

A REVIEW ON SOLAR POWERED WEEDER USING WHITWORTH MECHANISM.

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Abstract: This paper focuses on the various techniques used for weeding purpose for agricultural implants which have a scope to be used in future. The implants used in conventional methods have some side effects. The effective properties of solar powered weeding machine is suitable for weeding purpose and have no side effects. It avoids the use of any chemicals and hence prevents the crops from chemicals. Agriculture plays a vital role in Indian economy. The reason behind reduction in the productivity of agricultural is weeds. Weed removal is serious problem faced by the farmers that will reduce the farmer interest to continue cultivation. The main objective of this paper is to construct and develop a solar powered weeder to provide the best opportunities for cultivation. The working of this project is depends on the solar panel. This is motorized equipment driven by the solar energy which moves blades to cut the weeds by chain sprocket mechanism. The design is simple and easy to operate. This equipment is designed to minimise the human effort, to reduce the cost and provide the efficient work output. This weeder will fulfil the requirements of the marginal farmers.

Keywords: Solar powered Weeder, Agricultural Implants, Motorized Equipment's.

1. INTRODUCTION

Solar Weeding machine is the machine that operates on solar energy. Now, Solar energy is radiant light and heat from the Sun that is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaic, solar thermal energy, solar architecture and artificial photosynthesis. It is an important source of renewable energy and its technologies are broadly characterized as either passive solar or active solar depending on how they capture and distribute solar energy or convert it into solar power. Active solar techniques include the use of photovoltaic systems, concentrated solar power and solar water heating to harness the energy.

Weeder is a mechanical implement used to take away the unwanted plants in the field. Indian agriculture is reliant on human power and also animal power. It is a time consuming process. Most of the Indian farmers are having small agricultural land. Farmers still follow the conventional methods in the cultivation for weeding purpose. These methods require high labour force to perform the operations. The main disadvantage of the modern equipment is its cost effectiveness because most of them are mechanized and driven by fuel. So they can hardly afford such costly equipments.

2. LITERATURE REVIEW:

[1] Single row weeder was developed for weeding purpose but are not used widely in the agricultural operations. This is because lack of awareness on the newly invented single operated weeders. Weeding operation was done mostly by the hands. The weeding performance of the hand tools are good but mostly time consuming [3]. These tools may have the chances of injuring the performer. [4] The different postures of the workers have been studied on the basis of their working conditions on the field. Agriculture is not an easy task which includes different stages. Different working postures have been studied to develop an ergonomically suitable weeder for workers. [3] Different types of weeders have been studied to understand the weeders in a better manner. The comparisons of the weeders helped to understand the present weeding tools which perform better operation. But mostly fuel operated weeders are available in for the wet land cultivation.

3. MATERIALS:

The performances of the equipments are efficient but the fuel rates are going up in the present situations. Soli tillers and weeders are non-traditional tools used for weeding. The mechanical implemented tools plays major role in the weeding process helps to achieve the high productivity of the crops yields but they are labour intensive. In order to overwhelm this, a new type solar powered rotary weeder is designed based on mostly available nonconventional energy. This motorized agricultural equipment works with the support of rotating blades that breaks the soil to cut the weeds. This machine helps to minimize the expenses caused by labour and fuel.

1 Battery

A rechargeable battery, storage battery, secondary cell, or accumulator is a type of electrical battery which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discarded after use.



Fig. 1 Battery

4 METHODOLOGY:

The equipment is push forward by using handles. The motor is attached to the blades, the blades will be working with the withworth mechanism circular motion to linear motion. The blades with are attached dc motor it will move the blades in the linear motion and it will dig the ground. And the solar panel is connected to the battery the energy from the solar panel is stored in the battery. And that energy is used by the DC motor. The cutter is placed in the front for cutting the weed it is driven by the dc motor.

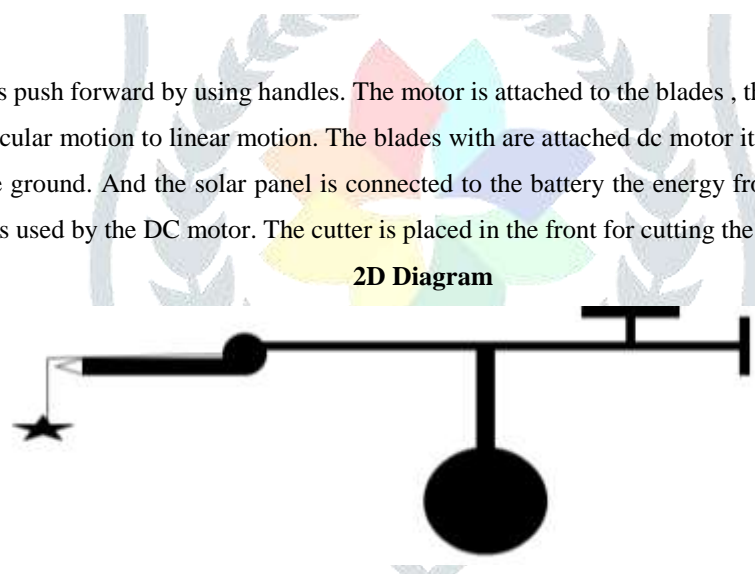


Fig. 2 2D Diagram of Solar Weeder and Cutter

3.1 Experimental Setup



FIG 3 SIDE VIEW



FIG 4 FRONT VIEW

5 RESULT AND DISCUSSION

- This equipment minimizes the man power.
- It gives the efficient work output.
- The fabricated equipment is easy to operate and suitable for dry land crops

Calculation of Motor

CONSIDERING FORCE AS

$$\text{Force} = 300\text{N}$$

If we use a motor of .128 HP the following calculations can be made-

$$.128 \text{ HP} = 96 \text{ Watts}$$

$$\text{Power Input, } P_{in} = 96 \text{ Watts}$$

$$\text{Power output, } P_{out} = P_{in} \times \text{Efficiency}$$

Efficiency of an electric motor to convert electrical energy to mechanical work done is assumed to be as 90%.

At 90 % efficiency

$$\text{Power output, } P_{out} = 96 \times 0.9 = 86.4 \text{ Watts}$$

As we know that,

$$\text{Power} = \text{Torque} \times \text{angular velocity} = T \times \omega$$

$$\text{Power} = \text{Force} \times \text{shaft radius} \times \text{angular velocity}$$

$$86.4 = 300 \times r \times \omega$$

$$r \times \omega = 0.288 \text{ m/sec} \quad \text{----- Equation 1}$$

$$\omega = 2 \times \pi \times n / 60$$

$$= 2 \times \pi \times 60 / 60$$

$$= 6.284 \text{ m/sec}$$

Using above equation, equation 1 can be written as,

$$r \times n = (0.25 \times 60) / 2 \times \pi$$

$$r = 45 \text{ mm}$$

From Equation 1

At n = 60 rpm,

Substituting n value in equation 2

$$r = 45 \text{ mm}$$

Calculation of Solar

1. Max Rated Power (Pmax) 5 Watts
2. Short Circuit Current (Isc) 0.31 Amps Max.
3. System Voltage 600 Volts DC
4. Length x Width x Depth (inches) 13.8 x 8.8 x 0.98 Weight of
5. Module 2.86 lbs.

You are here because you want to know how long it takes to charge a 12V battery with a solar panel.

In most cases, depending on the size of the battery, it will take around 5 – 8 hours to fully charge a 12-volt battery with a solar panel that can produce 1 amp of current.

Solar panel – 5W

$$5W * 5 \text{ hours} * .75 = 18.75 \text{ daily watt per hour}$$

$$18.75 / 1000 = 0.01875$$

$$0.018 \text{ KW}$$

6. CONCLUSION AND FUTURE SCOPE

An effort is made to Design and fabrication of solar powered multi crop weeder is done. Provisions are made to utilize solar energy was successfully completed. This work is executed with an idea to achieve an effective solution to the weed control. The designed equipment is safe to use and eco friendly. Single operator can operate this machine to weed out the plants. Labour requirement and fuel charges are greatly reduced by this weeder. Weeds are harmful for the crops hence would be removed. The weed cutter is safe as all the materials used can be recycled and does not pollute the environment as it is driven by solar energy. It is not so complicated mechanism and can be run by anyone. Further, The weeder consists of two rotors, float, frame and handle. The rotors are cone frustum in shape, smooth and serrated strips are welded on the surface along its length. The rotors are mounted in tandem with opposite orientation, and by increasing the efficiency of solar panel we can increase the power output of our weeder..

REFERENCES

1. M.G.Jadhav, "Design and fabrication of manually operated weeder with pesticides sprayer", International Journal Of Engineering Research And Technology, Vol03, PP:763-767, 2016
2. R.Y.Van Der Weide, "Innovation in mechanical weed control in crop rows", International Journal Of Engineering Research And Technology, PP:215-224, 2008
3. Manish Chavan, "Design development and analysis of weed removal machine", -International Journal For Research In Applied Science And Engineering Technology, Vol03, PP:526-532, 2015
4. G.Selvakumar, Dhansekar, "Design and fabrication of manually operated double wheel weeder", International Journal of Innovative Research in Science, Engineering and Technology, Vol06, 2017
5. Albert Francis, "Weed removing machine for agriculture", International Journal Of Engineering Research And Technology, Vol03, PP:226-230, 2017
6. M.Reddisankar, T.Pushpaveni, "Design and development of solar assisted bicycle", International Journal of Scientific and Research Publication, Vol03, PP:1-6, 2013

7. Gaurav Lahakar,Rupesh kumar,"Design and fabrication of agriculture working robot", International Journal of Engineering Science and Computing,Vol07,PP:11224-11227,2017
8. P.Amrutesh,"Solar grass cutter with blades by using Scotch Yoke mechanism", International Journal of Engineering Research and Applications,Vol04,PP:10-21,2014.

