Scientific Journal of Impact Factor (SJIF): 5.71

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

A National Conference On Spectrum Of Opportunities In Science & Engineering Technology
Volume 5, Special Issue 06, April-2018 (UGC Approved)

Multi Seed Sowing Machine

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Abstract: *Sowing machine should be suitable to all farms, all types of corps, robust construction, also it should be reliable, and this is basic requirement of sowing machine. Thus we made sowing machine which is operated manually but reduces the efforts of farmers thus increasing the efficiency of planting also reduces the problem encountered in manual planting. For this machine we can plant different types and different sizes of seeds also we can vary the space between two seeds while sowing. This also increased the sowing efficiency and accuracy. We made it from raw materials thus it was so cheap and very usable for small scale farmers. For effective handling of the machine by any farmer or by any untrained worker we simplified its design. Also its adjusting and maintenance method also simplified.*

Keyword: *Seed, Sowing, Planting.*

I. INTRODUCTION

The present invention relates to a device for sowing granular materials, particularly fertilizers mainly for the solid fertilizer and the seed. The major occupation of the Indian rural peoples agriculture and both men and women are equally involved in the process. Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. It has to support almost 17% of world population from 2.3% of world geographical area and 4.2% of world's water resources. The present cropping intensity of 137% has registered an increase of only 26% since 1950-51. The net sown area is 142 Mh. The basic objective of sowing operation is to put the seed and fertilizer 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 fulfill these requirements. In addition, saving in cost of operation time, labor and energy are other advantages to be derived from use of improved machinery for such operations. A traditional method of seed sowing has many disadvantages. 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.

Traditional methods include broadcasting, dibbling, drilling, 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 is likely to be uneven resulting in bunching and gaps in field.

The following are the limitations of Existing Machine:-

1. The Weight of the Machine is more. 2. Available for Tractors drive. 3. No Arrangement for seed bed preparation. 4. Improper compaction of soil over furrows. 5. Adjustment of row spacing is improper. 6. The cost of machine is more.

A. Types of Sowing

The following are different types of seed sowing:-

1. Broadcasting: -

A field is initially prepared with a plough to a series of linear cuts known as furrows. The field is then seeded by throwing the seeds over the field, a method known as manual broadcasting. The result was a field planted roughly in rows, but having a large number of plants. When the seeds are scattered randomly with the help of hand on the soil, the method is called broadcasting.[5]

Fig. 1: Broadcasting

2. Dribbling:-

Drill sowing and dribbling (making small holes in the ground for seeds) are better method of sowing the seeds. Once the seeds are put in the holes, they are then covered with the soil and prevents the damage of seeds by birds. This are time consuming method and more labor required.

Fig. 2: Dribbling

3. Drilling:-

Another method of sowing the seeds is with the help of a simple device consisting of bamboo tube with a funnel on it attached to a plough. As the plough moves over the field the tube attached to it leaves the seeds kept in the funnel with some spacing and depth. The plough keeps making furrows in the soil in which the seeds are dropped by the seed drill. The above sowing methods have the some disadvantages which are as follows:-

1. No control over the depth of seed placement.
2. No uniformity in the distribution of seed placement.
3. Loss of seeds.
4. No proper germination of seeds.
5. During khariff 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.
6. More labor requirement.
7. Time required for sowing is more.

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, labour 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 less contain complicated mechanisms this makes the machine more efficient and beneficial to farmer.

So there is scope to make machine which can perform the following operations with minimum cost.

1. seed bed preparation
2. seed sowing with proper distance between two seeds
3. fertilizer placement

II. OBJECTIVE AND SCOPE

A. Objectives:

1. Sowing seeds with proper distance and depth

Due to this machine we are able to plant seeds with proper distance between them. So amount required to sowing of seed per hector are fix. This also helps to increase the germination of seed, because seed to seed space is proper so plant get space to grow up.

2. Reduce Time

The most important objective for this invention is to reduce the time of sowing seeds with fertilization. In the conventional method the sowing by means of hands (manually) which take too much time to complete the sowing in the whole farm. Reduce in time result in increasing the efficiency.

3. Reduce Work done

Due to this invention the total work done by the farmer for sowing is decreases, because the farmer have not to carry the heavy bag of seeds and fertilizer and throughout the sowing process and the work of sowing by means of hands also gone reduce. The reason for these findings is due to the law of diminishing returns. The law of diminishing returns states that there will be a decreasing return for each additional increment of fertilizer applied. In attempting to obtain maximum yields, the last increment of fertilizer applied will increase the yield by a smaller amount than the previous

increment. Therefore, a given amount of fertilizer on an under-fertilized part of the field will result in a much larger yield increase than that same amount of fertilizer applied to an over-fertilized portion of the field.

- To achieve proper sowing of seed in seeding mechanism.
- To make this machine which is ox operate for small farmer.
- To provide this machine in lowest cost and light in weight.
- To adjust proper depth in variable soil in any whether condition.

B. Purpose of seed planter machine

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 .

C. Factors affecting seed emergence

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

- Uniformity of depth of placement of seed.
- Uniformity of distribution of seed along rows.
- Transverse displacement of seed from the row.
- Prevention of loose soil getting under the seed.
- Uniformity of soil cover over the seed.
- 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.

III. METHODOLOGY AND WORK

A. Problem Identification:

1. Wrong amount:-

Overdoing some nutrients will interfere with the uptake of others. For example, applying too much soluble nitrogen can wash available calcium out of the soil. Land that has been depleted of nutrients due to past farming practices and crop removal can have poor production if too little fertilizer is applied. Equipment calibration problems also fall into this category.

2. Wrong place:-

If soluble fertilizer is placed on top of the ground it can volatize or erode, and those nutrients are lost. Placing too much soluble fertilizer or a fertilizer with a high salt index next to the seed can inhibit root growth or dry out the roots. Another problem I see is bulk spreading a starter fertilizer that would be better placed down the row where the crop can access it.

3. Time Consuming:-

Another major problem occurring in the sowing seed and fertilizing by manually is required much time. Which is waste of time, the conventional method of spreading fertilizer manually is require too much time.

4. Not following a consistent program:-

Some farmers are hit and miss with their sowing and fertilizer program. They'll apply calcium, sulfur and boron some years but not others, when really those nutrients should be applied every year. If a farmer has a limited budget, they need to look at their major constraints and decide where to spend their dollars to do the most good for the crop and the soils. They should set up a program and determine the best time to take soil tests, then make their soil correctives and determine when and how much crop fertilizer to apply.

B. Problem Statement:

The basic objective of the sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing. Cover the seed 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. But many 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 seed from row.
d) Prevention of loose soil getting under the seed.
e) Uniformity of soil covers over the seed.
f) Mixing of fertilizer with seed during placement in the row.

A seed planter required to perform all of the following mechanical functions

a) Meter the seed.
b) Deposited the seed in acceptable pattern.

c) Cover the seed and compact the soil around the seed to prevent rapids loss of moisture from the soil around the seed.
d) Should not damage the seed not affect the germination, i.e. seed should be placed in soil in such a way that all the factors affecting germination and emergence will be as favorable as possible.
e) Since timeless is of extreme important in the majority of planting operations, it is desirable that a planter be able to perform these functions accurately at fairly high rates of speed and
f) Uniform soil penetration.

C. Methodology of Work

1. The first step is to go to the farmers and find the problems faced by them.
2. The second step is to choose a problem.
3. The third step is to visit to agriculture firms.
4. The fourth step is to Analyze the problem& their solution.
5. The fifth step is the selection of materials.
6. The sixth step is to find which mechanism is to suitable in lowest cost.
7. The seventh step is to find all components we require in proper dimension.
8. The eight step to start fabrication.
9. The last step is the testing of machine.

IV. DESIGN SPECIFICATION

This chapter deals with the theoretical considerations, design for development of manually operated seed-cum fertilizer drill and their components of the machine.

A. General design considerations

The design of seed drill consists of several steps. It would be require basic information about the following: Ease of operation, adjustment of machine and maintenance.

- Reduce of losses and free flow of seeds, placement of seeds in proper distance and depth.
- Cost of machine and farmer's paying capacity.

B. Functional requirements

The seed drill was design to fulfill the following functional requirements: To place seeds uniformly in the soil. To place seeds at proper depth. To cover the seeds with soil. (Consider the need to close the furrow to obtain good seed/soil contact, stabilize conditions and reduce the likelihood of seed loss by predators).

C. Calculation for metering rotor for seed sowing amount

T1 =18 teeth, d1 = 7.62 cm
T2, T3, T4 are of 12 teeth and d = 5.08cm
T5 and T6 of 16 teeth and d = 5.08 cm

Ground wheel:

d = 42 cm
1 hector = 1000sqm

Frame covers the area 1.22*1 sq.m at a time so, total distance run by a machine in 1 hector is 819.67 m.

Circumstance of ground wheel:

= Π *D
= Π*42
= 131.94cm =1.3194m

So, ground wheel turns = distance run by machine /circumstance of ground wheel
= 819.67/1.3194
= 620.24 turn per hector
= 620 turn

Ground wheel is connected to driving wheel i.e. sprocket1 by shaft.
So, turn of ground wheel =turns of driving wheel, i.e. 620 turn

T1/T2 = 18/12
= 1.5

No. of turn of driven wheel = 1.5 *620
= 930 turns

Gear no 2,3,4 have of same teeth and diameter.
So, no of turns of wheel = no. of turns of wheel 3 & 4 i.e . 930 turns.
Gear 5 is connected to gear 4 by shaft . So, no. of turns of gear 4 = no. of turns of gear 5.
Gear 5 & 6 are of same no. teeth. So, no. of turns of gear 5 = no. of turns of gear 6 i.e. 930 turns .
Metering rotor mounted shaft is connected to gear 6 . Turns of metering rotor = turns of gear 6 i.e. 930 turns
1 .For fertilizer rotor

Rotor no. 2 pick up 5 gm of fertilizer for every complete turns.
We have 3 rotor

5*3 =15 gm/ rotation

For one hector = no. of rotation for one hector *amount of fertilizer per rotation
= 930*150
= 13950 gm
=139.5 kg per hector

2. For gramme :
a. big grammer :
Rotor no. 2 picks 2.70 gm of gramme for every rotation
For 3 rotors

2.70*3 = 8.10 gm.

For one hector

8.10* 930 = 7533 gm
=75.33 kg
= 75 kg per hector

b. Medium gramme :
Rotor no 3 pickup 1.80gm For one revolution ,
For 3 rotors

= 3* 1.80
=5.4 gm

For one hector

5.4 * 930=5022 gm
= 50 kg for per hector

c. Small gramme:
Rotor no 5 pickup 1.50gm For one revolution
For 3 rotors

= 3*1.50
=4.5 gm

For one hector

4.5 *930 = 4185 gm
= 41 kg per hector

3. Wheat :
Rotor no 6 picks up 3.50 gm for one revolution.
For 3 rotors

= 3 *3.5
=10.5 gm

For one hector

3.5 * 930= 9465 gm
= 97.65 kg per hector

V. Working

The working of seed sowing machine is described as follows:

Fig 3: Seed sowing machine

When the machine is pulled by the ox it moves in forward direction, then due to the inclination angle furrows goes in soil at 5 to 6 inch depth and it creates a row for seed. At the same time power wheel rotates with some specific rotation which has joined sprocket wheel and are mounted on the metallic rod with bearing for friction less rotation. Also the sprockets are mounted on the metallic rod which transmit the rotating motion of the wheel to the another sprocket wheel, and again from these sprocket wheel to the wheel which is mounted to the shaft which has to rotate the

metering rotor. Here, the chain drive is used to smooth transmission of the motion of the wheel to the metering rotors shaft assembly. Middle used sprocket provides the flexibility to the drive system.

When rotational power is transfer to the shaft on which metering rotor is mounted, it rotates and pick up the seeds fertilizer with it into cells provided on the rotor, and through into the funnel. Funnel has connected to the furrow by rubber tube. The flow of these seeds in the downward direction takes place due to gravity and seeds flow through the holes. These flowing seed and fertilizer moves in the flexible pipes and after that it comes in the back side of the furrow and sows in the soil.

The same amount of seed come in tiny box from hopper as seeds and fertilizer from it is pickup by rotor cells maintain the level of it. These amounts of seed and fertilizer come to the tiny box is controlled by the vertical plate placed at the outlet of hopper which can move up and down with the help of round nob which has a grooves to engaged the plate.

VI. RESULTS AND DISCUSSION

A. Comparison:-

For the comparison we have select the 1) Manual seed sowing 2) Tractor mount seed sowing machine 3) ox operated Seed Sowing Machine

Table 1: Comparison

Sr.NO.	Parameter	Manual	Tractor	Ox operated machine
1	Man power	More	Less	Less
2	Time required	More	Less	Moderate
3	Sowing technique	Manually	Automatically	Automatically
4	Distance between seed	Not Fixed	Fixed	Fixed
5	Wastage of seed	Moderate	Less	Less
6	Required Energy	Less	Very high	Less
7	Pollution	NO	More	NO
8	Alarm and Display	NO	YES	NO
9	Cost of machine	Less	Very high	Moderate

B. Results

By taking trials on the field of our machine and gathering all information of other possible methods we have got following results.

Our goal was to build a system which is efficient to perform a various applications with the help of Manually Operated Fertilizer Spreader Machine with seed sowing . With the scope of improvement, the project is done to fulfill the demands of agricultural applications. The main objective of our project was to fulfill the need of farmers suffering from the problems of increasing cost of Fertilization, labor cost and availability as it is operated by single person. With this machine, percentage reduction in time required for Fertilization was observed to be 50%. And reduction in labor cost as compared to conventional method was 80%.

It has solved the problem of traditional way of Fertilization. Since the capital cost is essential factor while selecting type of equipment for farming. This machine has very less capital cost as compared to other type of machines and also principal advantages of having Eco friendliness and easy troubleshooting. By undergoing all this discussion and undergoing all the factors associated with Fertilization, this machine will be great boon for the Indian Agriculture. Experiments done with this fertilizer spreading machine show that approx a spreading area having diameter of 85cm to 90cm is acquired. For large scale farming, this may be small; but it compensates the need of batteries. It also contain seed sowing mechanism. The table below shows the cost comparison between the conventional methods cost and fertilizer spreader cost and tractor mounted fertilizer spreader that gives optimum cost of the system that can e used by the farmers.

Table 2: Cost Comparison

Sr. No.	Parameters	Conventional Method Cost	Multi seed sowing m\c Cost	Tractor mounted sowing machine
1.	Cost Per Acre	RS.600-700/-	Rs.100-150/-	Rs.900-1000/-
2.	Time Per Acre	3hrs	2hrs	0.5 hrs
3.	No. of Labors	7	1	1

Table 3: Seed specification

Wheel no. / seeds kg/ hector	2	3	4	5	6	7
Fertilizer	139-140					
Big gramme	15-18					
Middle gramme		50-52				
Small gramme				37-40		
Wheat				100-105		
Corn		37-40				
Soya				62-65		
Sorghum			10-12			
Mung			12-15			
Udid			15-18			
Tuwar					7-8	
Cotton						3-4
Ground nut	112-126	75-80				

C. Advantages

Following are the advantages of Fertilizer Spreader With Seed Sowing machine
1.High speed Fertilization. 2. Time savings. 3. Less fatigue to labor. 4. Applicable for small and medium farms. 5. No electric power required. 6. Easy to operate, as no skilled operator required. 7. Easy to assemble. 8. It is pollution free. 9. Maintenance cost is low 10. Improvement in planting efficiency. 11. Increase in crop yield and cropping reliability.12. Increase in croping frequency. 13. It increased seed planting. Seed can be placed uniformly in a row with required distance between plants. 14. Provide proper compaction over the seed. 15. Requirement of labour is less.

D. Disadvantages

1. Machine requires more effort in hard soil.
2. Operating force varies from person to person.

VII. CONCLUSION

We can conclude that our fabricated mechanical machine is advantageous over the existing machines in the following ways:

Control the seed and fertilizer depth and proper utilization of seeds and fertilizers can be done with less loss. It is of low cost comparatively and accounts less than 50% of the existing costs. The mode of operation is very simple even to the layman. It is more efficient than the present existing machines of this category and range. The maintenance cost of this equipment is very less as there is no delicate part involved. By using this machine we get accuracy in seeding. This machine used in any type of soil. Proper skill not required for operating this machine and easy to transferred.

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