AGRICULTRAL SOLAR SPRAYER WITH MULTI APPLICATIONS

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ABSTRACT

A Solar Operated Pesticide Sprayer is a pump running on electricity generated by photovoltaic panels or thethermal energy available from collected sunlight as opposed to grid electricity or diesel run water pumps. Theoperation of solar powered pumps is more economical mainly due to the lower operation and maintenance costsand has less environmental impact than pumps powered by an internal combustion engine (ICE). Solar pumps areuseful where grid electricity is unavailable and alternative sources (in particular wind) do not provide sufficientenergy. The solar panels make up most (up to 80%) of the systems cost. The size of the PV-system is directlydependent on the size of the pump, the amount of water that is required (m^3/d) and the solar Irradiance vailable. The solar sprayer has many advantages. Besides reducing the Cost of spraying, there is a saving on fuel/petrol. Also, the transportation cost for buying petrol is saved. The solar sprayer maintenance is simple. There is less vibration as compared to the petrol sprayer. The farmer can do the spraying operation by himself without engaging labour,thus increasing spraying efficiency.

INTRODUCTION

A sprayer is a mechanical device used to spray the liquid like herbicides, pesticides, fungicidesand fertilizers to the crops in order to avoid any pest. Sprayer provides optimum utilization ofpesticides or any liquid with minimum efforts.

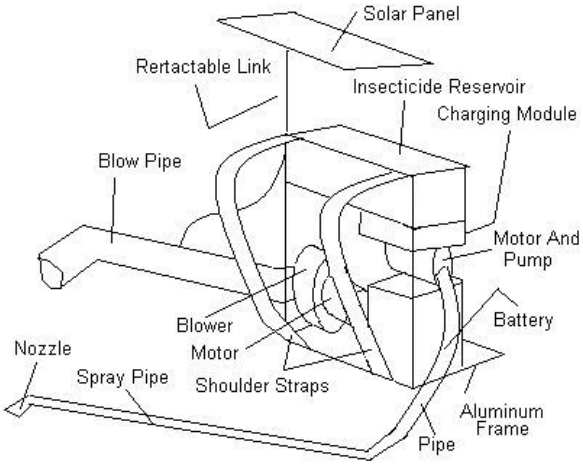
Dusters and sprayers are generally used for applying chemicals. Distinguish the simpler method ofapplying chemicals and dusters are best suited for portable machineries and this usually requiressimple

equipment. But these devices are less efficient than sprayers, because of the low retentionof the dust.

In Indian farms generally two types of spray pumps are used for spraying; hand operated spraypump and fuel operated spray pump, out of which hand operated spray pumps are most popular.The main drawback of hand operated spray pump is that the user can't use it continuously formore than 5-6 hours since he gets tired after such a long duration.

Also the fuel operated spraypump requires fuel which is expensive and availability of fuel at rural areas is difficult.Shivarajkumar.A and Parameswaramurthy.Dhave developed wheel driven sprayer. This wheeloperated pesticide spray equipment consists of

This blower pipe is held with hand by the device operator and is directed onto the area where he wishes to spraythe pesticides / insecticides. The insecticide reservoir is connected to the blower pipe. By continuously feeding this insecticide to the blower pipe the same is spread or sprinkled where wished. Liquid insecticide is sprayed onthe crops using Spray pipe, which receives liquid from a reservoir with the help of a pump. This pump is driven by another DC motor that receives power from the same battery. Thus insecticide in liquid from Is sprayed where wished. The project can also run emergency lamp using battery power thus this project can be of verymuch use and can be very beneficial for farmers. The running cost of project is nil.



SPRAYER:

In agriculture, a sprayer is a piece of equipment that is used to apply herbicides, pesticides, and fertilizers on agricultural crops. Sprayers range in size from man-portable units(typically backpacks with spray guns) to trailed sprayers that are connected to a tractor, to self-propelled units similar to tractors, with boom mounts of 60–151 feet in length.

SELECTIONOF COMPONENTS

The selection of component has done according to therequirement .following are the list of components,

1. Tank
2. Solar panel
3. DC Motor
4. DC Battery
5. Nozzle type

6. Connecting pipe
7. Mounting elements

TANK

SOLAR PANEL

DC MOTOR

DC BATTERY

Nozzle

CONNECTING PIPE

TYPES OF SPRAYERS

1.Hand driven Sprayer

2.Fuel operated Sprayer

3. Battery operated Sprayer

4. Tractor mounted Sprayer

5. Aerial Sprayer

6. Solar Sprayer

7. foot sprayer/pedal pump sprayer

Hand Driven Sprayer

Fuel Operated Sprayer

BATTERYOPERTED SPRAYER

Tractor Mounted Sprayer

AERIAL SPRAYER

SOLAR SPARAYER

Solar based pesticide sprayer is one of the improved model of pesticide sprayer pumps. Sun is the source of all energy on the earth. It is most abundant, inexhaustible and universal source of energy. All other sources of energy draw their strength from the sun. India is blessed with plenty of solar energy because most parts of the country receive bright sunshine throughout the year except a brief monsoon period. India has developed technology to use solar energy for cooking, water heating, water dissimilation, space heating, crop drying etc.

Most used pesticide sprayer available in market is petrol engine sprayer, which is bulky to carry, needs lot of maintenance (to engine and carborators) and cost incurred to maintenance, petrol to operate is noticeable. The another model which is ispired us to take this project is electrical pesticide sprayer in which battery is charged using conventional electricity but operates only for four hour once battery is fully charged. So improving operating time and solar energy harvesting is motivation of project.

Our proto Type solar sprayer

Foot Sprayer/Pedal Pump Sprayers:

DEFINATION OF NOZZELE

This fact sheet covers nozzle description, recommended use for common nozzle types, and orifice sizing for agricultural and turf sprayers. Proper selection of a nozzle type and size is essential for correct and accurate pesticide application. The nozzle is a major factor in determining the amount of spray applied to an area, uniformity of application, coverage obtained on the target surface, and amount of potential drift.

TYPES OF NOZZLE

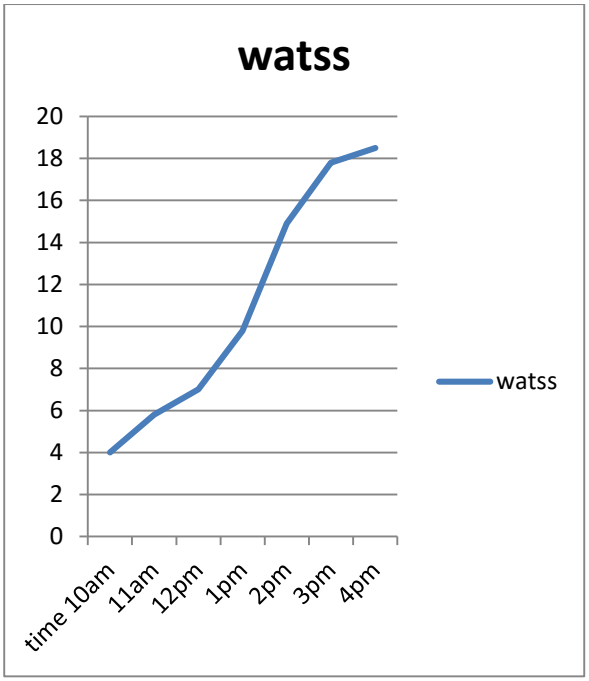
1. Fan Nozzles

2. FLOOD NOZZLES

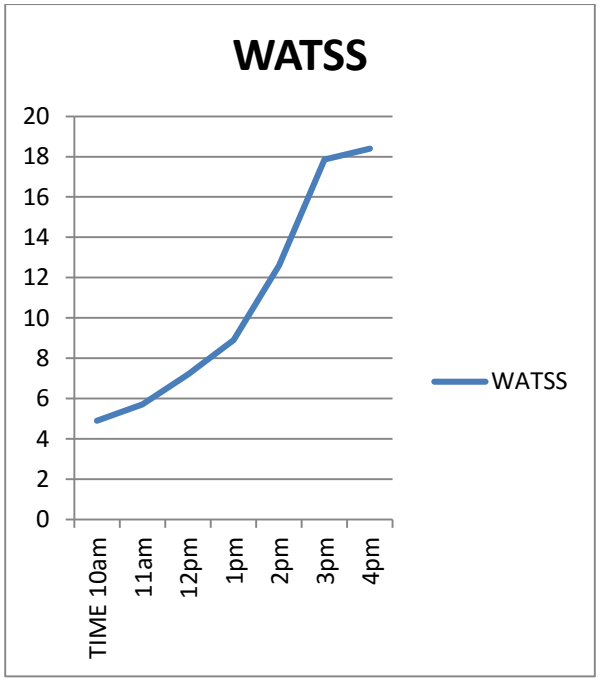
3. TRUF JET NOZZLES

RESULTSAND DISCUSSION:

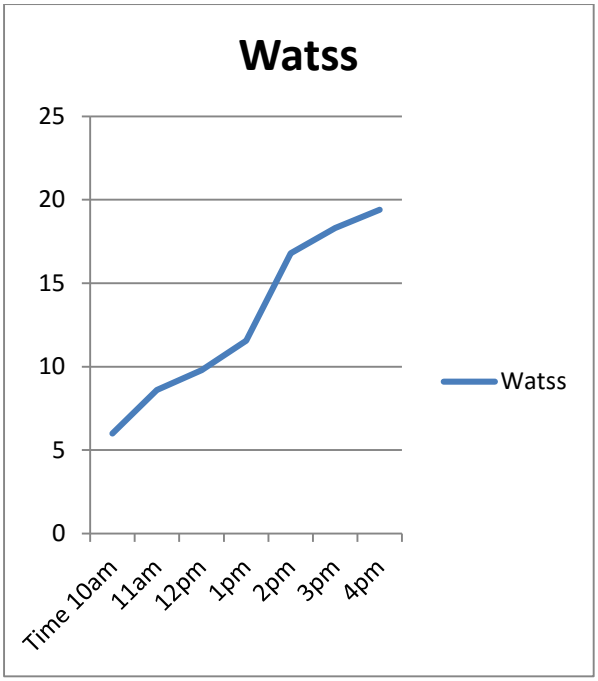
The proposed system was tested with AC charging as well as solar charging. From the results it was found that the current and time required for charging the full battery capacity of 12V, 12Ah by practically is 14.15 hours. The fully charged battery can be used to spray 580 liters of fertilizer, which approximately spray 5-6 acers of land it was also found that, if we charge the battery in a day it can used to spray 200 liters of fertilizer. The insital cost of the proposed system is little more as compare to conventional sprayer but the running cost of the system is very less. The developed system used for spraying the fertilizer, pesticides, fungicides and painting.



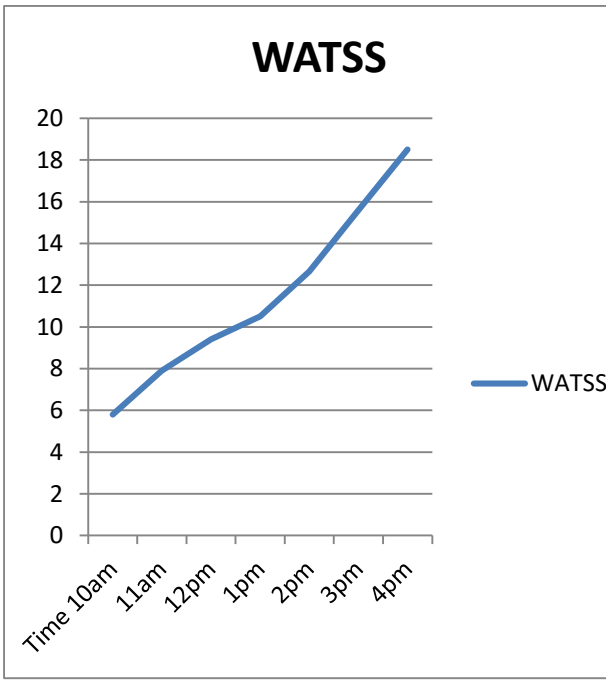
SOLAR POWER GENERATION ON FRIST DAY



SOLAR POWER GENERATION ON SECOND DAY



SOLAR POWER GENERATION ON THIRD DAY



CONCLUSION

As we know 70% of population of our country lives in villages & their main occupation is agriculture. The prominent aim of this project is to fulfill the tasks like hand spraying, IC engine spraying, and leg pump spraying etc. using non-conventional energy sources. Thus solar operated spray pump will help the farmers of those remote areas of country where fuel is not available easily. They can perform their regular work as well as saves fuel up to large extent. At the same time they reduces environment.

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