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FABRICATION OF MULTIPURPOSE AGRICULTURAL EQUIPMENT

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Abstract - *Multipurpose agriculture equipment is basic and major equipment involved in agriculture for maximum yielding. Conventional method of planting and cultivating the crops is a laborious process and hence for that reason there is a scarcity of labors, this result in delayed agriculture to overcome these difficulties, multipurpose agriculture equipment is designed. The main objective of this project is sowing operation is to place seed at proper position respective of other placed seeds in every row at particular depth. As per change in shape and size of different seeds the parameters like distance between two seed, depth of seed, planting rate chances. Our aim to produce highly efficient seed sowing machine which will reduce time of plantation, cost of labor, and enhances production.*

Key Words: *Multipurpose, agricultural, equipment, labour*

1. INTRODUCTION

Agriculture is the backbone of India. The agricultural history in India dates back to Indus Valley Civilization Era. Today, India ranks second worldwide in farm output. The special vehicles plays a major role in various fields such as industrial, medical, military applications etc., The special vehicle field are gradually increasing its productivity in agriculture field. Some of the major problems in the Indian agricultural are rising of input costs, availability of skilled labors, lack of water resources and crop monitoring. To overcome such adversity, the automation technologies were used in agriculture. The automation in the agriculture could help farmers to reduce their efforts. The vehicles are being developed for the processes for ploughing, seed sowing, levelling, water spraying. All of these functions have not yet performed using a single vehicle. In this one of the machine is developed to concentrate in an efficient manner and also it is expected to perform the operations autonomously. The proposed idea implements the vehicle to perform the functions such as ploughing, seed sowing, mud levelling, and water spraying. These functions can be integrated into a single vehicle and then performed.

1.1 Aim & Objectives

The main aim of the project is to develop multipurpose agricultural vehicle, for performing major agricultural operations like ploughing, seeding. The modification includes fabricating a vehicle which is small, compact in size. The project is about a machine design which makes cultivation much simpler. The design of the chassis of the vehicle is made in such a way that it is suitable for the operations. The purpose of this project is to provide farmer with multipurpose equipment which implements all the scientific farming specifications and technology to get maximum yield and good quality crops by reducing investment and number of labor. The objectives is 1) To manufacture a machine for a farmer who cannot afford the tractor and other heavy equipment. 2) To design all the operations in one machine. 3) The reduction of cost of the Ploughing tool and other tools. 4) To provide easy operation in one machine and also in less cost.

2. LITERATURE REVIEW

2.1 Design and Fabrication of Multipurpose Agricultural Equipment.

Agriculture being one of the major occupations in India, it is very essential to discover and implement new idea in this field, though lot of work has been done in this area. It is unfortunate that, these ideas are not been implemented properly in actual field. This is due to high cost and is complicated for rural people. Multipurpose agriculture equipment is basic and major equipment involved in agriculture for maximum yielding. Conventional method of planting and cultivating the crops is a laborious process and hence for that reason there is a scarcity of labours, this result in delayed agriculture to overcome these difficulties, multipurpose agriculture equipment is designed. Agriculture plays a vital role in the Indian economy. Over 70 % of the rural households depend on agriculture.

2.2 Design and Fabrication of Multipurpose Agriculture Vehicle

The main aim of the project is to develop multipurpose agricultural vehicle, for performing major agricultural operations like ploughing, seeding,. The modification includes fabricating a vehicle which is small, compact in size. The project is about a machine design which makes cultivation much simpler. The design of the chassis of the vehicle is made in such a way that it is suitable for the operations. The design for automatic seed sowing equipment is made.

2.3 Design and fabrication of multi-purpose farming tools

As up till now for any type of fast cultivation techniques farmers had to depend on tractors or any other fuel consumable devices or vehicles, which by the side increases air pollution, just to speed up the process. We found a cheapest and easy way for poor farmers and cultivation on small land. The design of multi-purpose farming tool equipped mobility cycle was done after consider some major factors i.e. decreasing cost of cultivation, making cultivation pollution free.

3. EXPERIMENTAL DETERMINATION OF MULTIPURPOSE AGRICULTURAL EQUIPMENT

When engine is started the auger bit drill tool will activated to drill hole for seed sowing after that operator press lever for drop a seed from hopper then the digging and sowing operation will be completed. The sowing operation can be done by semi manual.

Fig.3.1 Actual fig. of Multipurpose Agricultural Equipment

Generally cultivation of any crop involves various steps like seed selection, field preparation, fertilizing, sowing, irrigation, germination, thinning and filling, weed removal, vegetative stage, flowering stage, pesticide spraying, fruit or pod formation stage, harvesting and threshing. Farmer has to use various agricultural equipment's and labour's for caring out those steps, our purpose is to combine all the individual tools to form a multipurpose equipment which reduces the overall equipment cost and labour cost and also increases the yield of the crop by implementing scientific farming method. Initially plough is connected to the beam using fasteners and tilling of the soil is performed, later during sowing seed drill is attached to the beam along with leveler for levelling of soil for sowing and fertilizing, the seed and fertilizer are stored in the primary seed and fertilizer box. The seeds and fertilizer are provide to the secondary seed box to maintain the level of seeds in the box and the disc picks up the seeds from the seed hopper and fertilizer hopper and drop them to the furrow through the seed tube. When the seed is dropped at a specific distance then seed covering device covers soil over the seed and after germination of seed takes place, weeds are also developed in the field.

4. COMPONENTS USED AND ASSEMBLY

4.1 Hopper for Seed store

It is an arrangement to store the seeds. The shape of the hopper is rectangular box so the wastage of the seed can be avoided. It is made up of MS sheet.

Fig. 4.1 Hopper

When the seed is drilled, first seed is store in hopper. The distance of the hopper and the soil is nearby for that it is easy to drill in the soil. It is near the handle for the purpose of to see it is properly drilled or not.

4.2 Plough

The plough is connected to the frame in bottom side using remove the upper layer of the soil. When the seed is plunged at a specific distance then seed covering device covers soil over the seed and after germination of seed takes place, weeds are also used in the field. By replacing the seed drill by weeding tools for the same frame arrangement we can use it for weeding purposes.

Fig. 4.2 Actual fabricated Plough

Weeding blade is attached in inclined position such that it uproots the weeds and simultaneously weedicide is applied on the field by the weedicide container attachment. As the plough is drawn through the soil it creates long channels of fertile soil. Ploughing and cultivating a soil remove the upper 15to 23 cm of the soil to form a plough layer.

4.3 Spray

A sprayer is a device used to spray a liquid such as water, weed killers,, pest maintenance chemicals, etc. In agriculture, a sprayer is a part of equipment that is used to apply herbicides, pesticides, and fertilizers on agricultural crops. Sprayers are various range in size with spray guns. When we used multipurpose machine it is attached to the front bottom side of the frame with easily fit. It can use handy also by human interface. The length and width is depending on as per frame or machine. Here we used 10 inch in width and 15 inch in height.

Fig. 4.3 Agricultural sprayer

Operating principle of this is hand operated lever create a pressure difference in which pesticides and liquid is forced through nozzle in fine droplet form. The pressure of this sprayer approximately 6kg/sq cm. and capacity of storage tank is less than 20 litters. The components of backpack sprayer are lever, pump, tank, lance, boom and nozzle.

4.4 Chain and Sprocket

A chain is used to connect two sprockets. A sprocket is a toothed wheel that fits onto a shaft. One sprocket is the driver sprocket. The other sprocket is the driven sprocket. Motion and force can be transmitted via the chain from one

Fig 4.4 Chain and Sprocket

Sprocket to another, therefore from one shaft to another. Chains that are used to transmit motion and force from one sprocket to another are called power transmission chains

4.5 Free Wheel

In mechanical engineering, a free wheel is a device in a transmission that disengages the driveshaft from the driven shaft, when the driven shaft rotates faster than the driveshaft. In a fixed-gear bicycle, without a free wheel, the rear wheel drives the pedals around.

Fig. 4.5 Free wheel

4.6 Chassis of the Vehicle

The chassis of the vehicle is made of iron square section. The section is cut and welded according to the given design dimension. The arrangement is provided for the adjust the ploughing.

Fig. 4.6 Chassis of Vehicle

4.7 Fabrication of the Ploughing Tool and Frame

The plough tool is fabricated using high speed steel. The tool is machined by cutting and grinding operations. The tool is fixed to the plough frame and various supports were given in the frame for fixture of the plough frame in the vehicle. A separate hook and lever is attachment is given so that it prevent the motion of the plough in outward direction. The tool and the frame are welded using metal arc welding

Fig. 4.7 Ploughing Tool and Frame

4.8 Assembly procedure

1. Firstly we took the hollow square shafts and a frame of size 4 x 3 x 2.5 ft. with it.
2. Then by taking a 20 mm shaft it threaded of 2mm from both sides so eventually its size became 18 mm.
3. Then pedestal bearing is fitted to the 18mm shaft.
4. Then by fitting the 18 mm disc inside the tyre and attached it with the shaft.
5. Then frame is made of 0.5x1.5x2 ft. and attached it to the main frame to keep the spray tank.
6. Then ploughing tools is made of size 4.2x1.5 ft. containing five teeth's and attached it to the frame.
7. Then seed hopper is made and welded it to the main frame. The seed hopper works manually.
8. Chain drive is attached both the sprocket with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force.

5. MATERIALS AND PROCESSES

Table 1: Materials and processes

Sr. No.	Materials	Quantity
1	Square pipe	80 Feet
2	Solid Shaft	8 feet
3	Tyre	4
4	Pedestal bearing	4
5	Chain	2
6	Nut & Bolt(205 inch)	8
7	Nut	4
8	Gas Welding	-
9	Cutter Toll	10
10	Drilling	-
11	Sprocket (Drive)	2
12	Sprocket(Driven)	2
13	Square plate	8 Feet
14	Fertilizer Tank	1
15	Circular Disc Plate	4

6. CONCLUSION

Practically our multipurpose agricultural equipment can be used for tilling, fertilizing, sowing, leveling and also used for weed removal purposes. All the parts are connected in such a way that in every stage of agriculture the equipment can be rearranged or easily assembled with fasteners to required length and specifications of field operation. Our team has successfully combined many ideas from various fields of mechanical engineering and agricultural knowledge to improve the yield and by reducing the labor effort and expenses.

FUTURE SCOPE

By increasing the equipment strength and quality to its peak, we can have multipurpose agricultural equipment for life time usage. By providing hydraulics, gear arrangements, using non-corrosive material and some minor adjustments the equipment can also be made as tractor powered equipment.

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