

ECO FRIENDLY POWER TILLER MACHINE

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ABSTRACT

Agriculture starts from human existence. It is important part in human life as it feed us and thereby it runs the ecosystem though. It is extreme important section for living beings. But modern farming techniques are heavy-coughed and very intensive. Modern tractors which run by fuel are detrimental to environment and not affordable to farmers. Tilling in farming is main step and traditional techniques were time consuming and very intensive and modern ones are non-affordable and hazardous to environment. Portable Electric power tiller machine uses battery-powered mechanism to serve the tilling purpose at minimum cost, time in tilling and thereby increasing productivity, and it enhances the healthy environmental purpose too. The power tiller is most suited for usage in hilly locations, moist conditions, and on small farms because it can do both primary and secondary tillage operations. The power tiller, with the correct set of tools and attachments, can handle most of the field operations in intensive cultivation. The power tiller's small weight makes it ideal for working in both wet and dry situations. Depending on the type of work, external attachments can be added to the tiller. As a result, the tiller can be utilized for a variety of tasks. The power tiller is battery powered, so no fuel needed and it is pollutant free and hence it is eco friendly

Keyword: - Agriculture, Power tiller, Productivity, Eco friendly and human effort

1. Introduction

Agriculture or farming is the practice of cultivating plants and livestock. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that enabled people to live in cities. The history of agriculture began thousands of years ago. After gathering wild grains beginning at least 105,000 years ago, nascent farmers began to plant them around 11,500 years ago. Pigs, sheep, and cattle were domesticated over 10,000 years ago. Plants were independently cultivated in at least 11 regions of the world. Industrial agriculture based on large-scale monoculture in the twentieth century came to dominate agricultural output, though about 2 billion people still depended on subsistence agriculture

Agriculture has been an integral part of the human ecosystem. However, traditional farming methods require a lot of human effort and are very time-consuming. Farm tilling is one of the most labor intensive operations in agriculture. Manual tiling of fields is very strenuous task while tractors incur high capital along with heavy fuel consumption costs.

To enable good soil gripping, the machine uses a wheel with welded angles. The wheel design was created to offer a tight grip on the soil that would allow the cultivator prongs to be dragged during the tilling process. The machine is turned on and off using a switch on the handle. The machine is powered by an electric motor that drives the pulling wheel using sprocket chain configuration.

A power tiller, also sometimes known as a rotary tiller, a rotor tiller, a rotator, or a rotary hoe or plow, is a garden tool used primarily to cultivate and aerate soil. There are a couple of different variations and available options, but the most characteristic aspect of this tool is its basic form and function: it has blades that rotate to turn the soil, and in “power” options this rotation is harnessed to a motor.

The tools are basically a mechanical adaptation of manual tillers, which are hand powered tools used for a similar purpose. Attaching the bladed mechanism to a motor makes it more efficient and less straining. Some of the least expensive models still require pushing and maneuvering, and are often compared to lawn mowers when it comes to their size and basic utility.

Larger options can frequently be harnessed to farm machinery like tractors and ploughs. In some countries, this sort of mechanized tiller may also be a two-wheeled tractor, which may have other attachments and functions aside from cultivation.

The mass production and development of multi-functional mechanical devices such as the power tillers, to match the requirement of the end-users is an important factor for the growth of mechanization in the global agriculture market. Owing to their enhanced features, power tillers have abundant applications in small and medium agricultural farms in the global market.

The power tiller market is expected to grow on account of its growing number of applications and its multi-functional properties. Adding to that, further, development is underway to produce more safe and efficient power tillers in the global market.

The electric motor power tillers are estimated to grow as regulatory authorities are pressing manufacturers to use products that are eco-friendly and minimize the usage of natural resources during the production process. The power tiller market has a lot of scope in the research and development division.

Tharoon et al [1] aimed at development of rotary blades in order to reduce the energy requirement for tillage by optimizing the parameters which affect the cutting force of the rotary blades. For this reason the mathematical model of power requirement of the rotary blades and the equations of surface area per unit volume of soil tilled as well as cutting angle are determined and computer programs to solve those equations are developed. From the results of computer programs, blade geometrical dimensions corresponding to the minimum and optimum blade surface area per unit volume of soil tilled and cutting angle are selected to fabricate the rotary blades

Ashish kumar et al [2] designed and developed a soil tiller to reduce the human effort and to reduce the maintenance cost .

Mahesh Gavali, Satish Kulkarni [3] made a Comparative Analysis of Portable Weeders & Powers Tillers and it was identified that power tillers are much more effective than portable weeders and it can be operated in variable soil conditions.

Aby Cherian [4] made a detailed study on power tiller attachments and found that The power tiller is capable of primary and secondary tillage operations and is most suitable for operations in hilly regions, wet conditions and for small holdings. Given the right set of implements and attachments, the power tiller is capable of performing most of the field operations in the intensive cultivation. The light weight of power tiller is a favorable factor for working in

wet and dry land conditions. External attachments can be made on the tiller depending upon the nature of work. So, the tiller can be used as a multi-purpose machine.

Vasantha Kumar et al [5] designed and fabricated a Electric Tiller Machine with Fertilizer Dispenser for Arecanut and Coconut Plantation. It was found that electric power tiller does not emit any greenhouse gases; it is very eco-friendly. Human efforts are drastically decreased. Maintenance cost is very low. Operations are user friendly. The main disadvantage of the electric tiller machine with fertilizer dispenser is they cannot be used in the high slope farms.

CONSTRUCTION:

The power tiller comprises of DC motor, Lithium ion battery, controller, connecting wires, bicycle wheel, steel rod, nuts and bolts, screws and fittings, chain sprocket.

A steel rod is taken and cut into a required length, with the help of steel cutting machine. Then, the cut steel is joint by using the welding process. The bicycle wheel is attached between the steel rod through nut and bolt.

The motor is mounted on the required place and the connected with the lithium ion battery and the controller, with the help of connecting wires. Then the motor and the bicycle wheel is connected with the help of chain sprocket. And the on/off is connected in the circuit of starting purpose.

3. WORKING:

A motorized tiller is operated by walking behind the machine. The machine consists of electric motor, battery, chain sprocket, wheel angles, bearing, electrical & wiring, mounts and joints, supporting frames, screw and fitting, bicycle wheel. The machine is powered by an electric motor that drives the pulling wheel using a sprocket chain configuration. The motor that drives the forks into the soil is powered by a battery. A battery is used to power the motor with a force capable of pulling the forks through soil. The cultivator forks enable for precise and easy tilling, as required by farming. The 4 x cultivator forks allow for easy and narrow tilling exactly as needed for farming. A switch provided on the handle is used to switch on off the machine. The portable lightweight design makes it easy to control the direction of machine while in use. Also it can be easily carried around in vehicles or by hand for transporting the machine. Thus the electric power tiller provides a smart innovative fuel free mechanism to farm and garden tilling. The machine is light in weight and portable. Due to easy construction of machine the maintenance is very low.



Fig-1. Side view of tiller machine



Fig-2 Front view of tiller machine

Table 1 : List of Components

Non Recurring and recurring Items	Quantity	Cost in Rs.
Dc Motor	1	Rs.3,800
Lithium Ion Battery	1	Rs.7,800
Battery Charger	1	Rs.1,800
Alluminium Box	1	Rs.300
Steel Ploughs	1	Rs.300
For assembling Nuts & Bolts (Weld & Paint)		Rs.1,530
Total		Rs.15,530

CONCLUSION:

The power tiller is most suited for usage in hilly locations, moist conditions, and on small farms because it can do both primary and secondary tillage operations. The power tiller, with the correct set of tools and attachments, can handle most of the field operations in intensive cultivation. The power tiller's small weight makes it ideal for working in both wet and dry situations. Depending on the type of work, external attachments can be added to the tiller. As a result, the tiller can be utilized for a variety of tasks. The power tiller is battery powered, so no fuel needed and it is pollutant free .

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