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Review Article

Advancements in Automatic Seed Sowing Machines: A Comprehensive Review and Analysis

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I N F O

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A B S T R A C T

The most crucial step in farming is sowing. It is a labour intensive process that takes a long time and a lot of human work. Here, we suggest creating a completely automated seed-planting robot to complete this operation. Four motors are used by the suggested robot to move it in the required direction. We deposit seeds into a little bracket. The robot has a funnel-like setup that allows seeds to be poured into the lower container. To take up a small amount, we employ a shaft with gears shaped like bucket teeth. The robot's front is made up of a bent plate that drags on the ground to create a slot before seeds are placed inside it. The robot's back is made out of a bent rod that resembles a tail and is used to cover sown seeds with dirt by pouring soil on top of them. As a result, the system used a cleverly constructed mechanical robotic system to fully automate the seed sowing operation.

Keywords: Automatic, Seed, Sowing, Robot, Mechanical Robotic

Introduction

The Indian economy's foundation is agriculture, that will be the case for a very long time. The main goal of sowing seeds is to arrange them in rows at the right depth and spacing, cover them with soil, compact them properly. Row to row spacing, seed rate, seed to seed spacing, depth of seed placement recommendations change from crop to crop and for various agro climatic conditions. The aforementioned requirements should be attempted to be met in order to produce the best yields and an effective sowing machine. Other benefits to be gained from using enhanced machinery for these processes include savings in the costs of labour, time, energy.

Atomic energy was once assumed to be the answer to the world's rising energy crisis, but solar energy has recently emerged as a more effective, secure, safe source of energy. Solar energy-related ideas have been the subject of ongoing, intensive research and development. The main goal is to increase the efficiency and cost-effectiveness of the systems as a whole in order to maximise the energy generated by solar cells. Most solar panels are statistically oriented; they are fixed in place and facing the sky at a particular angle. As a result, the solar panel receives much less direct sunlight over a shorter period of time, which causes the photovoltaic (PV) cells to produce less power.

Using conventional techniques, seed sowing is accomplished by hand-dropping seeds, broadcasting manually, digging furrows with a plough. Traditional seed-sowing techniques have a lot of drawbacks. The goal of this project is to create a multifunctional seed sowing machine that can carry out many tasks at once while also examining various techniques of seed sowing and fertiliser settling in the soil.

A seed sowing machine is a tool that aids in spreading seeds at the desired location, helping farmers save both time and money. In order to help the agricultural business move towards mechanisation, this research examines several

aspects of seed sowing machinery. Due to ignorance and a lack of technological tools and machinery, India's agricultural business is still in the early stages of mechanisation.

Without the requirement for specialised design and tooling, the little machine would be put together from already-existing, mass-produced components. Additionally, this machine uses less energy than tractors or other agricultural equipment. Our daily lives involve seed preparation, but it takes more time, there is always a manpower scarcity. This project suggests a remedy for the problem.

Literature Review

According to Klocke (1979), two experimental planters were constructed, one utilising a smooth coulter and the other using a coulter with rippled edges. Openers came after both kinds of coulters. As long as the seed was sown in sufficient soil moisture, the drills performed satisfactorily. A manually driven seeding attachment for an animal-drawn cultivator was created by Kumar et al. in 1986. The field's capacity was 0.282 ha/hr while the seed rate was 43.2 kg/hr.

A two-row Okra planter that may be manually operated was created by Bamgboye and Mofolasayo in 2006. Field capacity and efficiency were 71.75% and 0.36 ha/hr, respectively, while the seed rate was 0.36 kg/hr with only an average seed loss of 3.51%. A straight paddy seeder made by Gupta and Herwanto in 1992 was designed to work with a two-wheel tractor. The machine's field capacity was around 0.5 ha/hr at a forward speed of 0.81 ml/s, the metering mechanism did not damage soaked seeds, however pregerminated seeds did sustain 3% damage.

According to Laukik P. Raut's research, agriculture must be modernised in order to fulfil the demands of an expanding population and a rapidly industrialising world. Mechanisation makes it possible to conserve inputs by assuring accurate metered distribution, lowering the amount required for a better response, preventing losses or wastage of applied inputs. Through increased productivity and input conservation, mechanisation lowers the production unit cost.

The review by D. Ramesh and H. P. Girish Kumar provides a summary of the numerous sorts of advances made to seed sowing machinery. The primary goal of a sowing operation is to arrange the seeds in rows at the correct depth and seed-to-seed spacing, cover the seeds with soil, apply the proper compaction over the seeds. For each crop and for various agro-climatic conditions, variable row-to-row spacing, seed rates, seed-to-seed spacing, depth of seed placement are advised in order to produce the highest yields. Devices for sowing seeds are widely used in agriculture.

A manually operated two-row okra planter made from locally accessible materials was put to the test by Bamgboye and Mofolasayo. With a field efficiency of nearly 72%, the planter had a field capacity of 0.36 ha/h. This paper discusses the design of sophisticated manually operated multi-crop seed planters, as well as the pros and cons of each way of use and the steps involved in creating these planters for the benefit of low-income farmers.

Materials and Methods

SOWING SEEDS

When sowing seeds, its important to prepare the soil ahead of time. In the fall or spring amend the soil with compost or composted manure. Dig it in! The soil should be forked over 6 to 8 inches deep. If you are starting a new vegetable patch, wait a week after you have turned the soil to plant. This will allow weed seeds to germinate, which can be hoed out of the bed before you plant. Read the package for specific planting directions, but the general rule for planting seeds is at a depth 2 to 3 times the diameter. Make little furrows with the edge of a hoe, a stick, or your finger before planting your seeds. To ensure that the plants receive equal sun exposure, your vegetable rows should be laid out from north to south. The rows should be spaced apart sufficiently to enable room for the plants when they are fully developed. Leave an extra 12 to 24 inches between rows if you intend to walk across them.

When you plant the seeds in the furrow, space them equally. One simple method is to gently crease one side of the seed packet and shake the seeds out of the resulting V. Finding an old salt shaker with holes big enough for the seed to fall through is another option. No matter how carefully you plant the seeds, you will need to thin the seedlings. If some of the seeds fail to sprout, it is preferable to start with more than you need than fewer. To ensure good seed-soil contact, cover the seeds, tap the soil softly, then sprinkle them with water. Check everyday to see whether they need water if it isn't raining; the soil should remain moist. Until they sprout, water with a rose-adorned watering can. To ensure that the seeds are not moved by the pouring water, gently swing the watering can from side to side. Sprinklers are acceptable once the garden has taken root, but not at first when small seeds are buried just below the soil's surface.

Selective Harvesting

The idea behind selective harvesting is to only take crop sections that pass specific quality standards. It can be viewed as a particular form of sensory-based pre sorting. Examples include choosing and harvesting fruits and vegetables that fulfil a size requirement, combining grain that is dry enough (and leaving the remainder to dry out), only harvesting barley below a specified protein percentage. Increased economic rewards could justify the extra sensing because these characteristics frequently fetch quality premiums. Two requirements must be met in order for selective harvesting to be successful: the ability to detect the quality factor

prior to harvest, the capacity to harvest the desired crop without causing damage to the surrounding crops. The majority of agricultural equipment is growing larger and is not suitable for this method. Equipment for selective harvesting needs to be more compact and adaptable. Before harvest, the crop can be surveyed to gather the necessary information about the location of the crop of interest, or the harvester may have sensors mounted to determine the crop status. The crop that is ready can then be harvested by the selective harvester, leaving the rest to develop, dry out, or ripen, for example. A stationary processing system that could clean, sort, maybe pack the product could be utilised as an alternative to using small autonomous whole crop harvesters to selectively collect the entire crop from a chosen region. This is an updated version of an old technique that employed stationary threshing machines. The cereal heads could also be collected separately and sent for threshing using a stripper header.

Dibbling

It involves scattering or putting seeds at (+) cross-marks that have been produced on the field with the aid of a maker according to the needs of the crop in both directions. By a dibbler, it is done manually. This approach is used for crops like groundnut, castor, high-value cotton, among others, that are large and valuable. When there is a limited quantity of seed, this strategy is employed. 'Dibbler', a little tool, is used to assist in sowing. It consists of a pegged timber or iron frame. One or two seeds are manually put into each hole once the frame has been driven into the ground and raised.

Comparitive Performance of Seeding Devices With Other Sowing Methods

The cylindrical shape container is the main piece of equipment in this multipurpose seeding machine. The four-wheel carrier assembly is where the container is fastened. Depending on seed size, it has two holes at the bottom and a measuring plate bevel gear mechanism. When the bottom holes of the container and the metre plate coincide, the working plate rotates in the container and the seeds flow down the pipe into the soil. Here, a bevel gear assembly rotates the metering plate, the bevel gears are propelled by the rear wheels with the aid of a chain and sprocket assembly.

Crop Yield

Due to enhanced plant establishment and proper input application, studies in various regions of the country have revealed that seeding devices implemented in rainfed areas have increased agricultural yields by 10 to 20 percent above conventional techniques of seeding. Seed drills are generally employed in the Southern regions of India, but most of North India uses seedcum fertiliser drills for sowing.

Energy Saving

When compared to behind the plough sowing, it was stated that employing a three row bullock drawn fertilised seed drill for wheat crop resulted in savings of 76.37 percent man hours and 59.92 percent bullock hours. (1970; Mehta and Varshney) According to Singh (1971), employing a ferti-seed drill for a wheat crop resulted in savings of 69.96% in labour hours and 55.17% in bullock hours.

Drilling or Line Sowing

By using a seed drill or fertilised seed drill, seed is sown using this technique. With the aid of this tool, seeds are dropped at a consistent depth, which leads to regular germination and stand. For the usage of a seed drill or fertilised seed drill, the seed bed needs to be smooth, level, free of weeds and clods. Drills for planting seeds are widely found on the market. They could be propelled by a tractor or a bullock. Wherever practical, a fertiliser drill should be used to achieve consistent planting depth, optimum fertiliser placement, optimal germination.

Putting Seeds through Behind

Most farmers employ this technique. This technique entails manually placing the seeds into the furrows that a local plough has created. The "Kera" method refers to manually placing seed in a furrow, the "Pora" approach refers to using a Hazara attachment with a local plough. With this technique, seeds are deposited at a depth of 5–6 cm, germination is successful. Manual sowing has the drawback of not providing appropriate space between rows and plants, resulting in fewer crops being produced than is advised by agronomists. There is also the issue of properly spacing the seeds and covering them with soil.

Result

In order to reduce the amount of labour required from humans, a seed-sowing machine has been conceived, built, is now ready for use.Using a secure low voltage circuit, a relay is utilised to control a high voltage circuit.The power flows through the circuit as soon as all connections are established and the circuit is closed, the machine uses switches to operate in the forward direction.As the machine travels forward, the cultivators tilt the soil, through a distributer mechanism made up of a hopper and a seed flow system, seeds are deposited into the soil at regular intervals. Thus, by maintaining a consistent space between rows of seeds and automating the model fabrication, farmers' challenges have been overcome.

Conclusion

The productivity of planting might be greatly increased by using this seed plantation machine. Up until this point,

the tractor served as the primary traction device for agriculture. The purpose of this seed-planting equipment will be served by its adaptation. Therefore, it is necessary to promote this technology and make it accessible so that even small-scale farmers can use it. This machine can be simply constructed in accessible workshops and can be made from raw materials as well, which lowers the cost of the entire project. Therefore, we may obtain flexibility of distance and control depth modification for various seeds by utilising this machine. Thus, applicable to all seeds. By utilising this project's seed-sowing machinery, we can speed up the sowing process and cut down on manpower costs significantly. Small farmers benefit greatly from it. After contrasting several seed-sowing techniques and the shortcomings of the competition, it has been determined that this solar-powered seed-sowing device can:

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

References

1. Adisa AF, Braide FG. Design and Development of Template Row Planter *Transnational Journal of Science and Technology* 2(7): 2012.
2. Rolando Automatic Seed Planter Punching Type, *International Journal of Emerging Technology & Research* 1(3): 2014.
3. P.P. Shelke:-"frontline demonstration on bullock drawn planter enhances yield of soya bean crop."International journal of farm science 2011
4. Mahesh R. Pundkar":-"A seed sowing machine: A review" IJESS volume 3, Issue 3. ISSN: 2249-9482, International journal of engineering and social science.
5. Enhanced agriculture robotic system‟ by Mr.Sagar R. Chavan , Prof. Rahul D. Shelke, Prof. Shrinivas R. Zanwar, International journal of engineering sciences & research technology, ISSN: 2277-9655 Scientific Journal Impact Factor: 3.449 2015.
6. Shivarajakumar. a1, parameswaramurthy ,Design and development of wheel and pedal operated sprayer‟ by, Volume 2, Issue 6, June 2014.
7. Kyada A, Patel DB. Design and development of manually operated Seed planter machine‟ , 5th International & 26th All India Manufacturing Technology, Design and Research Conference (AIMTDR 2014) December 12th–14th, 2014.
8. Aditya Kawadaskar SS. Chaudhari2, Aditya Kawadaskar ,Review of methods of seed sowing and concept of multi-purpose seed sowing machine‟ by, IJPRET, 2013;
9. Mahesh R, Pundkar AK. Mahalle, "A SeedSowing Machine: A Review" International Journal of Engineering and Social Science, Volume3, Issue3, Pp68-74
10. Laukik P. Raut, Smit B. Jaiswal and Nitin Y. Mohite, "Design, development, fabrication of agricultural pesticides. with weeder", International Journal of Applied Research and Studies, Volume 2, Issue11, 2011.