# Design and Fabrication of Solar Power Weeder Machine

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***Abstract*** **- A solar operated power weeder was developed to reduce dependency on fossil fuel, harmful emissions, and cost of operation. The developed weeder was tested on maize crop having row to row spacing of 600cm.**
**Three different width of cutting blade (50, 60and 70 mm) were selected with two, three and four number of blades per flange to evaluate its performance.**
**The operational width of developed weeder was 240 mm and blade penetrated into soil up to the depth of 35 mm. Maximum field capacity and weeding efficiency was found to be 0.175 ha/day and 88.03 per cent, respectively. Minimum plant damage was 1.96 per cent and the average performance index obtained was 841.**

***Index Terms*** **- Solar, Power weeder, Fossil fuel, Emissions**

## INTRODUCTION

Mechanized weed cutter is a machine that uses revolving blades, to cut a garden land spaces, at an even length. Weed cutters employing a blade that rotates about a vertical axis are known as rotary cutters, while those employing a blade assembly that rotates about a vertical axis are known as cylinder or weed cutters.

Many different designs have been made, each suited to a particular purpose. The smallest types, pushed by a human, are suitable for small residential lawns and gardens, while larger, self-contained, ride-on mowers are suitable for large lawns, and the largest, multi-gang mowers pulled behind a tractor, are designed for large expanses of grass such as golf courses and municipal parks.

## COMPONENTS AND DESCRIPTION

The major components involved in the fabrication of solar weeder power machine.

1. MOTOR
2. SOLAR PANEL
3. BATTERY
4. BEARING
5. BLADE

Description

The solar operated power weeder consisted of solar panel, DC motor, worm gearbox, rotor shaft, flanges, blades, frame, handle, blade cover, wheels.

Working principles

Solar energy was the main source of power for the developed weeder. A 160 W solar panel was used to harvest solar energy and it works on the principle of photo-voltaic effect which converts sunlight into electrical energy. The electrical energy developed was further transmitted to 150 W DC motor which was responsible for the conversion of electrical energy into mechanical energy. The output shaft of DC motor was connected to worm gear box in order to achieve the desired rpm. Output rpm of worm gear box was gained by the rotor shaft which further helped the cutting blades to perform their desired work. Cutting blades were attached to the rotor shaft with the help of flanges.

## CALCULATIONS

Weight of the actual weeder with engine = 110 kg
Weight of the engine and its accessories removed= 20-25 kg
Total self-weight after the removal of engine = 60 kg
Weight of a battery (2 x 12) = 24 kg
Weight of the motor = 5.5 kg
Weight of controller = 1.75 kg
Additional weight assumed to be added = 5 kg
Total weight assumed to be carried = 100-150 kg
Calculation of motor rating
weight to be pulled = 150 kg
Max speed required = 1.5-3 kmph
Horsepower (hp) = weight x(velocity/234)/3
= 150x (0.8/234)/3
= 0.17hp
Torque = 5252 x Hp/speed(rpm)
= 5252 x 2/1000
= 5.252N-m

Calculation of battery backup required.
power of the moto(p) = 1500 W
Estimated battery backup time = 1.5 hours
Total output voltage of the battery= 12 V x 2nos = 24 V
Calculation of required storage = (p x time)/ V
= (1500x1.5)/24
= 93.75 AH