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Design and Development of Multi-Purpose Machine for Agricultural Purpose

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***Abstract* – Agriculture helps to meet the basic needs of human and their civilization by providing food, clothing, shelters, medicine and recreation. Hence, agriculture is the most important enterprise in the world. It is a productive unit where the free gifts of nature namely land, light, air, temperature and rain water etc., are integrated into single primary unit indispensable for human beings. Secondary productive units namely animals including livestock, birds and insects, feed on these primary units and provide concentrated products such as meat, milk, wool, eggs, honey, silk and lac. The objective of the project was to assist development of a farmer-driven approach to farming. The project is about a machine design which makes cultivation much simpler and thus makes the cultivation process easier for the farmers. The project is a design of a machine which can plough the land, sprinkle water and sow the seeds at a single time. The main advantage of the project is that it needs no electronic devices for the entire process.**

I. INTRODUCTION

Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. ―A man without food for three days will quarrel, for a week will fight and for a month or so will die. Agriculture is a branch of applied science. Agriculture is the science and art of farming including cultivating the soil, producing crops and raising livestock. It is the most important enterprise in the world. Over the years, agricultural practices have been carried out by small-holders cultivating between 2 to 3 hectare, using human labour and traditional tools such as wooden plough, yoke, leveller, harrow, maillot, spade, big silk etc. These tools are used in land preparation, for sowing of seeds, weeding and harvesting. Modern agricultural techniques and equipment are not used by small land holders because these equipment's are too expensive and difficult to acquire. By adopting scientific farming methods we can get maximum yield and good quality crops which can save a farmer from going bankrupt but majority of farmers still uses primitive method of farming techniques due to lack of knowledge or lack of investment for utilizing modern equipment. The use of hand tools for land cultivation is still predominant in India because tractors require resources that many Indian farmers do not have easy access to. The need for agricultural mechanization in India must therefore be assessed with a deeper understanding of the small holder farmer's activities. There is huge gap in technology adoption and Implement used with small and marginal farmers. Sustainable improvement in the livelihoods of poor farmers in developing countries depends largely on the adoption of improved resource conserving cropping systems. While most of the necessary components already exist, information on the availability and performance of equipment is lacking and effective communication between farmers and agricultural research and development department is unsuccessful.

II. SCOPE AND OBJECTIVE

2.1 Scope of the Project

- The seed sowing mechanism is modified into simple mechanism
- The multipurpose agriculture vehicle is designed for small land holding farmers in future
- The project will become an example for future works

2.2 Objective of the Project

- The primary objective is to develop a Agriculture process which is simple and cost effective
- The reduction of cost of the Ploughing tool
- The height of the Ploughing tool is adjusted by Lead screw.
- Pesticides and fertilizers are easily Sprayed using Blower.

III.CURRENT RESEARCH

The economic contribution of agriculture in India's GDP is continuously decreasing with the country's broad-based economic growth. Still, agricultural research and development (R&D) in India has made impressive

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contribution in the past. But the system is under significant stress today due to lack of clarity on focus and inefficient use of financial resources. Links among sister institutions have weakened and accountability has declined over time.

Ramesh D; This research paper present "Agriculture Seed Sowing Equipment: A Review". The present review provides brief information about the various types of innovations in seed sowing equipment. The basic objective of sowing operation is to put the seed and the fertilizer in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed.There are lot of multi purpose agriculture machine which makes more cost.this machine cannot bought by small land holding famers.If they buy this machine,it is not efficient to small land holding farmers.To prevent the problem,we develop a multi purpose agriculture machine which can plough the land,sow the seeds,levelling the sand,spraying pesticides and fertilizer and also cut the corps and unwanted plants which makes cultivation process much simpler.This machine have low cost and more efficient

IV.COMPONENTS REQUIRED

1 Bevel Gear Arrangement
2 Scotch Yoke
3 Rotating Disc
4 Hopper
5 Cultivator
6 Piston and Cylinder Arrangement
7 Wheel
8 Frame
9 Fertilizer
10 DC Motor

4.1 BEVEL GEAR ARRANGEMENT

Bevel gears are gears where the axes of the two shafts intersect and the tooth-bearing faces of the gears themselves are conically shaped. Bevel gears are most often mounted on shafts that are 90 degrees apart, but can be designed to work at other angles as well.The pitch surface of bevel gears is a cone.

Two bevel gears in mesh is known as bevel gearing. In bevel gearing, the pitch cone angles of the pinion and gear are to be determined from the shaft angle, i.e., the angle between the intersecting shafts. Figure shows views of a bevel gearing.

4.2 Scotch Yoke

The Scotch yoke (also known as slotted link mechanismis a reciprocating motion mechanism, converting the linear motion of a slider into rotational motion, or vice versa. The piston or other reciprocating part is directly coupled to a sliding yokewith a slot that engages a pin on the rotating part. The location of the piston versus time is a sine wave of constant amplitude, and constant frequency given a constant rotational speed.

4.3.Rotating Disc

This disc is used to sprinkle the seeds those are coming through hoppers.

4.4.Hopper

A large tube,wide at one end,through which large amounts of small seperate things,for example seeds,can be moved from one end to another

4.5 Cultivator

A Cultivator is a tool or machine which is used to break up the earth or to remove weeds,for example in a garden or field.

4.6 Piston and Cylinder Arrangement

The principle of the instrument is to generate pressure by compressing a sample assembly, which includes a resistance furnace, inside a pressure vessel. Controlled high temperature is generated by applying a regulated voltage to the furnace and monitoring the temperature with a thermocouple. The pressure vessel is a cylinder that is closed at one end by a rigid plate with a small hole for the thermocouple to pass through. A piston is advanced into the cylinder at the other hand.

4.7 Wheel

A circular object that revolves on an axle and is fixed below a vehicle or other object to enable it to move easily over the ground.

4.8 Frame

The rigid supporting structure of an object such as a vehicle,building or piece of furniture.

4.9 FertilizerA chemical or natural substance mixed to soil to increase its fertility

4.10 DC Motor DC Motor is one type of motor that uses the DC Current to convert electrical energy into mechanical energy.When the electric current passes

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through coil in a magnetic field,a magnetic force will be generated,which produces a torque in the DC motor.

V.CONSTRUCTION AND WORKING PRINCIPLE

5.1 CONSTRUCTION

The construction process of our proposed model is first we collected/purchased the required materials. And next cut the raw materials in required measurements in precise manner by using hand wheel cutting machine. After that we made holes wherever we require. After completion of drilling we had done some rough finishing and finally we've joined by welding wherever require permanent joint and joined by rivets wherever we require rivet joints

5.2 WORKING PRINCIPLE

In this project we are making six operation which is performed from one prototype. The DC motor is connected to disc plate using chain drive for water spraying followed by blower with hopper which is used to spray fertilizer and its connected.

VI.COST ESTIMATION

Sl. No.	PARTS	Qty.	Material	Amount (Rs)
i.	D.c motor	2		1500
ii.	Battery	1		600
iii.	Scotch Yoke and its coupling link	1	Cast iron	600
iv.	Hopper	1	steel	400
v.	Bevel gear		Cast iron	700
vi.	Stand (Frame)	1	Mild steel	1500
vii	Wheel	4	Plastic	400
viii	Piston and Cylinder Arrangement	2		1200
ix.	Roller Bearing	2	Cast Iron	500
x.	Wheel Bearing	4	Cast Iron	200
xi.	Overheads			800

TOTAL = Rs.8400

VII.CONCLUSION

The top concentration of our design is the cost and operational ease in case of small farm units. This multipurpose agriculture machine is thus designed to reduce the cost of harvesting, spraying and seed feeding. In the development of multipurpose agriculturemachine we utilize the past data and techniques. In this way the design of multipurposeagriculturemachine is safe. Such human powered machine systems will help to a great extent in improving the production per acre and increase profitability of small and middle class farmers.

Thus a project on"Multi-purpose Agriculture Machine"is Designed and Developed to Facilitate farmers the ease of farming by increasing Productivity at low cost and Partial Automation.

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