

Design and Fabrication of Seed in Planter by Conversion of Energy

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Abstract:- The basic requirements for small scale cropping machines are, they should be suitable for small farms, simple in design and technology and versatile for use in different farm operations. A manually operated template row planter was designed and developed to improve planting efficiency and reduce drudgery involved in manual planting method. Seed planting is also possible for different size of seed at variable depth and space between two seed. Also it increased seed planting, seed/fertilizer placement accuracies and it was made of durable and cheap material affordable for the small scale peasant farmers. The operating, adjusting and maintaining principles were made simple for effective handling by unskilled operators (farmers).

Keywords:- Seed, sowing, planting.

INTRODUCTION:

Under intensive cropping, timeliness of operations is one of the most important factors which can only be achieved if appropriate use of agricultural machines is advocated. Manual method of seed planting, results in low seed placement, spacing efficiencies and serious back ache for the farmer which limits the size of field that can be planted. To achieve the best performance from a seed planter, the above limits are to be optimized by proper design and selection of the components required on the machine to suit the needs of crops.

Hand-pushed and Transnational Journal of Science and Technology August 2012 edition volume2, No.728 tractor mounted row seeders(usually single and multiple row).Normally requires a well prepared seed- bed which may be ridged or flat bed. In the past, various types of design have been developed with different design approaches which have their advantages and disadvantages and also operation a limitation. Adisa and Braid(2012) [1] designed and constructed a manually operated flute planter/fertilizer distributor which was found to be 94% efficient in seed spacing but could not be used on the ridged seed bed and requires quite some effort and time to change seed drill size and seed spacing. Also Braide and Njidda (1989) [2] developed a combined jab planter which was found to be 73.4% efficient and was three times faster than manual planting with hoes and cutlass. Abubakar (1987) [3] made use of the principle of jab planter in applying fertilizers. Adekoya and Buchele (1987) [4] developed a

cam activated precision punch planter which was capable of planting an untilled soil. Braide and Ahmadu (1990) [5] developed a transplanter for some selected crops in Guinea Savannah of Nigeria which has 0.19ha/h field capacity and 20% field efficiency. All of the above designs were reported to have got quite promise

Purpose of seed planter machine.

The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed. The recommended seed to seed spacing and depth of seed placement vary from crop to crop and for different agro-climate conditions to achieve optimum yields.

PROPOSED WORK:

This machine has very less cost. This planter is very simple to use hence, unskilled farmer is also able to handle this machine. We simplified the design also made it cheaper and affordable to every rural farmer. We made various adjustments and simplified it from controlling and maintaining point of view. In this design we connected drive shaft to metering mechanism which eliminates the attachments such as pulleys and belts system. DC motor drives the shaft of motor which is coupled with battery bank. As motor

starts it moves this robot as well as operates the metering mechanism. Seed storage tank is connected at the top of the robot near rear wheels. The sensor is fitted to it which senses the level of seed in it and gives the alarm when the tank is empty. Front sensor serves the function of guiding the robot. As any obstacle comes in front of robot it gives the signal to the robot and diverts the path of robot. For every rotation of the wheel according to the adjustment it allows the definite seed to fall into the hopper so that there is no wastage of the seeds also the sowing process does smoothly. When the robot reaches at other end and when it completes task it creates an alarm so that we can provide required facility.

DESCRIPTION OF EQUIPMENTS:

1. wheel

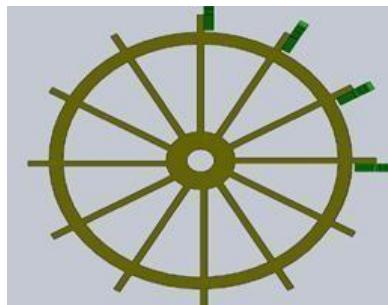


Fig.1: wheel of machine

As shown in Fig.1 the wheel rotates on the ground along with the tractor wheel. Pulley1 is attached on the same shaft of wheel. The motion of pulley1 is transferred to the pulley2 by means of chain/belt drive.

Depth Control Arrangement

The proper depth of seed and fertilizer needs to be maintained for the proper germination of the seeds. The depth of seed and fertilizer is controlled with the help of a stud on which four numbers of Nuts are given to control the depth. The seeds are to be sown at a depth of 2-3 cm and fertilizer to be placed at a depth of 3-4 cm. The depth control arrangement controls the depth of the seed and fertilizer. 4.5 Seed Box The seed box is made of HR sheet 2 mm thick. The box is designed on the basis of area of land. The box was located above the base frame supporting the furrow openers and transport cum depth control beam. A partition is provided along the length of the box to separate seed and fertilizer. The seed partition is again given one more partition so that mixed cropping can be done.

Complete Assembly The complete seed cum fertilizer assembly is made using PRO-Engineer software with additional mixed cropping arrangement, depth control arrangement, row spacing arrangement. Two Peg wheels are given so that the wheels does not slip on the land as the seed metering device works on the rotation of the ground wheels and maintain the plant spacing and control the plant density.

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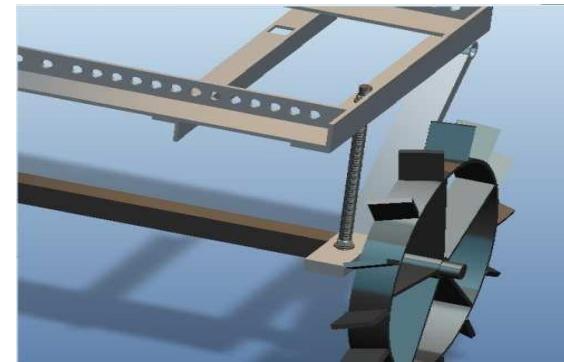


Fig 2:wheel of frame

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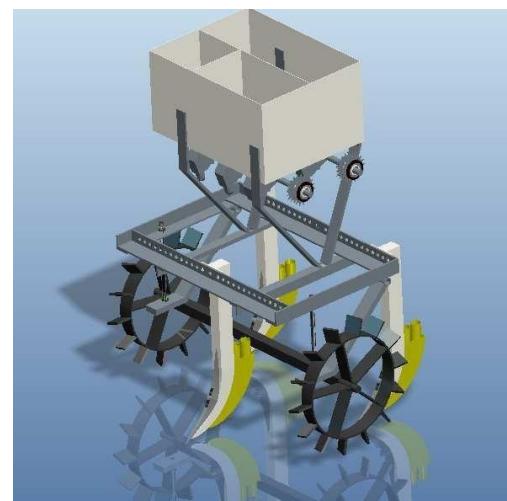


Fig 3:working setup

DIGGER MECHANISM:

Digger mechanism is used for digging and seeding. Digger itself is used as digging tool. Digger is connected to the frame by nut bolt. There are three adjustable diggers. Diggers has a flapper for opening into the cavity for seeding. Flapper is connected to the hopper with the help of hose.

LITERATURE OF SURVEY

Mahesh R. Pundkar et al [1] studied the performance of seed sowing devices by using image processing algorithm using MATLAB software. They

also studied the effect of seed depth, seed spacing, miss seeding ratio and performance seed sowing device on germination of seed and efficiency of yield crop.

Aditya Kawadaskar et al [2] redesigned and tested the seed sowing machine using CAD package like PROE. They concluded that multipurpose seed sowing machine maintain row spacing, control seed and fertilizer rate, control the seed and fertilizer depth.

B. Mursec et al [3] presented two sowing machines pneumatic vacuum sowing machine OLT and pneumatic pressure sowing machine Aeromat-Becker for interval sowing, differing in the mode of operation for cultivation of sugar beet. They concluded that on the pneumatic vacuum sowing machine OLT the optimum distance between seeds in the sowing row is reached with 4.5 - 8 km/h speed and on the pneumatic pressure sowing machine Aeromat - Becker with 4.5 - 10 km/h.

Joginder Singh [4] studied the effect of farm mechanization on Indian economy.

He concluded that production and productivity cannot be enhanced with primitive and traditional methods. Thus, selective mechanization is the need of the future.

METHODOLOGY:

First we fill the hopper with seeds manually. System that will made, uses the manual push force to run mechanism.

Rotary motion of wheels provided to the sowing shaft (which will placed in seed storage tank) by sprocket or belt drive. With controlled distance interval, seed get sowed in land via pipe and digging arrangement and seed is covered with soil.

Sprayer mechanism again uses rotary motion of wheels to convert it into reciprocating motion by slider crank chain mechanism.

Fertilizer distribution is done by mixing it with water and spraying it.

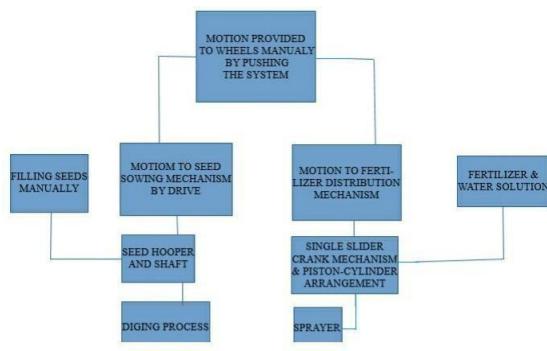


Fig. 4 Working of Setup

TRADITIONAL SOWING METHODS

Traditional sowing methods include:

- 1) Broadcasting manually, opening furrows by a

country plough and dropping seeds by hand.

2) Dropping seeds in the furrow through a bamboo/meta flannel attached to a country plough (Pora).

3) For sowing in small areas dibbling i.e., making holes or slits by a stick or tool and dropping seeds by hand.

Traditional sowing methods have following limitations:

i) Uniformity in seed distribution cannot be achieved by manual planting. There can be an uneven distribution of seeds in inter- row and intra-row.

ii) Poor control over depth of seed placement.

iii) It is necessary to sow at high seed rate and bring the plant population to desired level by thinning.

iv) Labour requirement is high because two persons are required for dropping seed and fertilizer thus it increases labour cost.

v) During kharif sowing, placement of seeds at uneven depth may result in poor emergence because subsequent rains bring additional soil cover over the seed and affect plant emergence.

WORKING OF SEED SOWING MACHINE:

1) Consider the assembly attached to the tractor. During cotton planting the wheel of planter is placed on ground, as the tractor moves planter wheel also rotates. This motion of planter wheel is transferred to pulley1 which is attached on the same shaft. Motion of pulley1 is transferred to pulley2 by means of chain or belt drive. Owing to this arrangement gear1 rotates.

2) When teeth on gear1 meshes with gear2, it rotates to some degree, then the holes on disc coincides with the holes of cylinder through moving strip so that seed from the tank get release as per requirement.

3) When gear1 disengages with gear2, gear2 return to its original position by means of spring tension (Spring is attached to the shaft of gear2).

4) This cycle goes on repeating resulting into the required spacing in seed sowing. The required spacing can be adjusted by providing holes on disc at different angles such as 0, 45, and 90 (for example we can plant the seed at 1, 2, and 4 feet by closing and opening of holes on disc).

5) Whenever seed spacing is not required, gear1 can slide on splined shaft so that gear2 does not mesh with gear1. Hence disc will not rotate and hole on disc coincides with the holes on cylinder ensuring continuous flow of seeds.

6) For different size of seeds we can adjust the flow of seeds (from tank to disc) with the help of moving strip which can slide over the cylinder with the help of lever.

7) Row spacing can be adjusted with help of the nut and bolt arrangement provided on the base plate.

8) In case if tractor stops the seed flow from tank can be stopped by providing key to the inlet pipes. This key can be attached to the lifting lever provided near to the operator.

ADVANTAGES OF MACHINE

Following are the advantages of manual seed planter machine are

- Improved efficiency in planting. Increased yielding and reliability in crop.
- Increased cropping frequency.
- Increased speed of seed planting. Seed planting accuracy.
- Durable and cheap as low cost materials are used.
- Less maintenance cost.
- Since seed can be poured at any required depth, the plant germination is improved.
- Dependency on labor also decreased. Also it saves time of sowing.
- Uniform placement of seeds in row with required distance.
- Proper compaction over the seeds is provided.

CONCLUSIONS:

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 made by raw materials also which saves the cost of whole project and is easily manufactured in available 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.hence usable to all seeds.

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