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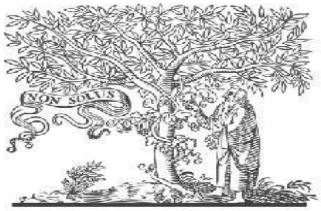

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A CASE STUDY OF MULTIPURPOSE AGRICULTURE OPERATING MACHINE"

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A B S T R A C T

The invention being described is a self-propelled agricultural machine with a significant power capability and an efficient soil-clearing mechanism. The machine is designed to accommodate various tools for tasks such as tilling, sowing, fertilizing, spraying, fumigating, and other types of agricultural labor. The machine is intended to be used for cultivating land between crop lines while avoiding damage to the crops. The machine is designed to be versatile and adaptable, with a mechanism for fitting and lifting tools for various agricultural tasks. The fitting mechanism allows the operator to attach different tools to the machine quickly, depending on the task at hand. The lifting mechanism enables the operator to adjust the height of the tool to the desired level for efficient operation.

The machine is self-propelled, which means that it has a power source that enables it to move independently without requiring an external power source. This is an advantage, as it allows the operator to maneuver the machine with ease and precision, regardless of the terrain or the size of the field.

The machine's significant power capability enables it to perform heavy-duty tasks such as soil clearing, which is necessary for preparing the land for cultivation. The soil-clearing mechanism is designed to remove any obstacles or debris that may be present on the ground, making the land ready for planting. The machine is specifically designed to operate between crop lines, which means that it can be used to cultivate land without damaging the crops. This is achieved by ensuring that the machine's tools do not come into contact with the crops during operation. Additionally, the machine's design includes features that allow it to operate efficiently regardless of the degree of growth of the crops. Overall, this self-propelled agricultural machine is an innovative solution for farmers looking to increase their productivity and efficiency while minimizing the risk of damage to their crops. Its versatility, adaptability, and significant power capability make it an essential tool modern agriculture.

1. Introduction

Agriculture has been the backbone of the economy and it will continue to remain. Agriculture is the science and art of farming including cultivating the soil, producing crops and raising livestock. Generally, cultivation of any crop involves various steps like ploughing, harvesting, sowing, and irrigation. Farmer has to use various agricultural equipment's and labors for caring out these steps, our purpose is to combine all the individual tools to provide farmers with multipurpose equipment which implements all the scientific farming techniques and specifications, suitable for all type of seed to seed cultivation with minimum cost as possible. All this can be done in this same machine. This multipurpose agro machine is wireless remote operated & designed and fabricated as a multipurpose equipment which is

used for agricultural processes like ploughing, sowing seeds and sprinkling water. This machine works in both directions when it is pushed forward it ploughs the field with the help of plough. The height of the plough can be adjusted, with the help of screw arrangement and the seed feeder is mounted directly to the motor. The motor rotates and the shaft attached to it has holes. The motor is directly attached to the shaft with holes. When we push the agriculture machine in a backward direction, we can pick the plough up from the ground and the pump which is attached to the front shaft will start pumping the water from the tank and it will sprinkle water over the field. Agriculture has been and will continue to be an economic cornerstone and it has been the key development in the rise of settled human civilization. The study of farming is referred to as agricultural science. Agriculture has a history of thousands of years, and its development has been motivated and defined by very different climates, crops,

and technologies. Modern agronomy, plant improvement, agro-chemicals such as pesticides and fertilizers, and technological advances have in many cases significantly increased crop yields, but in the meantime have caused extensive ecological damage. Agricultural food production and water management are increasingly emerging as global challenges. Mechanized farming is the process of using agricultural machinery to mechanize agricultural labor, the substantial increase in productivity of agricultural workers in modern times, and mechanical machinery has replaced many agricultural jobs previously carried out by manual labor, either through working animals such as oxen, horses and mules.

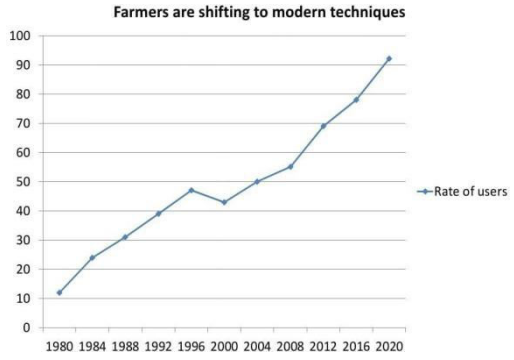
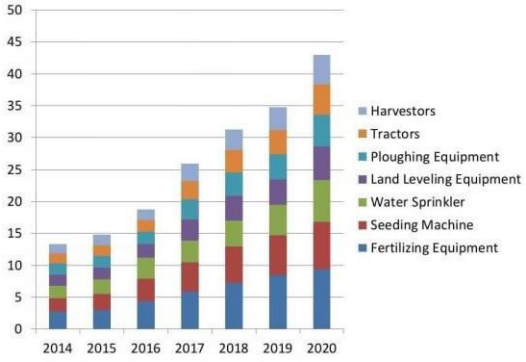


Table -1: Utilization of agricultural



equipment

Table-2: Demand for Different Types of Agricultural Machinery

The above graph illustrates the demand for several agricultural machines between the years 2014 and 2020. It is evident that the popularity of traditional equipment's such as tractors and harvesters are considerably lower than the modern equipment's. Moreover, the famers have shown more interest in Fertilizing Equipment, Seeding Machine and Water Sprinkler. However, we have designed a machine which can perform five different operations at the time. So, we can definitely say that our machine will improve the financial situation of the farmers and reduces their efforts.

2.LITERATURE SURVEY:

Pratikkumar V. Patel, Mukesh Ahuja:
Research and design of multipurpose agriculture equipment.in this research paper, we found that how conventional machines can be designed into modern agricultural machine.

Dr. C.N.Sakhale, S.N.Waghmare, Rashmi S.Chimote:
A review paper on "multipurpose farm machine". In this research paper, the author has mentioned the mechanization of machine and the concept of ploughing tool. From that we understood that by replacing the ploughing teeth, the life of ploughing tool can be increased.

Dhatchanamoorthy. N1, Arunkumar. J2, Dinesh Kumar. P3, Jagadeesh. K4 Madhavan.
P5: Design and fabrication of multipurpose agriculture vehicle. This research paper drew our attention to the design of chassis and frame of the machine and it has helped in selecting some light weight material to lower the cost.

R.M. Chandima Ratnayake University Of Stavanger (Uis):
Re-design, fabrication, and performance evaluation of manual conical drum seeder. From this research paper we have modified the assembly of the drum seeder and direct seeding can be done by manually operating machine.

1. Mysuru Venkataramaiah Achutha, 2. Mysore Sharath Chandra Nagaraju:
Concept design and Analysis of multipurpose farm equipment. This research paper outlines the concept of chain gear mechanism in multipurpose agriculture machine.

2.WORKING:

Working Principle: Initially the seeding unit and spraying unit are loaded with deserved seeds and the fluids manually at the base station. As the transmission initiates the vehicle starts moving in the desired direction, also the accessories like drum/disc rotates with respect to the transmission system, thus allows the seeds to fall on the path created by the ploughing accessory at the bottom. In the meantime, the ploughing accessory also acts as a weeder and removes any weeds on the path specified for sowing the seeds. Further it covers the soil inclusive of the removed weed by converting it as a natural fertilizer in the later stages of the crop development. At the same transmission stage even, the spraying unit also activates with the slider crank chain mechanism to accomplish spraying the desired fluids.

Working Methodology:

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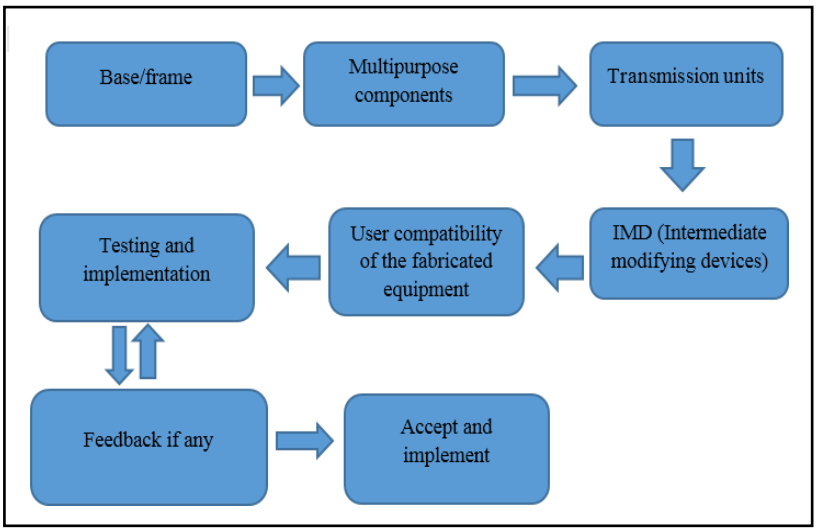

Fig.1: - Methodology Adapted for the Project

The methodology as shown in the Fig.1 which is adopted for the project isexplained below:

Base/Frame:

First of all, the base frame materials like handle, base, iron rods werecollected depending on the properties of materials and thedimensions.

Multipurpose Components:

Multipurpose agriculture vehicle consists of multipurpose components like seed sowing drum, fertilizer spraying drums with sprayer which was collected afterbase.

Transmission Units:

Transmission units basically consists of chain sprockets, bush, wheels, and aslider crank chain mechanism which was generally for transmission of motion.

IMD (Intermediate Modifying Devices):

The intermediate modifying devices consists of the parts that is to be modifiedaccording to our convenient. After all the above parts were collected n modified thenassembly was done by staying on the methodology of the project and after the work was over finally the testing was done and after the result are as per the expectation, we can finally implement the multipurpose vehicle to do the various operation like seed sowing, fertilizer or water spraying and weed removal.

Working Cycle:

1. Machine working cycle

a. Machine without any Components
b. Machine starts
c. Machine attached with Component (Sprayer)
d. Machine working in field

2. Machine working cycle

a. Machine without any Components
b. Machine starts

c. Machine attached with Component (Single Plough)
d. Machine working in field

3. Machine working cycle

a. Machine without any Components
b. Machine starts
c. Machine attached with Component (Double Plough)
d. Machine working in field

4. Machine working cycle

a. Machine without any Components
b. Machine starts
c. Machine attached with Component (Seed Drill)
d. Machine working in field

3.3.1 Starting Warm Engine

The starting procedure is the same as Cold Start except DO NOT close the choke (B). If engine does not start after 5 pulls, use Cold Start Procedure.

1. Stop Switch: -
Move Stop Switch (A) to START position. COMPONE.

2. Primer: -
Pump primer bulb (C) until fuel is visible and flows freely in the clear fuel tank return line. Pump bulb an additional 4 or 5 times.

3. Choke: -
Be certain choke (B) is open.

Recoil Starter:

4. - Pull recoil starter rope.

5. Start: -
Start engine at idle.

3.2 Stopping Engine

1. Throttle Trigger: -
Release throttle and allow engine to return to idle before shutting engine off.

2. Stop Switch: -
Move stop switch to STOP position (A).

The agricultural machine is designed to perform various agricultural tasks such as tilling, sowing, fertilizing, spraying, and fumigating while operating between crop lines. The machine is

self-propelled, which means it can move independently without requiring an external power source. The machine has a mechanism for fitting and lifting tools that enable the operator to attach different tools quickly and adjust the height of the tool for efficient operation. The fitting mechanism allows the operator to switch between tools, depending on the task at hand. The lifting mechanism allows the operator to adjust the height of the tool to the desired level, enabling efficient operation in various soil conditions. The machine's power
capability enables it to perform heavy-duty tasks such as soil clearing, which is essential for preparing the land for cultivation. The soil-clearing mechanism is designed to remove obstacles and debris from the ground, making it ready for planting. The machine is designed to operate between crop lines, avoiding contact with crops and minimizing the risk of damage. This is achieved through its design, which ensures that
the machine's tools do not come into contact with the crops during operation. The machine's design includes features that enable it to operate efficiently regardless of the degree of growth of the crops. This allows farmers to use the machine throughout the growing season, maximizing their productivity and efficiency. In summary, the self-propelled agricultural machine is a versatile and adaptable tool designed to increase productivity and efficiency in modern agriculture. Its power capability, soil-clearing mechanism, and ability to operate between crop lines while avoiding damage to crops make it an essential tool for farmers looking to improve their operations.

4. COMPONENT DESCRIPTION:

: IC Engine Specifications

Model	BAJAJ
Engine Displacement	150 CC
Engine Type	Air cooled, 2 Stroke
Number of Cylinders	1
Valves Per Cylinder	2
Fuel Type	Petrol
Starter	Rope Start
Number of Strokes	2 Strokes
Transmission Type	Manual
Number of Speed Gears	

Table 3: Specification of IC Engine

Components:

Agriculture Sprayer Components.

Agriculture sprayers are an essential component of multiple agriculture operated purpose machines, A self-propelled sprayers, and handheld sprayers. These sprayers work by applying chemicals, fertilizers, or water to crops or soil to improve plant growth,

control pests and diseases, or irrigate crops. The sprayer component of these machines typically consists of several parts, including a tank for holding the liquid or solution to be sprayed, a pump for pressurizing the liquid, a nozzle or boom for directing the spray, and controls for regulating the flow and pressure of the liquid. In a Multipurpose agriculture operated machine-mounted or self-propelled sprayer, the sprayer is attached to the machine and is powered by the engine or hydraulic system. The operator can control the flow and pressure of the liquid through the use of valves and gauges, and can adjust the height and direction of the spray using the nozzle or boom. In a handheld sprayer, the sprayer component is typically a small tank with a pump and nozzle attached. The operator manually pumps the sprayer to build pressure and then directs the spray onto the crops or soil. Overall, the sprayer component in agriculture machines is critical for

efficient and effective crop management and can significantly improve crop yields and quality.

Fig: -1. Sprayer

Clutch:

A clutch is a mechanical device which engages and disengages power transmission especially from driving shaft to driven shaft. In the simplest application, clutches connect and disconnect two rotating shafts (drive shafts or line shafts). In these devices, one shaft is typically attached toan engine or other power unit (the driving member) while the other shaft (the driven member) provides output power for work. While typically the motions involved are rotary, linear clutches are also possible.

Accelerator:

It is controlling the air-fuel mixture into the cylinder by control mechanism. In the carburetor engine it is placed in carburetor and it is controlling the air-fuel mixture. Itis use to control the speed of vehicle A throttle is the mechanism by which fluid flow is managed by the constriction or obstruction. An engine's power can be increased or decreased by the restriction of inlet gases (by the use of a throttle), but usually decreased. The term throttle has come to refer, informally, to any mechanism by which the power or speed of an engine is regulated, such as a car's accelerator pedal. What is often termed a throttle (in an aviation context) is also called a thrust lever, particularly for jet engine powered aircraft. For a steam engine, the steam valve that sets the engine speed/power is often known as a regulator.

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Fig: -2. Accelerator

Internal Combustion Engine (ICE):

An Internal Combustion Engine (ICE) is a heat engine where the combustion of a fuel occurs with an oxidizer (usually air) in a combustion chamber that is an integral part of the working fluid flow circuit. In an internal combustion engine, the expansion of the high-temperature and high-pressure gases produced by combustion applies direct force to some component of the engine. The force is applied typically to pistons, turbine blades, rotor or a nozzle. This force moves the component over distance, transforming chemical energy into useful mechanical energy.

Fig: -3. Internal Combustion Engine

Chassis:

They are made up of Mild steel it gives support to all the assembly of the machine. A chassis consists of an internal vehicle frame that supports all the objects on it. And it will absorb all the forces and supports the assembly.

Brake:

A brake is a mechanical device that inhibits motion by absorbing energy from a moving system. It is used for slowing or stopping a moving vehicle. Disc / Drum brake issued in this project

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Wheels:

This are used to drive the whole machine. There are two wheels in the front side and one adjustable wheel at back end.

Fig: - 4.

Wheel

Double Plough:

A plough is one of the agricultural tools and used for the initial soil cultivation in preparation for seed sowing or planting to loosen or turn the soil. It has been used since ancient times for tiling, turning the soil and adding fertilizers. Chisel plough is used in this project.

Fig: -5. Plough

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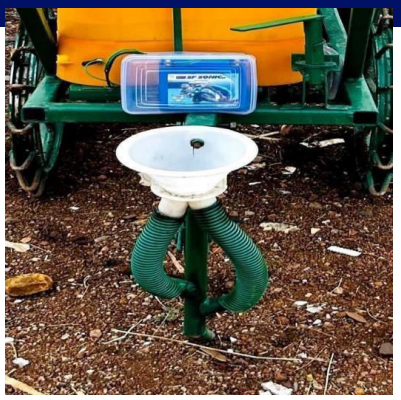

Tank:

A spray tank is a container for storing spray liquid like fertilizers and pesticides.

Fig: - 6. Tank

Chain and Sprocket:

It is used to transmit the power from engine to shaft. roller chain and sockets are very efficient method for power transmission. A chain is used to connect two sprockets. A sprocket is a toothed wheel that fitsonto 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. A sprocket or sprocket-wheel is a profiled wheel with teeth, cogs, or even sprockets that mesh with a chain, track or other perforated or indented material. The name 'sprocket' applies generally to any wheel upon which radial projections engage achain passing over it. Fig. 6.4 shows the Chain sprocket used in Project.

Fig: -7. Chain and Sprocket

Seed Sowing Machine:

Seed sowing is the process of planting seeds in the ground to grow crops. Agricultural seed sowing is a crucial step in the cultivation of crops, as it determines the yield and quality of the crop.

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Here are some key points to keep in mind when sowing agricultural seeds:

1. Choose the Right Seeds:
   It is essential to choose the right seeds for the type of crop you wish to grow.
2. Prepare the Soil:
   Before sowing, prepare the soil by removing any weeds, rocks, or debris that may interfere with the growth of the seedlings. The soil should be well-drained,fertile, and have a good supply of nutrients.

3. Choose the Right Time:
   The timing of sowing depends on the crop, weather conditions, and other factors. It is important to sow the seeds at the right time to ensure optimal growthand yield.

4. Sow the Seeds Correctly:
Different crops require different methods of sowing. Some seeds are sown directly in the soil, while others need to be transplanted from seedlings. Make sure to read the instructions on the seed packet and follow the recommended method of sowing.

5. Water and Fertilize:
After sowing, water the seeds regularly to keep the soil moist. Depending on thecrop, you may also need to fertilize the soil to provide the necessary nutrients for growth.

6. Protect the Seedlings:
Seedlings are delicate and vulnerable to pests and diseases. Take steps to protectthem, such as using pesticides and fungicides when necessary.

Gear shifting Handle: - Speed Controlling Gear Handle.

Rotates Clockwise and Anti Clockwise:

1. High Speed Gear.
2. Neutral.
3. Low Speed Gear.

Fig: -8. Gear shifting Handle

5 Procedure

1) Prepare Drawings of projects.
2) Find the proper dimensions of each part.
3) Select suitable material and size.
4) Take markings on material to cut.

5) Cut all material in Wright dimension
6) Create basic frame structure by welding.
7) Create wheel by joining both the wheels with the 1 feet rods.
8) Add axle between both rings for proper alignment purpose.
9) Attach Gear mechanism to the rings of wheel.
10) Assemble the wheels in frame.
11) Create frame for engine attachment.
12) Properly fix the engine to the frame.
13) Fix the cultivation Teeth (Blade).
14) Create the handle for controlling the system.
15) Attach Clutch and Acceleration system to the handle and to the engine.
16) Attach chain to the sprocket.
17) Apply oil paint for protection of machine form corrosion.

6 Advantages and Disadvantages:

Advantages of Multipurpose Agricultural Machine

Multipurpose machine is conducted for a variety of good reasons. It is important that sowing, cultivation, and spraying of the soil does not create as many problems as itsolves.

Some advantages of Multipurpose machine are:

- It is often a form of weed control.
- It can play a part in pest management. For example, Multipurpose machine isrecommended to reduce the number of overwintering hellions these pupae in paddocks where susceptible summer crops such as sweet com and tomatoes are grown.

- It may be required to incorporate herbicides and soil ameliorants, such as lime.
- It may reduce the incidence of soil-borne diseases. Soil-borne diseases such as rhizotomies can be a problem in soils where crops are planted using direct drill or zerotill.

- It reduces soil strength. High soil strength has been shown to reduce the vigor of crops,especially seedlings. High soil strength is one reason for poor seedling vigor in direct-drilled crops on poorly structured soils.

DISADVANTAGES OF MULTIPURPOSE GRICULTURAL OPERATED MACHINE

Some disadvantages of Multipurpose machine are:

- Multipurpose machine has the potential to destroy soil structure and make soils more prone to other forms of degradation, such as erosion. Incorrect use of cultivation can have the following effects:

- There may be a reduction in soil organic matter and therefore a decline in soil structure.Good soil structure is important for good root growth and water penetration by rainfallor irrigation.

- Multipurpose machine that mixes surface soil with subsurface soil will lead to a dilution of organic matter (which is most concentrated at the soil surface). This will

mean that crusts are more likely to form after Multipurpose machine.

- Multipurpose machine can make hard setting and crusting problems worse, since soil organic matter and stable aggregates are destroyed.

7. CONCLUSION:

The design of the machine is intended to meet the needs of small farmers who maynot be able to afford expensive farm equipment. The machine is designed to require less human power and less time than traditional farming techniques, which can be labor-intensive and time- consuming. By reducing the need for human labor, the machine can help address the labor problem that is currently facing Indian agriculture. Many small farmers struggle to findenough labor to perform all the necessary tasks, such as planting, weeding, and harvesting crops. This can lead to lower yields and higher costs, as farmers may have to pay higher wages to attract labor. The machine's output is expected to meet the needs of small farmers, but if it is produced on a larger scale, its cost could be reduced dramatically. This could make it more affordable for even more farmers and help to address some of the challenges facing Indian agriculture. Overall, the design of the machine is intended to provide a solution to the labor problem that is currently facing Indian agriculture. By reducing the need for human labor, the machine can help to improve yields, reduce costs, and make farming more accessible to small farmers who may not have access to expensive equipment.

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