



# INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

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## ENGINEERING INNOVATION IN DEVELOPING RURAL MULTI-SEED DRILL FOR FARM WORKERS - A REVIEW

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Accepted Date: 12/04/2015; Published Date: 01/06/2015

**Abstract:** A seed drill is a sowing device that precisely positions seeds in the soil and then covers them. Before the introduction of the seed drill, the common practice was to plant seeds by hand. Besides being wasteful, planting was very imprecise and led to a poor distribution of seeds, leading to low productivity. Nowadays, different types of seed drill are being developed. Compared with the existing seed drill, this paper presents the need for a seed drill more suitable to Indian farmers, Analyze the technical characteristics of Seed Drill system The focus is on methodologies as design modification, to analyze the different parameters that can be change for improving the performance of sowing machine, reduce the effort, time and cost requirement, alternative seed arrangement.

**Keywords:** Seed Drill, Design Analysis, Productivity

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PAPER-QR CODE

Access Online On:

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How to Cite This Article:

Shahzad Ahmed, IJPRET, 2015; Volume 3 (10): 91-98

## **INTRODUCTION**

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 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. The net sown area is 142 Mha.

In the farming process, often used conventional seeding operation takes more time and more labor. The seed feed rate is more but the time required for the total operation is more and the total cost is increased due to labor, hiring of equipment. A conventional seed sowing machine is less efficient, time consuming.

The conventional process of sowing is very tedious, time consuming, costly, less productive. The conventional process of farming separate two operations of seed sowing and fertilizer placement. These two different operations take separate time and cost. So there is a need to design and fabricate a machine which can perform these two operations simultaneously. Now every field in this world is moving towards less effort and less time consuming processes, here in this project an effort is made to reduce the complexity and criticality in the sowing operations. The farmers are carrying out all the operations related to sowing one by one. In conventional sowing process time taken is more, more labors are required, wastage of seed and fertilizer, total cost of farming increases, gives less yield and many more. In order to reduce the efforts and to carry out all the operations simultaneously, there is a need to develop a machine.

## **II. SEED SOWING METHODS**

1. Broadcasting:-When the seeds are scattered randomly with the help of hand on the soil, the method is called broadcasting. In this method, seeds are sown manually spread in the entire field with no uniformity of rows, no proper spacing and no proper depth of the soil. Cereals like wheat and rice are grown by this method.

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

3. 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 at proper spacing and depth. The plough keeps making furrows in the soil in which the seeds are dropped by the seed drill.

### III. LIMITATIONS OF TRADITIONAL SOWING METHODS

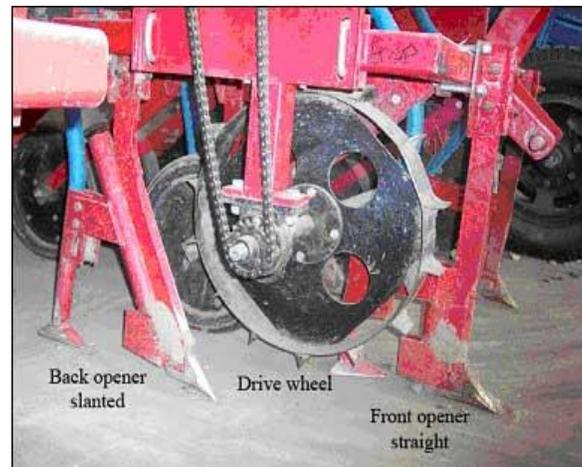
1. In manual seeding, it is not possible to achieve uniformity in distribution of seeds. A farmer may sow at desired seed rate but inter-row and intra-row distribution of seeds is likely to be uneven resulting in bunching and gaps in field.
2. Poor control over depth of seed placement.
3. It is necessary sow seed at high rates and bring the plant population to a desired level by thinning.
4. Labor requirement is high because two persons are required for dropping seed and fertilizer.
5. The effect of inaccuracies in seed placement on plant stand is greater in case of crops Sown under dry farming conditions.
6. During khariff sowing, placement seeds uneven depth uneven depth may result in poor emergence of because subsequent rains bring additional soil cover over the seed and affect plant emergence.

### IV. MECHANISM IN A SEED DRILL

The Seed Drill Consist of:

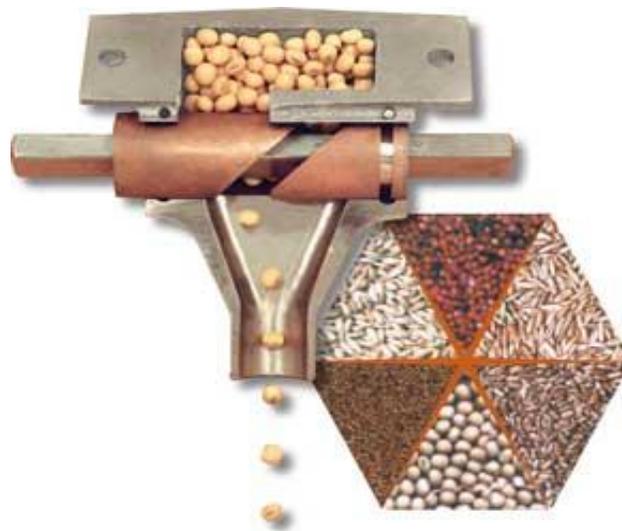
1. Furrow Opener
2. Seed Box
3. Seed Metering Device

A) FURROW OPENER: A furrow opener is used to prepare furrow for sowing of seed.



B) SEED BOX: A seed box is used as a storage compartment for the seed.

C) SEED METERING DEVICE : A seed metering device is used to maintain a proper seed to seed spacing .



#### V. EXISTING SOWING MACHINE

1. DIBLLER: It is single row manually operated equipment or dibbling bold or medium seeds in row or gap filling into well prepared soil.

2. ROTARY DIBBLER: It is manually operated push type equipment for dibbing bold and medium size seeds in rows at uniform spacing in well prepared soil.

3. TWO ROW SEED DRILL: It is an animal drawn simple, light weight, and compact machine to sow crops like wheat, gram, sorghum, soybean, lentil, pea, sunflower, safflower, etc in black soil under rained condition.



4. TWO ROW SEED CUM FERTILIZER DRILL: It is an animal drawn simple, light weight and compact machine to sow crops like wheat, gram, sorghum, soybean, lentil, pea, sunflower, safflower etc and drill fertilizer in black soil under rained condition. The fluted roller metering mechanism, fitted in the unit, gets the drive from ground drive wheel of 300mm diameter through chain and sprocket. The shoe type furrow opener with non-clogging boot place the seed at desired depth.

5. THREE ROW SEED DRILL: Drill Seeds along three rows.

6. THREE ROW SEED CUM FERTILIZER DRILL: It is an animal drawn simple, light weight, and compact machine to sow crops like wheat, gram, sorghum, soybean, lentil, pea, sunflower, safflower etc. and drill fertilizer in black soil under rained condition.

7. POWER TILLER DRAWN SEED CUM FERTILIZER DRILL: Specially designed for power tiller of 8-10 hp size to drill seed and fertilizer in row. It consists of main frame, seed and fertilizer boxes, metering mechanism, transport wheel, furrow openers, hitch system etc

8. POWER TILLER OPERATED TILL PLANT MACHINE: Specially designed as a matching equipment for 10-12 hp power tiller to prepare seedbed and drilling seed and fertilizer simultaneously. It consists of main frame with standard hitch, seed/fertilizer boxes transport wheel, drive wheel etc.

9. COMMERCIAL PNEUMATIC PLANTER: It is a six row (2 or 4 optional) 35 hp or above tractor drawn equipment to plant single seed at predetermined seed/row spacing. It consists of main frame, aspirator blower, disc with cell type metering plate, individual hopper, furrow openers, pto driven shaft, ground drive wheel etc



10. MANUAL RICE TRANSPLANTER: It is a six row manually operated equipment to transplant mat type rice seedling in puddle soil in rows. It consists of handle, picker assembly, seedling tray, and tray indexing mechanism, main frame, base frame, and seedling pushing lever, feeder link assembly, wooden skid and pivot arm assembly.

11. INCLIND PLATE PLANTER: It is a six row 35 hp or above tractor drawn equipment. It is suitable for planting Groundnut, Gram, Soybean, Mustered etc. Row to row distance can be controlled and planting of different seeds in different rows is possible. In this equipment separate seed box and inclined measuring unit is used for every row.

#### VI. POSSIBLE IMPROVEMENT IN SEED DRILL.

1. FEM analysis for optimization of weight of designed machine.
2. Analyze the different parameters that can be change for improving the performance of sowing machine.
3. Design of seed drill keeping in mind
  - Can make row and put the seed into the row
  - Can spread the fertilizers
  - Reduce the efforts

- Reduce the time requirement
- Reduce Manpower
- Affordable for poor farmers
- Also can put alternative seeds

4. The seed rate and row to row spacing affect the plant height, nodule no and leaf area of index for a stated period of time. Seed rate of 60 kg per hectare and row spacing of 45cm is most suitable.

5. The order of the importance of factors affecting the flow evenness is found to be flute length, axis rotation speed and flute shape, respectively. Minimum coefficient of variation, optimum conditions was obtained at the flute length of 15 mm, axis rotation speed of 35 min<sup>-1</sup> and flute shape of trapezoid. At the optimum conditions, coefficient of variation for wheat was obtained as 2.87.

6. The design of furrow openers of seed drills varies to suit soil conditions of particular length. Shoe type openers should be used in black soil regions. Seeds are dropped through a tube connected to boot at rear of opener for placement at shallow to medium depths. When used on seed cum fertilizer drills or planters a special narrow boot is designed to place seed and fertilizer in soil at same depth but separated by a small distance.

## VII. CONCLUSION

As requirement of sowing equipment, seed drill is widely required in today's modern port. Wide ranges applications of seed drill, and the work environment is generally more difficult, to achieve maximum efficiency, extend equipment life, improve the quality of operation, reduce operating costs has been the goal of engineering and technical personnel. Analyze and resolve the impact normal operation of the main problems, to ensure the good functioning of device. To fulfill above requirement it is to be needed further proper designing of seed drill system which is desired for the application keeping all parameters in mind and by inventing new approaches towards better design.

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