

FABRICATION of MULTI PURPOSE SPRAYER by SOLAR: a REVIEW

Pawan Tiwari¹, Hemant Banothe², Ishwar Giriya³, S.S.Pawar⁴

1(Department of Mechanical Engineering ,SRPCE, Nagpur

Email:hemantbanothe2011@gmail.com, pawantiwari@gmail.com,ishwargirya@gmail.com)

Abstract:

Spraying of agricultural chemical compounds (herbicides, pesticides etc.) is an necessary discipline exercise to protect vegetation from exclusive insect, pests and diseases. Conventionally, knapsack sprayers are most in many instances used in agricultural crops. Recently, the hand operated knapsack sprayer has been upgraded to power operated sprayer by using addition of diesel operated pumps. In this study, a solar PV based totally sprayer was once designed and developed. The developed solar PV sprayer operates each on direct mode and indirect mode. In the direct mode, the sprayer was once operated by way of using electricity generated by using 100 Wp polycrystalline PV modules hooked up on the sprayer and in the indirect mode it was operated on battery mode the use of stored electric powered strength in a deep cycle battery (12 V, 32 Ah). In each modes, a DC motor pump of 60 W was used to generate the required running strain to spray the liquid pesticide formulations. Among one-of-a-kind kinds of nozzles handy in the market, the satisfactory suitable one for spraying is the brass nozzle, which requires an working stress of about 1.5-2 kg cm⁻² to supply a discharge of 900 cm³ min⁻¹ was used in the study. The capability of the liquid tank in the sprayer was once designed with 50 litre capacity for an uninterrupted operation for 2 hours with two nozzles. Analysis of solar radiation statistics *Key Words— mechanization, back type sprayer, weeding, modernization*

INTRODUCTION

India is set to be an agricultural based totally u .s .about 75% of population of India is established on farming immediately or indirectly. Our farmers are the use of the same strategies and gear for the ages. e.g. seed sowing, spraying, weeding etc. There is need for development of wonderful spraying and weeding machine for increasing the productivity.

A. Status of agricultural mechanization in India

Most of the creating international locations of Asia have the problem of excessive population and low degree of land productivity as compared to the developed nations. One of the major reasons for low productiveness is insufficient energy availability on the farms and low degree of farm mechanization. This is specially genuine for India. It is now realized the world over that in order to meet the food requirements of the growing populace and rapid industrialization, modernization of agriculture is inescapable. It is stated that on many farms, manufacturing suffers due to the fact of unsuitable seedbed coaching and delayed sowing, harvesting and threshing. Mechanization allows the conservation of inputs through precision in metering making sure better distribution, reducing volume wished for higher response and prevention of losses or wastage of inputs applied.

II. LITERATURE REVIEW

A. Spraying Methods
One of the more frequent forms of pesticide application, in particular in conventional agriculture, is the use of mechanical

sprayers.

1. Backpack (knapsack) sprayer
One type of backpack sprayer is a compressed air sprayer with a harness that permits it to be carried on the operator's back. [1]

Another type of backpack sprayer has a hand-operated hydraulic pump that forces liquid pesticide through a hose and one or greater nozzles. The pump is typically activated via moving a lever. A mechanical agitator plate may also be connected to the pump plunger. Some of these sprayers can generate pressures of a hundred kilos per square inch (psi) or more. Capacity of both these sorts of backpack sprayers is generally 5 gallons or less.

Figure 1: Backpack kind spraying

Hydraulic sprayers consist of a tank, a pump, a lance (for single nozzles) or boom, and a nozzle (or more than one nozzles). Sprayers convert a pesticide formulation, regularly containing a combination of water (or every other liquid chemical carrier, such as fertilizer) and chemical, into droplets, which can be massive rain-type drops or tiny almost-invisible particles. This conversion is done by forcing the spray mixture thru a spray nozzle underneath pressure. The size of droplets can be altered via the use of extraordinary nozzle sizes, or by means of altering the pressure beneath which it is forced, or a combination of both. Large droplets have the advantage of being much less prone to spray drift, however require greater water per unit of land

covered. Due to static electricity, small droplets are able to maximize contact with a goal organism, but very still wind conditions are required. But, in this type of spraying, the labor has to lift all the weight of the pesticides stuffed tank which reasons fatigue to labor and for this reason reduces the human capacity.

2. Lite-Trac
 Lite-Trac is a trading identify of Home Farm Supplies Ltd, a manufacturer of agricultural machinery registered in England and primarily based in Peterborough. The Lite-Trac name comes from "lite tractor", due to the patented chassis diagram enabling the inherently very heavy machines manufactured with the aid of the organization to have a light footprint for minimal soil compaction.

Figure 2:

Lite-trac spraying
 Holme

Farm Supplies Ltd agricultural products, sold underneath the Lite-Trac name, encompass device carriers, self-propelled lime and fertilizer spreaders, sprayers, granular applicators and tank masters. Lite-Trac is presently the producer of Europe's biggest four-wheeled self-propelled crop sprayers. The company's products are identifiable by means of the combination of unpainted stainless metal tanks and booms with vivid yellow cabs and detailing. A Lite-Trac crop sprayer, or liquid fertilizer applicator, mounts onto the SS2400 Tool Carrier centrally between each axles to keep equal weight distribution on all four wheels and a low centre of gravity whether or not empty or full. The stainless metal tanks are manufactured in capacities of up to 8,000 liters, at the same time as Pommier aluminium booms of up to forty eight meters can be fitted, making these Europe's greatest four-wheeled self-propelled sprayers. [2]

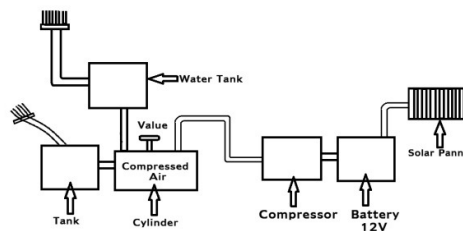
Magnetic Motor Starters

Magnetic starters furnish thermal over-load safety formotors and are advocated for necessary horsepower and all three-phase motors. Many compressors come standard with starters, however, when a starter is purchased one after the other from the compressor, nearby electrical codes be checked prior to purchasing and installation. Starters can be configured as full-voltage or reduced voltage. A frequent type of decreased voltage starter is a wye-delta. A wye-delta starter will reduce the quantity of in-rush current to the motor upon preliminary turn on as compared to a full-



voltage starter. A wye-delta starter is also in many instances referred to a star-delta configuration. As a note, the motor must be wired to aid a wye-delta starter; not all motors aid this kind of configuration. two

III.METHODOLOGY



In our united states farming is achieved by means of common way, except that there is giant development of industrial and provider sector as in contrast to that of agriculture. The spraying is historically achieved through labor carrying backpack kind sprayer which requires more human effort. The weeding is commonly accomplished with the assist of Bulls which will become highly-priced for farmers having small farming land. So to overcome these above two problems, we tried to put off these troubles and designed the tools which will be advisable to the farmer for the spraying and weeding operations.

B. Objectives

- Decrease the operational fee via using new mechanism.
 - Work reliably beneath exceptional working conditions.
 - Decrease the cost of machine.
 - Decrease labor fee with the aid of advancing the spraying method.
 - Machine can be operated in small farming land (5 acre).
 - Making such a machine which can be capable to operate both the operation (spraying and weeding).
- So thinking about these points associated to spraying and weeding an strive is made to layout and fabricate such gear which will able to function both the operations more efficaciously and additionally will consequences in low cost.

First the solar electricity is trapped by using solar panel This

solar strength is utilized for charging battery The battery is connected to the motor which runs the compressor. The compressor will suck the mospheric air and amplify its stress This pressurized air is then transferred to the chamber which is used to save pressurized air . The compressor two is ed with two stress manage valve which manipulate the stress of air. two 10.3 Lead-Acid Batteries

The chemical reactions that occur in a lead-acid battery are represented via the following equations: (1) (2) (3) As the mobilephone is charged, the sulfuric acid (H2SO4) attention will increase and becomes best when the cell is completely charged. Likewise, when the cell is discharged, the acid awareness decreases and turns into most dilute when the phone is thoroughly discharged. The acid awareness normally is expressed in phrases of particular gravity, which is weight of the electrolyte in contrast to the weight of an equal extent of pure water. Positive electrode: $PbO_2 + H_2SO_4 + 2H^+ + 2e^-$ discharge charge two ----- PbsO4 2H2O Negative electrode: Pb

Storage can be used to manage demand activities (peak demand periods) in a compressed air machine via lowering each the quantity of pressure drop and the rate of decay. Storage can be used to guard necessary strain purposes from different activities in the system. Storage can also be used to manage the rate of strain drop in demand whilst helping the velocity of transmission response from supply. For some systems, it is essential to grant a for pressure drop to appear $C = \text{Air demand, cfm of free air}$ $P_a = \text{Absolute environment pressure, psia}$ $P_1 = \text{Initial receiver pressure, psig}$ $P_2 = \text{Final receiver pressure, psig}$ The formulation assumes the receiver quantity to be at ambient temperature and that no air is being provided to the air receiver by way of the compressor(s). If the compressor(s) is running while air is being drawn from the receiver, the system be modified so that C is replaced with the aid of $C - S$, where S is the surplus compressor capacity, cfm of free air. The preliminary formula additionally can be used with a recognised receiver size, to determine the time to restore the air receiver pressure. In this case, C is changed by means of S, which is the compressor capacity, cfm of free air. In the past, in general with reciprocating compressors, rules of thumb for sizing a major air receiver, have been from 1 gallon per cfm to three gallons per cfm of compressor capacity. This is no longer considered as good exercise and the endorsed primary receiver dimension will range with the type of compressor and ability manage used.

Conclusion

The proposed sprayer gives the average values in all elements like weight, discharge, pressure and cost. The proposed rayer requires 10 hours for whole charging and utterly charged battery gives 4 hours of backup to the application. It reduces the soreness to the operator whilst spraying and it creates the awareness about renewable electricity to the farmers. The proposed system has received very good aesthetic graph and the operator feel easy to operate this new sprayer due to the fact of it is mild weight, handy to carry, transportable and environmental friendly. The proposed sprayer is most

suitable for small and medium scale farmers and remote areas like field, forest fuel is now not accessible easily. weight of stand can be nonetheless decreased by way of incorporating fiber strengthened plastic (FRP) instead of mild steel. The complete system can be made.

REFERENCES

- [1] R. Joshua, V. Vasu and P. Vincent "Solar Sprayer - An Agriculture Implement", "International Journal of Sustainable Agriculture 2 (1): 16-19, 2010 ISSN 2079-2107" International Journal of Applied Research and Studies (iJARS) ISSN: 2278-9480 Volume 2, Issue eleven (Nov - 2013) www.ijars.in Manuscript Id: iJARS/667 8
- [2] R. D. Fox, R. C. Derksen, "Visual and photo system size of spray deposits using water-sensitive paper" Applied Engineering in Agriculture Vol. 19(5): 549-552 2003 American Society of Agricultural Engineers ISSN 0883-8542
- [3] M. A. Miller, B. L. Steward, M. L. Westphalen "Effects of multi-mode four-wheel steering on sprayer laptop performance", American Society of Agricultural Engineers ISSN 0001-2351
- [4] A. Taiwo K. Oje, "Development and checking out of a swirl chamber nozzle", Journal of Agricultural Engineering and Technology (JAET), Volume sixteen (NO. 1) June, 2008