

# Seed Sowing Fertilizer Drilling Machine

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## Abstract

In the farming process, often used conventional seeding operations always take more time and more Labor. The seed feeding rate, the time required to complete the operation, the total cost is also more due to labor along with the hiring of equipment. The conventional seed-sowing machine is less efficient and also time consuming. The modern era has kept a march towards the rapid growth of agriculture sector. To meet the food demands in future, the farmers have to implement the new techniques for farming which won't affect the soil texture but will increase the crop production to a vast level. Today, India ranks second in the agriculture sector all over the world.

**Keywords:** *seeding operation, agriculture sector, demographically, socio-economic fabric.*

## 1. Introduction

Agriculture is a vital source of income in India. The Indian economy is based on the Agriculture field and hence there is need of more advancement in the equipment used during the cultivation or during the process of farming. The process of farming includes the main stage as the seed sowing.

Seed sowing process in traditional ways includes the bullock driven sowing equipment. Animals are considered as the backbone of rural farming in India. Apart from the manual work, the traditional cultivation in India was based on the use of animal power for 97.6 % of farmers (land

owners) accounting for 77.2 percent of land holdings. As the Indian economy is based on the animals there is a limit of their use in farming due to their efficiency in work.

Hence to increase their efficiency and ultimately improving the cultivation capacity we have to improve the bullock driven sowing machines or equipment and also the tractor driven equipment. Most of the planter can't achieve equidistant placement between crops causing the less production crops having lack of nutrient. According to researches, equidistant placement of plants or seed with proper environment gives maximum possible yield, quality and uniformity of crops.

The basic objective of seed sowing operations is to sow seed and fertilizer in rows and at desired depths considering different types of seed and their sizes. Hence there is need of inventions of such seed sowing machine and further improvement and development in such equipment. The overall aim is to put the seeds and fertilizer in a common row at the desired depth and spacing, cover the seeds with soil and provide proper compaction over the seed. Saving the cost of operation and time, labor and energy are other advantages to be derived.

The modification and fabrication of advanced seed sowing cum fertilizer drilling machine is a basically seed sowing machine which is the modification of previous model. Bull or tractor is used to pull a machine. With modified

machine we can sow the seeds but also the fertilizer. The modified seed sowing machine can sow seeds and fertilizer at equal distance.

The depth of sowing is controlled by the metering mechanism and the equidistant sowing is achieved by the gear mechanism which is run by chain drive driven by ground wheel. The machine is simple and contain less complicated mechanisms this makes the machine more efficient and beneficial to farmer.

## 2. Objectives:

The aim and objectives behind the project are-

1. Study of various agricultural tools and its working
2. Study of various designs of agricultural tools.
3. Modification of existing design parameter using analytical and software analysis.
4. Modeling and assembly of various parts
5. Checking feasibility of modified design.
6. Fabrication and experimentation.

## 3. Working:

### 1. DRILLING:

When the machine gets pulled by using the tractor or manually, its first task is to drill the soil by setting the depth of drill. When the machine gets moved, the wheels starts rotating and drill also moves with respect to the puller. By this the drilling process gets completed.

### 2. SEED SOWING:

Wheels are connected to the circular plates that are situated below the hoppers. Both the wheels and plates are connected to each other by shaft and gear. The seeds are filled into the hoppers to be get sowed into the soil. When wheel starts rotating, the plate also gets rotated as they are connected to each other. The hole on the plates coincides with the hopper hole, and the seed gets dropped through this hole to be get sowed into the soil.

### 3. FERTILIZER SPREADING:

This process is as same as the seed sowing process. The Fertilizer is filled into the hoppers to spread into the soil. When wheel starts rotating, the plate also gets rotated as they are connected to each other. The hole on the plates coincides with the hopper hole, and the fertilizer gets dropped through this hole to be get spread into the soil.

### 4. SOIL COVERING:

The backward part of the machine consist an angle shaped part which is used to fill up the soil which gets extracted at the time of drilling process.

## 3.1 MODEL DESIGN

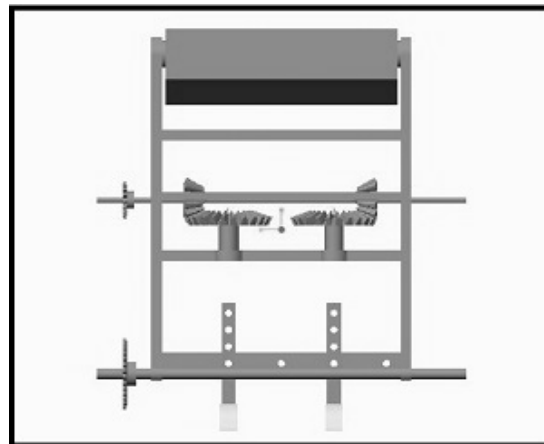


Figure 1: Top View- Design of Seed sowing cum Fertilizer machine

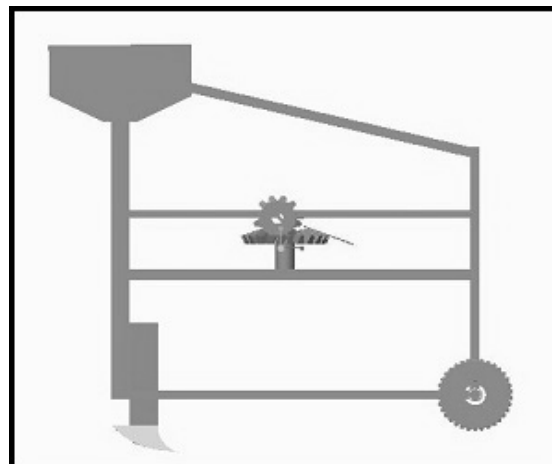


Figure 2: Side View- Design of Seed sowing cum Fertilizer machine



Figure 3: FRONT VIEW- Design of Seed sowing cum Fertilizer machine

## 4. Equations

1. Design of chain and sprocket:

In rpm

$$\begin{aligned} &= \frac{60 \cdot 10^3 \cdot V}{\pi D} \\ &= \frac{60 \cdot 10^3 \cdot 0.9722}{\pi \cdot 300} \\ &= 61.89 \\ &= 62 \text{ rpm} \end{aligned}$$

$$\therefore N_1 = 62 \text{ rpm}$$

2. Shaft Design

i. Torque

$$T_d = \frac{60 \cdot P_d}{2\pi N_2}$$

ii. Power Capacity of roller chain

$$P = P^2 \left[ \frac{V}{104} - \frac{V^{1.41}}{526} \left( 26 - 25 \cdot \cos \frac{180}{t_2} \right) \right] \cdot K_c$$

iii. Length of chain in pitches

$$Lp = \frac{t_1 + t_2}{2} + \frac{2C}{P} + \frac{PC(t_1 - t_2)^2}{40C}$$

3. Bevel gear design

i. Acute angle gear

$$\tan \gamma_p = \frac{\sin \theta}{\frac{t_g}{t_p} + \cos \theta}$$

ii. Pitch line velocity

$$Vp = \frac{\pi \cdot D_p \cdot N_p}{60 \cdot 1000}$$

## 5. Application

- i. Equidistant seed sowing process.
- ii. More fertile soil.
- iii. Multi-process machine.
- iv. Increased crop productivity.

## 6. Conclusion

Hence the seed sowing cum fertilizer drilling machine completes the task of soil drilling, seed sowing, fertilizer spreading and soil marinating as it proves itself for a multipurpose usage. The machine comes with its biggest advantage that it is a non-electrical, manual or mechanically operated machine. It is also a comparatively less time consuming machine than the previous methods used for farming and crops cultivation.

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