

DESIGN AND FABRICATION OF SOLAR SEED SOWING AND WATER SPRAYING MACHINE

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Abstract - This dissertation provides information about the various types of innovations done in seed sowing machine available for plantation and water sprayer. The seed sowing and water spraying machine is a key component of agriculture field. 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. This dissertation deals with the various sowing methods used in India for seed sowing and water spraying. The comparison between the traditional sowing method and water spraying and the new proposed machine which can perform a number of simultaneous operations and has number of advantages. As day by day the labour availability becomes the great concern for the farmers and labour cost is more, this machine reduces the efforts and total cost of sowing the seeds and water spraying. In this dissertation we are development of solar powered seed sowing and water spraying machine.

I. INTRODUCTION

Agriculture has been the backbone of the Indian economy and it'll still remain so for an extended time. Today the environmental influence of agricultural production is extremely much focused and therefore the demand to the industry is increasing.

In the present scenario, most of the cities in India do not have sufficient skilled man power in agricultural sector and that affects the progress of developing country. Therefore, farmers have to use upgraded technology for cultivation activity. Manual method includes broadcasting the seeds and fertilizers by hand. So it's time to automate the sector to overcome these problems.

Innovative idea of this paper is doing the processes like verifying if the soil is suitable for cultivation, seed sowing, covering the land and spraying water automatically so that human efforts will get reduced. Different sensors are used to detect parameters like soil moisture and obstacle detection. Depending upon the sensors output the microcontroller will take the necessary actions. The moisture sensor output will help to determine if the soil is suitable for cultivation. Once the soil is suitable, the seed

sowing operation can be performed. Also, on desired time water spraying operation can be performed.

II. PROBLEM IDENTIFICATION

There is an urgent need to mechanize the agricultural operations (use machines to carry out basic agricultural practices like irrigation, sowing, weeding, fertilizing etc.) as it increases the production and decreases the wastage of labour force. Present machineries available are costly and not useful for small scale farmers. To meet the future food demands, the farmer have to implement new techniques which will not affect the seed feeding, soil texture but will increase the overall crop production. The existing seed sowing machine is too cost. It is not abundantly available in India. It has a complex design. Every seed distributor has the individual seed storage place. Hence, it leads to increase the cost of the machine. It is not compact in size and weight. Hence, it is difficult to transportation from one place. Due to increasing the fuel Cost, So we are using solar energy.

OBJECTIVES

- To investigation of various types of seed sowing and spraying machine.
- To reduce pollution.
- For testing the development of solar powered seed sowing and water spraying machine in actual agricultural farm.
- To complete large amount of work in less time.

III. LITERATURE SURVEY

A. Kunal et al. [1] (2014) In pakistan has evaluated three sowing methods and seed rate in a four replicated method and concluded that drilling method of sowing at seed rate 125 kg/ha is optimal for yield and quality of wheat grains, because the said sowing method and seed rate distribute.

ShindeVanitaKacharu et al. [2] (2012) The purpose of this work is to design and develop the robot which can perform operations like Ploughing, Seed Sowing, Water Sprinkling. This robot gets power supply from solar panel, so it does not need any external power supply.

P. Giftson Paul et al. [3] (2020) In the current generation most of the countries do not have sufficient skilled man power in the agriculture sector and it affects the growth of developing countries. The basic operation of sowing machine is to sow the seed in row at the required depth and maintain the distance between two seeds.

M.W. Andure et al. [4] (2017) The agricultural has always been the backbone of India's sustained growth. As the population of India continues to grow, the demand for produce grows as well. Hence, there is a greater need for multiple cropping in the farms and this in turn requires efficient and time saving machines.

KalashSinghal et al. [5] (2018) Mechanization reduces labour cost and improves the overall productivity without affecting the quality of soil. This paper represents a machine which can carry out various farming activities simultaneously. Air and Noise Pollution are caused by the combustion of fossil fuels in IC Engines and External Combustion Engines.

V. Pranil et al. [6] (2018) During sowing the seeds and fertilizer are put in rows at favoured depth by providing proper spacing, covering the seeds with soil and proper compaction is provided. Components used: Chassis, PCB, Drill, Battery, Electric Motor Solar panel Remarks: Concludes that bullock drawn planters are essential for sowing because the experienced workers for sowing are nearly decreasing. Plant population and Planting distance are major factors in increasing the production of crops.

P.V. Bute et al. [7] (2018) An agricultural mechanism or agri mechanism could be a mechanism deployed for agricultural functions. The most space of application of robots in agriculture is seeding robots square measure designed to exchange human labour. The agricultural business is behind alternative complementary industries in victimization robots as a result of the kind of jobs concerned in agriculture are not any adding.

R. Mahesh et al. [8] (2016) High precision pneumatic planters have been developed for many varieties of crops, for a wide range of seed sizes, resulting to uniform seeds distribution along the travel path, in seed spacing. The basic function of sowing operation is to sow the seed and fertilizer in rows at required depth and to maintain the distance between the seeds and provide proper compaction over the seed.

A. Trupti et al. [9] (2017) In seed sowing machine system, they are used battery powered wheels and dc motor inbuilt in these wheels. When the seeds are empty it detects the level of storage seed and indicates the alarm. When any obstacle comes in the in-front of machine or divert path the seed sowing machine can detect this obstacle very easily. In each complete rotation of rotating wheel there is seeds falls from this seed drum and the seed plantation process can take place smoothly as well as

without wastage of seeds.

S. Swetha et al. [10] (2015) In this machine solar panel is used to capture solar energy and then it is converted into electrical energy which in turn is used to charge 12V battery, which then gives the necessary power to a shunt wound DC motor. This power is then transmitted to the DC motor to drive the wheels. And to further reduction of labour dependency, IR sensors are used to maneuver robot in the field.

COMPONENTS REQUIREMENT

- MS square pipe and rod
- Solar panel
- DC motor
- Battery
- Chain and Sprocket
- Seed storage Hopper
- Manual Hand Pump
- Liquid tank
- Sprayer
- Wheel
- Wires
- Crank Mechanism

IV. DESIGN AND CALCULATIONS

DESIGN

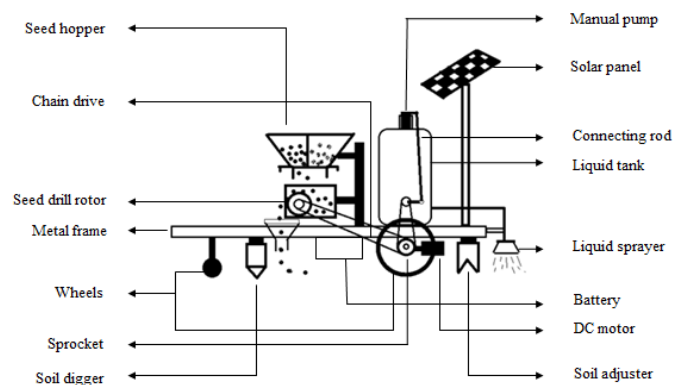


Fig.1 Fabrication model.

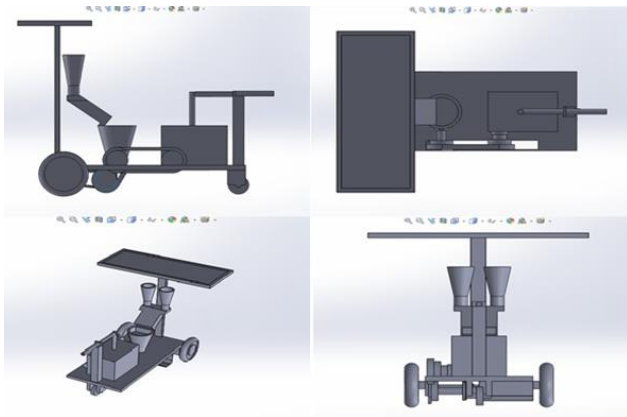


Fig.2 Different isometric view of fabrication model

FABRICATION PROCESS



Fig.3 Side view of fabrication model

CALCULATION

Battery

12 volt, 7 amps

Battery watts = volt*amps

= 12*7

= 84 watts

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

Motor

Speed = 30 RPM

Voltage = 12 Volt

Power = 18 Watt

Torque Of the motor

Torque = $(P \times 60) / (2 \times 3.14 \times N)$

Torque = $(18 \times 60) / (2 \times 3.14 \times 30)$

Torque = 5.72 Nm

Torque = 5.72×10^3 Nmm



Fig.4 Top view of fabrication model



Fig.5 Front view of fabrication model

WORKING PRINCIPLE

This paper is constructed with the above mentioned parts. In a hand operated vehicle a water tank is fixed on the given area as shown in the figure. Above this tank a pump is placed for the purpose of pumping water from the tank. This pumping operation is done by the linkage with cam arrangement. A rod is connected to the cam arrangement. The other end of the rod is connected to the slider which is connected to the pump lever. This cam arrangement is fixed to the driven sprocket of the chain drive. The driving sprocket is connected to the wheel shaft of the vehicle. This cam is actuated with the help of the chain drive. When the vehicle moves the wheel starts to rotate and the chain drive also functions. By the above process the cam is actuated and this leads to the sliders reciprocating motion.

Due to this operation the pump lever starts to actuate and hence the water is pumped and stays in the outlet tube. When the spray nozzle is pressed the stored water is sprayed out with high pressure. Thus the water or pesticide is sprayed wherever required. Disc which is attached at the bottom of the tank allows one seed during one rotation of wheel. In the above fig seed sowing disc is also included. The buckets are screwed on the disc. These buckets are very similar to half shape of pelton buckets. As these are screwed to disc its size is varied according to diameter of the seed and required distance between the seeds.

V. CONCLUSION

A solar seed sowing and water spraying 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. This solar operated automatic seed sowing machine will help the farmers of those who are in 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.

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