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Design and Fabrication of Seed Sowing and Spraying Machine for Agriculture

S. Muruganantham[1], S. DeepanchakkaravarthI[2], S. Mahendra Kumar[3], S. Muknesh[4], K. Rajasreethar[5]
[1]*Associate Professor, Department of Mechanical Engineering, Erode, Tamilnadu, India*
[2, 3, 4, 5]*UG Scholar, Department of Mechanical Engineering, Erode, Tamilnadu, India*

Abstract: ***Agriculture is one of the major sectors of the world that plays a key role in growth the economy of a country. The seed sowing machine is used to sowing the seeds into land for making lots of plant production in agricultural field. The model is proposed with the objective of establishing a seeding and spraying processing. It is a mechanical device; the spraying machine is used to spray the water and chemicals to protect the plant. We can plant different varieties for this machine Different sizes of seeds can make the space between us different two seeds when planting.***
It also increased planting Efficiency and accuracy made from raw materials so it was much cheaper and more suitable for small-scale farmers. The advantage of this method is that it reduces seeding and spraying time to land and reduces human effort. The cost of this machine is very low and easy to operate simple construction.

I. INTRODUCTION

In this project we are fabricating seed sowing and spraying machine. The seed sowing machine is used to sowing the seeds into land for making lots of plant production in agricultural field, the sprayer is used to spray the chemicals to protect the plant. The spraying machine consumes electrical power as an input. So this is very much useful in agricultural field and develops the seed sowing and sprayer process in less cost and easier method.

A. Seed Sowing

Sowing is the process of planting seeds. However, before sowing, good quality seeds (clean and healthy seeds) should be selected to produce a high yield.
the nozzle increases with a higher pressure. Once the pressure in sprayer decreases, the spray pattern is slow.

B. Hand Sowing

Hand sowing is the process of casting handfuls of seed over prepared ground: broadcasting. Usually, a drag or harrow is employed to incorporate the seed into the soil. Though labor intensive for any but small areas, this method is still used in some situations. Practice is required to sow evenly and at the desired rate. A hand seeder can be used for sowing, though it is less of a help than it is for the smaller seeds of grasses and legumes.

C. Open Field Sowing

Open-field refers to the form of sowing used historically in the agricultural context whereby fields are prepared generically and left open, as the name suggests, before being sown directly with seed. The seed is frequently left uncovered at the surface of the soil before germinating and therefore exposed to the prevailing climate and conditions. This is in contrast to the seedbed method used more commonly in domestic gardening or more specific (modern) agricultural scenarios where the seed is applied beneath the soil surface and monitored and manually tended frequently to ensure more successful growth rates and better yields.

D. Spraying

A sprayer is a device used to spray a liquid, where sprayers usually use water, weed killers, crop performance products, pest production chemicals, as well as manufacturing and production line products. In agriculture, a sprayer is a tool used for herbicides, pesticides and fertilizers in agriculture crops.
Now a day's employing this non-conventional energy becomes very popular for all kinds of development activities. One of the major area, which fines number applications are in agriculture sector. Solar energy plays an important role in agriculture sector. This technology can be extended for spraying chemicals on the plants using solar sprayers.

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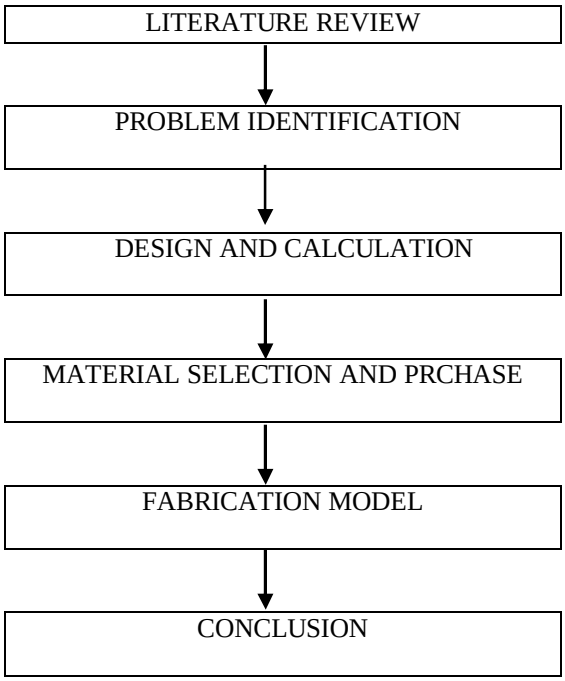
E. Types Of Sprayer

1) *Hand Operated Sprayer:* Hand operated sprayers are for small plant treatments. It involves applying water or liquid chemicals in a small land area. Hand operated sprayer works through an air pump. The pump compresses air into the tanks and pressurizes the liquid content. The spray pattern from
2) *Fuel Operated Sprayer:* The fuel operated sprayer is to contain one blower set up and one outlet port the inside of the blower is to fix the blade set up. The fuel engine is run to rotate the blower blades and the water chemical is suck in high pressure and to spray the chemical is land surface to protect the plant.

II. METHODOLOGY

Describes about the methodology of the Project starts with selection of materials, by considering the requirements the suitable materials are chosen. Then solution is modeled along with design calculations. Model is fabricated and test run is conducted. Based upon the results design is modified until desired solution is obtained. Various steps involved are shown below.



III. LITERATURE SURVEY

The extensive literature review will help to understand the concepts, the theorems and the different factors that influence the machines performance. Before starting our work we had viewed many research papers which indicates that for a production based industries machines installation is a crafty and a skillful task as many fact or are associated with it such as power consumption, time required, maintenance cost, number of units produced per machine etc.

Seed sowing and spraying machine are multi use such as, seeding and spraying works in this single machine. solar panel is the power source of the machine, electric power is stored in a 12 volt battery, Electric Motor is used for the power supply. A. C. gear Motor is widely used for the running the machine. Dimension specification of the frame model is cleared from the studied journal papers. Selection of materials for the frame and shaft is cleared for better performance of the machine.

IV. PROBLEM IDENTIFICATION

A. Specification of the Problem

In the type of machine is mostly operated in hand operated and fuel operated. Therefore, we had the another idea of used to operated the machine is solar power. Then this two work is working by a separate machines, the machines are large size and cost is high.

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B. Objectives

1) The aim of the proposed to develop a machines are renewable energy source (Seeding, Spraying) with one machine
2) To reduce the size of the machine
3) To develop a different operations in one machine
4) To reduce the man power while performing various operations.
5) To reduce the initial investment for machines by the manufacturers
6) To develop a compact, portable and economical machine for the manufacturers

V. DESIGN AND CALCULATION

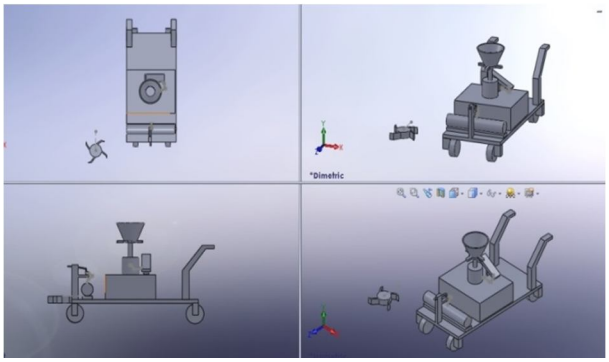

Fig. 1. Solid model design

A. Proposed Design

The most reliable design of seed sowing and spraying machine is described below along with their specification in order to show the different existing approaches to the existing seeding and spraying concept. These data could be useful when performing the initial sizing in the design stage of seed sowing and spraying machine. Following are designs for initial data collection.

Calculation

1) Solar Panel

3 watts solar panel
Solar panel output power = watts*solar panel 1hr of sunshine*0.85
= 3*1*0.85
output power in one hour = 2.4 WH

2) Battery

12 volt, 4.7 amps
battery watts = volt*amps
= 12*4.7
= 56.4 watts

3) Battery fully charging time = power in watts/solar panel output power per hr
= 56.4/2.4
= 23.5 hr

4) Gear Motor

Power P =50W, Speed of the motor N=45 RPM, 12 Volt
Torque:
Speed N=45 RPM

$$P = \frac{2 \times \pi \times N \times T}{60}$$

T = (P x 60) / (2 x 3.14 x N)
T = (50 x 60) / (2 x 3.14 x 45)
T = 1.01 Nm.

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5) Battery power in mah = 20000*Amps/volt
= 20000*4.7/12
= 7833 mah

Load current of the motor = 300 ma

6) When the motor is running time in full of battery power = battery mah / motor load current
= 7833/300
= 26 hours

7) Water pump

12 volt, 70 psi, 4 liter per minute.

VI. MATERIALS SELECTION

For structural design it is important to consider all materials appropriate to the application. For the design of this machine, the material should be cost effective and capable of providing the required properties of each application. Materials that were considered were steel, aluminum and composites. Aluminum can be immediately rejected due to ability to withstand heavy load. Steel would be satisfying the weight requirement. Some types of composites that can be neglected due to higher cost. So, finally Steel was determined to be optimal for this application.

A. Required strength
B. Rigid
C. Wear resistant
D. Long life use

VII.FABRICATION MODEL

The fabrication work is done by the mechanical process known as welding for joining different lengths of mild steel rod for obtaining the structure of frame and fixing the seed hopper and seed distributer, the water pump is fixed in a frame the battery also fixed, the top of the machine to fixed by the solar panel, Hopper outside the gear motor is fixe, then moving wheels are stay in four side of frame used to purpose of moving the machine.

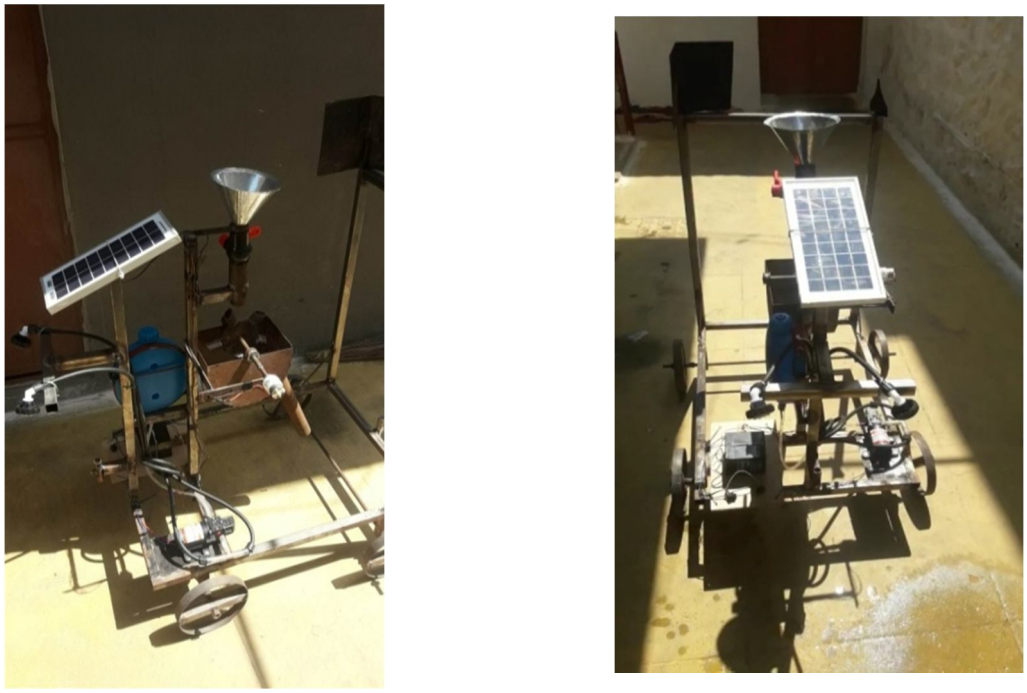

Fig. 2. Fabrication model.

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VIII. WORKING OF THE MACHINE

It is simple construction made up of four wheel used to move the machine manually. It consists of two wheel shaft one is fixed in front and another one at the back side. The motor is used to rotate the seed stopper into the seed hopper. Motor power is required to power which is connected to solar panel. The motor operate the seed stopper open then the seed is get sowing to the land. It is easy to operate and more efficient. The water sprayer is to spray the chemicals into the land surface to protect the plant, sprayer are get two spray nozzle at some height then the water storage tank is to place the machine to contain the water and chemicals. The motor suck the water into the tank to spraying purpose. It all usages of power are getting to solar panel.

IX. REULTS AND DISCUSSION

A. The machine is useful particularly for small scale formers.
B. Workers movements can be minimized.
C. Two operations can be carried out on the single machine.
D. Floor area is reduced.
E. Manufacturing cost is also reduced.

X. ADVANTAGES

A. It is an renewable energy source
B. Easy construction
C. Easy to operate
D. Low cast

XI. CONLUSION

This project is made with pre planning, that it provides flexibility in operation. This innovation has made the more desirable and economical. This project “Design and Fabrication of Seeds Sowing and Spraying Machine for Agriculture Purpose” is designed with the hope that it is very much economical and help full to agricultural field. This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.

XII. FUTURE SCOPE

A. Seed sowing and spraying machine is a device which helps in the sowing of seeds and spraying in the desired position hence assisting the farmers in saving time and money.
B. Future is fully all machines are operated in renewable energy sources
C. The machine can be made more portable.
D. Cost can also be reduced to some extent by manufacturing it on a mass scale.

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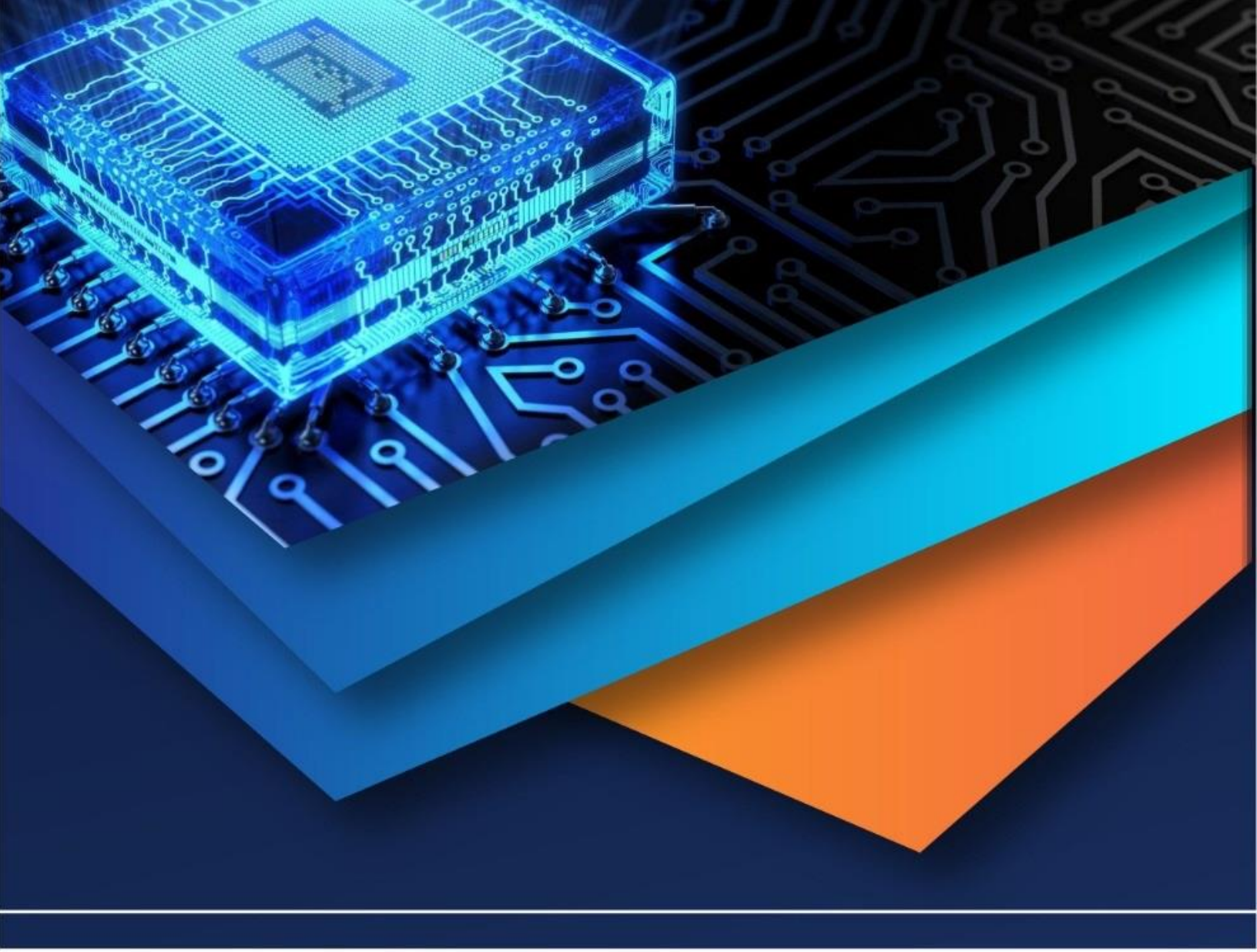

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