

Automatic Seed Sowing Machine

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Abstract- 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. The cost price of imported planters has gone beyond the purchasing power of most of our farmers. Peasant farmers can do much to increase food production especially grains, if drudgery can be reduced or totally removed from their planting operations. 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. The problem has intensified due to the unavailability of labour in time and multi-fold increase in labour cost. 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. The operating, adjusting and maintaining principles were made simple for effective handling by unskilled operators.

Keywords- Seed sowing equipments, seed metering device, Seed spacing, and mechanical design consideration.

I. INTRODUCTION

The agricultural has always been the backbone of India's sustained growth. As the population of India continues to grow, the demand for produce grows as well. Hence, there is a greater need for multiple cropping in the farms and this in turn requires efficient and time saving machines. In traditional methods seed sowing is done by broadcasting manually, opening furrows by a plough and dropping seeds by hand. The main objective of this paper is to develop seed sowing machine for agricultural field so it is helpful for small and medium scale formers. The sowing operation is to put the seed desired depth and seed to seed spacing cover the seeds with soil and provide proper compaction over the seed. Seed sowing machine is a device which helps in the sowing of seeds in a desired position hence assisting the farmers in saving time and money.

II. FACTORS AFFECTING SEED GERMINATION

1. Seed damage during metering.
2. Uniformity of depth of placement of seed.
3. Uniformity of distribution of seed along rows.

4. Transverse displacement of seed from the row.
5. Prevention of loose soil getting under the seed.
6. Degree of soil compaction above the seed.
7. Uniformity of soil covers over the seed.
8. Mixing of fertilizer with seed during placement in the furrow.

III. LITERATURE REVIEW

Adisa A. F ^[1] conclude that template row planter was able to plant on both ridged and flat seed bed at average field capacity with effective planting rate which was quite adequate for small scale farming.

Rohokale and Shewale ^[2] it gives comparison between conventional Sowing method and new proposed machine which can perform number of simultaneously Operation seed and fertiliser flow rate can be controlled.

Ayesha Akhtar ^[3] it gives mechanical factors affecting seed germination such as: Uniformity of depth of placement of seed, distribution of seed along rows, Soil cover over the seed and transverse displacement of seed from the row.

Kyada A. R. ^[4] stated that the manual seed planter machine can be readily made from local components in workshops. By using manual seed planter machine, achievement of flexibility of distance and depth variation for different seed plantation is possible.

Khan K.S ^[5] It conclude that the need of poor land farmer has fulfilled by the manual operated seed planter and they easily and effectively plants their seeds in the field by planters.

Jack D.S ^[6] Research found that vacuum seed disc seed meter are most suited to the highly spherical, yet irregularly sized seed. This study aimed to develop a seed metering device that would bring the sandalwood industry closer to using a one pass seed drill method for tree establishment.

Rawat S. N ^[7] Zero tillage sowing was found to be most time, energy saving and reduces cost of production as compared to conventional method of sowing. It reduces the

cost of irrigation which was more economical in comparison to conventional method of sowing.

IV. COMPONENTS OF SEED METERING DEVICE

4.1 FRAME

The raw material used for fabrication of frame is C. I. angle dimension 50mm x 50 mm x 5 mm. The length of frame is 3.5 ft, and its width is 5 meter. Two angle bars of length 3 ½ ft. and two of 1 ft are cut from raw material and welded in rectangular shape. No. of holes are drilled at a certain distance on the back side of frame for holding the plough at a certain distance for adjust the inter-row distance between two rows of plant. Channel for the hopper is made on the upper side of the frame. Arrangement is made for holding transmission shaft on top portion of the frame. Two vertical bars are welded on the front side of the frame for holding the base wheel.

4.2 HOPPER

The under script is the procedure for fabrication of the hopper of Metering Device .The raw material for fabrication of hopper is C. R. sheet of 20 gauges. Hopper is made up in following steps. C. R. sheets of following dimension. Length – 15 inch, Width – 12inch, Depth – 12 inch. The box is made of given dimension in following steps. A rectangular sheet of length 54” and of width 12” is cut from raw material Bend the sheet by bending machine at given length and width. Cut a sheet of 15” x 12 “dimension for base of hopper. Weld the bended sheet and base by electric arc welding. At distance of 20 from one side, a square plate of dimension, 12” x 12” ix welded. A circular cross section of 6” diameter is cut- out. A hole of 1 “diameter ix drilled on the one Side of hopper for maintaining the shaft. A circular hole in cut one the base of the hopper for dropping the deed. Inner portion of the hopper is in slant from to collect even a single seed at the disc base.

4.3 SHAFT

Shaft is manufactories by not rolling and finished to size by cold drawing or turning and grinding. The shaft act as transmission shaft which is used to transmit power between the source and the machine absorbing power. This shaft carries disk and bearing therefore they are subjected top bending in addition to twisting shaft dimension. Diameter 1 inch, Length – 3 feet.

4.4 DISC

It is heart of the seed metering devise. Our main focus and key of success is as the disc only. Disc is made up of new wood. Two plates of 10 inch diameter and 1 inch thickness is made and both are nailed together to gives better performance. A curved shape slate curved on both side of the disc on which inlet was on one side of the wheel where as outlet on the other side and inlets slots was a curved strip having opening for picking minimum number of seeds. And a hole of ½ inch is left on the centre of the disc for adjusting the transmission shaft. As the wheel rotates and comes in contact with seed. The mouth of sloth picks the minimum no. of seed and as the disc rotates it further rotation its drops from the other side of the disc. We can change the opening as per as the dimension of seed.

4.5 CHAIN DIVE

The velocity ratio of a chin drive is given by

$$V. R. = N1/N2 = T2/T1$$

N1 = speed of rotation of smaller sprocket in R. P.M.

N2 = Speed of rotation of larger sprocket in R. P. M.

T1 = No. of teeth on the smaller sprocket

T2 = No. of teeth on the larger sprocket

A bush roller chain consist of outer plates or pin link plates, inner plates or roller link plates, pins, bushes & rollers. A Pin passes through the bush which is secured in the holes of the roller between the two sides of the chain. The rollers are free to rotate on the bush which protects the sprocket wheel teeth against wear. The pins, bushes and rollers are made of alloy steel.

4.6 PLOUGH

Plough is made up of rectangular hollow rod. It is used for making the soil loose for seeding the seed. The seed outlet is fitted on the back side of plough. As the plough moves forward making the soil plough moves forward making the soil loose the Seed outlets drop the seed.

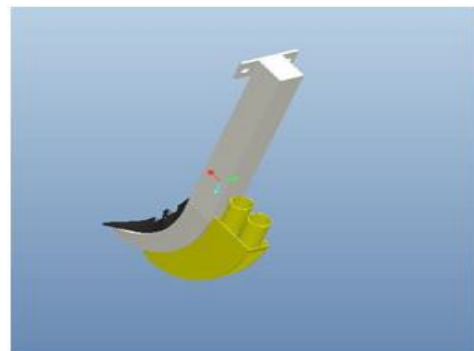


Fig. 1 Plough

4.7 WHEEL

Wheel is made up of C. I. bar of diameter 6 inch. A three inch C.I. bar is welded on the bush of outer diameter ½ inches and a C. I. bar is bended and welded circularly over the vertical bar. After that, spike of 4 inch is used on the wheel surface for making the grip powerful and easy movement wheel on any type of soil.

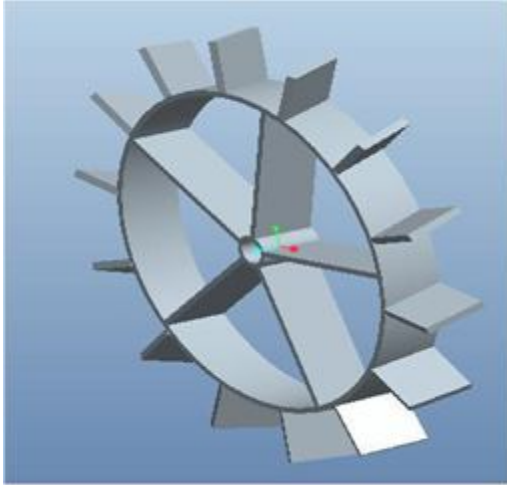


Fig.2 Driving Wheel

V. WORKING

During the forward moment of device the ground wheel gets rotary motion. This motion is transferred to shaft by means of chain sprocket arrangement. If the chain is attached with upper and lower sprocket of same number of tooth that means the velocity ratio will be 1:1. As disc are mounted on shaft by bush fitting, due to rotary motion of shaft disc also rotates, which have equal velocity to the ground wheel.

The hopper is full of seeds and the disc has a curved slot as described earlier. During rotary motion of disc, when the slot goes to extreme down position the slot picks one or more than one seed as per requirement. During further movement of disc when disc goes to extreme upper position it drops the seed on another side of disc. And seed goes to behind the plough through a flexible plastic pipe. The arrangement made in such a way that we can control the depth of sowing. With the help of this machine the formers can save lot of labour cost.

VI. ADVANTAGES

1. It saves labour cost.
2. It saves operating time and saving on cost of operation as compared – to conventional method of behind country plough.

3. It is light in weight as compared to present devices.
4. It reduced the use of man power up to 50 %.
5. It is cheaper so poorer farmer can also afford this modern devices.
6. The plough entre into the soil and automatic dropping of seeds takes place.
7. It can be used also for various seed.

VII. LIMITATIONS

1. Disc is not flexible for all types of seed
2. Feed index is 60 to 70%, hence there is chance for not dropping of seed.
3. Probability of falling the seed at required to keep the ground wheel above the ground
4. Not easy to transport the model
5. Not applicable for large scale cultivation

VIII. CONCLUSION

The main aim of this paper is to develop multipurpose seeding machine in order to reduce the human power. Seeds continuously feed to the earth surface without restriction while in flowing. Comparing to other machines cost of this machine is economical.

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