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Design and Fabrication of Manual Ploughing and Seeding Machine

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Abstract: Agriculture being one of the major livelihoods in India, it is very indispensable to discover and implement new idea in this field, though lot of work has been done in this area. It is unfortunate that, these ideas are not been implemented properly in actual field. This is due to high cost and is complicated for rural people. Agro technology is the technology of agriculture, as the methods or machinery needed for efficient production. Agriculture sector need an improvement in the efficiency of the crop produced and also to develop a better mechanical machine to help the agriculture field which reduces the amount and time of work spent on one crop. In this paper it deals with designing a better mechanical machine which is available to the farmers at a cheaper rate and also which can plough and seed the crop at the same time. This paper consists of the better design of the machine which can be used specifically for rice, wheat crops etc. The advent of this system gives the opportunity to develop a complete new range of agricultural equipment based on small smart machines that can do the right thing, in the right place, at the right time in the right way.

Keywords: Agriculture, crop, Agro Technology, Equipment, Design

I. INTRODUCTION

Agriculture has been the backbone of the Indian economy and it will continue to remain for a long time. It has to support almost 17 percent of world population from 2.3 percent of world geographical area and 4.2 percent of world's water resources. The present cropping intensity of 137 percent has registered an increase of only 26 percent since 1950-51. Agriculture plays a vital role in the Indian economy. Over 70 % of the rural households depend on agriculture. Agriculture is an important sector of Indian economy as it contributes about 8.4% to the total Gross Domestic Products (GDP) and provides employment to over 60% of the population[1]. Indian agriculture has registered impressive growth over last few decades. The basic objective of sowing operation is to put the seed in rows at desired depth and spacing, cover the seeds with soil and provide proper compaction over the seed. The recommended row to row spacing, seed rate, seed to seed spacing and depth of seed placement vary from crop to crop and for different agricultural and climatic conditions to achieve optimum yields and an efficient sowing machine should attempt to fulfil these requirements. In addition, saving in cost of operation time, labour and energy are other advantages to be derived from use of improved machinery for such operations. The ploughing and seeding mechanism at the same time can be achieved by using the chain drive mechanism which transfers the rotator motion from the wheels to the seeders placed above which is used for seeding purpose.

II. DESCRIPTION OF EQUIPMENT

A. Belt Drive

Belts are the cheapest utility for power transmission between shafts that may not be axially aligned. Power transmission is achieved by specially designed belts and pulleys. They run smoothly and with little noise Belt drives are simple, inexpensive, and do not require axially aligned shafts. They help protect machinery from overload and jam, and damp and isolate noise and vibration. Load fluctuations are shock-absorbed (cushioned). They need no lubrication and minimal maintenance. They have high efficiency (90–98%, usually 95%), high tolerance for misalignment, and are of relatively low cost if the shafts are far apart.



Fig.1 V-Belt

B. Furrow Opener

The major function of seed furrow openers is to create a well-defined groove in the soil where the seed can be placed at the proper depth. Research indicates no difference in seed spacing uniformity exists among the various openers.

Although a runner can create a cleaner seed furrow, the double-disk opener can cut through residue and reduce potential clogging problems. The double-disk opener also has better depth control under conservation tillage conditions because, unlike a runner, it does not have a tendency to float up and over residue. The staggered double-disk opener is a modification of the double-disk seed furrow opener. With this design, the leading edge of one disk is slightly in front of the other. The leading disk cuts the residue and soil and the trailing disk helps open the seed furrow.

A variation of a runner opener is a slot shoe opener which slides under the residue and lifts it out of the seed furrow. The slot shoe opener requires a coulter in front to avoid clogging problems from residue wrapping around the opener when used in no-till. The planter's capability to cut residue depends on the amount and condition of the residue[2]. For example, planters with disk seed furrow openers can cut fragile soybean residue and penetrate the mellow soil surface without a coulter, provided the residue was uniformly spread behind the combine.

On older planters, the disks may need sharpening or adjusting to properly cut the residue. As the disks wear, a gap develops and allows residue and soil to wedge between the disks. If this occurs, remove spacer washers behind the disks and adjust to maintain about two inches of blade contact on the leading edge of the double-disk seed furrow openers. When properly adjusted and maintained, double-disk seed furrow openers without coulters also can cut dry land corn or grain sorghum residue, especially if the stalks were shredded or heavily grazed.



Fig.2 Furrow Opener.

C. Seed Box

The roll seeding mechanism consists of a fluted roll located in housing and mounted on a turning shaft, a socket, and a fixed coupling. The rotating roll drops the seeds into the seed tube, through which they are delivered to the drill shoe and fall into the furrow made by the latter. Depending upon the direction the roll turns, there are seeding mechanisms with upper and with under seeding. The roll of a seeding mechanism with under seeding releases the seeds from the lower part of the feed chamber[3]. A seeding mechanism with upper seeding differs in that the upper channels of the roll pick up the seed from the upper part of the feed chamber. A seeding mechanism with under seeding is usually used for wheat, rye, oats, and barley.

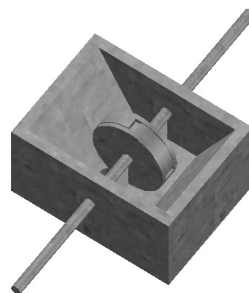


Fig.3 3D design of Seed Box

III. CONSTRUCTION AND WORKING

- A. The furrow opener is connected to the frame of the machine in such a way that the teeth are inclined to give a deep cut in the soil.
- B. The machine is rested on two wheels which helps in movement.
- C. The wheel shaft is welded with chain drive which is used for transmitting the power to the seeding mechanism
- D. The seeding mechanism is placed above the wheels at a height of 700mm. The seeding mechanism consists of the shaft which is aligned with the wheel shaft and is connected via chain drive.
- E. When the machine is pushed the wheels will rotate which in turn rotates both the shafts.
- F. The seeding mechanism consist of a disc with thickness of 10mm having a groove at the edges which are used to pick up the seeds from the box and deliver it to the furrow.
- G. A reservoir is placed at the top so that the seeds can be stored for seeding purpose.
- H. A pipe is connected at the bottom of the seed box which is connected to the end of the furrow opener so that seeds can be placed directly into the soil.
- I. The furrow opener has a sharp end which helps in making deep grooves in the soil causing it to cut open through the soil
- J. At the end of the machine is the furrow closer which consist of the a plate which is kept at an angle so that while the movement when seed being placed in the soil it will gradually cover the soil above the seed.

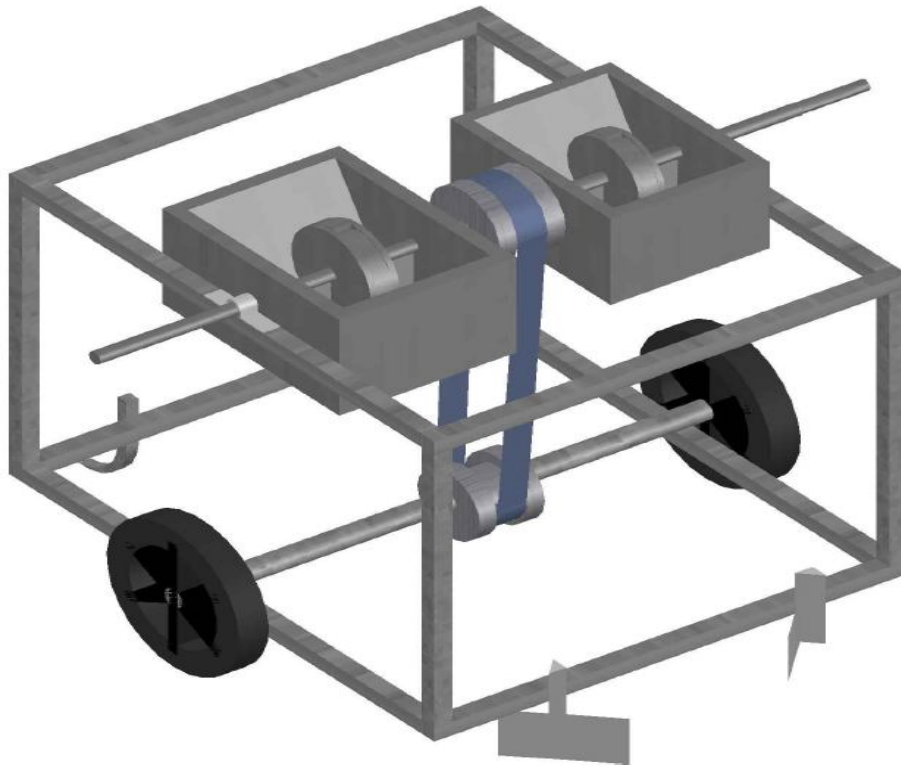


Fig.4 Design of Machine

IV. ADVANTAGES

Followings are advantages of manual seed planter are

- A. Improvement in planting efficiency.
- B. Increase in crop yield and cropping reliability.
- C. The seed can be placed at any required depth
- D. Seeds can be placed uniformly in a row with required distance between plants.
- E. Seed rate can be controlled.
- F. The loss and damage of seeds is controlled by this machine

V. CONCLUSION



Hence after comparing the different method of seed sowing and limitations of the existing machine, it is concluded that the manual seed sowing machine can

- A. Maintain row spacing and controls seed rate.
- B. Control the seed depth and proper utilization of seeds can be done with less loss.
- C. Perform the various simultaneous operations and hence saves labor requirement, labor cost, labor time, total cost of saving and can be affordable for the farmers.

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