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Design and Fabrication of Manual Seed Sowing Machine with Fertilizer

Prof. M.W. Andure¹, Rajiv Indani², Nikesh Jadhav³, Vaibhav Kawde⁴, Rahul Khamankar⁵

¹ Assit. Prof., Department of Mechanical Engineering, Descoet, Dhamangaon, Maharashtra, India

^{2, 3, 4, 5} B.E Student, Department of Mechanical Engineering, Descoet, Dhamangaon, Maharashtra, India

Abstract: *The present review provides brief information about the various types of innovations done in seed sowing equipment. 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 row to row spacing, seed rate, seed to seed spacing and depth of seed placement vary from crop to crop and for different agro-climatic conditions to achieve optimum yields. The comparison between the traditional sowing method and the new proposed machine which can perform a number of simultaneous operations and has a number of advantages. As day by day the labour availability becomes the great concern for the farmers and labour cost is more, this machine reduces the efforts and total cost of sowing the seeds and fertilizer placement. Seed sowing devices play a wide role in agriculture field.*

Keywords: *Fertilizer, Planting, Seeds metering device, Seeds sowing, Seeds spacing*

I. INTRODUCTION

This Indian economy is based on agriculture. Development in agriculture leads to raise economic status of country. In India farmers are facing problems due to unavailability of labours, traditional way of farming using non efficient farming equipment which takes lot of time and also increases labour cost. This project is all about enhancement in seed sowing and fertilizer like farming operations by using multifunctional seed sowing machine. The main objective of sowing operation is to place seed at proper position respective of other placed seeds in every row at particular depth and provide a cover of soil on it. As per change in shape and size of different seeds the parameters like distance between two seed, depth of seed, planting rate changes. This project is attempt to produce multifunctional and highly efficient seed sowing machine which will reduce time of plantation, cost of labour, and enhances production. Traditional method of seed sowing based on assumptions of seed to seed spacing and depth of placement which is not at all efficient and beside this it requires lot of time and efforts too. As per change in climate farmers are facing one more problem which occurs due to harmful insects and pest. Farmers have to stay alert for fighting to this problem by using different fertilizer. Fertilizer is one of the common operation in agriculture field which requires lots of efforts. This machine contain pesticide fertilizer too which make it multifunctional. [2]

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. The paper discusses different types of seed sowing machine which will be helpful for the agriculture industry to move towards mechanization. This project addresses improvement in agriculture processes like sowing of seeds on ploughed land and distribution of fertilizer combine by using mechanisms. Primarily this system works manually, but with lesser input energy requirement.

II. HISTORY

Traditional methods include broadcasting manually, opening furrows by a country plough and dropping seeds by hand and dropping seeds in the furrow through a bamboo/metal funnel attached to a country plough. For sowing in small areas dibbling i.e., making holes or slits by a stick or tool and dropping seeds by hand, is practiced. Multi row traditional seeding devices with manual metering of seeds are quite popular with experienced farmers. In manual seeding, it is not possible to achieve uniformity in distribution of seeds. A farmer may sow at desired seed rate but inter-row and intra-row distribution of seeds are likely to be uneven resulting in bunching and gaps in the field.

A. *Traditional sowing methods have following limitations*

1) In manual seeding, it is not possible to achieve uniformity in distribution of seeds.

- 2) A farmer may sow at desired seed rate but inter-row and outer-row distribution of seeds are likely to be uneven resulting in bunching and gaps in field poor control over depth of seed placement. Labour requirement is high because two persons are required for dropping

The effect of inaccuracies in seed placement on plant stand is greater in the case of crops India is set to be an agricultural based country approximately 75% of the population of India is dependent on farming directly or indirectly. Our farmers are using the same methods and equipment for the ages. E.g. seed sowing, fertilizer, weeding etc. There is a need for the development of effective spraying and weeding machine for increasing the productivity.

Most of the developing countries of Asia have the problem of high population and low level of land productivity as compared to the developed nations. One of the main reasons for low productivity is insufficient power availability on the farms and low level of farm mechanization. This is especially true for India. It is now realized the world over that in order to meet the food requirements of the growing population and rapid industrialization, modernization of agriculture is inescapable. It is said that on many farms, production suffers because of improper seedbed preparation and delayed sowing, harvesting, and threshing.

Mechanization enables the conservation of inputs through precision in metering ensuring better distribution, reducing quantity needed for better response and prevention of losses or wastage of inputs applied. Mechanization reduces the unit cost of production through higher productivity and input conservation.



Fig.1:Line Sowing Technique



Fig.2: Broad Casting

III. OBJECTIVE OF WORK

- A. To manufacture seed sowing machine this can be operated by the single operator.
- B. To set fertilizer with sowed seed.
- C. To level the ground in small extent.
- D. To enable the machine for the sowing of several of seed like maize, wheat etc.
- E. To maintain the same distance between two seeds at the time of sowing process.

IV. SCOPE OF WORK

Seed sowing machine is a device which helps in the sowing of seeds in the desired position hence assisting the farmers in saving time and money. So considering these points related to fertilizer and seed sowing an attempt is made to design and fabricate such equipment which will able to perform both the operations more efficiently and also will result in low cost. Decrease the operational cost by using new mechanism.

- A. Work reliably under different working conditions.
- B. Decrease the cost of the machine.
- C. Decrease labour cost.
- D. The machine can be operated in the small farming land.
- E. Making such a machine which can be able to perform both the operation.

V. METHODOLOGY

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

A) Design of shaft:

The shaft is subjected to 15 kg of load.

$$W = 15 \text{ Kg } F = 150 \text{ N}$$

Bending Moment is given by,

$$M = WL/4$$

Twisting Moment is given by

$$T = FR$$

Permissible stress is given by Applying A.S.M.E code

$$\text{Ultimate tensile stress} = S_{ut} = 770 \text{ N/mm}^2$$

$$\tau_{per} = 0.18 \times 0.75 \times S_{ut}$$

$$\tau_{per} = 103.95 \text{ N/mm}^2$$

A.S.M.E. code for Shaft design is given by,

$$\left(\frac{\pi}{16}\right) \times d^3 \times \tau_{per} = \sqrt{(K_b M)^2 + (K_t T)^2}$$

B) Checking Safety of Shaft:

Bending Stresses is given by

Bending moment = Moment of resistance

$$(M/I) = (B_{induced}/y)$$

Where,

$$\text{Polar Moment of Inertia} = \frac{\pi}{32} \times d^4$$

VI. FACTORS AFFECTING SEED EMERGENCE

Mechanical factors, which affect seed germination and emergence, are:

- A. Uniformity of depth of placement of seed.
- B. Uniformity of distribution of seed along rows.
- C. Transverse displacement of seed from the row.
- D. Prevention of loose soil getting under the seed.
- E. Uniformity of soil cover over the seed.
- F. Mixing of fertilizer with seed during placement in the furrow.

To achieve the best performance from a seed drill or planter, the above factors are to be optimized by proper design and selection of the components required on the machine to suit the needs of the crops. The seed drill or planter can play an important role in manipulating the physical environment. The metering system selected for the seed should not damage the seed while in operation.

VII. WORKING



Fig.3: Seed Sowing Machine

Length(mm) 5.0 Fluted	12 inches
Width(mm)	5 inches
Height(mm)	5 inches
Power Transmission	Through chain and pinion
Weight (kg)	8
Seeding mechanism	roller with narrow flutes
Hooper capacity(kg)	2
No. of roller	3

Table: Details of Project

In our country farming is done by the traditional way, besides that there is the large development of industrial and service sector as compared to that of agriculture. The spraying is traditionally done by labour carrying backpack type which requires more human effort. The weeding is generally done with

A. Specification

The help of Bulls which becomes costly for farmers having small farming land. So to overcome these above two problems, we tried to eliminate these problems and designed the equipment which will be beneficial to the farmer for the spraying and weeding operations. When the equipment is pull forward by using handles, the driving wheel rotates and the pinion is mounted on the axle of the wheel is start to rotate and its rotation is then transferred to the pinion through the chain drive. The chain drive another pinion mounted in seeding mechanism axle and seeding wheel is mounted for axel then rotating seeding wheel. The delivery is connected to the pipe carrying the nozzles. Improved seed-cum-seed drills are provided with seed and seed boxes, metering mechanism, furrow openers, covering devices, frame, ground drive system and controls for variation of seed and seed rates.

VIII. CONCLUSION

- A. A Seed sowing machine is designed for small farmers to improve their productivity. In this machine a common seed storage place is introduced to reduce the cost of the machine.
- B. 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.
- C. 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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