

Analysis of the Application of Seed Sowing Device for Improvement in the Agriculture Production

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ABSTRACT: India is an agriculturally based country where different personalities belong to various communities and coexist. The majority of Indian farmers are small-scale producers, and due to the high cost of sowing equipment, the farmer would be unable to employ such devices. Thus, the equipment on the market is largely tractors, robots, and so on. These devices are useful and inexpensive for large-scale farmers, but not for small-scale farmers. As a result, small-scale farmers choose conventional methods to save the costs of fuels necessary to power such devices, as fuel prices rise in the worldwide market. The research is carried out to comprehend the operation of various machines on the market, as well as the operation of a device with various seed samples from various seasons. As a result, there is a requirement for machinery that is inexpensive, simple to run, requires little maintenance, and can do numerous seed sowing procedures simultaneously to save the farmer money on labor. The goal of the device is to improve farming more comfortable for local producers by increasing production while decreasing labor costs.

KEYWORDS: Agriculture, Fertilizer, Soil, Seed Sowing, Semiautomatic.

1. INTRODUCTION

India is a place of biodiversity, agriculture, and a rapidly expanding population. As the world's second most populous country, it also ranks second in agricultural production. India exports a variety of agricultural goods, including cash crops, fruits, millets, dry fruits, grains, oilseeds, herbal, and spices. Farming is still regarded as the major and primary vocation in some sections of the nation since there is no other source of income owing to a lag in the growth of industrialization. India is a developing nation, not a developed one. Because of the high prices of mechanized equipment on the market, as well as a lack of understanding among farmers, the old approach is still in use worldwide for seed sowing [1]–[3].

Traditionally, planting was done manually using labor, but the adoption of bullocks transformed the entire concept of farming throughout history, improving farmer development and production. As labor costs rise, so does the usage of bullocks, but feeding management forces farmers to minimize the number of bullocks. Reducing the usage of bull or oxen increases the number of automatic machinery such as tractors, reducing the need of traditional agricultural methods as shown in Figure 1. The main act within agriculture is seed planting; a proper depth of seeds in the soil promotes seed fertility and productivity. Ample water, sunshine, and fertilizer use are critical

to agricultural output. It is critical to the Indian economy since agriculture employs more than half of the population [4]–[6].



Figure 1: Represents The Seed Sowing Process Using Tractor In Ancient Times. [Source-Wikipedia]

Seed planting methods are widespread in India, with varied locations based on climate and occupancy. Although the techniques change, food remains a basic necessity of all living beings. Thus, seed planting is one of the most fundamental and fundamental jobs of each farmer inside the farming activity. As a result, the machinery utilized throughout the country are the same. Different groups do research all across the world to study land production and ways to increase it. However, it is not practical for everyone to employ modern farm equipment due to a lack of understanding, high maintenance costs, a high initial cost, as well as a lack of an adaptable attitude toward change [6].

Farmers' abilities are evolving as a result of technological and intellectual improvements. There are several ways and equipment that are available to make farmers' lives easier in order to boost yield. Some gadgets are automated, robotic, and use artificial intelligence, while others are semiautomatic and manual. The gadgets are intended to provide comfort to farmers by minimizing the amount of physical energy, labor costs, and fertilizer overuse. However, pleasure comes at a cost; machines have high market costs since advanced and clever technology are applied. Although the methods and technologies are mechanized and bound by a little chip, the country is still growing, thus few can utilize such technology [7]–[9].

Farmers primarily employ tractors since they cannot afford to purchase modern machinery. However, due to worldwide market problems, the cost of fuels has skyrocketed, forcing farmers to seek other means of seed planting. To create a semiautomatic apparatus capable of performing manual seed sowing tasks in any kind of soil. A device capable of repeated seed sowing by delivering a suitable amount of fertilizer to the soil and lowering a farmer's labor and equipment

costs in order to improve profits by enhancing land productivity and efficiency. Building a low-cost, low-maintenance technology that any untrained individual can run [10].

The purpose of this research is to examine various elements of direct seeding and seed sowing devices. The literature research is conducted to comprehend recent advances in agricultural techniques and what is being done to address farmer difficulties. Different components are put together to create the seed sowing equipment based on the needs of the farmers. Throughout the year, different planting samples are collected for evaluating the device in order to understand how it works and how effectively it works. As a result, the world need a new approach, method, or equipment that is inexpensive, simple to use, requires little maintenance, and is highly efficient. The equipment that provides some all answer for the farmers is preferred the most.

2. DISCUSSION

Research into diverse agricultural practices and the usage of machineries, including various seeds and their spacing when planting from one another. Machine design, production, and assembly utilizing design modelling software. The many seed samples are gathered and placed in the device, making it simple to understand the gadget's true functioning. Thus, the motorized machine built may execute digging prior to planting and is appropriate for cropping fields to boost the farmer's land production. The developed equipment is suitable for repeated cropping, increasing farmer production.

The goal of the project is to create an autonomous seed sowing robot capable of transporting seeds and fertilizer while executing seed planting operations. The Arduino is used to automate the robot and increase its usability. The design was created with design tools and built in a workshop. To test the device's operation, seed specimens of soybean, and groundnut was placed in its container. Because physical work is more costly and time-consuming for any farmers. The end result was the creation of a farming robot that a user could operate from a single location. The robot is excellent for reducing labor expenses, but it comes at a hefty initial cost.

The gadget was created to reduce the personnel and mechanical machinery costs associated with seed planting. The groundnut, maize, sunflower, and toor seeds are tested for a year after the seed sowing apparatus is manufactured and assembled. The semiautomatic seed sowing apparatus includes a traction system, seed metering system and power system. The operation must be carried out for three rows. The observed effects include a decrease in seed planting and increased production. The semiautomatic gadget is convenient and simple to operate as shown in Figure 2.

According to the report, numerous persons from various localities have conducted seed planting research. It has been noticed that while the gadgets on the market are beneficial, they do not meet the demands of customers or farmers. Automatic devices are expensive, and manual ones are inefficient. As a result, there is a requirement for a machine that makes seed sowing easier for farmers, is straightforward to use, and has minimal maintenance and starting costs.



Figure 2: Illustrates The Simple Seed Sowing Process For Any Machine Working.

According to the study's findings, mustard seeds and sesame seeds, which are tiny in size, may cover a vast amount of land, but maize seeds cover a smaller area due to their larger size and weight of seed. Maize seeds may be sown more quickly with the gadget. The gadget research clarifies the advantages of utilizing the equipment, which really is time-saving, enhanced efficiency, minimal maintenance, and user-friendly. Labor costs are minimized, resulting in cost savings. Many automatic devices exist in India, however individuals are unable to utilize them due to their exorbitant pricing, whilst manual equipment are time-consuming to farmers.

Germination was greatly enhanced by the introduction of the seed drill. A set of runners spaced within the same length as the ploughed furrows were used in the seed drill. First before seed was dropped, those runners, or drills, expanded the furrow to a consistent depth. While behind drills were indeed a number of presses, which were metal discs that chopped down the edges of the trenches in which the seeds were placed, covering them. This breakthrough gave farmers exact control over the depths during which seeds were placed. Because of this increased level of control, less germinated seeds early or late, and seeds are able to take full use of soil available water in a planned seedbed.

Farmers may use the seed drill to plant seeds in very well rows at precise depths and seed rates; each tube produces a hole at a certain depth, falls in one or even more seeds, then fills it up. This technology provides farmers far more flexibility over the depth at which the seed is placed, as well as the capability to cover those seeds without having to backtrack. As a result, germination rates increase and crop output increases (up to eight times). Weed management is further aided by the utilization of a seed drill. Broadcast sowing produces a periphery of crop cultivation, making weed management difficult using methods apart from hand weeding. A seed drill-planted field is considerably more consistent, often in rows, and allows for weeding with a spade during the growth season. Trying to weed by manually is time-consuming and inefficient. Because poor weeding affects crop output, this advantage is enormous.

The examination of several gadgets enabled one to comprehend their advantages and disadvantages. Automatic and robotic technologies are costly, and the average man or farmer cannot afford them. Manual devices need more time and energy, as well as more effort. Semi-automatic devices are both user and machine operated, but their operation and design are difficult, therefore maintenance costs are considerable. To address all of these concerns, a semiautomatic seed sowing equipment was developed, which not only lowers labor costs but also improves production through minimal maintenance and high efficiency.

3. CONCLUSION

The technology is usable and has the potential to cut the costs of small-scale producers/farmers. The gadget result analysis indicates that now the distance travelled is greater and the production is higher due to the seed's proper depth in the soil. The separate seed and fertilizer chambers make it easier for the user to utilize the gadget. The time needed is less, but the work done by the machine is more. The consumption of fertilizers is easily reduced due to collector changes based on soil condition. When there is no requirement for fertilizers again for soil, the fertilizer box is utilized for seeds, using additional land. The device's handling, functioning, and running is smooth for the user, with cheap maintenance and initial expense. The gadget may also be used by an inexperienced individual because the mechanism is basic and easy to grasp, allowing any user to fix it. The gadget may be attached to automatic moving equipment such as tractors for seed sowing, lowering the cost of the seed harvest machine. The presence of a motor causes the gadget to operate automatically. Farmers prefer it to other devices due of the device's design and process.

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