Design and development of manual vegetable seeding machine

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Abstract*— In this modern era research in the agricultural field has a great potential .Now a day's plant nursery is facing so many problems. The problems are availability of labours; low productivity rate and more manual efforts are required for seed feeding. In plant nursery the time consumption for plant seeding is comparatively high. For reducing these problems of plant nursery, research of mechanised seed feeder mechanism can be used. The main aim of this paper is to make design and fabricate a vegetable seeding machine which is suitable for farmers. The modelling of vegetable seeding machine is done in CAD software. In this machine the main components are two soil removal blades, a pair of seed hopper, a covering plate, a braking mechanism for seed feeding, a water tank and plumbing set for watering and fertilizing.

***Keywords*— Vegetable seeding machine, blade, seed hopper, water tank.**

I. INTRODUCTION

Cropping is tedious activity for any farmer. Agriculture machines are invented to reduce human efforts. Conventionally seeds are planted manually. Manual method of seed planting will results in low seed placement and less spacing efficiencies. It also depends on the size of field that seeds have to be planted. Hence in order to obtain best performance from a seed planting machine, the above limits should be optimized. Thus there is a need to make proper engineering design of the seeding machine and proper selection of the components for the machine to suit the needs of crops.

Manual method of seed planting is time consuming and it application is limited by the size of field that can be planted. Best performance from a seed planter, a vegetable seeding machine is designed to suit the needs of crop. The main objective of this paper is to design and manufacture a simple vegetable seeding machine. Also it should be capable of achieve flexibility in distance and depth variation for different variants of seeds to be planted.

A. Purpose of seed planter machine.

The basic working of this machine is to put the seed and fertilizer in rows at desired depth and correct seed to seed spacing. Then cover the seeds with soil and give proper compaction over the seed. The seed to seed spacing and depth of seed placement vary from crop to crop. It can be easily adjusted for this machine.

B. Factors affecting seed emergence

Mechanical factors, which affect seed germination and emergence are:

1. The depth of pit for putting seed is uniform.
2. Seed distribution along the path should be uniform.
3. Vertical displacement of seed from the row.
4. Prevention of loose soil getting under the seed.
5. Uniform soil covering over the seed

The above factors should be considered while designing the manual vegetable seeding machine.

II. DESIGN

The CAD model of vegetable seeding machine is shown in fig 1. The drafted front view is shown in fig 2. The drafted left view and drafted top view are shown in fig 3 and fig 4 respectively. The fabricated model is shown in Fig 5

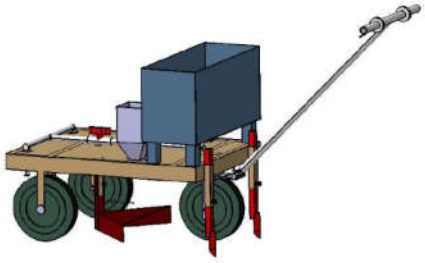

Fig 1. Manual vegetable seeding machine

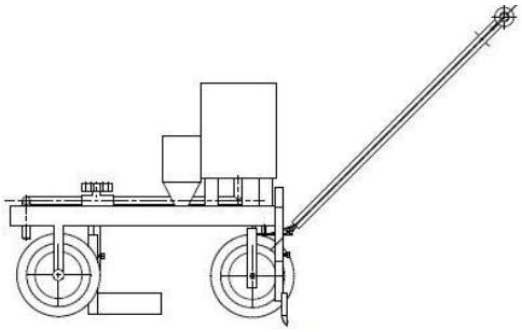

Fig 2. Drafted front view

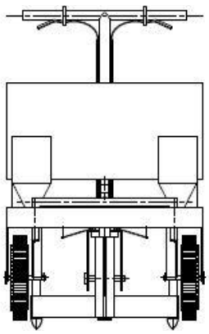

Fig 3. Drafted left view

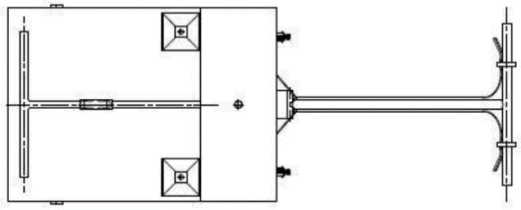

Fig 4. Drafted top view

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Fig 5. Fabricated manual vegetable seeding machine

The welded parts are assembled. The handle is attached to the welded parts through a thread mechanism. The wheels are locked on its vertical supports using pins. The cutting blades along with the covering plates is connected to the platform by using a nut and bolt. The plumbing system are separately assembled and joined with the water tank. The feeder mechanism which includes plates that are displaced using spring actuated brake mechanism.

III. WORKING STEPS

The various working steps for manual vegetable seeding machine are:

A. Soil removal

Soil removal is one of the operation performed by the manual vegetable seeding machine. It is done with the help of a two row cutting blade system that is placed upfront at the bottom of the platform as shown in fig 6.

Soil removal is performed when the machine is pulled backwards along the rows on which seeds have to be sown. The cutting blades used in this machine for this purpose are mild steel which is sharp, corrosion resistant, single pointed and strong enough to resist any wear and abrasion from the soil. The faces of the cutting blades are at an angle of 90^0 which when moved along the soil surface tends divide the soil along the inclined faces of the blade.

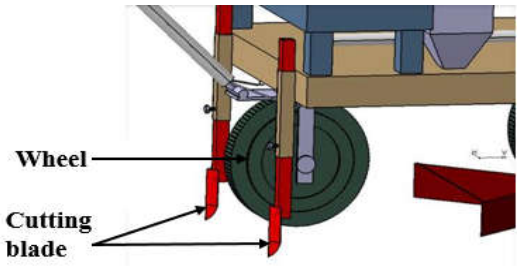

Fig 6. Soil removal blades

B. Seeding

The seeds are stored in the seed hopper as shown in fig 7. Seeding is performed with the help of a two row seeding mechanism as shown in fig 9. After the soil removal has been done, the seeds are fed when the operator engages the brake levers on either sides of the handle as shown in fig 8. Hence the sowing intervals can be decided by the operator.

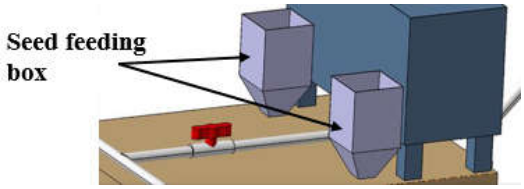

Fig 7. Seed hopper

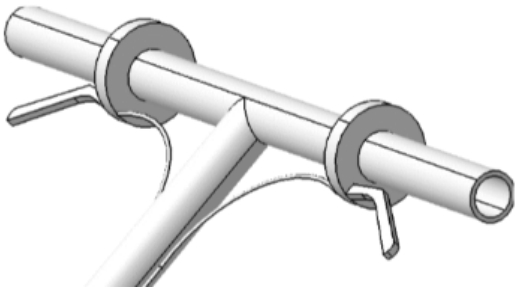

Fig 8. Hand brake

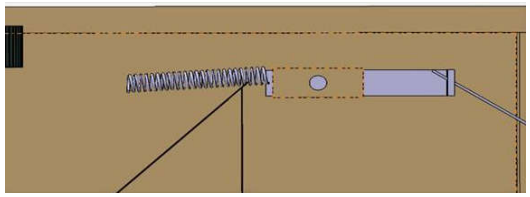

Fig 9. Row feeding mechanism

C. Seed covering

Soil covering is carried out by a v plate, made of stainless steel, inclined at a certain angle with respect to its faces as shown in fig 8.The v plates are attached to a vertical support beneath the platform by a screw mechanism. As machine is being pulled in the soil the earlier displaced soil by the cutter is heaped back into its earlier position to cover the sown seeds. The height of the plates, with respect to the ground can be adjusted by the screw mechanism. The v plates are held at an angle by using a truss to connect the two ends of the v plates.

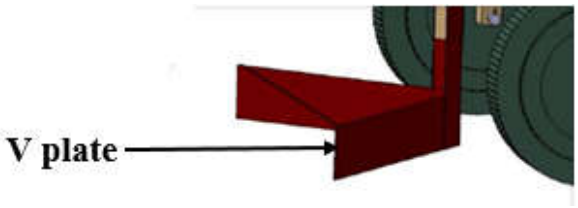

Fig 10. V plates

D. Fertilization and watering

The fertilizers and water to be supplied to the seeds are to be mixed in the correct proportion. The water tank employed has a capacity of 25500 cc as shown in fig 11. The mixture is gravity fed to the ground through the assembled plumbing lines connected to the water tank and regulated by a ball valve. Since it is a two row system the tees and the elbows ensure proper supply towards both the rows. The water tank is refilled when then supply drains out. The watering and fertilization process is performed simultaneously along with the soil removal, seed feeding and soil covering mechanisms.

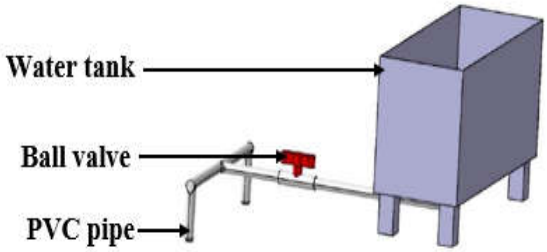

Fig 11. Water Tank

IV. ADVANTAGES OF MANUAL VEGETABLE SEEDING MACHINE

The advantages of seeding machine are:

1. Increase crop yield
2. It increased seed planting.
3. Accuracy in Seed/fertilizer placement.
4. Low cost.
5. Seed positioning depth can be varied.
6. Less labour is required.
7. Less time consuming.
8. Seed can be placed uniformly in a row with required distance between plants.
9. Compaction is provided over the seed.

V. CONCLUSION

This seed plantation machine has great potential for increasing the productivity of the planting. Till now tractor was the main traction unit for nourishment in farming. With the adaptation of this seed planting machine its purpose will be done. Hence there is need to promote this technology and made available to even small scale farmers with affordable prices. This machine can be easily manufactured in workshops. The only cost is of metering device and sensors. Hence by using this machine we can achieve flexibility of distance and control depth variation for different seeds. It can be used for a wide variety of seeds. The main aim of this project is to promote this technology at low cost. By using of this machine, achievement of flexibility of distance and depth variation for different seed plantation is possible.

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