



## FABRICATION OF AGRICULTURE PORTABLE ELECTRIC POWER TILLING MACHINE USING SOLAR ENERGY

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**Abstract:** Agriculture helps to sustain life by providing the food we need to survive. Thus, agriculture could be referred to as the production processing and distribution of agricultural products. Agriculture is the backbone of economic system of a given country. About 70% of people rely directly on agriculture as a livelihood. Farm tilling is one of the most labour intensive operations in agriculture as a livelihood. Tilling was first performed via human labour, sometimes involving animals. It is estimated that nearly 60% of the total draft power used in agriculture is still provided by animals. Manual tilling of fields is very strenuous task while tractors incur high capital along with heavy fuel consumption and costs. The solar electric power tilling machine helps to reduce the time and cost involved in tilling using a smart portable design thereby increasing the productivity and efficiency in agriculture

### INTRODUCTION

For decades agriculture has been associated with the production of essential food crops. Agriculture plays a critical role in the entire life of a given economy. A developing country like India is expected to continue to rely more on hand 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 any access. For this we found a solution for this problem and introduced a portable electric tilling machine using solar energy. This low cost solar electric power tilling machine is a one-step modern solution to enhance the conventional agricultural methods of farming as it reduces human effort, at a very negligible price using motorized tilling mechanism

### Literature review

Professor Shailendra Zaveri (2022)<sup>[1]</sup> published in International Research Journal of Engineering and Technology (IRJET). Design and fabrication of portable electric tiller and cutter machine. In this paper research they developed battery powered tiller machine and concluded that by using this machine they reduce the farming cost, animal use, and air pollution and man power.

Zakariya (2022)<sup>[2]</sup> published in Journal of Engineering Research and Reports perform modification of Portable Power Tiller for Small Scale Weeding Operation. After preliminary study, it was found out that power tiller could be adopted for weeding. As a result, the study sought to improve its performance by altering some essential components, such as weeding blades and depth blades. Three sets of four, six, and eight blade gangs were fabricated from 3mm mild steel sheet metal. The fabrication took place at Ahmadu Bello University's Department of Agricultural and Bio-Resources Engineering in Zaria. The redesigned machine was tested in the maize field at the Institute for Agricultural Research, IAR, and Ahmadu Bello University for weeding effectiveness, field capacity, plant damage, and fuel consumption.

Anagha Deshmukh (2021)<sup>[3]</sup> published in Journal of Emerging Technologies And Innovative Research (JETIR). Design "multipurpose battery operated electric mini cultivator for tilling operations". In this paper research they concluded that depending on the nature of the task, external attachments will be made to the tiller. As a result, this tiller will be employed for a variety of tasks. This machine was created with the goal of functioning in a variety of soil conditions.

Sonu Yadav (2021)<sup>[4]</sup> published in International Journal of Advanced Research in Science, communication and technology (IJARSCT). Design "portable electric power tiller machine". In this paper research they concluded that the portable battery charged electric power tiller machine provides maximum soil grip, the machine uses a wheel with welded angles. The wheel design was created to offer a strong grip on the soil that would allow the cultivator prongs to drag during the tilling process.



An electric motor drives the pulling wheel through a sprocket chain arrangement. By adopting a motorized tilling system, it minimizes human effort at a very low cost.

Shabbir J.Karjatwala (2020)<sup>[6]</sup> published in open access international journal of science and engineering. Design “development and fabrication of mini cultivator and tiller”. In this paper research they concluded that the farmers used to use traditional farming methods, which are time-consuming, labor-intensive, and expensive, therefore they introduced new technologies. Machines are commonly employed for farming purposes in India, which is at a higher level. They are creating this model in order to solve this challenge. This document discusses the operating machinery that would be used to till one and a half hectares. With this new technology, the plough will be able to go ahead and the base wheel will rotate with blades that provide traction.

### Working Principle

This model consists of solar panel, solar controller, chain and sprocket, battery, motor etc... The sunlight falls on the solar panel and cover convert it into DC electricity to charge the battery. The machine uses a sprocket chain arrangement to drive the pulling wheel and driven by the electric motor for which the energy is supplied by battery. The electricity is fit to the battery by a solar regulator. The wheel with forks is operated with motor and the motor is powered through battery. This machine allows us for easy and narrow telling exactly as needed for farming. The maintenance cost is very low as the machine is light weight and portable.



### COMPONENTS LIST

#### 1.BATTERY



Device that stores chemical energy and converts it into electrical energy. It is a source of electric power consisting one or more electrochemical cells with external connections. For this project we use 24volts and 24 amperes battery.



## 2.MOTOR



It converts electrical energy into mechanical energy. We use 24 volts Brushless DC motor to run this machine.

## 3.CHAIN AND SPROCKET



This drive is a type of power transmission in which a chain engages with two or more sprockets used in engines as drive from crankshaft to camshaft.

## 4.GEAR



Transfer motion and torque between machine components in mechanical devices

## 5.WHEEL



It is a circular object which is fixed below a vehicle to move easily on the ground. This machine makes use of a wheel with welded angles to provide efficient gripping on soil.

## 6.SUPPORTING FRAME





It is a structural system that supports other components of a physical construction .

#### 7.SOLAR PANEL



This solar panel absorbs sunlight and then it is converted into electrical energy.

#### 8.SOLAR CHARGE CONTROLLER



A solar charge controller is used to keep the battery from overcharging by regulating the voltage and current coming from the solar panel to the battery

### CONCLUSION

This tilling machine which uses solar energy can do both primary and secondary tillage operations. This machine is proved to be an effective and sustainable solution for agriculture. The performance of this machine was evaluated in terms of efficiency, power output and durability. It is better when compared to traditional gas powered tillers. In this solar charge controller and 20 W solar panel are used to charge 24 V battery quickly and consistently. This solar powered electric tilling machine works efficiently in place of animal power and human effort.

### REFERENCES

- 1] Professor Shailendra Zaveri(2022) published in International Research Journal of Engineering and Technology(IRJET). Design and fabrication of portable electric tiller and cutter machine. We have taken this as base for our research and further production of our solar powered electric tilling machine.
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