

# Mechanical Seed Dispensing Machine for the Vegetable Industry



by Engr. Hafidha binti Azman

## INTRODUCTION

In nursery operations, it is often necessary to distribute individual seeds into each nursery tray so that the seeds will have sufficient space to develop (Figure 1). Conventional vegetable seeding is the most inexpensive approach but it is a laborious and time consuming operation for high volume seeding. The task performed is more like precision seeding which is very important for the vegetable grower.

## THE PRECISION SEEDING PROCESS

Precision seeding is defined as the placing of the desired numbers of seeds at a precise depth and spacing such as filling each cell of a nursery tray with individual seeds. Precision seeding has many advantages for the vegetable grower over conventional multi-seed dropped seeding. The former method can cause a reduction in seed cost because only seed that is needed is sown. Besides, precision seeding produces greater crop uniformity, as each seed is equally spaced. This often leads to uniform and high quality produce, fewer harvests, and greater yield.



Figure 1(a): A nursery tray with 104 cells Figure 1(b): Germinated seeds after 1 week

Looking at the importance of quality seed growth, precision seeding has gained increasing acceptance by local growers. However, the existing seeding technology in the market is too expensive to be affordable by local farmers. Therefore, a simple low-cost tray seeding machine is developed to assist local farmers in the seeding operation as well as reducing the cost and time in running the activity.

Efficiency in performing the seeding operation depends on avoidance of the placement of multiple seeds in each hole of the nursery tray. Only a single seed should be located or the omission of a seed from its place. The conventional method for filling the seed tray is manually done by selecting the individual small sized seed to be placed into the cell (Figure 2). The task of seeding each cell solely by hand is both time consuming and prone to error. Therefore, a

mechanised seeder is required to overcome this problem. A simple easy-to-handle device is used to make work easier by reducing the effort and the total strapping time needed to feed seeds into the nursery tray as compared to manual or conventional operation.



Figure 2: Conventional seeding, where a farmer uses forceps to hold the seed before placing it into the cell of a nursery tray

## SEEDING TECHNOLOGY

MARDI has developed a mechanical seed dispensing machine, using local standard components to assist the farmer in sowing seeds. The easy-to-handle seed dispenser was developed to replace conventional seeding. It is targeted for smallholding farmers, thus it is designed to be portable with a dimension of 830mm x 570mm x 1200mm. The uniqueness and the novelty of the machine come from the design itself. It is a compact machine, portable and provides two degrees of freedom (2 D.O.F) to reduce the work effort of the operator. An operator can easily use the machine without much skill or experience. The machine consists of a vacuum receptacle, a seed dispensing plate, a seed trapper, a nursery tray holder, a frame, a control valve and a vacuum connector (Figure 3 and 4).



Figure 3: Mechanical seed dispensing machine

This machine can be used for custom made plastic (PS) nursery trays with various numbers of cells. The seed dispensing plate is replaceable in order to fit the 82, 104, or 200 hole nursery tray. The operator has to change the plate to suit it with the nursery tray in use. Different trays are used depending on the type and size of the vegetable seed. The dispensing plate is designed with precisely spaced perforations so that a single seed is dispensed into



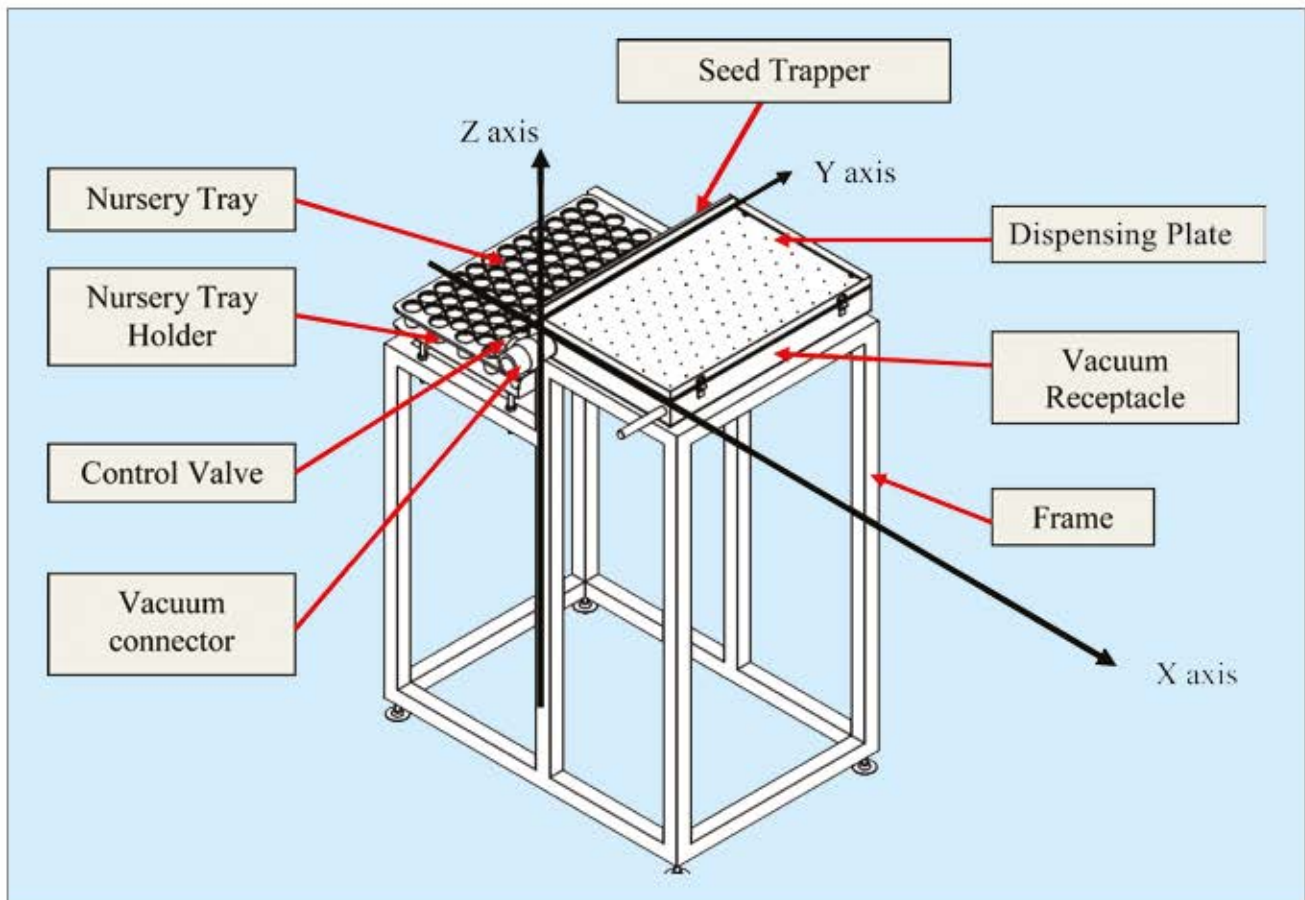


Figure 4: A perspective view of the mechanical seed dispensing machine

each cell of the nursery tray. The perforation must be in the centre of the cell to suit the particular seed being sown.



Figure 5: An operator using a seed dispensing machine in a vegetable nursery

The vacuum receptacle has been developed with a pin and sliding joint so that it can revolve 180 degrees at the y-axis and translated in the same axis to ensure seeds are well distributed on the suction plate. When the vacuum is turned on, each perforation on the dispensing plate will hold one seed. Excess seeds are removed into the trap area (on the left side of the suction plate) when

the plate is turned more than 0°. The vacuum receptacle where perforations containing individual seeds revolute to 180 degrees, is lowered over a nursery tray. The vacuum is then turned off and the seed is released into each cell (Figure 6).



Figure 6: Dispense plate is holding seed at each perforation before the receptacle turn 180 degree facing the nursery tray to release seed into the cells

The use of the mechanical seed dispensing machine is superior to conventional seeding regardless of operator competency. Even though the machine is not too sophisticated when compared to a needle seeder, it is good enough to assist local farmers in sowing vegetable seeds in the nursery tray. Mechanical seeding is ten times faster than conventional seeding with additional seeds sown (104 cells per tray, instead of 82 cells per tray by conventional seeding).

This machine works very well with uniform and round shaped seeds such as those of cabbage and cauliflower. They are suitable for this seeding machine because the machine can hold and release each seed into each cell on the nursery tray. Most flower seeds have a non-uniform shape, thus the machine will usually hold more than one seed which are later dumped into the nursery tray cell. The bigger the size of a seed, the more suitable it is for use with the machine. Although the outcome shows promising results in the seeding process, the quality of the seed itself has to be taken into consideration as it affects the germination rate. Some of the seeds may be of low quality with a high mortality rate.

The use of a mechanical seeder will provide the benefit of reducing the cost of seeding activity. Firstly, the labour cost can be reduced, and secondly fewer seeds are needed because excess seeds can be retained and used in the next sowing.

## CONCLUSION

Sowing in a nursery tray is an important part of modern plant breeding. However, there is a problem with precision seeding that arises from the fact that vegetable seeds are small in volume and light in weight. Manual sowing of small seeds in each cell is a slow and labour-intensive operation, which limits the production capacities of vegetable nurseries in Malaysia. The existence of affordable yet precise technology, through mechanical seeders, can overcome this problem. The development of the mechanical seed dispensing machine can assist local farmers in the seeding operation as well as in reducing the cost and time of performing this activity. ■

---

Engr. Hafidha binti Azmon earned her BSc. in Mechatronics Engineering from the International Islamic University Malaysia (2006) and is currently a research officer at the Mechanization and Automation Research Centre, MARDI Serdang. Her research interests focus on agriculture machinery and instrumentation systems, and include machine design and development.