprayer siphon begins its working cycle by spraying the fluid to a predefined region. First, the engine is controlled by utilizing put away electric force from the DC battery. The battery is charged by sun powered force. In Diaphragm siphon a specific measure of vacuum pressure is made in the siphon packaging and thus the low weight fluid is changed over into high weight fluid at the outlet. This weight vitality is then changed over into motor vitality by utilizing spout at the sprayer end. The control valve is utilized to control the weight of the fluid. The spout can convey a sensitive fog, high volume splash, or long-extend steam to meet any spraying need. The fully charged battery approximately spray 3-4 acres of land. It was also found that, if the battery is fully charged in a day it can be utilized to spray 100 liters of fertilizer. The initial

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cost of the proposed system is a little more but the running cost of the system is very less. The developed system used for spraying fertilizer, pesticides, fungicides. Completely charged solar spray pump works for 4-5 hrs continuously and at the same time, it will be charged. Therefore, this modern model is more effective and eco-friendly than a hand-operated and fuel operated spray pump.

Fig. 1. Solar Powered Agriculture Machine

5. RESULTS AND DISCUSSION

The developed model was shown in Figure 1. The fabricated model has satisfied all the required objectives. The working of the machine as per specified requirements and the results reported were quite satisfactory. The solar panel can provide the required power to the sprayer pump and the excess amount of power produced by the solar panel was stored in the associated battery. The proposed sprayer requires 10 hours for complete charging and a fully charged battery gives 4 hours of backup to the application. The proposed sprayer is most suitable for small and medium-scale farmers and remote areas like the field, forest where fuel is not available easily. The solar operated sprayer will help the farmers of those remote areas of the country where fuel is not available easily. They can perform their regular work as well as saves fuel up to a large extent. At the same time, they can do their pesticide spraying work with very little environmental pollution. This invention is about an agricultural pesticide sprayer, which uses solar energy as a source of power for spraying. Laboratory and field tests were conducted to determine the flow rate, the application rate of the sprayer, and the charging time of the battery used in the developed sprayer. The results presented that the fabricated sprayer has a flow rate of 2.5 to 3.1 L/min by using different nozzles. The charging time of the battery using solar panel has been measured by continuously charging the battery and it is found that 10 hours for two days of every day 4 hours. The weight of stand can be still reduced by incorporating fiber reinforced plastic materials or any Aluminium matrix lightweight components, instead of mild steel, so that the weight may be still reduced, which in turn results in better productivity results.

6. CONCLUSIONS

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This sprayer is economical than that of the conventional engine operated sprayers. Besides, a similar process and novelty can similarly be reached out for a wide range of power sprayers. Spraying of agricultural chemicals (herbicides, pesticides, etc.) is an important field activity to protect crops from different insects, pests, and diseases. Conservatively, knapsack sprayers are most frequently used in agricultural harvests. In recent times, the hand-activated knapsack sprayer has been progressed to power functioned sprayer. In this study, a solar energy-PV based-sprayer was designed and fabricated. The fabricated solar-PV sprayer controls both on better modes of power.

- This project to confrontation the farmer while spraying owing to the trolley-based spraying. We can eliminate by back-mounting of the sprayer and it is well organized for farmer safety and occupational conditions.
- The sprayer was developed in the ergonomic factors.
- The proposed sprayer is most suitable for small and medium-scale farmers and remote areas like the field, forest where fuel is not available easily.
- Solar-powered pesticide systems take very little maintenance because they only have a few moving parts. They have long life usually 20 to 40 years. And solar pesticide systems never run out of fuel as long as the sun is shining.
- The method used here to build a solar-powered pesticide pumping system is cost-effective compared to an electrically operated hydraulic pump. Since here non-conventional energy is used to achieve the required head.

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