Nursery Seed Plantation and Sowing Machine

K.K.Waghmare[1], R.R. Rathod[2],
K.A. Chaudhari[3], B.V. Dubas[4]
Mechanical Engineering Department,
Rajarambapu Institute of Technology, Islampur,
Dist. Sangli, Maharashtra, India-415414
[1]kiranwagh11427@gmail.com
[2]rathodroshan941@gmail.com
[3]ktnchdhr@gmail.com
[4]bansidubas@gmail.com

Abstract: Currently inventions are going on to manufacture various seed sowing machines. Jethro Tull was the first man to invent this kind of machine and thereafter various machines are invented in order to get the maximum efficiency. After having interaction with nearby local nurseries and Mr. Suhas Patil who has been working as a professor in Dr. D. Y. PATIL College of Agriculture, Talsande, Kolhapur, it is identified that local plant nurseries in India are using the traditional process as they cannot afford cost of existing machines. Considering local nurseries problem, Roller type and Ram type mechanisms are proposed. The basic objective of these mechanisms is to reduce time of traditional process. Reduction in the number of workers required and enhancement in the time for seed sowing are accomplished by the proposed mechanisms. Simplicity in construction reduces the cost of manufacturing which will be affordable for local nurseries as well as farmers.

Keywords: Nursery, Tray, Seeder, Cocopeat, Seed Sowing,

1. Introduction: Seed sowing machines is used to sow the seeds in proper way & to reduce human efforts. For seed sowing, earlier there was traditional method, thereafter various mechanisms were invented and implemented. But local nurseries are still using the traditional way of plantation and seed sowing.

Corresponding Author
S. A. Danane, Asst. Prof. Mechanical Engineering Department, Rajarambapu Institute of Technology, Islampur, Dist. Sangli, Maharashtra, India-415414
sumit.danane@ritindia.edu

As manual seed sowing in trays is a tiresome job which results in more time consumption. There may be chances of dropping more than one seed at a time by human operator. This leads to the wastage of seeds and improper growth of the seeds in single hole of tray. So proposed systems helps to minimize the human efforts involved in plantation and save the time. This will give effective plantation with less effort.

Fig. 1 Manual Plantation Process

2. Method of Operation:

A. Roller Type

Considering the problem of local nurseries, at first, the Roller type of mechanism is proposed for proper plantation and sowing of seeds. The proposed mechanism meets the requirement of the local nurseries & farmers and will operate effectively.

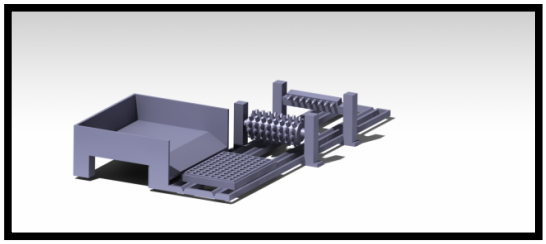

Fig. 2 Working Construction

The mechanism shown in the above figure, gives the overall structure of the roller type seed sowing machine. Roller is used to compact the cocopeat powder in the tray holes, then the tray is indexed towards the vacuum system for seed sowing.

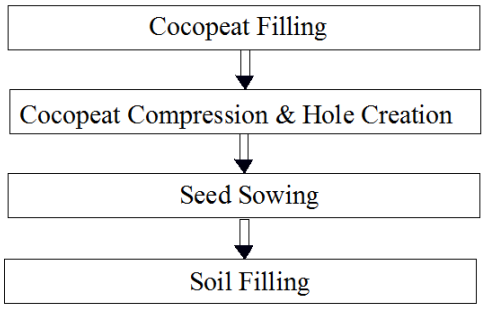

Fig. 3 Flow of Process

1. *Coco peat compression*

After filling the trays with cocopeat powder, the cocopeat in the holes should be compressed in order to create the small size holes for seeds. These small holes are required for the proper growing of the seeds in the tray. For the purpose of punching small holes & compression of cocopeat in the tray, the tapered section on the roller is provided. Arrangement between tray & roller is provided in such a way that the tapered section on roller should match with holes of the tray. The holes punched in the cocopeat should be in range of maximum to minimum size of the seeds.

2. *Nozzle assembly*

The assembly is made by mounting 8 nozzles on a hollow rectangular bar at the desired spacing. Among the different tray sizes available in the market, a plug tray of 96 holes (12x8) with spacing of 40 mm had maximum holes (cavity) along its length. A positioning system for the nozzle assembly is also provided to pick up the seeds by the nozzles. Nozzles pick up seeds from the seed vibrating bucket and drop them in tray holes. The rotating motion to the vacuum nozzle system is given by the electrical motor. The electrical supply was given to the nozzle assembly to facilitate its retraction to the original position.

3. *Seed Singulation and Pickup System*

Singulation of seeds and their pickup by the nozzles is accomplished by a vacuum-based pneumatic system. It consists of a vacuum pump, a pressure regulating valve, and airflow direction valve and air pipes. The pneumatic system is designed to obtain a maximum suction of 7.84 kPa at the nozzles.

B. Ram Type

At first we need to fill the tray with the required amount of cocopeat powder from the cocopeat box. Fill trays properly with powder as there must not be too much cavity present in the holes. After filling the trays with required amount of cocopeat powder we need to punch the holes in the cavities of the tray.

For the purpose of punching holes in the tray, herein we are using different method for it. To punch the holes in the tray we use vertical ram. Vertical ram will be mounted at some distance from the cocopeat box. Ram is vertically held. The bottom part of it is having exact cross section as that of the tray, such that when the vertical ram is forced to punch holes exact replica is produced.

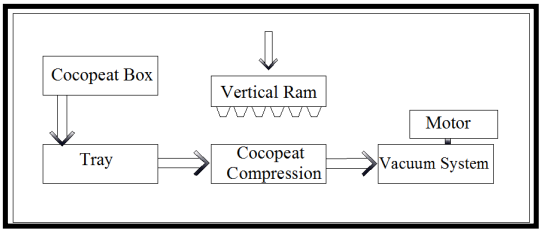

Fig. 4 Block Diagram of System

Once the holes are punched in the trays then it comes towards the sowing of the seeds. For the purpose of doing this, same vacuum injection system is adopted. It wholly works with the pneumatic system. Thus when the punching is done, tray moves in forward direction where the vacuum injection system is provided. When tray is passing through the vacuum system, the injections attached to the horizontal column pick up the seeds and releases it in the punched holes. Thus proper sowing of seed is done by the vacuum injection seeder.

3. **Conclusion:**

It is understood that the nurseries are the main part of agriculture so it is important to design and develop related equipments with efficient and economically at affordable price. Hence after studying different existing mechanisms of seed plantation it can be concluded that the mechanisms proposed for plantation of seeds is efficient and meets the requirement. Proposed systems work effectively and with proper seeding rate.

A. More comfort to worker due to Ramming mechanism used.
B. The mechanisms avoid the wastage of the seeds by using vacuum seed dropping system.
C. Reduction in seed plantation time.
D. Increased productivity of plantation.
E. Increased efficiency of the plant and reduced manual efforts.
F. Space required for the automatic seed feeder is minimum

G. Adjustable seeding rate as accuracy of seed dropping in hole is increased due to vacuum seeder.

Acknowledgement

It gives us immense pleasure to present our MERME-16 research paper titled **"**Nursery Seed Sowing Machine**".** We are highly thankful to our honorable guide **Prof. S. A. Danane,** Department of Mechanical Engg. RIT, Islampur for his help and encouragement. We are highly obliged to him for his invaluable guidance and contribution to the project.

References:

Web Reference:

http://en.urbinati.com/cataloghi/Urbinati-Catalog-2014-English.pdf

Journal Articles:

Amol B. Rohokale, Pavan D. Shewale, Sumit B.Pokharkar, Keshav K. Sanap "A REVIEW ON MULTI-SEED SOWING MACHINE" IJMET, Volume5 Issue 2, February (2014)
D. Ramesh, H. P. Girishkuma "AGRICULTURE SEED SOWING EQUIPMENTS: A REVIEW" Volume 3, Issue 7, July 2014

A.O.Hannure, S.P.Kshirsagar, "LITERATURE REVIEW ON AUTOMATIC SEED FEEDER" In ternational Journal of Engineering Trends and Technology (IJETT) – Volume 36 Number 7- June 2016.

Olimpia Pandiaa, Ion Saracinb, Ion Bozgaa, "STUDIES REGARDING PNEUMATIC EQUIPMENT FOR SOWING SMALL SEEDS IN CUPS", "ST26733", International Conference "Agriculture for Life, Life for Agriculture", Agriculture and Agricultural Science Procedia 6 (2015) 690 – 695.

B.B. Gaikwad, N.P.S. Sirohi, "DESIGN OF A LOW-COST PNEUMATIC SEEDER FOR NURSERY PLUG TRAYS", AE Automation and Emerging Technologies, 22 October 2007