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Design and Fabrication of Seeding Machine for Nursery

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Abstract: - *The main objective of our work is to increase the speed of seeding process with higher rate of accuracy. This process is mostly applied in the plant nurseries where large numbers of plant saplings are to be grown. At present the seeding process in plant nurseries is done manually by hand which is a time consuming process and the accuracy and speed of planting the seed depends on the skill of the worker, so to bring a solution to this problem we are developing an automatic seeder which uses vacuum pressure to plant the seed in less time, with more accuracy and with no wastage of seeds.*

Keywords: - *Needle seeder, Vacuum pump, Suction, seedling tray*

I. INTRODUCTION

Our work is related to User Defined Problem which concern on the cost reduction and reduction of seed wastage in plant nursery. The variable cost of plant nursery included the cost of human labor, seeds/ seedling, organic manure, chemical fertilizer, soil, irrigation, insecticides. On the other hand, the fixed cost included cost of family labor, cost of land use and depreciation of tool and equipment. The cost of human labor and seeds/seedling were the highest cost items constituting 39% of total cost of nursery. The income of plant nursery owners came from selling of sapling/seedling of fruits, flowers and wood/ forest plants. The highest source of income of Government plant nursery was the sale of fruit sapling (94%) followed by flower / ornamental plants. Wastage of seed in the study area was the crucial problem for private and Government plant nurseries

Constraints	Rank value		
	Private nursery	Government nursery	NGO nursery
Lack of adequate fund	5	1	
Inadequate supply of Improved seed/seedling	1	3	1
Lack of technical know-how	6		
Low price of sapling/seedling	2	2	2
Lack of efficient labour	4		3
Damage of sapling/seedling	3	4	4
Infestation of insects and diseases	5	5	5
Lack of irrigation facilities	7		6
Lack of credit facilities	8		

Table 1.1: Constraints of different categories of plant nursery.

II. WORKING

2.1 Basic concept of seeding machine

The basic concept of seeding machine is to pick up the seeds from the seeder tray using suction through a vacuum pump and place them in the seedling tray. The suction created is used to pick up the seeds using a needle and it is brought over the seedling tray where the suction pressure is released to drop the seeds in their respective slots in the seedling tray after which the seedling tray are kept for the process of germination.

2.2 Detail Working of seeding machine

Using a vacuum pump suction is created in the needle tray which has an array of needles arranged according to the slots in the seedling tray. The suction produced by the vacuum pump which is used to pick up the seeds from the seeding tray.

Fig.2.2.1: Needle tray above seedling tray

With the help of an arm the needle tray is brought above the seed tray which contains seeds in it. The seed tray has partition in it that are equal to the number of rows in the seedling tray so that all the needles have seeds in them.

The seed tray consist of V shape rows in it in the V shape rows the seeds are kept and the number of rows equals to the number of rows of needles in the needle tray so each needle in the needle tray gets a seeds every time it picks up the seed from the seed tray

With the suction created in the needles from the vacuum pump the seeds get stuck to the needles in the needle tray. The needle tray is then brought above the seeding tray by a reciprocating arm and when the needle tray is above the seedling tray the suction is stopped and the seeds fall in the respective slots in the seedling tray. Thus planting 98 seeds in one operation cycle with high rate of accuracy.

Fig. 2.2.2: Vacuum pump

The vacuum pump used is Skyline canister vacuum cleaner VI – 2525 – B. it is a high power vacuum pump of 1400 Watt with a suction power of 400 air watt.

III. MODIFICATION

3.1 Needle

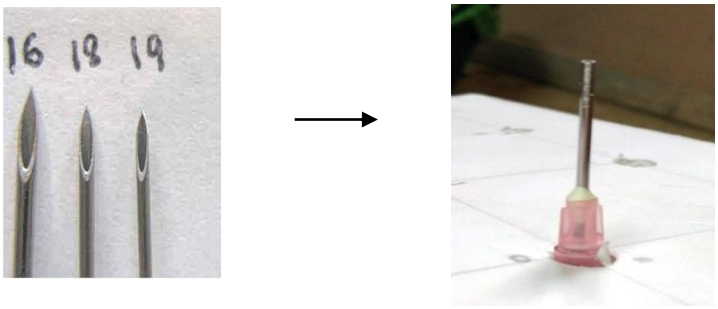

Fig. 3.1.1: Needle modification

Modification is done on needle as due to the large surface area there loss of suction due to which there is problem in lifting the seeds so to solve this problem the tip of the needle is grinded off to reduce the surface area and picking up of seeds is done easily

After the tip of the needle is grinded off the area of contact with the seed is also reduced so there is less loss of suction pressure and the needles are lifting the seeds with less effort and suction pressure.

IV. LITERATURE REVIEW

1) **Author- Timothy Groff[1], Greg Pajak[2], W. Gee II Jack[3],Andrew Chick[4], David Khalil[5]**
Title- Hand held vacuum cleaner Publication number US8069529 B2

The objective of this literature review was to find out the detailed working and components of vacuum cleaner. and to understand the working of the vacuum pump.

Summary

Handheld vacuum cleaner including an inlet, an outlet, and a dust cup having an aperture. The dust cup is in fluid communication with the inlet and the outlet and is configured to retain debris collected by the handheld vacuum cleaner. A fan is configured to draw air through the inlet and the dust cup and to discharge air through the outlet. A door is adjacent to the dust cup and includes the inlet. The door is movable between an open position to allow a user to empty the debris collected within the dust cup through the aperture of the dust cup and a closed position to inhibit debris from being emptied through the aperture of the dust cup and to allow debris to be collected through the inlet and through the aperture of the dust cup. A biasing member configured to bias the door toward the open position

2) **Author - John Dubrovin[1]**
Title- Vacuum pump

The objective of this literature review was to understand the principle and working of vacuum pump.

3) **Author - Gladys J Chisman[1]**
Title – Surgical needle Publication number US3160157 A

The objective of this literature review was to understand the the advancement in the needles and how to use the needles in our project.

4) **Title - Seedling production using cell trays**
Published and Authorized by: Department of Environment and Primary Industries 1 Spring Street Melbourne, Victoria

Summary

Costs are high in a modern seedling nursery. But then the returns are even better from a healthy business. To maintain long-term profitability there must be sound planning, operation and investment. This will only be achieved when the buyers are satisfied. For the vegetable grower, the loss of farm income must not result from inferior quality in seedlings delivered to the farm

Cell trays are used by commercial growers to produce seedlings for planting out. The seedlings are easily removed from the tray for transplanting and the growth check to transplants from cell trays is minimal when planted in the field compared to the use of other types of transplants. Seedlings from cell trays may be used in manual or automatic planters. Soil-less mixes are usually used for commercial seedling production. Commercial sterilized soil-less mixture are

5) **Title - AN ECONOMIC STUDY OF PLANT NURSERY BUSINESS IN GAZIPUR AND JESSORE DISTRICTS OF BANGLADESH**

BBS. 1996. Bangladesh Bureau of Statistics. Statistical Yearbook of Bangladesh. Ministry of Planning, Government of Bangladesh. Islam, S.S., M.G. Kibria[1]; and M.H. Chowdhury[2]. 1998. Financial analysis of agro forestry trial at Ichamati, Chittagong.
***Bangladesh Journal of Forest Science* 27(2): 76-81.**

The objective of this literature review was to find the problem in Nurseries.
"Non-availability of improved seeds/seedlings was the main constraint for private and NGO nurseries, whereas lack of adequate fund was the crucial problem for government nurseries."

6) **Title - Global Journal of Researches in Engineering:**
A Mechanical and Mechanics Engineering
Volume 14 Issue 2 Version 1.0 Year 2014
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Summary
Basically a vacuum pump is the most essential component of any vacuum system which is accountable to bring into being the required vacuum in the sealed setup, to accomplish certain process. But for the broad vacuum range, all the vacuums cannot be generated by a single vacuum pump. Consequently, various pumps of distinct types are used to properly generate the vacuum of diverse ranges. Therefore, the selection of suitable vacuum pump or pumps to produce the required vacuum, for a particular vacuum work, is of primary importance. There are many factors that affect the suitable pump selection. In this paper, proper guidelines highlighting key criteria for selecting an appropriate vacuum pump, supportive for proper vacuum production has briefly been discussed that can make the task of pump selection simpler and exact.

7) **Title - Selection of Precise vacuum Pumps for the Systems with Diverse Vacuum Ranges**
Author - H. M. Akram [1]
Abstract
Basically a vacuum pump is the most essential component of any vacuum system which is accountable to bring into being the required vacuum in the sealed setup, to accomplish a certain process. But for the broad vacuum range, all the vacuums cannot be generated by a single vacuum pump. Consequently, various pumps of distinct types are used to properly generate the vacuum of diverse ranges. Therefore, the selection of suitable vacuum pump or pumps to produce the required vacuum, for a particular vacuum work, is of primary importance. There are many factors that affect the suitable pump selection. In this paper, proper guidelines highlighting key criteria for selecting an appropriate vacuum pump, supportive for proper vacuum production has briefly been discussed that can make the task of pump selection simpler and exact.

V. CONCLUSION

After referring to various research papers, review papers the main objective of our work is to increase the speed of seeding process with higher rate of accuracy. This process is mostly applied in the plant nurseries where large numbers of plant saplings are to be grown. At present the seeding process in plant nurseries is done manually by hand which is a time consuming process and the accuracy and speed of placing the seed depends on the skill of the worker, which causes

wastage of precious seeds, so to bring a solution to this problem we are developing an automatic seeder whose functions is to plant the seed in less time, with more accuracy and with no wastage of seeds.

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