International Journal of Engineering and Technical Research (IJETR)
ISSN: 2321-0869 (O) 2454-4698 (P), Volume-4, Issue-1, January 2016

# Experimental Investigation and Modification of Seed Drilling Machine to Avoid Blockage

**Sagar S. Thosre, Shubham A. Awaghad, Rahul M. Aochar, Rupesh A. Honale, Akshay S. Jadhao, Chandrakant Thakre**

***Abstract*— The present review provides brief information about the various types of innovations done in seed drilling equipments. 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. Seed sowing devices plays a wide role in agriculture field.**

***Index Terms*— Agro-Conditions, seed metering device, Seed spacing.**

## I. INTRODUCTION

The major occupation of the Indian rural people is 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 Mha. 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 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 paper shows the brief information regarding seed sowing method and its implementation to day to day life.

**Sagar Sudhakar Thosre**, BE Final Year Mechanical Engineering, MGI-COET Shegaon, India, +918698028573
**Shubham Ashokrao Awaghad**, BE Final Year Mechanical Engineering, MGI-COET, Shegaon, India, +918698722179,
**Rahul Manohar Aochar**, BE Final Year Mechanical Engineering, MGI-COET, Shegaon, India, +919970992447,
**Rupesh Ashok Honale,** BE Final Year Mechanical Engineering, MGI-COET, Shegaon, India, +919657849163,
**Akshay Sanjaysing Jadhao**, BE Final Year Mechanical Engineering, MGI-COET, Shegaon, India, +919370496888,
**Chandrakant Ganeshrao Thakre**, BE Final Year Mechanical Engineering, MGI-COET, Shegaon, India, +919404411172,

Figure : Mechanism

Now a day price of seed is increases day by day, so the importance is given to the effective seed drill machine. in seed drilling various types of problem are occurs due to nature of soil, physical condition of soil and other environment factor. due to this problem the seed not drill uniformly in soil. The seed drilled into soil are continues so the empty are generated in row while drilling and because of this the productivity of farm decreases.

Traditional sowing methods have following limitations:

- 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.
- Poor control over depth of seed placement. Labor requirement is high because two persons are required for dropping seed and fertilizer.
- The effect of inaccuracies in seed placement on plant stand is greater in case of crops

The above problems can be overcome by used of the block less Automatic Seed Drilling Mechanism.

## PROBLEM CONVENTIONAL

Each design of no-tillage opener requires a different down force to obtain its target seeding depth. Required down force is determined by a number of variables:

**1.** Soil strength, which determines the soil's resistance to penetration.
**2.** Soil moisture and density, which affect soil strength.
**3.** The presence or absence of stones and their sizes.

**4.** The presence or absence of plant roots that directly resist penetration.
**6.** Operating speed, because openers penetrate better at slower speeds than at higher speeds.
**7.** The draught of the openers (their resistance to moving through the soil).
**8.** The attachment geometry of the openers to the drill frame, because, as an opener moves downwards into a hollow, the vertical component of pull increases, acting upwards, opposing and reducing the down force pushing the openers into the soil.

Seeds are broadcasted on the soil which results in the loss and damage of the seeds. As the cost of seeds is more and cannot be affordable for the farmers so there is the need for the proper placement of seeds in the soil.
The previous drilling 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.

## II. COMPONENTS

*A. Shaft*

Transmission shafts is used to transmit torque from wheel to crank.
Shaft Loads :
• Torsion due to transmitted torque
• Bending from transverse loads ( pulley, teeth wheel and crank )
• Steady transverse -bending load fully reversing bending stress (fatigue failure).

Figure : Shaft And Crank

*B. Crank*

A crank is an arm attached at right angles to a rotating shaft by which reciprocating motion is imparted to or received from the shaft. It is used to convert circular motion into reciprocating motion, or vice versa. The arm may be a bent portion of the shaft, or a separate arm or disk attached to it. Attached to the end of the crank by a pivot is a rod, usually called a connecting rod. The end of the rod attached to the crank moves in a circular motion, while the other end is usually constrained to move in a linear sliding motion.

*C. Connecting Rod*

Connecting rods may also convert rotating motion into reciprocating motion. Historically, before the development of engines, they were first used in this way.

As a connecting rod is rigid, it may transmit either a push or a pull and so the rod may rotate the crank through both halves of a revolution, i.e. pipes pushing and pipes pulling.

Figure : Connecting Rod

*D. Outer Pipes*

Outer pipes is present on the outer side of inner pipe the main function of outer pipe is to remove the soil which is going to stick to inner side of pipe (Inner Pipe).Motion of outer pipe is reciprocating type.

Two outer are connected by webs having rods to connect the connecting rod. this pipes are reciprocates on the inner pipes and square rods which is welded inside it in 120 axially also reciprocate inside the slots on the inside pipes. the diameter of outer pipe is more than inner pipe to provide clearance for reduce friction between pipes.

Figure : Outer Pipes

*E. Inner Pipes*

In this mechanism to pipes are connected by web having a drilled hole. the web provided between pipes are also support the total load acted on the wheel. This pipes are stationary. on the upper side of this pipe two flexible fibre pipe with narrow opening are attached to provided flow of seeds. the thee slots on each pipes at 120° are cut at the bottom side of the pipes axially for providing the way to reciprocate square rods which removes the stick soil.

Figure : Inner Pipes

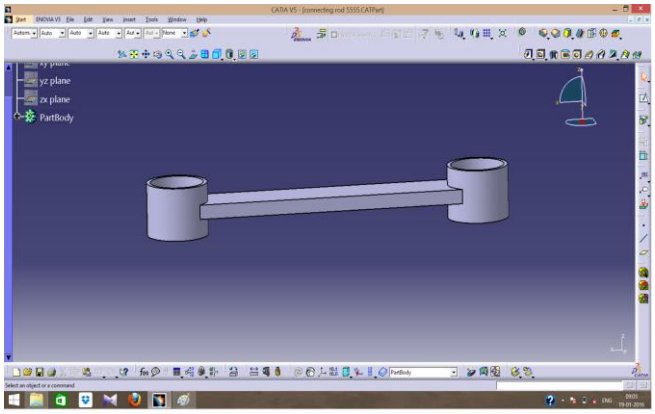
*F. Ground Wheel*

Ground wheel is the power generation device. It is attached with tiller. It has a circular disc. Teeth's are provided on the periphery of the disc. It is provided to make a fine grip with the land. When the tractor is moved ground wheel also rotated. This motion can be transferred to the main shaft through power transmission system.

## III. DESIGN AND DEVELOPMENT

It is agile based process for creating and obtaining innovative solutions. Each problem statement have to go through these procedure. Likewise, in order to achieve the objectives design specifications have been drafted for shaft, connecting rod, crank and assembled vies is as shown in CATIA V5R19

*A. CONNECTING ROD*



Dimensions :

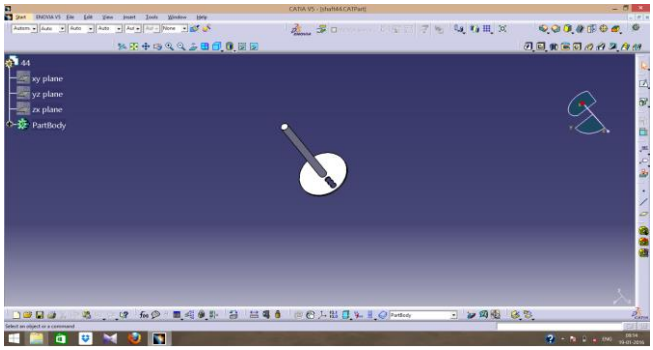
i. Ends diameter : 32 mm
ii. Length : 158.5 mm
iii. Thickness : 6.8 mm
iv. Width of ends : 25 mm

Material used : Mild Steel

Manufacturing process :

i. Cutting
ii. Welding

*B. SHAFT AND CRANK*



Dimensions :

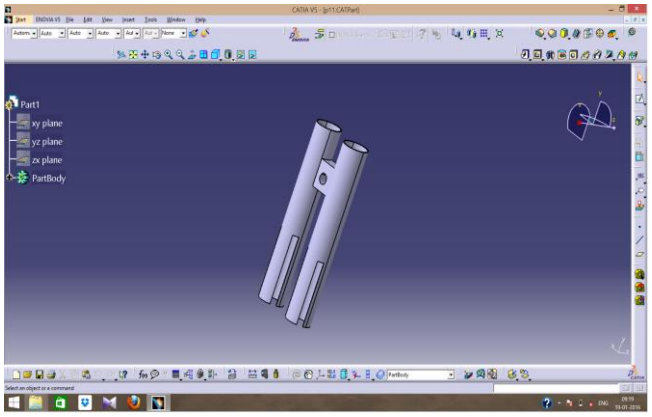
i. Diameter of shaft : 15.5 mm
ii. Length of shaft : 216 mm
iii. Radius of Crank : 50 mm
iv. Hole on Crank diameter : 12 mm

Material Used : Mild Steel

Manufacturing Process :

i. Cutting
ii. Drilling
iii. Grinding
iv. Welding

*C. INNER PIPES*



Dimensions :

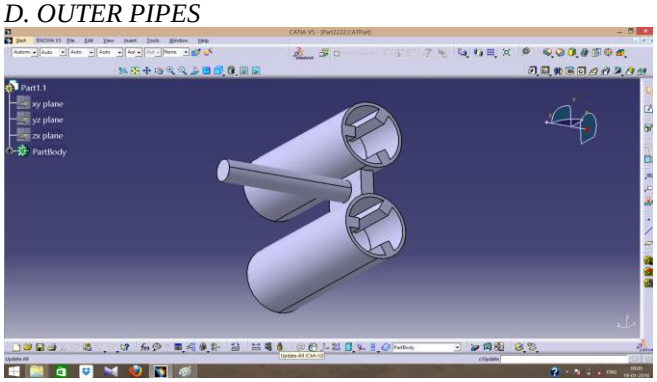
i. Outer Diameter : 42 mm
ii. Thickness of pipe : 2.5 mm
iii. Length of pipe : 254.5 mm
iv. Length of slot : 100 mm
v. Width Of Slot : 10 mm

Material Used : Mild Steel

Manufacturing Process :

i. Cutting
ii. Grinding
iii. Welding

*D. OUTER PIPES*



Dimensions :

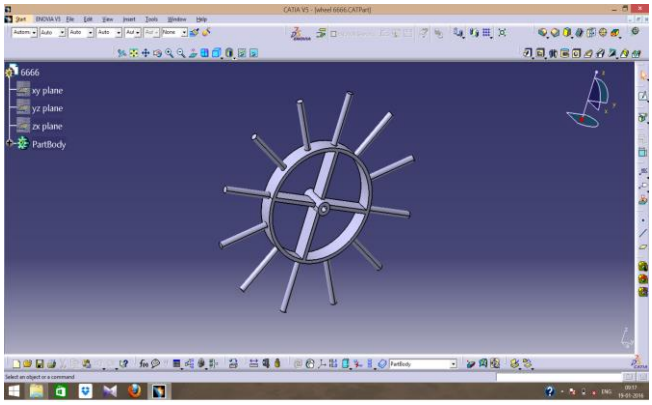
i. Diameter : 48 mm
ii. Length : 123.5 mm
iii. Thickness : 2.5 mm
iv. Length of Shaft : 97.5 mm
v. Center Distance : 68 mm

Material Used : Mild Steel

Manufacturing Process :

i. Cutting
ii. Grinding
iii. Welding

*E. GROUD WHEEL*



Dimensions :

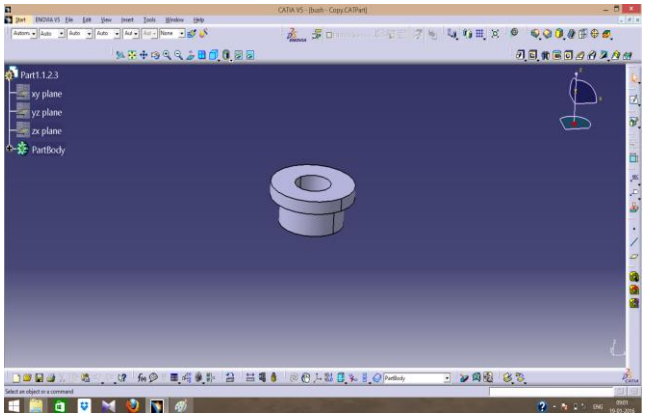
i. Diameter : 273 mm
ii. Thickness : 8.5 mm
iii. Width : 40.3 mm
iv. Number of Teeth : 12
v. Hub Diameter : 32.2 mm

Material Used : Mild Steel

Manufacturing Process :

i. Welding
ii. Grinding
iii. Finishing

*F. BUSH*



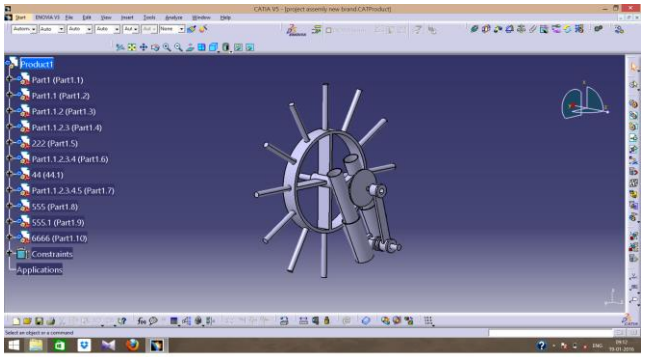
Type of Bush : Head or Flange

Dimensions :

i. Diameter : 27 mm
ii. Length :21 mm
iii. Thickness : 5.35 mm

Material used : Fiber

*G. PROJECT ASSEMBLY*



## I. WORKING

Now a day the farmer mostly drill the seed in the farm by using automatic seed drilling machine because of that using the automatic seed drilling machine the human effort and accuracy problem is reduced.

But, while using this machine some another problem i.e. Blocking of seeds. It means when you are going to drilling the seed, the property of soil is effect on drilling process and out of that soil moisture it is the most important property of soil due to this the soil is stick on the pipe while seed drilling and blocking of seed is occurs and it directly effect on the farmer productivity.

When operation are being done and if there will any obstruction of uneven soil surface are come in path and soil sticks on the pipe opener and flow of seeds stop due to this the distance between two seeds in row increases and gap created. the problem of blocking is can be detect when the pipes fill of seed at particular level. this problem of blocking is solved by the mechanism as working below.

When end wheel are rotates and transmit the rotary motion of it to the crank. due to the rotation of crank the connecting rod transmit this motion and convert it into sliding motion of outer pipes.

Outer pipes has square rod attached inside it, that also reciprocate in slot of inner pipe and soil and other particle stick on pipes opener is removed and pipe will be free to flow the seed's.

## IV. FUTURE SCOPE

1. Top priority is given only for safety operation lost reduction; the multipurpose seed drilling machine is fabricated with safety and effective seed drilling operation.
2. Instead of using separate wheel for each teeth this mechanism provide for every teeth on seed drill machine by using chain and sprocket transmission system which is take a power from ground wheel which is already present in conventional seed drilling machine.
3. By using this mechanism we can increase the value of the seed drilling machine in future.

## V. RESULT

In earlier seed drilling machine the blocking of seed while drilling is mostly arise and due to that the seed is not properly drill and empty space is occurs and because of this problem the productivity decreases ,loss of seed is high . we know that cost of seed is very high due to this problem the effect is directly face by the farmer.

After application this mechanism on the seed drilling machine we came to know that, the problem of empty space in a row and blocking of seed in pipe are eliminated. And it is also observed that this machine is more efficient than existing machine of same category.

## VI. CONCLUSION

Hence after comparing different method of removing soil sticking problem on opener manual and limitation of soil sticking is eliminate; it is concluded that mechanism for seed drilling machine can assure.

1. Productivity of seed is increases.
2. Problem of blockage is solved by the mechanism.
3. Empty space produced due to uneven seed feeding is

minimize by the mechanism.
4. If the uneven seed is then again we have to done sowing this have take so much time and efficiency due to this mechanism this problem is minimizes.

## REFERENCES

[1] Roshan V Marode, Gajanan P Tayade, and Swapnil K Agrawal.(2013)," Design And Implementation Of Multi Seed sowing machine" ISSN 2278 – 0149 Vol. 2, No.4, October 2013.
[2] Aditya Kawadaskar, Dr. S. S. Chaudhari," Review Of Methods Of Seed Sowing And Concept Of Multi-Purpose Seed Sowing Machine" ISSN: 2319-507X,Volume 1(8): 267-276 IJPRET, 2013.
[3] D.Ramesh , H.P. Girishkumar, " Agriculture Seed Sowing Equipments: A Review" International Journal of Science, Engineering and Technology Research (IJSETR), ISSN: 2278 – 7798 IJSETR Volume 3, Issue 7, July 2014.
[4] Textbook of Theory of Machine by R. S. Khurmi and J. K. Gupta.
[5] Textbook of Workshop Technology Vol.1 and Vol.2 by B. S. Raghuwanshi.
[6] Mohammed Jamil Rajput, Shamsuddin Tunio, Mushtaque Ahmed Rajput and Fazal Karim Rajput (2008), "Effect of Row and Plant Spacing on Yield and Yield Components in Soyabean", Pakistan Journal of Agriculture Research, Vol. 5, No. 2.
[7] Mahesh.R.Pundkar, a seed-sowing machine a review, IJESS Volume3, Issue3 ISSN: 2249.
[8] Sankaranarayanan M, "Development Of A Push Type Seed Drill For Sowing Maize In Rwanda". Institut Supérieur d'Agriculture et d' Elevage, ISAE, Busogo, Post Box No. 210, Musanze, Rwanda.
[9] Ed Dager, "Proper Equipment for Small Farms" Kaitlin D'Agostino, Economics, SAS '13, Rabin, 12/03/09
[10] www.agroproducts.com
[11] www.agriculturalimplements.com