Design and Fabrication of Solar Seed Sprayer Machine

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Abstract-.Today's era is marching towards the rapid growth of all sectors including the agricultural sector. To meet the future food demands, the farmers have to implement the new techniques which will not affect the soil texture but will increase the overall crop production. In this project, a=-n attempt has been made for the "Design and fabrication of solar seed sprayer machine". In this technique seeds in a hopper get sprayed by means of fan or blower directly to land without human effort. By this process the seed is feed to land at the time of plough .The main benefit of using this method is to reduce the time of seed to the land and reduced human effort. Usually the manpower is needed for sowing a seeds by using this machine there is no need for human power. This system does not require any additional power source to run the fan, because here solar panel is employed as a power source.

Key Words: *Agricultural sector, Power source, Solar seed sprayer machine*

I. INTRODUCTION

Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. The government of India appointed a commission to assess the feasibility of increasing the crop productivity under prevailing Indian ecological conditions. In order to develop the standard of living of small farmers we should make the machines with low cost. Then only small farmers can implement the recent modern machines for farming purposes.

The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and spacing, cover the seeds with soil and provide proper compaction over the seed. The recommended row to row spacing, seed rate, seed to seed spacing and depth of seed - 089IJlacement vary from crop to crop and for different agricultural and climatic conditions to achieve optimum yields and an efficient sowing machine should attempt to fulfill these requirements. In addition, saving in cost of operation time, labor and energy are other advantages to be derived from use of improved machinery for such operations. A traditional method of seed sowing has many disadvantages. Our proposed "Solar seed sprayer machine" is used to sowing seed easily. In this project an attempt has been made to provide the low cost sowing machine and also it reduces the human effort.

A. Problem Statement

Seed sowing machine is a device which helps in the sowing of seeds in a desired position hence assisting the farmers in saving time and money. The basic objective of sowing operation is to put the seed and seed in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed. Hence, there is a greater need for multiple cropping on the farms and this in turn requires efficient and high-capacity machine

B. OBJECTIVES

1.To investigation of various types of seed sowing and spraying machine
2.Todevelopment of solar powered seed sowing and seed spraying machine.
3.Totesting of development of solar powered seed sowing and seed spraying machine in actual agricultural farm.
4.To extend the concept of Solar PV-Technology on "Solar Sprayers" as "Energy Alternate Devices".

II. LITERATURE REVIEW

Our country faces the totalloss of 33% of its economy from Weeds. The Losses are due to some of the following reasons, total loss of 26% from Crop Diseases, total loss of 20% from Insects and Worms, total loss of 6% from Rats. Has been Surveyed. Shrinking farm lands, acute labor shortage, decreasing income per acre of cultivation, and economic frustration are some of the key factors hurting a farmer's confidence in continuing farming. Weeding control is done by: mechanical weeding, thermal weeding: flaming, biological control, chemical control, and by farming pattern. It has always been a problem to successfully and completely remove weeds and other innocuous plants. Invariably, weeds always grow where they are not wanted. This work involved the design and construction of mechanical weeder, after discovering that tools such as cutlass and hoes require high drudgery,

time consuming and high labour force. As a solution to these problems, mechanical weeder was designed and constructed. The mechanical weeder was made of two implements attachment i.e. the primary cutting edge which is in front to loose soil above and the secondary cutting edge which is behind to do cutting and lifting of weeds. The overall machine field efficiency was 98.67%. The Single Wheel Weeder being manufactured is the equipment, which is used for very special purpose when the weeding is required at narrow places or between rows. The blade is thin but very sturdy and tough besides, it is very safe to use and offers zero threat of hurting to the user, Other than the wheel, there is nothing mechanical in this single wheel weeder but, it works wonderfully under the condition where it is put into. This hassle free equipment requires no special maintenance. It is necessary to design the weeder which minimize the human effort and provide efficient work output.

A. Scope

1.Maintain row spacing.
2.Proper utilization of seeds can be done with less loss.
3.Achive automation in agriculture field.

III. METHODOLOGY

First we will design the Seed Sowing & Spray Pump system suitable to various agriculture application. we need to analyze Seed Sowing & Spray Pump system taking into consideration the applications and operational conditions. Then we will analyse the design in ANSYS for static and dynamic conditions .Theoretical: Theoretically we will compare basic and operational parameter of existing system with propose system.

IV. DESIGN CALCULATION

DC Battery
Model name: Sealed lead acid battery 6DFM8.
Weight= 2.5 kg
Capacity = 12 volts, 8 Ah
Charging current = 2.4 A (Max)
Standby use: 13.5 V - 13.8 V
Cyclic use: 14.5 V - 14.9 V
Nozzle
Nozzle discharge rate is 2.9 lit/min.

According to Spraying Capacity & Discharge Capacity of Spray pump[3]

1) Is Selected Type : Centrifugal Pump.

. Liquid Discharge : 0.5lit/min to 1lit/min.

Speed : 1500 rpm.

Suction Head (hs) = 0.5m.

Discharge Head (hd)= 3m.

Suction pipe Diameter : 12mm =12*10-^{3m}.

Discharge pipe Diameter : 8mm =8*10^{-3m}

Overall Efficiency Of The Pump $\eta = \frac{W*Hm}{1000*S.P}$

. Where, S.P = Power Required To Drive The Pump.

Hm = Monometric Head (in m)

η= Overall Efficiency Of The Pump (Assume it is 60%)

$\eta \frac{= \rho*g*Q*Hm}{1000*S.P}$

$\eta = \frac{= 1000*9.81*8.10\text{^}3*Hm}{1000*S.P}$

where, Q= 1lit/min= 1.66*10^-5 m^3/sec.

Assume Overall Efficiency of Pump η=60% Vo^2

Hm= Manometric Head.

$Hm=(\frac{Po}{\rho*g} + \frac{Vo2}{2*g} + Zo) - (\frac{Po}{\rho*g} + \frac{Vo2}{2*g} + Zi)$

Where ,$\frac{Po}{\rho*g}$ = Pressure head at outlet of pump (hd) = 3m.

$\frac{Vo2}{2*g}$ = Velocity head at outlet of pump = $\frac{Vd2}{2*g}$

$\frac{Po}{\rho*g}$= Pressure head at inlet of pump (hs) = 0.5m.

Vd(Velocity at Discharge)= $\frac{\text{Discharge}}{\text{Area of Delivery pipe}}$

$=\frac{1.66*10\text{^}-5}{\frac{\pi}{4}*8*10\text{^}-3}$ = 2.16*10^{-3} m/sec.

Vs(Velocity at Suction) =)= $\frac{\text{Discharge}}{\text{Area of Delivery pipe}}$

$=\frac{1.66*10\text{^}-5}{\frac{\pi}{4}*12*10\text{^}-3}$ = 1.76*10-3 m/sec.

m/sec. Hm = 3+ $((\frac{(2.16*10\text{^}-3)2}{2*9081})$-0.5+$\frac{(1.76*10\text{^}-3)2}{2*9.81}$-

Hm = 14.71-2.45

Hm = 12.26 meter.

We know that ,

Overall Efficiency of the pump

$\eta = \frac{W*Hm}{1000*S.P}$.

putting the above value in the equation, we get the power of pump.

Rearrangement of Above equation

$S.P = \frac{W*Hm}{1000*\eta}$

$= \frac{1000*9.81*1.66*10-5*12.26}{1000*0.60}$

= 3.327*10-3

= 0.00327*103

= 3.27 Watte ~ 3.50 Watte .

Power required to the pump is 3.50 Watte.

2) According To Pump Operating Power Battery Is Selected Type:[4]

Lead Acide Battery.

Voltage : 12 V

Current : 7 Amp

Power = Voltage*Current

= 12*7

= 84 Watte(Maximum power when the ckt is open)

When the circuit is short then,

Voltage: 12 v Current: 1.5 Amp

Power = Voltage*Current

= 12*1.5

= 18.Watte

3)According To Battery Output Power Solar Panel Is Selected[5]

Power : 20 watt

Dimension : 397*278*25 mm

Weight : 1.6 kg

Open Circuit Voltage : 21.5 volt

Short Circuit Current : 0.82Amp

Operating Current : 12 Amp.

When the Battery is connected to the Solar Panel Through Charge Controller then some amount of load is Applied on solar Panel (that is short ckt)

Actul power of Solar Pane

l = voltage* short circuit current

= 21.5*0.82 = 17.63 Watte.

Theoretical calculation of current and charging time of the battery.

(i).The current produced by the solar panel (I) was calculated by knowing the maximum

power (P) of the solar panel and the voltage rating (V) of the battery that is

given by

I =P/V

Therefore,

I =20/12

=1.66Amp

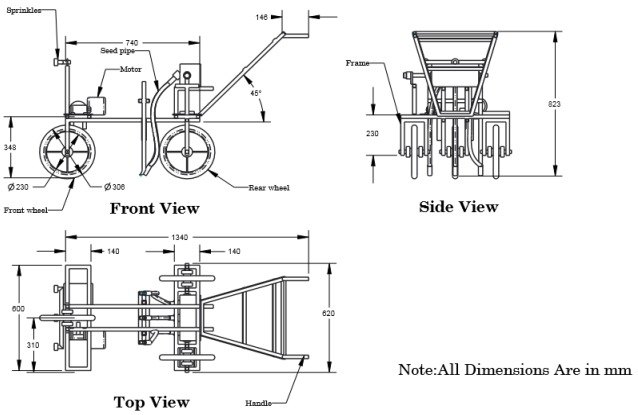
(ii). Charging time (T) was computed by taking the ratio rating of battery in ampere hour (Ah) to the total current supplied by the solar panel.

T =battery rating in ampere hour/ total current consumed by the solar panel

Therefore

, T = 7/1.66=4.21 Hrs.min

FRAME MODEL



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