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A Review on Agricultural Seed Sowing

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ABSTRACT: Modern era is marching towards the rapid growth of all sectors including the agricultural sector. To meet the future food demands, the farmers have to implement the new techniques which will not affect the soil texture but will increase the overall crop production. This paper deals with the various sowing methods used in India for seed sowing and fertilizer placement. As day by day the labour availability becomes the great concern for the farmers and labour cost is more. Sowing is the process of planting seeds. An area or object that had seeds planted will be described as being sowed. Among the major field crops, oats, wheat, and rye are sown, grasses and legumes are seeded, and maize and soybeans are planted. In planting, wider rows (generally 75 cm (30 in) or more) are used, and the intent is to have precise, even spacing between individual seeds in the row; various mechanisms have been devised to count out individual seeds at exact intervals. This paper deals with the study of different terminologies involved, types of existing machineries.

KEYWORDS: Seed sowing, agricultural, fertilisers, spacing, machineries, sowing methods.

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 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 following are the three different types of seed sowing

- **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.
- **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. This saves time and labour and prevents the damage of seeds by birds.
- **Precision planting** is the method of accurate placing of single seeds at about equal intervals in rows and Hill dropping is placing groups of seeds at about equal intervals in rows.
- 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

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

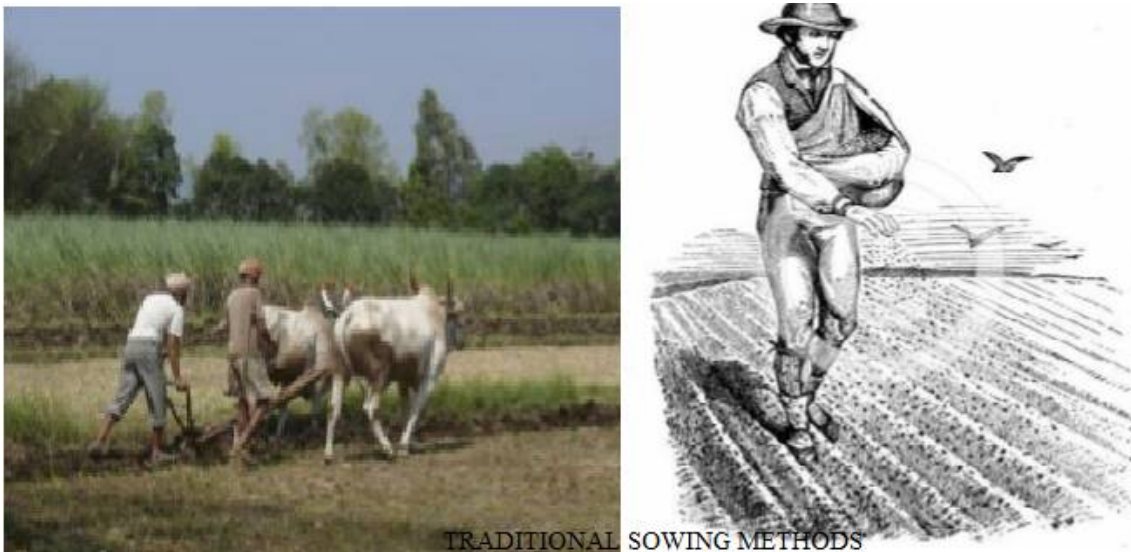


Figure1: Traditional methods of seed sowing

It is observed that lots of problems arise in seeding as mentioned below.

- a) Dependency on ox driven machines.
- b) Musculoskeletal disorders due to sowing by bending and sowing.
- c) High cost for buying and maintaining the equipment.
- d) Handling of equipment due to excess weight of the machineries.

Due to these reasons, the design and development of “Seed sowing machine” has been taken up. Taken care to ensure that the cost of the machine, operational cost and maintenance cost are low. Also to reduce the weight of the machinery to increase the productivity of crop. Various health problems can be minimized. This product is easy to use and less effort required as compared. It is helpful for small scaling farming.

In this survey, we dealt on various methods to approach our idea and also studied about relevance to various engineering solutions. The survey reviles various efficient and alternative methods in order to start upon our idea.

The move from a conventional to a direct seeding system influences four important crop growth factors:

- access to nutrients
- competition with weeds
- access to available moisture
- use of sunlight

Row spacing is the distance from the centre of one seed tube outlet to the centre of the next outlet (Figure 2). Row spacing is related to nutrient placement, weed competition and sunlight. Seeding rate is primarily related to weed competition and available moisture. As a result, row spacing usually changes and seeding rates sometimes change with the move to direct seeding.

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Vol. 6, Issue 4, April 2017

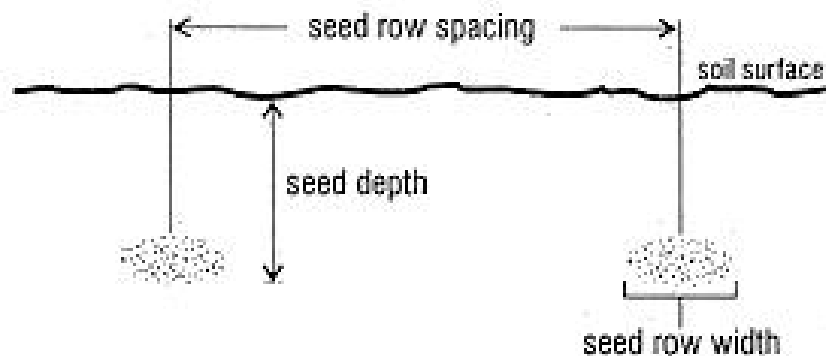


Figure 2: Various parameters involved in seeding.

In direct seeding, the ground between the seed rows is left undisturbed. As a result, fewer weed seeds germinate because they are left in the crop residue at the soil surface.

With most direct seeding systems, fertilizer is banded. Usually, nitrogen is precision-placed at seeding time, about 1 or 2 inches (2.5 to 5 cm) to the side of the seed row or between two paired rows. Thus, the nitrogen is more available to the young growing crop than to weeds, which are further away. The optimum row spacing for your own direct seeding system is needed to get

- Proper Soil distribution
- Proper supply of fertilizers
- To utilize the soil bed effectively.

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.

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Vol. 6, Issue 4, April 2017

Seed name	Diameter(mm)	Vegetable	Distance between plants(cm)	Planting depth (cm)
Arugula	2.5	Asparagus	30	2.5-4
Beet	7.5	Beet	3-5	1.5
Broccoli	3.5	Broccoli	45-60	0.5-1.5
Cabbage	3.5	Cabbage	45	0.5-1.5
Carrot	3.5	Carrot	3-5	1.5
Cauliflower	3.5	Cauliflower	45-60	0.5-1.5
Corn	13.5	Corn	15-25	2.5
Cucumber	9	Okra	30	2.5
Lettuce	6	Onion	5-8	1.5-3
Okra	7.5	Pepper	60	1.5
Onion	6	Potato	25-30	10
Pea	10	Radish	2.5	1.2
Radish	4			
Sun flower	2.5			
Finger Millet	5			

Table [1]: -Diameter of various kinds of seeds. Table [2] Planting depth and distance between the plants.

II. LITERATURE REVIEW

I)Kyada, A. R, Patel, D. B.[2014] focused on the basic requirements for small scale cropping machines are, they should be suitable for small farms, simple in design and technology and versatile for use in different farm operations. A manually operated template row planter was designed and developed to improve planting efficiency and reduce drudgery involved in manual planting method. Seed planting is also possible for different size of seed at variable depth and space between two seed. Also it increased seed planting, seed/fertilizer placement accuracies and it was made of durable and cheap material affordable for the small scale peasant farmers. The operating, adjusting and maintaining principles were made simple for effective handling by unskilled operators (farmers).

Conclusion: This research paper presents seed planter machine. In this they present objective of seed planter machine design, factors affecting seed emergence, some mechanisms. 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. From this we know that mechanical factors effects on seed germination like uniformity of depth of placement of seed, uniformity of distribution of seed along rows. In this power transmission mechanism, seed meter mechanisms, plunger mechanism etc. mechanisms" are used. The working as machine is pushed; power wheel is rotating which transmit power to plunger through chain and sprocket mechanism. From this we get idea that if we use the belt having small holes with defined thickness then it is beneficial for our project.

II)D.Ramesh, H.P. Girishkuma [2014] mainly focused on 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

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 4, April 2017

from crop to crop and for different agro-climatic conditions to achieve optimum yields. Seed sowing devices plays a wide role in agriculture field.

Conclusion: 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. In this multipurpose seeding machine equipment consists of cylindrical shape container in which the seeds can fill. The container is attached on the four wheeled carrier assembly. It consists of metering plate bevel gear mechanism and two holes at the bottom depending on seed size. The working as plate will rotate in container when the bottom holes of container and meter plate hole coincide seeds will flow through pipe to soil. Here the metering plate gets rotating motion by bevel gear assembly and the bevel gears get the motion by rear wheels with the help chain and sprocket assembly.

III) A. P. Rathod, A. V. Gorde, R. K. Gondane [2015] focused on seed sowing and fertilizer placement is the main activity in farming. This paper deals with the various methods of seed sowing and fertilizer placement in India. Here is a comparison between traditional methods of seed sowing and newly designed machine which can perform simultaneous operations in less time and has several advantages. The depth at which seed should be sown and distance between seeds can be maintained by proper seed metering device because depth of seeding has great influence on crop yield. Farming process by using conventional methods takes more time and more labour for seed sowing and fertilizer placement. In today's era availability of labour is becoming great concern. This machine does the work with less efforts and in less time so it reduces cost of labour required for seed sowing and fertilizer placement.

Conclusion: This paper presents design modification in multipurpose sowing machine. In this they present that for sowing purpose we import the machinery which are bulk in size having more cost. To prevent this they design multipurpose sowing machine which consists of hopper, seed metering mechanism, ground wheel, power transmission system, seed distributor, and tiller. A main shaft has a disc with scoops inside the hopper. When the ground wheel rotates the main shaft also rotates with the help of power transmission system. The scoops collect the seed from hopper and leave it inside the seed distributor. The tiller is having very good contact with ground.

IV) Roshan V Marode, Gajanan P Tayade [2013] focused on the seed feed rate is more but the time required for the total operation is more and the total cost is increased due to labour, hiring of equipment. The conventional seed sowing machine is less efficient, time consuming. Today's era is marching towards the rapid growth of all sectors including the agricultural sector. To meet the future food demands, the farmers have to implement the new techniques which will not affect the soil texture but will increase the overall crop production. Agriculture in India has a significant history. Today, India ranks second worldwide in farm output. Still, agriculture is demographically the broadest economic sector and plays a significant role in the overall socio-economic fabric of India. This paper deals with the various sowing methods used in India for seed sowing and fertilizer placement. The comparison between the traditional sowing method and the new proposed machine which can perform a number of simultaneous operations, has number of advantages.

Conclusion: This paper gives types sowing machine. The following are the three different types of seed sowing are broadcasting: 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. 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. Comparing the different traditional seed sowing methods with the proposed machine and considering its limitations, it is concluded that,

- 1) Seed and fertilizer flow rate can be controlled.
- 2) Row spacing and seed spacing process can be achieved.
- 3) Seed and fertilizer utilization can be done in proper manner with minimum loss.

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 6, Issue 4, April 2017

V)Amol B. Rohokale, Pavan D. Shewale, Sumit B.Pokharkar, Keshav K. Sanap[2014] mainly covered that agriculture is demographically the broadest economic sector and plays a significant role in the overall economy of India. For the growth of Indian economy, mechanization is necessary. The main purpose of mechanization in agriculture is to improve the overall productivity and production. Planting is conventionally done manually which involves both animate (humans and draught animals), this result in higher cost of cultivation and delay in planting. The main purpose of this paper is to compare between conventional sowing method and new proposed machine which can perform number of simultaneous operation. The required row to row spacing, seed rate, seed to seed spacing and fertilizers placement varies from crop to crop can be achieved by the proposed machine. This machine reduces the sowing time, human efforts and labour cost.

Conclusion: The paper is to compare conventional sowing methods and modern methods. The required row to row spacing, seed rate, seed to seed spacing can be achieved by proposed machine. The machine reduces the human efforts.

VI)Kalay Khan, Dr. S. C. Moses, Ashok Kumar[2015] focused on manual method of seed planting, results in low seed placement, spacing efficiencies and serious back ache for the farmer which limits the size of field that can be planted. The cost price of imported planters has gone beyond the purchasing power of most of our farmers. This project work focused on the design and fabrication of a manually operated planter sowing for different crop seed that is cheap, easily affordable by the rural farmers.

Conclusion: The need of a poor and small land farmer has fulfilled by the manual operated seed planter. They can easily and effectively plants their seed in the field by these planters.

VII)A. A. Wankhede[2015] focused on the seed feeding rate, the time required to complete the operation, the total cost is also more due to labour 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.

Conclusions: 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.

VIII)Nagesh B. Adalinge, Ganesh P. Ghune, Ganesh B. Lavate [2017] focused The main aim 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. The 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 is carried out and has a number of advantages. As the labour availability has becomes the great concern for the farmers and hence labour cost is more, this machine reduces the efforts and total cost of sowing the seeds and fertilizer placement.

Conclusion: This paper represents the method used and the design of the machine. In this paper main objective is to make seed sowing simple and easy for the farmers. The design is simple and the machine is locally manufactured with light materials. The main objective is to make it affordable to the farmers so that they can manually do their own work without depending on labour. The above mentioned machine increases the efficiency of seed sowing so there by reducing the wastage of seeds and thus improving overall yield.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

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Vol. 6, Issue 4, April 2017

III. METHODOLOGY

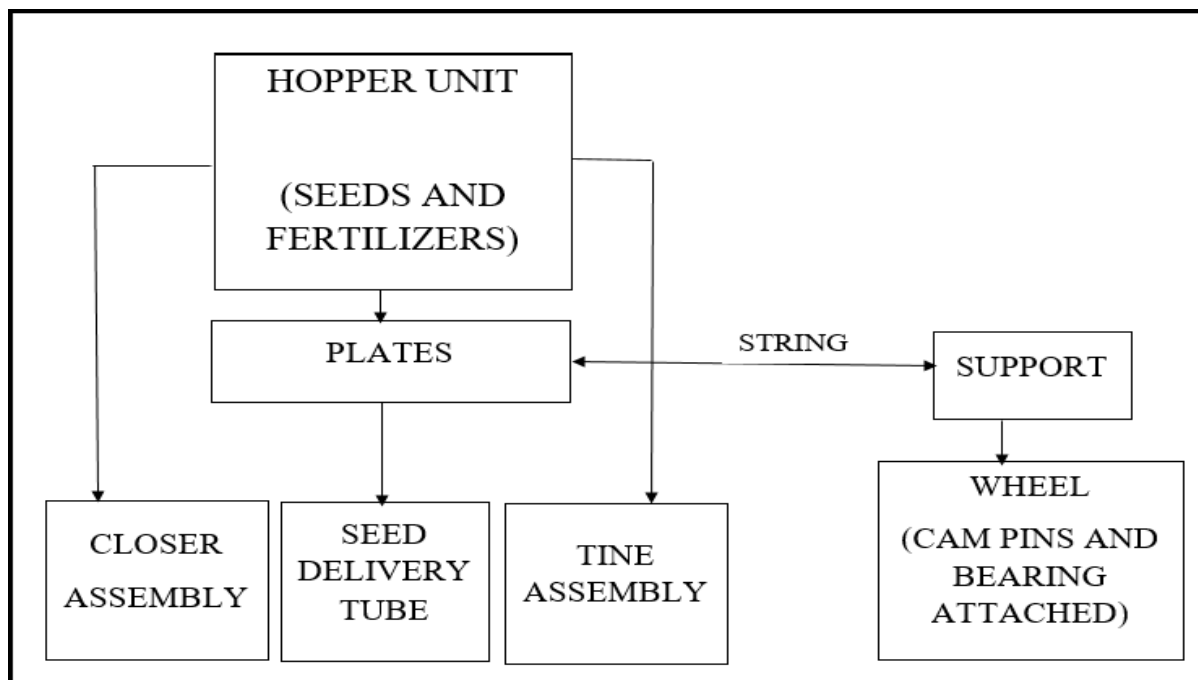


Figure3: Block diagram of seed sowing machine.

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 intrarow distribution of seeds is likely to be uneven resulting in bunching and gaps in field.

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. Labour 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 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 proposed seed sowing machine works on the concept of “string and plate” to reduce the seeds and fertilizer wastage, to sow them at a certain depth which varies from crop to crop and for different agro-climate conditions to achieve optimum yields.

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Vol. 6, Issue 4, April 2017

IV. CONCLUSION

Innovative Seed sowing equipment's has remarkable influence in agriculture. By using this innovative project of seed sowing equipment we can save more time required for sowing process and also it reduces lot of labourer cost. It is very helpful for small scale formers as it weighs less. After comparing the different method of seed sowing and limitations of the existing machine, it is concluded that the this seed sowing machine can

- Maintain row spacing and controls seed rate.
- Control the seed depth and proper utilization of seeds can be done with less loss.
- Perform the various simultaneous operations and hence saves labour requirement so as labour cost, labour time and also save lots of energy

Hence it is easily affordable by farmers. So we feel that this project serves something good to this world and we would like to present it before this prosperous world.

SR.NO	Parameter	Manual	Tractor	Seed sowing machine
1	Man power	More	Moderate	Less
2	Time required	More	Less	Less
3	Sowing technique	Manually	Automatically	Automatically
4	Distance between seed	Not Fixed	Fixed	Fixed
5	Wastage of seed	Moderate	More	Less
6	Required Energy	High	Very high	Less
7	Pollution	NO	More	NO
8	Cost of machine	Less	Very high	Very less

Table [3]:-Parameters comparison between manual and tractor.

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