

# A Review on solar powered cultivator

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**Abstract:** In this paper we are focusing on the various technologies used for the weeding purpose in the agriculture. The mainly solar power cultivator developed for agriculture which has a scope to be in future. The another use of conventional methods have a some side effects, so the effective properties of solar powered cultivator avoid the side effect of conventional method. It avoids the use of any type of chemical. The solar powered cultivator has portable weed removing machine for the agricultural and it reduces the human efforts of weed elimination. The expensive machine buy for a farmer is very difficult, so our team develop solar powered cultivator machine. The cultivator is helpful for farmers because of low cost and time saving. It also increases the crop productivity.

**Index Terms:** Agriculture, Solar power, Blade, Motor, Increase crop productivity

## I. INTRODUCTION

Indian economy is based on agriculture. The development in agriculture leads to the rising economic status of the country. In India farmers are facing a lot of problems due to the unavailability of laborers; the laborers have been an integral part of rural agriculture systems in India for many years and are continuing. Due to the unavailability of electricity and the immediate use of farm equipment, solar energy is effectively used. Solar-powered cultivator machine that operated on solar energy. Now the solar energy is radiant light and heat from the sun harnessed using a range of ever-evolving technologies such as solar heating, solar thermal energy, solar architecture, and artificial photosynthesis. It is an important source of renewable energy and its technologies are characterized as either passive solar or active solar depends on how they capture and distribute solar energy and convert it into solar power. The traditional way of farming using non-efficient farming equipment takes a lot of time and also increases labor costs.

Weed removal is one of the primary processes in agriculture, there is a necessity for removed in all the fields to increase the quality of crops and decrease the effect of weeds on crops. It is a very difficult task to weed out unwanted plants manually as well as using bullock operated equipment which may further lead to damage of main crops. A weed can be thought of as any plant growing in the wrong place at the wrong time and doing more harm to main crops. These plants are competing with crops for water, nutrients, and light. This can reduce crop production. The neglected and improper weeding reduces the crop yield which various forms and in a lot of cases whole crop yield may fail. So the solar power cultivator is the process used to remove the unwanted plants to protect the regular crop concerning soil nutrition and wetness. Hence the crop may give a high yield and more profit to the farmer.

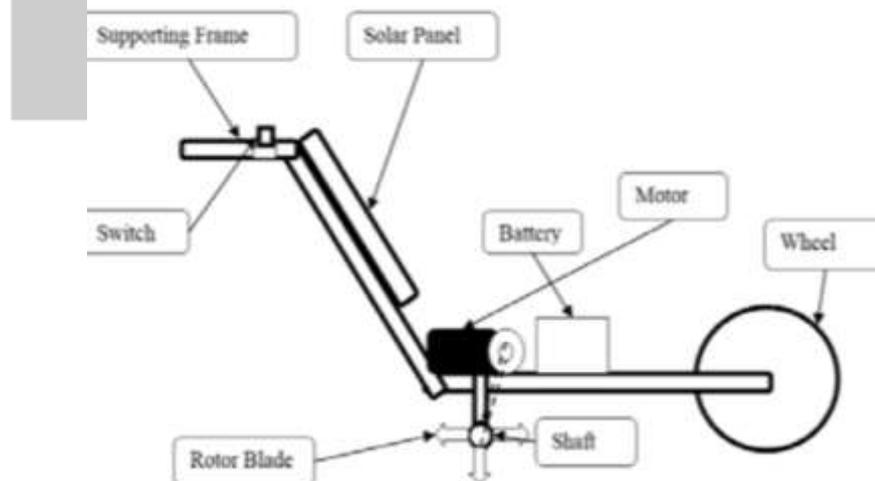


Fig. Solar Powered Cultivator

## II. LITERATURE REVIEW

**M.Rajashkhar and Dr.S.Mohankumar** studied all components of solar powered inter cultivator and obtain the performance analysis and simulation on the basis of design basis and tools, including three-dimensional modeling techniques, finite element method, and virtual prototype. In this research paper analysis and simulation are done on the CATIA 3D modeling tool and ANSYS software.

The tools and design of all the main components of solar-powered inter cultivator developed effective blades on basis of CATIA and ANSYS software. The design of Solar operated inter cultivator tested for its work gives an efficiency of about 86% and the weeding capacity gives 0.028 ha/hr. solar powered inter cultivator after tested or working gives mass production at less cost, this design is sustainable for poor farmers.

**Anurag Dwivedi & et.al** design and developed solar powered weeding machine. The study was focused on the various techniques for weeding agriculture implants that are used or scope in the future. The effective property of the weeding machine is sustainable for weeding purposes and no side effects. It avoids the use of any chemicals and prevents the crop from chemicals.

Weeds are harmful to the crops hence, it removed. The weed cutter is safe as all the material used can be recycled and does not pollute the environment because it drives on solar power. The mechanism is not complicated and is run by anyone. It reduces human efforts and also time, which increases crop productivity.

**Prof. Mathan.M & et.al** studied design and analysis of battery powered weeder, the existing gasoline engine is replaced with a motor for drive and batteries for the power source. The machine is driven with the help of a belt and pulley, For providing an easy drive to the system. The battery-powered weeder machine design is analyzed for stress; strain and deformation to detect the withstand ability of the system. The parameter such as load, force, and speed are varied. After analyzing the machine the weight of the machine is 210kg.

In conclusion, the comparing between electrical power weeding and normal weeding machine based on test five times gives an 80% efficiency is almost equal to the normal weeding machine. The machine is efficient to operate a single person. The weeder machine working depth and travel speed can archive a good weed control. Battery-powered weeder machine is modernization and advancement in the agriculture field. These machines make the farmer independent on the labor for removing the weed.

**Shrivishnu.L.R & et.al** studied fabrication and testing battery-powered weeder, the gasoline engine is replaced with a motor for drive and batteries for the power source. The D.C power 2hp and 1500 watt are replaced with 5.5hp gasoline engine according to engine and motor power eqilancy. The drive output of the motor gives the input to the gearbox through the belt and pulley set up 3:7. The gearbox has 2 forward and 1 reverse arrangement. Battery source gives to the motor for a drive. Four batteries setup each battery capacity 12 volts.

After comparing working depth and slow travel speed can achieve good weed control. The test is done with different soil conditions with different weeds; it is simple and more effective for regular use. With the help of an electric power weeder, zero-emission is ensured, which is the primary motive to develop the machine

**Dr.V.Jayaseelam, R.Mangesh Kumar, M.Mayakannan,** are studied design and fabrication of battery-operated weeder machine the use of mechanical weed control is easily adopted by the farmhouse gate convened of its advantage. In humans operate a weeder is required muscle power so it cannot operate for or a long time. The method of hand weeding is time-consuming. In this battery, drive motorize weeder used motorized system which is battery operated.

When developing the weeder the demand is more form of farmers. The efficiency of the weeder is satisfactory and it is easy to operate. Here do not use any fuel or power, hence maintenance cost is less. The cost of a weeder is low with locally available material. The overall performance of the weeder is satisfactory.

**Karthik Shrivastav & et.al** aim to make an effective design of weed removing machine to minimize the time for removing the weeds from growing plants. They are mainly focused to increase the growth rate of plants. So the team is made battery operated weeder specially used from aluminum frame and plastic gear.

The whole project is focus on increasing the weeding process. This is less costly and time saving device for the farmers. It reduces the human efforts of weed elimination. It increases the productivity of food verities.

**Ashish Kumar & et.al** worked on solar power tiller. The solar panel is fixed on the upper part on the tiller so that the sunrays directly on the solar plate and solar plate output is given to the battery which supplies current to the wiper motor. The rotation of the motor is clockwise or anticlockwise depends on the connection. The project is mainly concentrates on designing a suitable operating system.

The project is successfully implemented or minimization of harmful efforts of using the manual rotavator. The new developed battery powered rotavator is operated. These project archives high safety, reduces human efforts, increasing the efficiency of soil tiller, reduces the work load and maintenance cost.

**Mukesh K Singh & et.al** are studied mechatronic concepts are incorporated in the development of a battery-assisted four-wheel weeder for weeding operation in wide row (more than 30 cm) crops. A brushed DC motor of 250W powered by 24V-14Ah battery with sweep type weeding tool performed satisfactorily in the field for weeding operation up to 147N draft. The operators are to only guide the weeder up to 147N draft while they need to apply their muscle power beyond 147N to prevent slippage. The average field capacity with this machine was 0.0554 ha/h at a walking speed of 2.52 km/h with 97.5% weeding efficiency.

The machine is gender-friendly with simple design and technology and has the potential to be adopted by small and hill farmers with reduced drudgery. The concept of transforming manual operated to battery-assisted weeder was found satisfactory for wide row crops. It is simple in construction, low cost, and environment freely as the battery can be charged with a solar panel.

**S. Kumari & et.al** developed weeder was test on a maize crop having a row to row spacing of 600 mm. There are three different widths of cutting blades (50, 60 and 70 mm) were selected with two, three, and four blades per flange to evaluate its performance. The operational width of the developed weeder was 240 mm and the blade deeper into the soil up to the depth of 35 mm. The maximum field capacity and weeding efficiency were found to be 0.175 ha/day and 88.03%, respectively. Minimum plant damage was 1.96%. A solar operated power weeder was developed to reduce dependency on fossil fuel, harmful emissions, and cost of operation.

**Sushant S. Kolhe & et.al** are developed universal multipurpose cultivator and the field analysis is done for various agricultural operations, the design and development of MPC are done by using the analysis tool. The machine is able to perform various agricultural operations such as seed sowing, plugging, fertilizing, and cutting through power generation in the respective order. We can use insecticide instead of fertilizer. The main objective of the multipurpose cultivator is to put the seed in the desired depth and

provides particular spacing between the seeds and further, it covers the seeds with soil with the help plowed. We can achieve optimum yield by proper spacing within the seed and can provide particular row spacing with the help of implementing various mechanisms.

The research is to be done to provide farmers which minimize the labor hours required in multiple agricultural activities by implementing various operations. This paper provides an alternative method to the existing farming system in the agricultural field at an effective cost. It gives minimum efforts, low maintenance cost, and good quality of seeding. Proper expertise is not required for working this machine and simple to exchange.

### III. CONCLUSION

In this project, we focused to increase the weeding process. Weeds are harmful to the crops hence would be removed. The Solar-powered cultivator is safe as all the material can be recycled and does not pollute the environment as it is driven by solar energy. The efficiency of the cultivator should be satisfactory. It is not so complicated mechanism and can be run by anyone. Less labor is needed and it is more economical. Hence the maintenance cost is very low. All the fabrication of low-cost weeder is done with locally available material. The overall performance of the solar-powered cultivator has satisfactory.

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