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Multipurpose Agriculture Machine

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Abstract: The economy of India heavily reliant on agriculture, which employs a significant part of its population and contributes significantly to GDP. The industry, however, faces multiple barriers that keep it from achieving its full potential. One of the challenges is non-adoption of modernization and mechanization particularly by small and marginal farmers who constitute a significant portion of the farming community. This results to limited productivity in most cases because their chances for accessing modern agricultural technologies, machinery and equipment are very low. This raises the question about whether Indian Agriculture has poverty issues that require multi-functional machines for it to remain viable as an enterprise performing such functions as ploughing, seed sowing, water Sprinkling at lower prices resulting in increased output and overall development of agriculture in India.

Index Terms **– Indian Agriculture, Multi-functional agricultural machine, Agriculture Development, Small and marginal farmers**

I. INTRODUCTION

In an era where agriculture is not a just source of livelihood but a force behind worldwide economies, the need for modern options to enhance agricultural productivity and sustainability has never been more pronounced. The multipurpose agriculture device we present in this venture represents a significant step towards addressing these challenges.

"A person without meals for three days will quarrel, for every week will fight and for a month or so will die." Agriculture is a branch of applied science. Agriculture is the technology and art of farming including cultivating the soil, producing vegetation, and raising livestock. It is the most vital industry in the world.

India's agricultural panorama is great and extraordinarily varied, consequently, small-scale farmers regularly must cope with numerous challenges and because of a lack of finances, they cannot get superior farm machinery like tractors. price-powerful solutions are essential, and this presents the idea of a Multipurpose Agricultural gadget that has been developed for small-scale farmers. Modem agricultural strategies and gadgets are not used by small landholders due to the fact those systems are too costly and tough to accumulate. By adopting modern farming strategies, we can get maximum yield and top-quality plants that may keep a farmer from going bankrupt, but many farmers nonetheless use the primitive technique of farming techniques because of a lack of expertise or lack of investment in utilizing modern devices. the usage of hand tools for land cultivation remains predominant in India due to the fact tractors require resources that many farmers do not have easy entry to. The want for agricultural mechanization in India ought to consequently be assessed with deeper know-how of the smallholder farmer's activities.

It is a revolutionary machine designed for ploughing, watering, and sowing seeds to provide a holistic solution to for resource-limited farmers.

Features of Indian Agriculture

1. **Source of livelihood:**
   Agriculture is the main occupation. It provides employment to nearly 61% persons of total population. It contributes 25% to national income.[10]

2. **Monsoon dependent:**
   Due to lack of irrigation facilities Two-third of Indian agriculture is dependent on monsoon rains.[11]

3. **Labour intensive cultivation:**
   Due is increase in population the pressure on land holding increased. Land holdings get fragmentated and subdivided and become uneconomical. Machinery and equipment can not be used on such farms.[10]

4. **Variety of crops:**
Due to the presence of different types of topography, diverse soil (like alluvial, red, black cotton soil, etc), and different types of climates, India is blessed with the production of different varieties of crops in different regions. For eg., hilly areas are suitable for tea cultivation, plains for rice cultivation.[11]

5. **Traditional methods of production:**
In India methods of production of agriculture along with equipment are traditional. It is due is poverty and illiteracy of people. Traditional technology is the main cause of low production.[10]

6. **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 labourer is 162 dollars in India, 973 dollars in Norway and 2408 dollars in USA.[10]

II. LITERATURE SURVEY

1) Shivam Rai., et al., [1], [2021].
In this Research paper they have been discuss about the Village artisanship in black-Smith carpentry and stone contributed to the development of Farm tools, such as counterpoises and earthenware for irrigating crops. Farming is the backbone of the Indian economy, requiring field work and spraying for a pest protection multipurpose agriculture equipment (MAE) was developed to improve the labor productivity and quality of a work to improve the efficiency, information Technology can utilize to develop a intelligent machine reduce energy Input and target energy more effectively. This new concept offers opportunity to develop a new range and agricultural equipment.

2) Akanksha Mande., et al., [2], [2020].
In this Research paper they have been discuss about the India has agricultural with the 70 to 75% population primarily engaged in agriculture. A multipurpose farming machine is being developed for a three operation: digging ,seeds sowing and pesticide spraying. The machine uses an Iron plough tool for a soil losing and two rows of seed are Sowed per operation. This affordable low-cost machine can increase crop productivity.

3) Mr. Muruganantham S.., et al., [3], [2021].
In this Research paper they have been discuss about the Multipurpose Agricultural Machine is used to ploughing the agricultural field and sow the seeds into the land for making lots of plant production in field. The model is proposed with the objective of establishing a ploughing, seeding and spraying processing. It is a mechanical device, in which the spraying machine is used to spray the water and chemicals to protect the plant. It also increases planting Efficiency and accuracy made from raw materials so it is much cheaper and more suitable for small-scale farmers. The advantage of this method, it reduces seeding and spraying time in land and reduces human effort.

4) Mr. Dilip Radkar .., et al., [4], [2021].
In this Research paper they have been discuss about the field faces some problems such as how to minimize the losses, how to increase productivity and how to minimize cost.In India, two types of agricultural methods are used, manual method (conventional method) and mechanize type method. In Manual method they are working with those equipment's was tedious and laborious. Mechanization involves the use of a hybrid device between the power source and the work. This hybrid device usually transfers motion, such as rotary to linear, or provides sample of mechanical advantages. There are variety of machines are available for almost every task in agriculture. Beginning with preparing land to the harvesting of crop and further process can be done by machines. This machines not only easier way to do this task but also very efficient. The agriculture machineries that are used now days are costlier and cannot be afforded by most of farmer with rural background. Most of the farmers in India own very small pieces of land and owning these costlier machines may not be feasible for them. The fact that most of the farmer are low level income earners, they cannot invest on the purchase of large machine. Considering above mentioned factors there is need to develop such an equipment, which will be of multiple use and especially will be of low cost.

5) Hanumesha Pujar., et al., [5], [2020].
In this Research paper they have been discuss about the Work has been carried out to design and fabricate a multipurpose agricultural vehicle, to perform agricultural operations like goods carrying, pesticide spraying, inter-cultivating, ploughing. Use of hand tools for cultivation is still leading in India because tractors need resources which many farmers cannot afford. The need for improvisation in agriculture is very much essential, it is important to fill the gap between farmers and technology implementation. But most of the necessary components already exist, the information about the availability and performance of equipment is very poor between farmers and agricultural research and development departments. From the recent years the input to the farms increased such as fertilizer, insecticide, pesticides, HYV seeds, farm labor cost etc. Increase in the cost makes small land holding farmers at a risk. Due to this lack of information suicide rate is increasing yearly, we need to identify the common factor for this. Commercialization of the landscape along with large reduction in investment in agriculture was the beginning of the decline.

6) Kadole Pavan Prabhakar., et al., [6], [2021].
At present famers pay a lot of money on machines that work with them decline work and increment yield of harvests. The Multipurpose machine is accustomed to planting the seeds and manure shower into land and seed planting for making heaps of plant creation in rural field. As there is huge advancement in the field of designing the current situation makes us to discover answer for serious issues looked by the farming field. The greater part of the Farmers in India is affordable frail because of which they cannot buy work vehicles and other expensive hardware's subsequently they utilize conventional strategy for cultivating. So, work has been

completed to plan and manufacture a multipurpose agribusiness vehicle, to perform rural tasks like furrowing, seed planting and showering of pesticides or water utilizing the sun- oriented energy.

III. PROBLEM DEFINITION

The other conventional practices may require farmers to employ separate machines for seed sowing, water spraying and ploughing which is expensive and time consuming.
This has led to the need for a combined machine that can perform all these tasks as it is highlighted by the following:

1. Multiple Machine and Labor: Concerning traditional practices, different machines and human resources are used in different activities like seed sowing, pesticide spraying, water spraying, and ploughing.

2. Operational Efficiency: The lack of one machine makes farming inefficient because farmers have to switch from one machine to another thereby lowering its productivity on average.

3. Precision and Accuracy: Individual machines cannot be precise enough hence they affect the general quality of agricultural operations as well.

4. Time Management: Consecutive use of different machinery takes time; this affects the whole efficiency of farming.

IV. OBJECTIVES OF THE RESEARCH

The main purpose of this task is to design, develop, and make a special farm vehicle exclusively for the essential services of seed sowing, ploughing, and water sprinkling. The desired machine should have a ploughing mechanism for effective soil preparation, a seed tank with a controlled release system to ensure uniform seeding and a water sprinkling component that will optimize seed germination. In focusing only on these fundamental aspects, the project tries to provide an automated solution to farmers hence increasing efficiency while minimizing human intervention in terms of manual labor during ploughing, seed sowing or water application in agricultural fields.

V. METHODOLOGY

To develop the Multipurpose Agriculture- Machine using step-by-step plans and procedures. This helps it fit with modern farming's growing demands Once its motor Starts off, this machine- gets to work. It moves forward executing tasks.

This Machine as three Features: - 1] Ploughing, 2] Seed Sowing, 3] Water Sprinkling

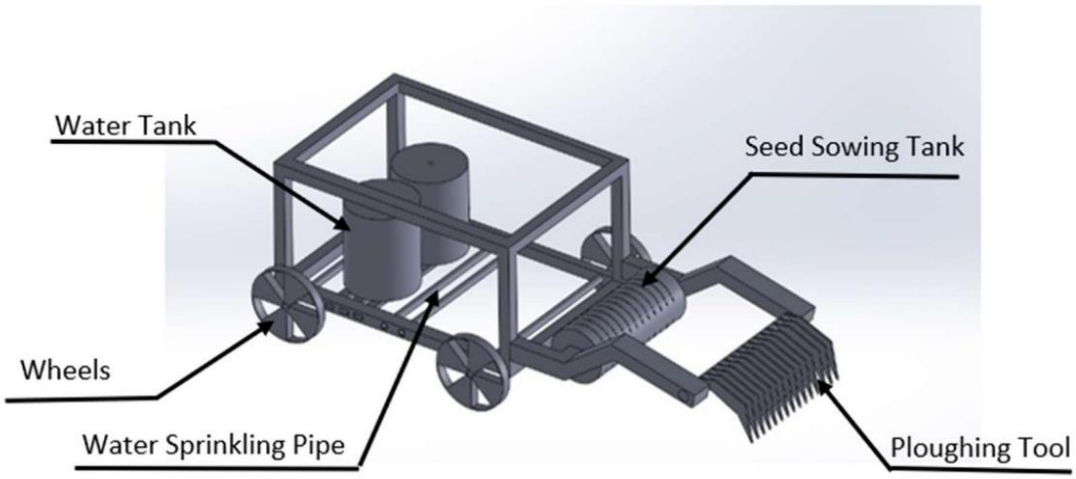

Fig 1 Operation of Multipurpose Agriculture Machine

1] Ploughing Tool: - Soil cultivation is the main purpose in farming having a strong ploughing tool in Multipurpose Agriculture Machine with a robust tool. It is used to break and turn over soil, making it a good seedbed for planting, while mounted on an agricultural machine.

2] Seed Sowing Tank: - The machine has a seed sowing tank which is the major component for accurate and efficient planting. Seeds are kept in a round vessel. When ploughing is done, then seed sowing operation starts, small holes on the tank release seeds at regulated periods as the vehicle moves through the field. This ensures even distribution of seeds and correct spacing thus maximizing crop yield.

3] Water Sprinkler: - The Multipurpose agriculture machine has the task of sprinkling water for irrigation and performs it well as one of the three tasks. Just connect to a source like an irrigation system or pump crops will uniformly receive water. This method saves water when irrigating plants. The switch of the on-board pumped water is integrated into the system thus making control of the whole irrigation process easier. An operator can turn on or off this pump any time soon, so that watering proceeds more effectively. This function facilitates regulation over irrigation against modern methods in agriculture. As far as supporting good crop growth.

VI. Working

The Multipurpose Agriculture Machine boasts a brilliant design with three distinct capabilities: ploughing, seed sowing, and water sprinkling. It operates efficiently with a single torque motor that drives the machine forward. Here how to works:

Upon activating the torque motor switch, the machine moves forward, with the torque motor providing power to the rear axle. Ploughing begins automatically as the machine moves forward, utilizing the torque form the motor. As machine move forward, the ploughing tool at the front of the machine effectively cultivates the soil, creating an optimal seedbed.

The seed sowing operation is done when following ploughing operation is complete then seed sowing operation starts. One sprocket, located at the front axle connected via a chain to second one sprocket to the seed tank which is designed in circular shape. As the torque motor propels the machine forward, both sprockets at the front and rear axles rotate, Ensuring consistent and controlled release of seed through the small holes in circular shape seed tank.

To sprinkle water, just put on a water pump switch. The only thing that happens when you put on that pump in motion is that it forces water to move from its source through pipes into sprinkler using a water pump. This promotes metered watering thus enhancing proper crop growth.

VII. EQUIPMENT TO BE USED

Sr.No	Component	Description
1	Chassis	Mild steel framework providing structural support.
2	Torque Motor	Powers the wheels for mobility.
3	Water Pump	Facilitates water spraying for irrigation.
4	Battery	12-volt power source for torque motor and pump.
5	Wheels	Drive the machine for mobility.
6	Seed Tank	Metal sheet tank for seed storage and mechanism.
7	Control Panel	Two-switch interface for torque motor and pump.
8	Water Tank	Stores water for irrigation.
9	Chains and Pulleys	Transmit power from motor to axles.
10	Pipes	Convey water from tank to spray points.
11	Wires	Electrical connections for power distribution.

Table 1: Equipment's

VIII. DESIGNING IN PARAMETRIC SOFTWARE

We used SolidWorks software to create a detailed 3D model of what the finished product would look like, creating individual elements and them fitting them together. In manufacturing, every single component of a machine is separately built in accordance with given features and then integrated to make an operational unit.

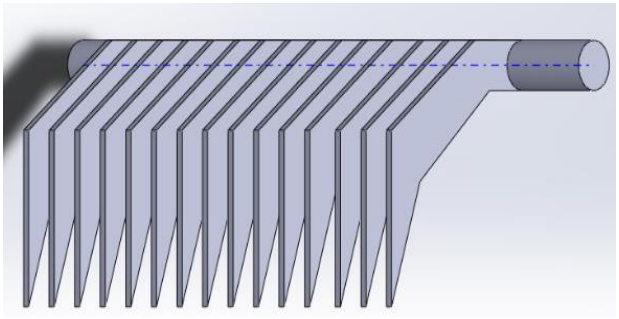

Fig 2: Ploughing tool

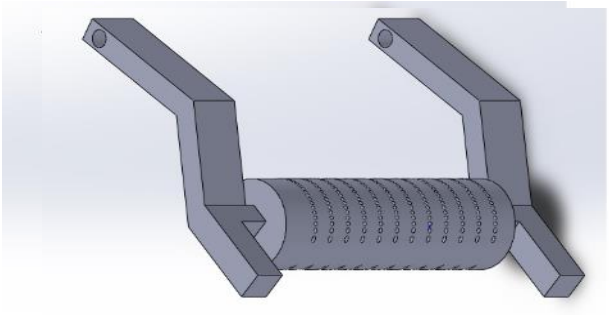

Fig 3: Seed tank

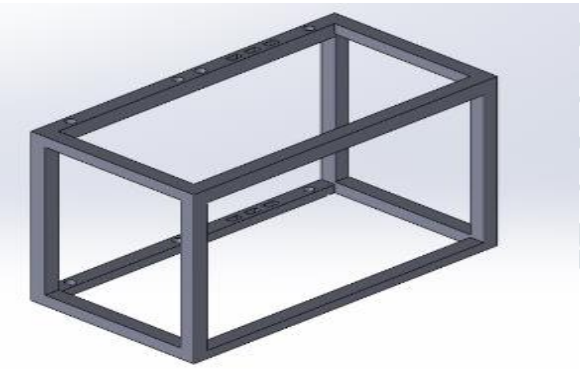

Fig 4: Frame

Fig 5 Water Sprinkling Pipe

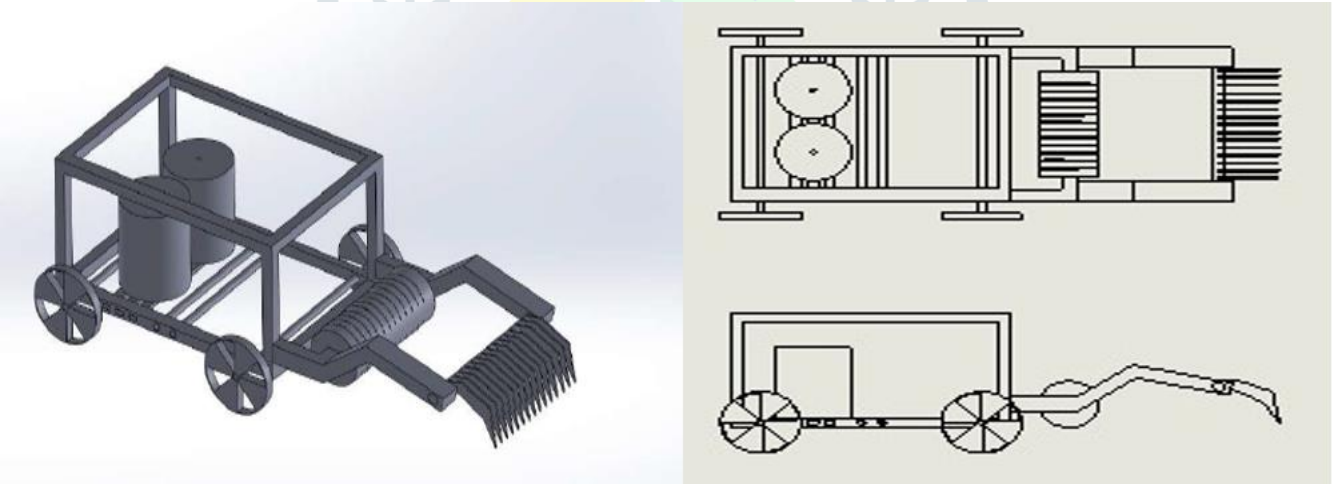

Fig 6 Final assembly

IX. Advantages and Application

Advantage of Multipurpose Agriculture Machine

1. Small-scale farmers benefit from this because they have limited land and labour.
2. Thus, it helps to reduce the amount of human effort required and hence lowers operational costs making it affordable to resource poor small-scale farmers.
3. The highest growth rates and output levels attained.

Application of Multipurpose Agriculture Machine

1. Ploughing: - It is utilized for breaking and inverting soil thereby creating a fine seedbed suitable for planting purposes.

2. Seed sowing: - This allows seeds to be distributed uniformly with appropriate spacing between them that maximizes crop yields.
3. Water sprinkling: - Precision irrigation system operates most effectively in crop growth which saves water plus ensuring consistent hydration throughout agricultural settings thereby improving productivity.

X. RESULTS AND DISCUSSION

Based on the thorough evaluation of the performance of the multipurpose agriculture machine, it can be confidently concluded that this demonstration is well-suited to meet the diverse needs of small-scale farmers. Considerations the financial constraints experienced by these farmers, who cannot access viable solutions, this machine offers a promising solution.

Fig 7 Actual Model

XI. CONCLUSION

In conclusion, this machine is a versatile tool. it can plough sow seed and sprinkle water. this makes it a handy choice for smaller scale farmers. The design is considerate of their budgets and help ease the need for manual labor. It also saves time when compared to older methods. It a cheaper, more efficient way to farm fitting into modern agriculture trends. It is a good solution for dealing with labor issues faced by farmers nationwide.

XII. REFERNCE

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