Design and Fabrication of Semi-Automatic Seed Sowing Vehicle

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ABSTRACT

This review paper present brief information about semi-automatic seed feeding vehicle. The main importance of this semi-automated seed feeding vehicle is to inseminate the seed as per the required depth with certain space and covering the seed with the soil with the help of closing jaw or furrow closer. And this machine is also used for the furrow in order to feeding the seed as per the depth. This semi-automated seed feeding vehicle will not affect the soil, it will increase the overall crop production. This machine reduces the effort and total cost of feeding the seed.

KEYWORDS: seed feeding; furrow; cam shaft; semi-automatic.

1. INTRODUCTION

In this current generation most of the countries don’t have skilled man power in the agricultural sector. Due to that reason we are introduced the semi-automatic seed feeding vehicle it involves all the agricultural requirements like plough, seed feeding as per the distance operated by simple chain mechanism, furrow closer. This vehicle is similar to the tractor but the cost wise, capacity wise different this vehicle available all the farmers with low cost. So, this project helps to minimize the human effort involved in plantation and save the time. This machine will give the perfect plantation with less effort.

MAIN FEATURES OF INDIAN AGRICULTURE:

Source of livelihood: -Agriculture is the main occupation. It provides employment to nearly 61% persons of total population. It contributes 25% to national income.

Dependence on monsoon: -Agriculture in India mainly depends on monsoon. If monsoon is good, the production will be more and if monsoon is less than average then the crops fail. As irrigation facilities are quite inadequate, the agriculture depends on monsoon.

Labor intensive cultivation: -Due to increase in population the pressure on land holding increased. Land holdings get fragmented and subdivided and become uneconomical. Machinery and equipment cannot be used on such farms.

Under employment: -Due to inadequate irrigation facilities and uncertain rainfall, the production of agriculture is less; farmers find work a few months in the year. Their capacity of work cannot be properly utilized. In agriculture there is under employment as well as disguised unemployment.

Small size of holdings: -Due to large scale sub-division and fragmentation of holdings, land holding size is quite small. Average size of land holding was 2 to 3 hectares in India while in Australia it was 1993 hectares and in USA it was 158 hectares.

Traditional methods of production: -In India methods of production of crops along with equipment are traditional. It is due to poverty and illiteracy of people. Traditional technology is the main cause of low production.
Low Agricultural production: Agricultural production is low in India. India produces 27 Qtls Wheat per hectare. France produces 71.2 Qtls per hectare and Britain 80 Qtls per hectare. Average annual productivity of an agricultural labor is 162 dollars in India, 973 dollars in Norway and 2408 dollars in USA.

Dominance of food crops: 75% of the cultivated area is under food crops like Wheat, Rice and Bajra, while 25% of cultivated area is under commercial crops. This pattern is cause of backward agriculture.

2. LITERATURE SURVEY

G. L. SURYAWANSHI ET AL. [1]: In the Indian nurseries often used conventional seeding operation takes more time and more labor. This 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. The conventional seed sowing machine are less efficient, time consuming. Today’s era is marching towards the rapid growth of all sectors including the agricultural sector. To meet the future demands, we have to implement the new techniques will increase the overall production. As day by day the labor availability becomes the great concern for the farmers and labor cost is more, this machine reduces the efforts and total cost of sowing the seeds and fertilizer placement. Theoretical studies regarding pneumatic equipment for sowing small seeds in cups, highlighting the advantages of this type of equipment with superior parameters obtained from the considered crops. Equipment can be used in narrower spaces, being easily to handle and use, of driving the vacuum generator can be done electrically. By using this equipment, the productivity will increase, the space of establishing the seedlings will reduce and the seeds norm will diminish. The germinating, rising and development space of plants is assured, equipment can be automated and built by minimum costs. Conclusion: The conventional seed sowing machine are less efficient, time consuming. Today’s era is marching towards the rapid growth of all sectors including the agricultural sector.

KYADA A ET AL. [2]: This research paper presents design and development of manually operated 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. 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. 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. Now cam is mounted on sprocket shaft which push plunger towards downward direction. Once plunger is penetrating in soil and during backward stroke flapper is opened so seed get separated from plunger and inserted in dig. From this we get idea that if we use the belt having small holes with defined thickness then it is beneficial for our project. As our automatic seed feeder is only for small seeds then using of conveyor belt with motor is useful.

SHIRIPRASAD B ET AL. [3]: This research paper presents information about modern globalization; many technologies are to update a new development based on automation which works very rigidly, high effectively and within short time period. The progressive invention in agricultural system is becoming an important task especial because of rising demand on quality of agriculture products and declining labors availability in rural farming areas. The designed system is seeding and fertilizing agriculture robot using micro controller. The aim of designed system is to seeding fertilizing and soil ph, temperature, moisture, humidity checking. The robot is controlled by remote. The designed system involves navigation of robot is controlled via remote. The robot and remote system are connected through internet system. DC motors are used for navigation of the robot. The speed of DC motor is controlled using controller. The solenoid is used to control seeding fertilizing. This paper gives idea about the automation and use of motor for movement of belt conveyor.

JOSHI ET AL. [4]: This paper presents a system with high speed of operation for an advanced agriculture process which includes cultivation based on robotic platform. The robotic system is an electromechanical (conveys a sense that it has agency of its own) and artificial agent which is steered by DC motor which has four wheels. The farm is cultivated by the machine, depending on the crop considering particular rows & specific columns. The infrared sensor detects the obstacles in the path and it also senses turning position of vehicle at end of land. The seed block can be detected and solved using water pressure. The machine can be controlled remotely and solar panel is used to charge DC battery. Assembly language is used in programming the microcontrollers. The microcontroller is used to control and monitor the process of system motion of vehicle with the help of DC motor. The result of implemented unit is also presented. Conclusion: This paper has presented the requirements and progress made towards achieving a future precision autonomous farming system. The assembly is developed for cultivating ploughed land automatically i.e. less power is required. The blocking of seed problem is eliminated with the help of water pressure. So, this project increases the efficiency and accuracy. The project consists of two different mechanisms. The first mechanism contains making an
assembly of vehicle and its motion, whereas second mechanism is preparing a seed bed on ploughed land. The microcontroller is used to control and monitor the process of system motion of vehicle. It is controlled with help of DC motor and servo motor.

OLIMPIAPANDIA ETAL.[5]: The paper presents theoretical studies and laboratory experiments regarding pneumatic equipment for sowing small seeds in cups, highlighting the advantages of this type of equipment with superior parameters obtained from the considered crops. Equipment can be used in narrower spaces, being easily to handle and use, of driving the vacuum generator can be done electrically or thermally. By using this equipment, the productivity is increased, the space of establishing the seedlings is reduced, and the seeds norm is diminished. The germinating, rising and development space of plants is assured, equipment can be automated and built by minimum costs. Studies and experimental tests relating to the production index, consumption standard, the emerging degree and the plants percentage obtained will be continued. Conclusion: -Driving the vacuum generator can be done electrically or thermally; Depression in installation does not require greater values, because of the seeds small mass; Nozzles holes should represent 0.5-0.6 out of the smallest size of seed. By using this equipment, the productivity is increased, the space of establishing the seedlings is reduced, the seeds norm is diminished; The germinating, rising and development space of plants is assured; Equipment can be automated and built by minimum costs.

3. Methodology of semi-automatic seed sowing vehicle

The semi-automatic seed feeding vehicle works on the simple mechanism, a 2-stroke engine is used in this system which will transfer the rotary motion to the shaft with the help of chain drive. There is another connection between the seed hopper and to the engine i.e. simple chain mechanism connected between seed hopper and the engine. For every one complete rotation of the chain drive the hopper shaft rotates 11 times due to that seed sowing rate will increases. The engine will operate or run in a single gear as our semi-automatic seed sowing vehicle suitable for low speed so that we run our machine in single gear. When the farmer puts seeds into the hopper, seed drops into the seed meter which is control by the chain drive connected between engine shaft and the seed hopper. In order to feed the seed in a single row we are adding one more component that is furrow plough its used to create a plough with certain depth say 18 cm to 20 cm has based on the soil or based on as per the requirement. As the seed meter rotates; The seeds and fertilizers will get placed in the furrows as through the guide pipes and seed drops in the seed pipe, which is connected to the furrow opener for the seeding; there is furrow closer for covering the seeds by soil.

<table>
<thead>
<tr>
<th>Sl. no.</th>
<th>Quantity of seeds in (grams or kg)</th>
<th>Distance Traveled in (cm)</th>
<th>Time in (sec)</th>
<th>Distance Between Adjacent Seeds in (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>73 grams</td>
<td>280</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>148 grams</td>
<td>560</td>
<td>120</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>219 grams</td>
<td>840</td>
<td>180</td>
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<td>4</td>
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<td>1130</td>
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<td>30</td>
</tr>
<tr>
<td>5</td>
<td>365 grams</td>
<td>1400</td>
<td>300</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>438 grams</td>
<td>1680</td>
<td>360</td>
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</tr>
<tr>
<td>7</td>
<td>500 grams</td>
<td>1950</td>
<td>420</td>
<td>30</td>
</tr>
</tbody>
</table>
4. ADVANTAGES OF SEMI-AUTOMATIC SEED FEEDING VEHICLE:

- It maintains the proper row spacing.
- The seeds and fertilizers can be placed at proper depth.
- Seed rate can be controlled.
- The loss and damages of seeds can be controlled by this machine.
- With the help of the innovative seed sowing equipment the seed can be feed into the soil continuously without any restriction while in flowing of seeds.
- Increasing speed of the seed planting.
- Proper compaction over the seed is provided.
- No extra man power required.
- Lesser maintenance cost.
- It’s useful for both composting and seed feeding.
5. DISADVANTAGES OF SEMI-AUTOMATIC SEED FEEDING VEHICLE: -

- When seed is small in size, we need manual effort for setting.
- It is operated on 2s petrol engine so the entire working process dependent on engine only, if engine off the whole process will be off.

6. APPLICATION OF SEMI-AUTOMATIC SEED FEEDING VEHICLE: -

- Purely made for the agriculture purpose.

7. 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 laborer cost. It is very helpful for small scale formers. After comparing the different method of seed sowing and limitations of the existing machine, it is concluded that this semi-automatic seed sowing vehicle / machine can.

- In each complete rotation of rotating wheel there is a seed fall from the seed hopper to the ground through the furrow flow and plantation process takes place smoothly without wastage of seeds.
- 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 labor requirement so as labor cost, labor time and also save lots of energy.

This seed plantation machine has great potential for increasing the productivity of the planting. Till now tractor was the main traction unit for nourishment in farming. With the adaptation of this seed planting machine its purpose will be done. Hence there is need to promote this technology and made available to even small-scale farmers with affordable prices. This machine can be made by raw materials also which saves the cost of whole project and is easily manufactured in available workshops, The only cost is of seed hopper and the engine which is used to run the machine. Hence by using this machine we can achieve flexibility of distance and control depth variation for different seeds. Hence usable to all seeds.

8. SCOPE FOR FUTURE IMPROVEMENT

- Pneumatic power can be utilizing to run the machine.
- Replacing the 2stoke engine with 4stroke engines may increase the efficiency and reduce NOx emission.
- Replacing of 2stroke / 4stroke engine to DC motor can be used to run the machine.
- Alternative fuel such as LPG, CNG, Bio-Fuel can also be used as working fuel for engine.
- Solar power can be utilized to drive the machine.

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