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, an 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.

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 placement 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.

MATERIAL SELECTION:

Selection of material is based on cost, availability and suitability of materials for heat treatment. Hopper is made up of G.I sheet of 20G material. The other parts are made as per the requirement.

MAJOR COMPONENTS IN THE PROPOSED SOWING MACHINE

The proposed seed sowing machine consists of the following components,

- Hopper
- Solar panel
- Battery
- Fan
- Connecting wires

SOLID WORKS MODEL:

Solid works is the world leading 3D product development solution. It takes care of entire product development process from creative concept through detailed product definition to serviceability. Solid

work plays a vital role in creation of 3D models of all complicated components both in small scale and large scale industries not only in India but also in all western countries. This image represents 3D model of the project.

Fig 1.Seed sowing setup on the tractor digger

FABRICATED MODEL

DESIGN CALCULATIONS:

Design of Hopper Nozzle:

In this project Nozzle have a following data

Circumference(C) = 60 mm

Length (L) = 20 mm

To find the diameter, area and volume of the nozzle

Circumference(C) = 3.14*D

60 = 3.14*D

Diameter (D) = 19.09 mm

Area (A) = $3.14/4*D^2$

$=3.14/4*19.09^2$

$=286.22\ mm^2$

Volume (V) =A*L

=286.22*20

$=5.72\times10^3\ mm^3$

Assume 20% air gap inside the nozzle

Volume (V) = $4575\ mm^3$

The standard size object has a following data

Circumference(c) = 380 mm

Length (L) = 160 mm

To find the diameter, area and volume of the standard size object:

Circumference(C) = 3.14*D

380= 3.14*D

Diameter (D) =121.01mm

Area (A) = 3.14/4 * D^2

= 3.14/4*121.01^2

=$11.5\times10^3 mm^3$

Volume (V) =A*L

=11.5×10^3*160

=$1.84\times10^6 mm^3$

Assume 20% air gap inside the standard size object

So Volume (V) =$1.472\times10^3 mm^3$

1.472×10^3 = 1015grms

4575 = x

1.472×10^3*x = 1015×4575

Mass flow rate (m) X=3.152 grams/sec Where m = x

Design of Fan:

Speed of the fan (N) = 3000rpm

Circumference(C) = 870mm

Circumference(C) = 3.14*D

Diameter (D) = 277mm

Velocity (V) = ((3.14*D*N)/60)

= 14.5 m/s

We know that

Air flow rate (Q) = V*A*60

= 43.51*0.060*60

= 157.32 m^3/s

(Mass flow rate(m)/ Airflow rate (Q)) = (3.152/157.32)

=50m^3/gram

Merits Proposed Solar Seed Sprayer Machine:

- It is simple in operation.
- Maintenance cost is low.
- No seed loss in terms of remaining in the hopper.
- Low cost.
- It is more suitable for small farmers.
- Reduced size and complexity when compared to existing machine.
- No Power needed.
- Human power is not necessary.

CONCLUSION:

A solar seed sprayer machine is designed for small farmers to improve their productivity. In this machine a common seed storage place is introduced to reduce the cost of the machine. The drawbacks in the existing sowing machine are rectified successfully in our machine. It will be more useful for small farmers and the agricultural society. Thus solar operated automatic seed sowing machine will help the farmers of those remote areas of country where fuel is not available easily. And also they can perform their regular cultivation activity as well as saves fuel up to larger extent. At the same time by using solar energy environment pollution can also be reduced. Thus aiming to save the revenue of government & also most demanded fossil fuel. By using this innovative project of seed sowing equipment we can save more time required for sowing process and also it reduces lot of laborer cost. It is very helpful for small scale farmers.

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