



SOLAR OPERATED FERTILIZER SPRAYER FOR AGRICULTURE PURPOSE

S. Srinath¹, M. Hariprasath², V. Kanimozhi³, S. Karikalan⁴, P. Mohanapriya⁵

¹Associate Professor, ²⁻⁵UG-Scholars,

Narasu's Sarathy Institute of Technology, Salem, Tamilnadu

ABSTRACT

Fertilization and pesticide spraying for plants is principle a part of project in farming. The guide procedure of fertilization and pest spraying have been present for remaining decades. In modern day generation, hand operated machines and heavy engine operated machines are applied for farming. Due to gas call for the economic system hike, the engine operated machines aren't powerful to acquire most yield. Also, the hand operated machines want most manufacturing time and most human effort. By thinking about those problems, the battery-operated sprayer pump is has been added to acquire fertilization and pest spraying. This task describes approximately the multipurpose agro sprayer system which operated with aid of using battery power. Additionally, the strength supply for battery were generated with the aid of using integrating sun system. This system will rectify strength call for agriculture system, pollutants loose and allows for excessive yield.

KEYWORD: Farming, Pesticide spraying, Battery, High yield.

1. INTRODUCTION

Generally, farmer makes use of conventional manner this is spray carried on backpack and spraying crop this will become time consuming, high-priced and human fatigue is fundamental concern. Present day in agriculture the sprayer plays crucial function in spraying pesticide. Although sprayers vary like motorized, hand operated. Now a days, there are numerous forms of pesticide sprayer are available. For those sprayers have complex shapes, sizes, approach to hold it however the feature are same. The cutting-edge concept on sprayer in our assignment is to make use of

efficaciously for lowering time of spraying, human efforts and price of spraying.

The traditional sprayer having a few problems such because it desires lot of attempts to push the liver up and down so that can create the strain to spray. Another issue of petrol sprayer is to want to buy the gas which will increase the going for walks value of the sprayer, it produces extra vibration and noise that irritates the farmer and him refuse to do such paintings repeatedly. In order to conquer those problems, we've proposed a wheel pushed sprayer, it's miles a transportable and sprays the pesticide via way of means

shifting the wheel. The mechanism contain on this sprayer is reciprocating pump, and nozzles which have been linked on the front cease of the spraying equipment. A unique association is applied for adjusting the stress as low and excessive with the assist of fixing the nut. Also, the weeding is executed with the aid of using this device. In agriculture zone use of reasonably priced and useful device for boom productiveness which could be very crucial for higher contribution for India's GDP. We ought to make monetary machineries so farmers can buy it as in step with capital profits of farmers are low with capital cost. Present state of affair in agricultural subject in India is associated with sprayer is that farmers are the use of hand operated sprayer or motorized sprayer. According to concept in our challenge we're creating a small agricultural reciprocating multi sprayer that is automatically operated with the aid of using a slider crank mechanism. One horizontal arm at pinnacle of the vertical arm. Nozzles are suited to this arm in order that it may spray pesticide each the sides. As greater number of nozzles are there consequently spraying is executed swiftly and time is saved.

2. LITERATURE REVIEW

Akshay and waghmare had been defined approximately the sun operated sprayer for agriculture purpose. This inspired us to layout and fabricated a version that is essentially trolley primarily based totally sun sprayer. In our challenge right here, we are able to put off the lowest back mounting sprayer due to fact farmer fitness factor of view at some point of sprayer on this manner right here, we are able to lessen the customer fatigue level.

Binod Poudal et al demonstrates the implementation of robotics and mechatronics with inside the area of agriculture. This being a check version the robustness of the automobile isn't always very high. The overall performance is quality below laboratory condition. The version gave a reasonably accurate fee of operation as calculated turned into additionally fairly low. In addition, the protection and long time period fitness of the farmers is ensured via way of means of removing human exertions absolutely from this process.

Harshit Jain et al, this version of sun powered pesticide sprayer is extra value powerful and offers the powerful consequence in spraying operation. As it runs at the non- traditional strength supply i.e., sun strength, it's far extensively to be had at freed from value. In now days where in global is transferring toward the location the brand-new methods for the strength requirements, it is able to be a higher choice for the conference sprayer. As India is a growing country, this product may become to be extra famous in rural areas.

3. METHODOLOGY

Design and fabrication of solar powered pesticide sprayer has following steps, selection of components. The choice of factors has been performed consistent with the requirements. Solar electricity received via way of means of the solar is transformed into electric. Electricity the usage of sun panel via way of means of photovoltaic effect. The output of the electricity conversion is given to fee a deep cycle lead acid battery through a free controller. The controller limits the charge at which electric powered contemporary is delivered to the battery. Preventing overcharging and protective in opposition to over voltage. It employs the pulse width modulation (PWM) approach which progressively stops charging the battery. The primary gain of PWM is that strength loss with inside the switching tool may be very low. The output from the fee controller is given to the battery via way of means of a 3- pin socket through an electrical network.

4. RESULT&DISCUSSION

4.1 Selection of spray pump

According to spraying capacity, the spray pump is selected.

Type: Centrifugal pump.

Liquid Discharge=2.9 lit/min.

Speed=3600 rpm

Power=3.5 W

Time consumed	60 Seconds
Replicate	Volume of Water
1	1.428
2	1.5
3	1.32
4	1.40

Table 4.1. Data collection for the spray pump

4.2. Selection of battery

According to pump running power, battery is selected.

Type: Lead acid battery.

Voltage=12V

Current=8A

When the circuit is brief then,

Voltage=12V, Current=2.4A

Power=Voltage*Current=12*2.4=28.8W

4.3. Selection of sun panel

According to battery output power, sun panel is detected.

Power=20W

Dimensions: 500mm*22mm*340mm

Weight=2.0 kg

Open circuit voltage=21.6V

Short circuit current=1.318A

Operating current=1.176A

4.4. Current produced with the aid of using panel and charging time of the battery

- i. The contemporary produced with the aid of using the sun panel(I) changed into calculated with the aid of using understanding the most strength(P) of the

- ii. sun panel and the voltage score(V) of the battery this is given with the aid of using $I=P/V$. Therefore, $I=20/12=I$. sixty-six A
Charging time (T) changed into computed with the aid of using taking the ratio score of battery in ampere hour (Ah) to the full contemporary provided with the aid of using the sun panel. $T=(\text{battery score in ampere hour})/(\text{overall contemporary ate up with the aid of using the sun panel})$. therefore, $T=8/1.66=4.79$ hr 4.5 power conversion efficiency of the panel. The sun mobileular strength conversion performance may be calculated with the aid of using the usage of the relation.

Where, $P_{in} = \text{Incident Solar Radiation} \times \text{Area of the solar cell} = I_r \times A$

Performance parameters are below standard take a look at situations at irradiance of a $1000 \text{ W/m}^2 = 1000(\text{W/m}^2) \times 36 = 123.552 \text{ W}$

The output strength (Pout) = $V \times I = 17 \times 1.176 = 19.992 \text{ w}$

$\eta = \text{output strength} / \text{enter strength}$

$\eta = 19.992 / 123.552 = 16.18\%$

This is the strength conversion performance of the solar panel.



Fig:4.1 Model of sprayer

5. FUTURE SCOPE

Now a days the spraying of crop is done by operator taking pump on back, but we were developing this conventional spraying for reducing efforts and time by using slider crank mechanism and motion transmission by chain

and sprocket arrangement principles. Future scope of this type of sprayer are very useful in agriculture and reduces the time consumed in spraying the pesticide liquid and work very efficiently. It will help the farmers to do work in any terrain, season and conditions.

6. CONCLUSION

In agricultural sector, spraying of insecticides is a vital venture to shield the plants from bugs for acquiring excessive yield. However, farmers had been especially the use of conventional traditional strategies like hand operated and gas operated sprayer device for spraying insecticide. This proposed machine “solar operated fertilizer sprayer machine” has achieved efficaciously and triumph over such foremost troubles for farmers. This device became designed with the aid of using thinking about parameters like favored spraying capacity, low weight, low cost, user-pleasant nature, excessive working time and for quicker insurance of area. Thus, the sprayer became fabricated to be a cost for cash product with inside the agricultural sector.

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8. REFERENCES

1. R. Rajesh, V. Vimal kingsley, M. Selvapandi, G. Niranjana and G. Varun harshath, “Design and Fabrication of Solar Pesticide Sprayer”, International Journal of Innovative Research in Science, Engineering and Technology, Vol. 5, Special Issue 8, May 2016.

2. Charvani, Sowmiya, Malathi, Ranjini and Saibaba, “Design and Fabrication of Solar Operated Sprayer for Agricultural Purpose”, ICETEMR, May-2017.

3. Akshay M.Narete and Pof. Gopal Waghmare, “solar sprayer for agriculture” National Conference on Innovative Trends in Science and Engineering

4. Akshay M.Narete and Prof. Gopal Waghmare, “Design and Fabrication of Solar Operated Sprayer for Agricultural Purpose”, National Conference on Innovative Trends in Science and Engineering, Volume: four Issue: 7, 2016. four. Binod Poudel, Ritesh Sapkota, Ravi Bikram Shah, Navaraj Subedi, Anantha Krishna G.L, “Design and Fabrication of Solar Powered Semi-Automatic Pesticide Sprayer”, IRJET, Volume: 04 Issue: 07, July – 2017.

5. Harshit Jain, Nikunj Gangrade, Sumit Paul, Harshal Gangrade, Jishnu Ghosh, “Design and Fabrication of Solar Pesticide Sprayer”, IJARIE, Vol-four, Issue2, 2018.

6. Preet H. Kothari, Hemant M. Age, Jaspreetsingh A. Kathuria, Avinash A. Bagul, Rohan D. Hucche, “Design and Fabrication of Solar Operated Agro Sprayer”, International Journal of Innovative and Emerging Research in Engineering, Volume four, Issue 3, 2017.