

Vacuum Based Seed Sowing Machine

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ABSTRACT

The present paper discusses on the solution of the problems being faced in seed sowing activity in agricultural field. The principal objective of sowing operation is to put the fertilizer and seeds in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed. Hence in order to achieve this in more effective manner automation is necessary. Hence the solution of this problem is a Vacuum Based Seed sowing machine which is most effective and time saving. This machine can overcome all the problems faced by farmers while using conventional seed sowing technique. This paper thus explains how this machine is better over conventional technique and also its outcomes.

Keywords: Vaccum, Seed Spacing, Green House Technology, Horticulture etc.

1.INTRODUCTION

Demographically agriculture is the broadest economic sector and plays a vital role in the overall economy of “INDIA”, and it will continue to remain so for a long time. Over the past four decades the growth of India in Agricultural field is quite impressive. The agriculture sector has been keeping pace with rising demand successfully. In order to meet the future food demands farmers have to implement the new and modern techniques which will increase the overall crop production without affecting the soil texture.

More emphasis is laid on the quality of agricultural product along with the quantity of production to meet the ever-growing food and nutritional requirement after the advent of green revolution. In order to meet both these demands the environment for the plant growth is suitably controlled. Hence in order to protect the crops against un-favorable environmental conditions led to the development of protected agriculture. The most practical method of achieving the objective of protected agriculture is Greenhouse, where sound engineering principle are used to modify natural environment to achieve optimum plant growth and yields. India is self-dependent country on food grain production but to fulfill its nutritional security, the gap between the increasing demands of horticultural produce has to be filled. The traditional horticulture can be filling the gaps by which required large area under horticulture to increase the production for the ever growing population. The potential to produce more produce per unit area with increased input use efficiency is present in Green House technology.

It is very difficult to find the workers for planting seed in nursery as well as in farm also there is loss of seed while sowing it in seed planting even when India is the second largest man power in the world; it leads to loss of self property and ultimately leading to loss for nursery as well as for farmer. The existing sowing machine is too costly. It is not abundantly available in India. It has complex design. So have to study agriculture in deep. The innovative idea of our project is to automate the process of sowing seeds. Precision seeding reduces wastage of seeds and increase production rate. To increase precision seeding we have to develop automatic machine which reduce the overall cycle time and cost of labor. In India traditional farming is prevalent but now new farming technology like poly-house farming provides better income in short period of time with fewer labors. Poly-house farming is an alternative new technique in agriculture gaining foothold in rural India. It reduces dependency on rainfall and makes the optimum use of land and water, seed resources.

All the processes in farming are advanced to modifying the mechanism in farming which works automatically without the man power requirement. There is no need of specialized design and tooling as this machine would be assembled from existing mass produced components. Also energy requirement of this machine is less as compared with tractor or any agricultural instrument. So it's time to automate the sector to overcome this problem. So this paper presents a machine which would automatize the seed sowing technique which will satisfy the requirements of present agricultural seed sowing related problems in various nurseries and farms.

II. LITERATURE REVIEW

Mangesh Koli¹, Umesh Kori², Ahmadakar³, Abdulrahman⁴ (Volume 5 Issue 2, Mar- April 2017) [01]. Agriculture is the backbone of Indian economy. About half of the total population of our country has chosen agriculture as their chief occupation. The modern techniques presently used are tractors for ploughing the field, production of pesticides, invention of tube-wells etc. Since water is the main necessity in this scenario, techniques were discovered which would help in watering the field easily, consume less water and reduce human efforts. Agro-Technology is the process of applying the technology innovation occurring in daily life and applying that to the agriculture sector which improves the efficiency of the crop produced and also to develop a better Mechanical machine to help the agriculture field which reduces the amount and time of work spent on one crop. Hence in this work of project we decided to design a better mechanical machine which is available to the farmers at a cheaper rate and also which can sow and seed the crop at the same time. This project consists of the better design of the machine which can be used specifically for sowing of soybean, maize, pigeon pea, Bengal gram, groundnut etc.

Atul B. Akad¹, Sonal Salunke², Sunaina B. Gawde³, Prof.G.L.Suryawanshi⁴ (Volume 5, Issue 7, July 2016) [02]. In the Indian nurseries, often used conventional seeding operation takes more time and more labor. The seed feed rate is more but the time required for the total operation is more and the total cost is increased due to labor, hiring of equipment. The conventional seed sowing machine are less efficient, time consuming. Today's era is

marching towards the rapid growth of all sectors including the agricultural sector. To meet the future demands, we have to implement the new techniques will increase the overall production. As day by day the labor availability becomes the great concern for the farmers and labor cost is more, this machine reduces the efforts and total cost of sowing the seeds and fertilizer placement. Theoretical studies regarding pneumatic equipment for sowing small seeds in cups, highlighting the advantages of this type of equipment with superior parameters obtained from the considered crops. Equipment can be used in narrower spaces, being easily to handle and use, of driving the vacuum generator can be done electrically. By using this equipment, the productivity will increase, the space of establishing the seedlings will reduce, and the seeds norm will diminish.

Amol B. Rohokale¹, Pavan D. Shewale², Sumit B. Pokharkar³, Keshav K. Sanap⁴, (Volume 5, Issue 2, Feb 2014) [03]. Agriculture is demographically the broadest economic sector and plays a significant role in the overall economy of India. For the growth of Indian economy, mechanization is necessary. The main purpose of mechanization in agriculture is to improve the overall productivity and production. Planting is conventionally done manually which involves both animate (humans and draught animals), this result in higher cost of cultivation and delay in planting. The main purpose of this paper is to compare between conventional sowing method and new proposed machine which can perform number of simultaneous operation. The required row to row spacing, seed rate, seed to seed spacing and fertilizers placement varies from crop to crop can be achieved by the proposed machine. This machine reduces the sowing time, human efforts and labor cost.

Sagar R. Chavan¹, Prof: Rahul D. Shelke², Prof: Shrinivas Zanawar³, (Volume 4, Issue 02, February 2015) [04]. This article addresses improvement in agriculture processes like automatic planting of seeds on ploughed land by using robot. We have developed a robotic vehicle having four wheels and steered by DC motors. The seed planting mechanism is fitted on the vehicle to plant the seeds in uniform manner. The enhanced agriculture robotic system architecture gives us the opportunity to develop a complete new range of agricultural equipment based on small smart machines. The machine will cultivate the farm by considering particular rows and specific column at fixed distance depending on different seeds. The obstacle detection problem will also be considered, sensed by infrared sensor. Forward movement of the vehicle can be defined by defining delay to microcontroller. Turning of the vehicle can be obtained by position encoder circuit which is fixed to one of the wheel. The complete assembly can be powered by using 12V rechargeable battery. The battery can be charged by using solar panel which is also mounted on robot. Assembly language is used in programming the microcontrollers. The whole algorithm, processing, monitoring are designed with dc motors, sensor and encoder circuit. The result obtained through activation unit is also presented.



III. PROBLEM STATEMENT

- In the existing sowing machine every seed distributor needs separate seed storage place and seed metering mechanism.
- This problem occurs because it leads to addition of weight as well as increase the initial cost of machine.
- It requires more than two operators.
- Flow rate of seed are not controllable.
- The existing sowing machine is too much costly & not abundantly available in market.

IV. JUSTIFICATION OF PROBLEM

- We are motivated for doing this project because it is an agriculture based project and here we get to deal with the cost of the machine, which is going to be reduced by introducing the common seed storage place in the machine.
- Common seed storage needs a single metering mechanism instead of number of mechanism in the existing machine.
- If it is removed, the design is going to be simple and easy to fabricate.
- The size of machine, production cost, transportation, everything will be reduced.
- There will be automation in process so the requirement of operator will be reduced.
- Flow rate will be controllable as per requirement.
- We will work on cost-benefit analysis and it will be easily available in market.

V. OBJECTIVE

- Study of present 'Seed Sowing Technique'.
- Technology Selection.
- Design a schematic layout of "Seed Sowing".
- Component Selection.
- Design & Auto Cad modelling for the machine.
- Fabrication of machine.
- Performance evaluation of developed machine.

VI. METHODOLOGY

- In this project, seed planting system for different crop is represented.

- As we aware about Seed sowing machine is to be design and fabricate, such equipment which will be able to perform the operations more efficiently.
- Now the project mainly concentrates on designing a suitable working system.
- Our project achieves higher safety, reduces human effort, increases the efficiency, reduces the workload, reduces the fatigue of workers and reduces maintenance cost.

VII. EXPERIMENTAL WORK

- To select the various types of nozzles as per required seed size because the seed must be hold or pick by the nozzle.
- We have survey about different types of solenoid pumps and motors, because these are the most important parameter of our machine.
- The vibrating motor is placed to vibrate the tray, without vibrating the seed cannot jump; due to jumping of seed the nozzle can pick the seed easily.
- We had test that the various types of seed that the nozzle can pick and drop.

VIII. ACTUAL MACHINE



Fig.1 Seed Sowing Machine

IX. CONCLUSION

- Traditional seed sowing has some limitations and to overcome this, innovative seed sowing equipment's are used. It can save more time required for seeding process.
- This system has been developed for the sowing of seeds in an automatic way.
- As the existing problem regarding the availability of machine at low cost, workers availability and wastage of seeds in agriculture sector are eliminated with the help of Automatic seed sowing machine.
- Also area consumed by Automatic seed sowing machine is very less that allows the machine to work easily. Precise placing of seed also helps in proper growth of plant.

X. SCOPE OF THE PROJECT

- Seeds of plants grown in "Green House".
- Nozzle based seed sowing technique.
- "08" Nozzle with ON/OFF valve on each nozzle.
- Costs benefit material selection.
- AUTO CAD software for modelling and design purpose.
- Flow rate of seed, Seed distribution system, Tray size 1*x (Row xColumn) up to 8*x.

XI. REFERENCES

- [01]. Seed Sowing Robot– Mar-April 2017, ISSN: 2347-8578.
- [02]. Design & Development of Pneumatically Operated Automatic Seed Sowing Machine – July 2016, ISSN: 2347-6710.
- [03]. A Review on Multi-Seed Sowing Machine – February 2014, ISSN 0976-6340.
- [04]. Enhanced Agriculture Robotic System –February 2015, ISSN: 2277-9655.
- [05]. Agriculture Seed Sowing Equipment– July 2014, ISSN: 2278-7798.
- [06]. Review of methods of seed sowing and concept of multipurpose seed sowing machine – 2013, ISSN: 2319-507X.
- [07]. Modern seed sowing techniques and developing technologies– 2017, e-ISSN: 2394-3343; p-ISSN: 2394-5494.