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A REVIEW ON MULTI-SEED SOWING MACHINE

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ABSTRACT

Agriculture is demographically the broadest economic sector and plays a significant role in the overall economy of India. For the growth of Indian economy, mechanization is necessary. The main purpose of mechanization in agriculture is to improve the overall productivity and production. Planting is conventionally done manually which involves both animate (humans and draught animals), this result in higher cost of cultivation and delay in planting.

The main purpose of this paper is to compare between conventional sowing method and new proposed machine which can perform number of simultaneous operation. The required row to row spacing, seed rate, seed to seed spacing and fertilizers placement varies from crop to crop can be achieved by the proposed machine. This machine reduces the sowing time, human efforts and labour cost.

Keywords: Mechanization, Seed Sowing Machines, Indian Economy, Seed Spacing etc.

1.0 INTRODUCTION

Agricultural sector is changing the socio-economic environment of the population due to liberalization and globalization. About 75% people are living in the rural area and are still dependent on agriculture. About 43% of geographical area is used for agricultural activity. Agriculture has been the backbone of the Indian economy. As Indian population is growing continuously, the demand for producing crop per hector is also increasing, this requires efficient and high-capacity machines. So mechanization in agricultural industry plays an important role in Indian economy.

The basic function of sowing operation is to sow the seed and fertilizer in rows at required depth and to maintain the distance between the seeds and provide proper compaction over the seed. A sowing machine is a device that plants or sows the crops, it digs a furrow places the seed or seeds into the furrow and covers it. Seed sowing machine ensures uniformity in seed broadcasting and saves time and money.

The row spacing for soybean seed is 15 to 18 inch and seed spacing as 2 to 3 inch.For corn seed the row and seed spacing is 15 inch and 6 inch respectively. For groundnut which having around 7.2mm in diameter has row spacing from 6 to 12 inch.

2.0 LITERATURE 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.

3.0 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 sand 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.

4.0 PARTS OF THE SEED SOWING MACHINE:

4.1 WHEEL AND PULLEY ARRANGEMENT

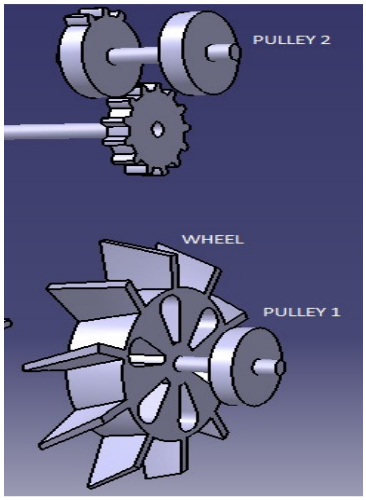

Fig. 1

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.

4.2 GEAR ARRANGEMENT

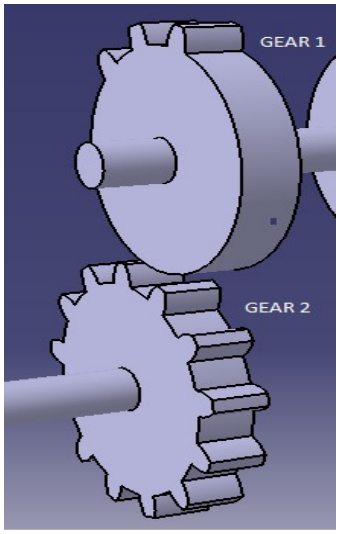

Fig. 2

Gear1 is attached on the same shaft of pulley2 which meshes with gear2. Gear1 has splined shaft for shifting of gear1 so that gear1 will not mesh with gear2 to ensure continues flow of seeds during sowing.

4.3 DISCS AND CYLINDER

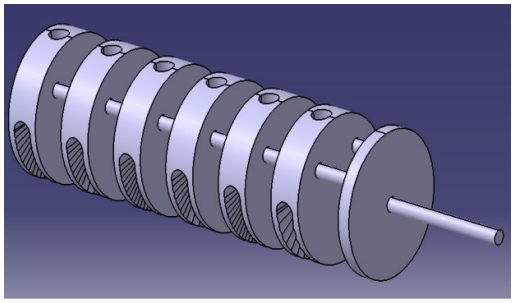

Fig. 3

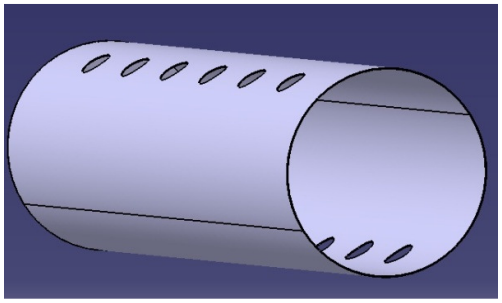

Fig. 4

As shown in Fig.3 discs are placed on shaft and gear2 is placed on the same shaft. This disc assembly is placed in cylinder which rotates freely inside cylinder. The slot is provided on the periphery of the discs opposite to the hole to ensure smooth flow of seeds during sowing.

4.4 MOVING STRIPS

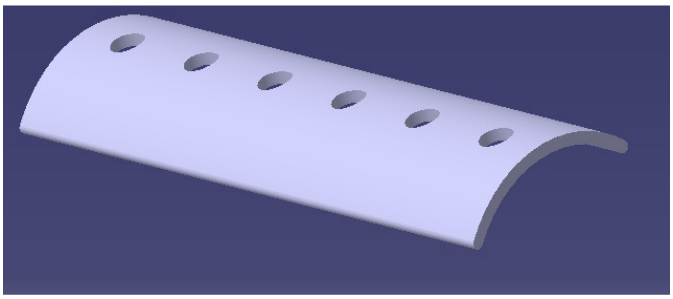

Fig. 5

The moving strip is placed on cylindrical surface which slides on it with the help of lever to deal with different seed size.

4.5 STORING TANK

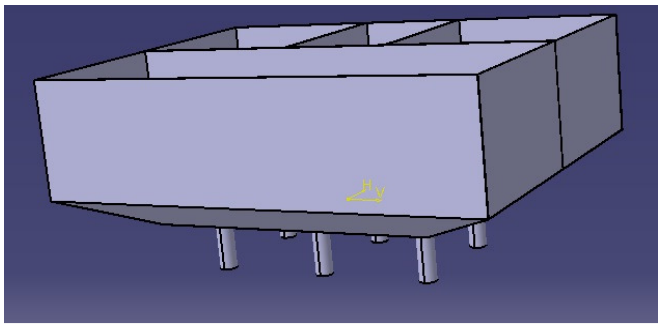

Fig. 6

The storing tank is used for storing seeds. Another compartment is provided for fertilizer. The ratio of soybean seed to fertilizer is 3:5.The proposed tank has a dimension of 120*22.5*45 which can contain total weight of 50kg seed and fertilizer.

4.6 BASE PLATE AND FURROW OPENERS

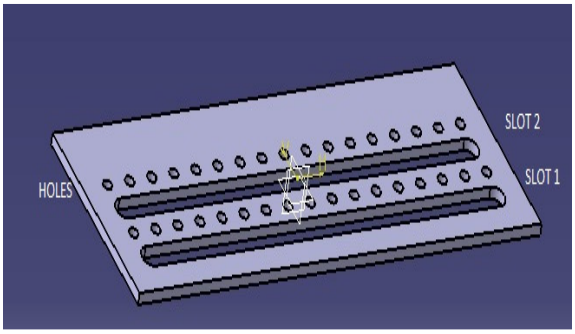

Fig. 7

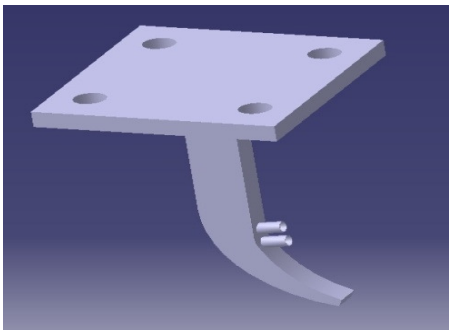

Fig.8

Slot1 is provided for easy moving of pipes (which carries seeds and fertilizer). The furrow openers shown in Fig.8 can be moved and fixed on base plate by using nut and bolt arrangement at any position to obtain required row spacing.

5.0 ASSEMBLY OF PROPOSED MACHINE

The complete assembly is made using CATIA V5 R20 software with extra mixed cropping arrangement, row and seed spacing arrangement.

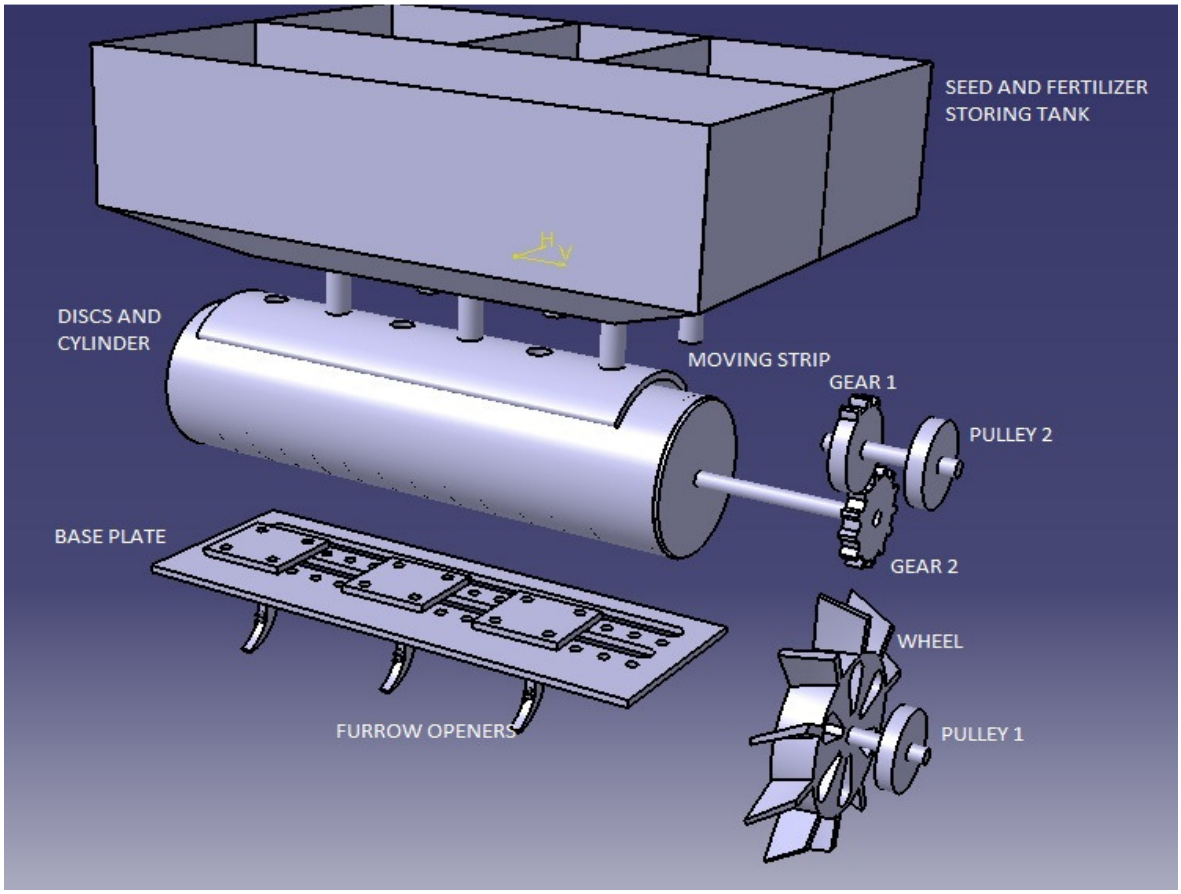

Fig. 9

6.0 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.

7.0 ADVANTAGES OF PROPOSED MACHINE

The advantages of proposed machine are:

1) Row to row spacing can be adjusted.
2) Required seed spacing can be achieved.
3) Less manpower is required.
4) Variety of seed can be sown by this machine.
5) As compared to traditional sowing methods time required is less.
6) Seed flow can be controlled.

8.0 CONCLUSION

Comparing the different traditional seed sowing methods with the proposed machine and considering its limitations, it is concluded that,

1) Seed and fertilizer flow rate can be controlled.
2) Row spacing and seed spacing process can be achieved.
3) Seed and fertilizer utilization can be done in proper manner with minimum loss.

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