

# Portable Electrical Cultivator for Agricultural Purpose

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**Abstract:** *In these upcoming days there is more a usage of EV'S which helps toprotection of Environment. As a part of that we can also implement those EV's towards the Agricultural Farming Equipment's which makes more unpolluted Ecosystem. Further, as mentioned above the Cultivator is equipment used for Cultivation using Rechargeable Batteries. These Portable Cultivators are Basically used for yielding in small agricultural lands, especially for the people who are having a small amount of landcan't able to buy the tractors for those kind of people it suit's with least amount and more effective. In this report various parameters of the design and manufacturing of the Cultivator is studied. The machine would be developed considering difficulties face by farmers those who are holding less land and with regards to Environmental protection.*

**Keywords:** Electrical Cultivator

## I. INTRODUCTION

As we all know that India is a developing country it continues to rely on hands tools for the foreseeable future for cultivation. The use of hand tools for land cultivation is still predominant in India because draft animals and 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 and what values farm power generated for them [1-10]. As per seeing the current scenario in our country, we all know that our population is increasing day by day. So as to fulfill the requirement of the food for the increasing population, this can only be achieved through some level of mechanization. Herethe portable Electric Cultivator makes the work to famers or for those who are maintained a garden behind their homes. So, to make this happen this we came with our ideas as best out of our knowledge [11-16].

### 1.1 Scope and objective

Reason for selecting problem:

- To make use of EV's in agriculturalsector.
- To ensure the availability of Cultivatorsfor small gardening purposes.
- To make yielding with less economy

### 1.2 Scope

The Portable Electrical Cultivator can be Easy to assemble and disassemble depending upon needs, and makes use of battery which saves the fuel costs, it helps for people who are wanted to grow crops forthemselves. The main objectives are:

- To make sure the availability of Cultivators for the Farmers with less cost.
- To make use of EV's in Agricultural Sector.
- To design a machine in small operable Land.
- To make it simple in use for those whodon't even know driving.

### 1.3 What is Portable Electrical Cultivator?

It is a farming equipment used for yielding purposes, which makes use of electrical power source i.e., use of DC motor and rechargeable batteries like the use of EV Vehicles. Which makes to availability of cultivator with less initial price as well as less operating price. The name portable is used because it can be easily assembled as well as disassemble and it also less in size compared to other farming equipment's. For this equipment we can increase the number and size of tillers (Teeth's) Used for Cultivation, which plays a major role in the Farming.

## II. LITERATURE REVIEW

**Dr. C.N. Sakhale et al. (2016):** According to the author multifunctional agricultural vehicle mainly focuses on basic problems faced by our fellow farmers i.e., seed sowing, water spraying, cultivation and digging. Cultivation tool is removable. This operation is done by manual force. For spraying motor, battery and switch is given. When switch is on fertilizer pump from motor, enter to the spray nozzle then it sprays with high velocity to the crops. In our machine the cultivation tool i.e., the tiller will be removable for the ease of transportation purpose and also the operation can be carried out by manual force. [1]

**Mr. Thange R.B, Mr. Ugale A.G et al. (2016):** The author studied and developed agricultural needs to find new ways to improve efficiency. One approach is to utilize available information technologies in the form of more intelligent machines to reduce and target energy inputs in more effective ways than in the past. Here author is trying to make such an equipment that will perform no. of operations like sowing, weeding, grass cutting, tillage, spraying, etc. So, we will be making the sprayer drum of plastic and will have capacity of 15 liters which will be used for spraying purpose. Existing old machines had the individual storage place and separate individual mechanism which leads to more cost. The drawbacks in the existing machine are rectified successfully in our machine. [2]

**Amol Nalawade, Akash L. Kundu et al. (2019):** The author presented the information about the different innovations done in seeding machines available for farming and plantation purpose. In this the main aim of seed sowing operation is to put the seed in rows and at desired depth and having a particular spacing between seed to seed with soil and provides a proper exertion of a force over the seed. So, it shows proper row spacing within the seeds, their seed rate and their depth associated with different agro-climatic conditions to achieve optimum yields. Our equipment consists of a low maintenance cost which does not consist of a fine texture which can be easily broken or damaged. [3]

**Nagesh Adalinge, Rahul Mane et al. (2017):** Here the author has proposed that seed sowing machine is a device which helps in sowing of seeds in the desired position hence assisting the farmers in saving time. When the equipment is pushed forward by using handles, the front wheel rotates and the gear is mounted on the axle of the wheel start to rotate and its rotation is then transferred to the pinion through chain drive. The rotary motion of pinion is converted into reciprocating motion by simple slider crank mechanism. Improved seed drills are provided using seed and seed boxes and by seed metering mechanism for variation of seed and seed dropping rates [4].

**Pradip Gunawat, Vinayak Yadav et al. (2017):** The author proposed that the objectives of seed planter machine are to put seeds at desired depth with constant seed spacing and covering the seed with soil. Our machine is suitable for planting seed in ridge and furrow method, flat arrow method, flat bed method as well as multi cropping. The main objective of our machine is to reduce human effort and back ache of farmers. Tooth Bevel gear is used to convert rotational motion into Linear. Dibber is used to stir the soil to various depths. [5]

## III. COMPONENTS DETAILS

Portable Electrical Cultivator consists of the following major components:

- Wheel
- Electric DC Motor
- Belt Drives
- Battery
- Tiller's

**III. BASIC CONCEPT OF DESIGN**

Concept to design a project for small scale farmers. And in this machine main functions can be performed with cheap costas compared to other agriculture machine.

For this concept not essential to skilled person. Mechanism of the machine should be very simple. So, that for gardening and small-scale farming, design this concept.

**4.1 Brief description and working of some major components**

**Wheel:**



Fig. 4.1 Wheel

A wheel is a circular component that is intended to rotate on an axle bearing. The wheel is one of the key components of the wheel and axle which is one of the six simple machines. Wheels, in conjunction with axles, allow heavy objects to be moved easily facilitating movement or transportation while supporting a load, or performing labor in machines. Wheels are also used for other purposes, such as a ship's wheel, steering wheel, potter's wheel, and flywheel

**Electric DC Motor:**



Fig. 4.2 Electric DC Motor

A DC motor is any of a class of rotary electrical motors that converts direct current (DC) electrical energy into mechanical energy. The most common types rely on the forces produced by induced magnetic fields due to flowing current in the coil. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current in part of the motor.

**Belt and Pulley:**

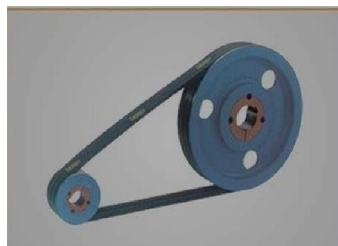


Fig. 4.3 Belt and Pulley

A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a taut cable or belt, or transfer of power between the shaft and cable or belt. In the case of a pulley supported by a frame or shell that does not transfer power to a shaft, but is used to guide the cable or exert a force, the Supporting shell is called a block, and the pulley may be called a sheave or pulley wheel.

The pulley driver and driven is used to connect the DC Motor to the wheel through belt and pulley mechanism.

### Battery



Fig. 4.4 Battery

The battery is in use, the water breaks down into hydrogen and oxygen gas by going through a series of chemical reactions. The gas evaporates from the battery and water level decreases with time, which in turn, makes the plates dry. The battery is in use, the water breaks down into hydrogen and oxygen gas by going through a series of chemical reactions. The gas evaporates from the battery and water level decreases with time, which in turn, makes the plates dry. Thus, it is important to use the distilled water in the battery so that it keeps on performing efficiently. Thus, it is important to use the distilled water in the battery so that it keeps on performing efficiently

### Tiller



Fig.4.5 Tillers

Tiller is a mechanized tool used in agriculture to prepare and cultivate soil for planting. Also known as a cultivator, it loosens soil, removes weeds, and cultivates the land to improve its fertility. The tiller can be connected to a tractor or operated manually, making it highly efficient and versatile. With its sharp blades, this tool can effectively break up compacted soil, ensuring that the soil is fertile and ready for planting. Farmers must till the soil regularly to ensure that crops have sufficient access to nutrients and water. Therefore, tillers play a vital role in the success of any agricultural operation.

The tiller is used for plugging the field.

So after the field is successfully plugged then the seed sowing operations can be performed.

### V. WORKING PRINCIPLE OF CULTIVATOR

The machine makes use of a bike wheel rim with welded angles to provide efficient gripping on agriculture soil. The wheel rim design is developed to provide a firm gripping on agriculture land strong sufficient to drag the tiller machine blade

while tilling process. A switch is provided on the right side of handle is used to switch on or off the machine. The machine is run by an electric hub motor which uses a Belt and pulley mechanism arrangements run the pulling bike wheel rim.

Views of Cultivator

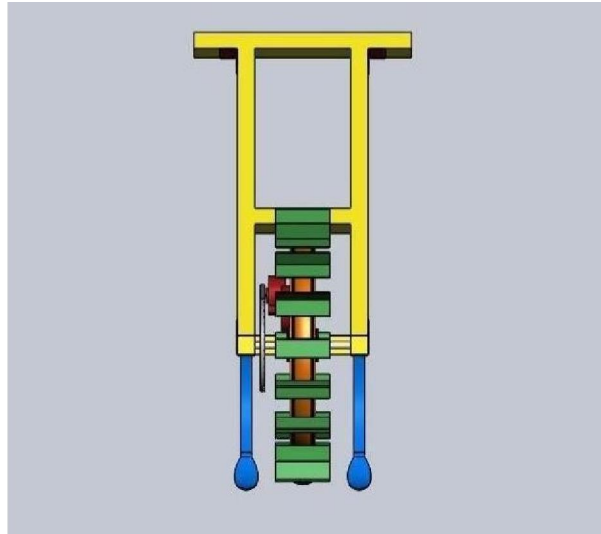


Fig. 5.1 Front view of Cultivator

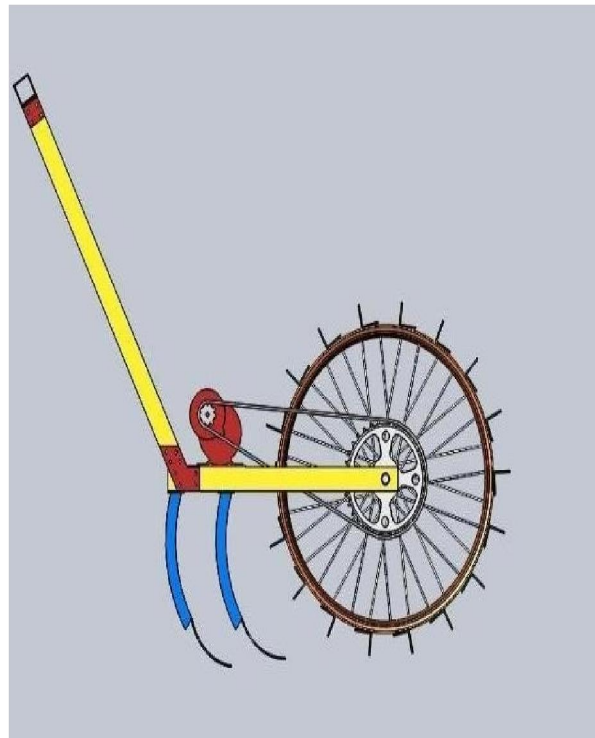


Fig. 5.2 Side View of Cultivator

**VI. CONCLUSION**

Today in the world fuel prices and environmental pollution increases day by day. So control environmental pollution, to save fuel and bio product this project is design. For this model requires low investment at the starting stage but its gives more energy output with low maintenance. Our new project developed battery powered is minimizing the harmful effort of manual tiller. Here in our project, we conclude that by using this machine we reduce the farming cost, animal use, and air pollution and manpower. Our main objective is to help the farmers.

### 6.1 Future Scope

1. We can interface sensors to this Machine so that it can monitor some parameters.
2. We can add Wireless Technology to Control Machine.
3. We can add More Drill for different crop
4. There are to be proper provisions are needed to couple the machine with the tractor.
5. We can add solar panel for spraying system or for powering the battery and motor.

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