

# **Design and fabrication of cultivator and Sprayer machine operated by Sustainable Energy**

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## **Abstract**

Agriculture being one of the major occupation in India, Agriculture plays a vital role in the Indian economy. Indian agriculture has registered impressive growth over last few decades. It is very essential to discover and implement new idea in this field, though lot of work has been done in this area. It is unfortunate that, these ideas are not being implemented properly in actual field. This is due to high cost and is complicated for rural people. Weed is a plant that is considered undesirable in a particular situation, it is basically “a plant in the wrong place”. Weeds are needed to be controlled because it reduces crop quality by contaminating the commodity. Weeds reduce farm productivity, they invade crops, smother pastures and in some cases can be harmful for the livestock. They aggressively compete for water, nutrients and sunlight, resulting in reduced crop yield and poor crop quality. Weed control is one of the most difficult tasks on an agricultural farm. Mechanical weed control is easily adopted by farmers once they get convinced of its advantages. Motorized agriculture weeding machine not only uproots the weeds between the crops rows but also keeps the soil surface loose, ensuring better soil aeration and water intake capacity. Weeding by motorized Weeder reduces the cost of labor and also saves time. In human operated Weeder, muscle power is required and so it cannot be operated for long time. The traditional method of hand weeding is time consuming. In this Battery drive motorized weeder we use motorized system, which is powered by battery

**Keywords:** Agriculture, Crop, Weeding machine, Sunlight, Battery.

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## **1.INTRODUCTION**

Presently in India, weeding with simple tools such as cutlass, hoe etc is labour intensive and intensive and time consuming. Thus, there is a need for the design of manually operated weeder for intensive and commercial farming system in India. One of the problems in crops and vegetables production is poor weed control; hence there is need of mechanical weeder to increase the production of these products. The cost for employing a Labour force when using simple tools is very high in commercial farming system. This can be reduced using mechanical weeder. The aim of the paper is to design, construct and test manual weeder, to provide the best opportunity for the crop to establish itself after planting and to grow vigorously up to the time of harvesting.

## **2. Literature review**

1] Paper Name: Performance Evaluation of Power Tiller in Bauchi State Nigeria Authors: F. A.Adamu, B. G. Jahun, B. Babangida[2014] In this paper authors draws our attention towards the performance factor of a power tiller. Among those demand for light weight power tiller was sought out most. Fuel efficiency and field capacity of such parameters are also discussed. We taken those points in consideration while designing a sustainable Agricultural machine.2] Kamlesh Kishor Rangari, Swapnil B. Bandane, Pravin Jaybhaye, Dr.S.K.Choudhary, Prof.R.D.(2015)“Design and fabrication of organic fertilizer and pesticides sprayers”.International Journal for Scientific Research & Development| Vol. 3, Issue 01, 2015 | ISSN (online): 2321- 0613.3] D.A. Mada, Sunday Mahai, [2013] [1]concluded that the importance of mechanization in agricultural. The information from the paper was need of multifunctional vehicle for pre-and post-harvesting. We have taken this as base for our research and further production of our multifunctional agricultural vehicle.4] F.A. Adamu, B. G. Jahun and B. Babangida [2014] [2] . In his paper authors draws our attention towards the

performance factor of a power tiller. Among those demand for light weight power tiller was sought out most. Fuel efficiency and field capacity of such parameters are also discussed.

### 3.OBJECTIVE

- The main objective of this project is to develop a solar-powered weeder and sprayer. This innovation targets some of the objectives listed below.
- To spray Fertilizer or pesticides aerially on Crops.
- To decrease the operational cost by further introducing new mechanisms.
- To consume zero electricity.
- It should able to spray both fertilizer and pesticide
- To eliminate environmental pollution by using a natural energy source.
- To complete the work with solar energy

### 4. COMPONENTS

The model which we have fabricated comprised of one of prototype model of solar sprayer. All these components assembly assemble on the flat ply board

- Solar cell panel
- Diaphragm PumpDC motor
- BatteryTank
- Nozzle
- Shaft
- Adjustable handle
- Wires/cable
- Wheel
- Chassis frame
- Plough



Fig:-Solar cell plate.



Fig:- Battery



Fig:-Diaphragm pump.



Fig:- DC motor

### 5. Technical details

The innovation utilises a pump to pressurise spray liquid from a tank through a delivery lance at relatively constant pressure (28-35 psi). His earlier model used a bicycle pump, subsequently replaced by a 1.8 fluid ounces diaphragm-type water pump. The latter delivers 1.1 to 3.5 gallons per minute at 35 psi and is able to handle up to a half-inch diameter head of 95 inches, without priming the line. It costs less than US\$46.

The pump is easily attached to any existing sprayer. An intake tube pulls the spray mix in and pumps it out. Sprayer tank, lance, shoulder straps and frame from any existing sprayer model can be adapted to the innovation. An original design four-inch diameter PVC pipe tank was used in the 1998 model. Power is supplied by either of two sources:

1. A 12 volt, 7 amperes DC battery giving 14 to 20 hours on full charge.

2. A slow-charge solar panel which will provide constant operation even in the absence of direct sunlight. The unit (17 x 10 x 0.75 inches), weighs 1.7 lb and costs approximately US\$92.

The battery, pump and a recharging circuit have been housed in a utility pack which can be attached to any tank unit, giving a powered, high volume knapsack sprayer. The unit (1.5 x 1.2 x 0.4 inches) weighs about 10 lb.

## **6.CONSTRUSTION AND WORKING**

### **CONSTRUCTION OF WEEDER MACHINE:**

1.Assembly of machine consist the mounting of motor on the frame&chassis is mounted on wheel. Then the motor is assembled on chassis by using nut, bolt & somewhere by weld.

2. Manufacturing of motor includes following procedure Blades are cut by grinding cutter & Bending of blade is done manually. These blades are attached with the frame by adjusting setting.

3. Two wheels are fitted below the wiper motor. Fitted by nut & bolt

4. Square pipe is used for the handles with required dimensions & switch is fitted on handle & connected to battery by using wire.

5. Switch & electrical connections are made for on/off the engine & Switch is mounted on handle of machine.

### **WORKING OF WEEDER MACHINE:**

1. Initially start the motor with the help of on/off switch mounted on handle. We used the wiper motor.

2. The blades are used for the forward movement of the machine.

3. Battery is used to transmit power from motor to intermediate shaft.

4. The blades are mounted on the front side of the machine. When blades start rotating forward motion occurs.

5. Hence weeding is done with less effort and less cost

The Solar Powered sprayer is one of new innovative ideas . That we show in our project and works on Solar Energy with backup facility to run uninterruptedly during the day and nights as well as cloudy days. The whole system can be derived into two segments, one is the solar panel station and the other is battery station .

The panel station Unit consists of a Solar Photo Voltaic Module,, Battery and Charge Control Unit (CCU). The Solar Photovoltaic Module in panel station converts the sunshine into electrical energy and charges the Battery through CCU. The storing electrical supply of battery utilized to run / start the diaphragm pump.

## **7.CALCULATION**

Agricultural development plays important role as a driver of rural poverty reduction. The effort required to develop a weeder will meet the demand of farmers. The efficiency of weeder should be satisfactory and it is easy to operate. It was faster than the traditional method of removing weed. Less labor needed and it is more economical than hand weeding. Here do not use any fuel and power. Hence maintenance cost is very less. Cost of weeding by this machine comes to only one-third of the corresponding cost by manual laborers. The fabrication of Low cost Weeder is done with locally available material. The overall performance of the weeder was satisfactory.

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between the institution and the industries. We are proud that we have completed the work with the limited time successfully. The fabrication of "Weed Removing Machine" is working with satisfactory conditions. We can able to understand the difficulties in maintaining the tolerances and also the quality. We have done to our ability and skill making maximum use of available facilities. In conclusion remarks of our project work, let us add a few more lines about our impression project work. Thus we have developed an "Weed Removing Machine" which helps to clear out the weeds in agricultural lands as well as also in other garden areas with less involvement of manual effort. Also the time taken is less and thus the labour costs can be saved. By using more techniques, it can be modified and developed according to the applications.

## **8.FUTURE SCOPE**

1. If we use new material then performance will be high.

2. The farmers need alternatives for weed control due to the desire to reduce chemical use and production costs.

3. Currently no such system exists for removing weeds located in the seed line between crop plants.

## **9. CONCLUSIONS**

Agricultural development plays important role as a driver of rural poverty reduction. The effort required to develop a weeder will meet the demand of farmers. The efficiency of weeder should be satisfactory and it is easy to operate. It was faster than the traditional method of removing weed. Less labor needed and it is more economical than hand weeding. Here do not use any fuel and power. Hence maintenance cost is very less. Cost of weeding by this machine comes to only one-third of the corresponding cost by manual laborers. The fabrication of Low cost Weeder is done with locally available material. The overall performance of the weeder was satisfactory.

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