

# Grass Cutting & Sprayer Machine Using Solar Energy

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## ABSTRACT

Rapid growth of various high-tech tools and equipment's makes our jobs done comfortable and sophisticated. The project aims at fabricating a grass cutting machine system which makes the grass cutter based motor running through solar energy. Power plays a great role wherever man lives and works. The living standard and prosperity of a nation vary directly with the increase in the use of power. The electricity requirement of the world is increasing at an alarming rate due to industrial growth, increased and extensive use of electrical gadgets. The best alternative source is solar energy.

Solar energy plays an important role in drying agriculture products and for irrigation purpose for pumping the well water in remote villages without electricity. This technology on solar energy can be extended for spraying pesticides, fungicides and fertilizers etc., using solar sprayers.

**Keywords-** Solar energy, rechargeable battery and grass cutting.

## I. INTRODUCTION

Moving the grass cutters with a standard motor powered grass cutters is an inconvenience, and no one takes pleasure in it. Grass cutter machine with engine create noise pollution due to the loud engine, and local air pollution due to the combustion in the engine. Also, a motor powered engine requires periodic maintenance such as changing the engine oil. Even though electric solar grass is environmentally friendly, they too can be an inconvenience. Along with motor powered grass cutter, electric grass cutters are also hazardous and cannot be easily used by all and moving could prove to be problematic and dangerous. [2]

Grass cutter machines have very popular today. Most common machines are used for soft grass furnishing. In our project grass cutter machine we are aimed to develop for operation and construction. The main parts of the grass cutting machines are DC motor, battery for charging it through solar panel. It is placed

in a suitable machine structure. The motor have 18000 rpm and it is connected to the electric supply by the use of a roll of wire. Motor controlled by an electric switch for easy operation. The raw materials mainly used are motor, switch, wheel, wire, square pipe, paint, insulating material and other standard item like nuts, bolts, washer and reverts. The machines required for manufacturing includes welding machine, grinding machine, cutting machine.

Basic Description- The aim of the project is to make the grass cutter which operate on solar energy hence save the electricity and reduce manpower. Grass cutter connected to shaft of the PMDC motor which rotates the blade by using DC supply. At present in order curtail global warming and ozone depletion, the government of India is offering subsidy for the solar equipment. The industries are producing these components in mass production, so the cost of system may come down. So in future it is expected to run on equipment's by using solar energy. This system is

having facility of charging the battery while the solar powered grass cutter is in motion.[2]

Also with the use of sprayer pump various pesticides can be sprayed, due to which the speed of grass growing reduces to maximum extent.

Working- Working principle of the grass cutter is providing a high speed rotation to the blade, which helps to cut the grass. The cutting edges are very smooth and accurate. In order to enhance the beauty of home-lawns and gardens, grass cutting machines are the best available option. With the help of a lawn mower which is a machine with revolving blades to help us cutting lawns at even length, people can easily maintain and beautify their lawns and gardens without any hassle. Now-a-days, there are plenty of options starting from the simplest push along mower to the most advanced electric grass cutting machine. According to world energy report, we get around 80% of our energy from conventional fossil fuels like oil (36%), natural gas (21%) and coal (23%). It is well known that the time is not so far when all these sources will be completely exhausted. So, alternative sources should be used to avoid energy crisis in the nearby future. So introduce solar energy for the machine process to work.[1] The agriculture equipment like spraying machine and dusting machine are used to spray and dust the pesticides solid, liquid or mist and the cutting machine is used to harvest or used as a grass cutter in the farm field. Also the pesticides are spreads for improving the quality of the crop therefore the pesticides should be sprayed uniformly all over the plant. For spraying the pesticides uniformly the spraying machine.[1]

Solar Panel- A solar panel is a set of solar photovoltaic modules electrically connected and mounted on a supporting structure. A photovoltaic module is a packaged, connected assembly of solar cells. The solar panel can be used as a component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications. Below fig. 2 shows solar panel of 10 watt capacity. Each module

is rated by its DC output power under standard test conditions (STC), and typically range 10 watt. A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes a panel or an array of solar modules, an inverter, and sometimes a battery and/or solar tracker and interconnection wiring. [3]



Figure 1. Solar Panel

Solar Sprayer- We know 70% of population of our country lives in villages and their main occupation is agriculture. Our prominent aim of this project is to fulfill the tasks like hand spraying, IC engine spraying, and leg pump spraying etc. using non-conventional energy sources. Here we prepared a low cost solar operated pesticide pump, which can work without any fuel. This pesticide pump can be use at various places such as farm, garden, etc. We hope our new invention make the farmer modern and smarter. In this project, we emphasized on the spraying of pesticides using solar power as energy. [7] “Energy demand” is one of the major threads for our country. Finding solutions, to meet the “Energy demand” is the great challenge for Social Scientist, Engineers, Entrepreneurs and Industrialist of our country. According to them, applications of non-conventional energy are the only alternate solution for conventional energy demand. One of the major area, which finds number of applications are in Agriculture Sectors and grass lands.

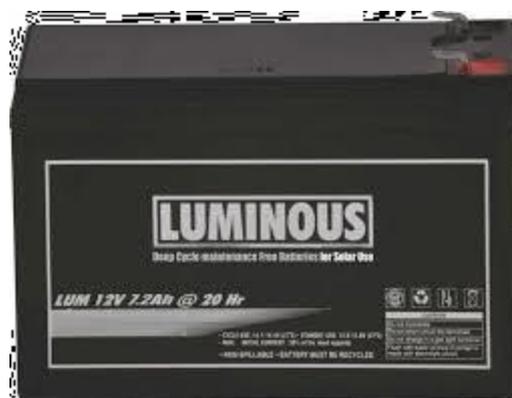


**Figure 2.** Sprayer Pump

Manufacturer has received a lot of attention recently for very good economic reasons. In Indian farms generally two types of spray pumps are used for spraying; hand operated spray pump and fuel operated spray pump. From which hand operated spray pump is most popular. The main drawback of hand operated spray pump is that the user can't use it for more than 5-6 hours continuously as he gets tired after some hours where as fuel operated spray pump requires fuel which is expensive and availability of fuel is not easy at rural places. At the same time it exhausts carbon dioxide as pollutant which is harmful to our environment. Also use of other pesticide pumps causes fatigues. In such situation we should think to move towards some non-conventional energy. Considering it, solar energy would be one of the solutions. Solar energy plays an important role in drying agriculture products and for irrigation purpose for pumping the well water in remote villages without electricity. This technology on solar energy can be extended for spraying pesticides, fungicides and fertilizers etc., using Solar Sprayers.

**Battery-** When a battery is charged or discharged, only the reacting chemicals, which are at the interface between the electrodes and the electrolyte, are initially affected. With time, the charge stored in the chemicals at the interface, often called "interface charge" or "surface charge", spreads by diffusion of these chemicals throughout the volume of the active

material. The battery plates charge only near the interface between the plates and the electrolyte. In this case the battery voltage might rise to a value near that of the charger voltage; this causes the charging current to decrease significantly. After a few hours this interface charge will spread to the volume of the electrode and electrolyte; this leads to an interface charge so low that it may be insufficient to start the car. As long as the charging voltage stays below the gassing voltage (about 14.4 volts in a normal lead-acid battery), battery damage is unlikely, and in time the battery should return to a nominally charged state. Sealed lead acid battery with voltage 12V and nominal capacity of 8 Ah is used for the energy storing purpose. The battery usage ups and having weight 2.1 kg. The size for the battery is 151\*65\*101 mm. This battery is maintenance free type. The battery is charge during the day in the present of solar energy and use when necessary. The battery after charging can be used up to 5-6 hrs continuously. Solar power can be stored in the rechargeable battery and can be further used for the grass cutting machine to run.



**Figure 3.** 12V Rechargeable Battery.

The batteries are used as a storage device for solar energy which can be further converted into electrical energy. The only exceptions are isolated sunshine load such as irrigation pumps or drinking water supplies for storage, for small units with output less than one kilowatt. Batteries seem to be the only technically and economically available storage means. [2]

### Battery Feature:

- ✓ Stable quality high reliability.
- ✓ Sealed construction.
- ✓ Environmentally friendly.
- ✓ Maintenance-free operation.
- ✓ Low pressure venting system.
- ✓ Heavy duty grid.
- ✓ Low self-discharge. [1-4]

### Advantages:-

1. There is no need of field excitation is required in case of permanent magnet DC motor.
2. It does not cause any environmental pollution like the fossil fuels and nuclear power.
3. Environmentally friendly.
4. Maintenance-free operation.

### Disadvantages:-

1. There is also a chance of getting the poles permanently demagnetized (partial) due to excessive armature current during starting, reversal and overloading condition of the motor.
2. Another major disadvantage of PMDC motor is that, the field in the air gap is fixed and limited and it cannot be controlled externally.

### Applications:-

1. PMDC motor is extensively used where small DC motors are required and also very effective control is not required, such as in automobiles starter, toys, wipers, washers, hot blowers, air conditioners, computer disc drives and in many more.
2. This project is used as a Lawn mover.

Objective- This project entitled Fabrication of solar powered grass cutter is successfully completed and the results obtained are satisfactory. It will be easier for the people who

are going to take the project for the further modifications.

## II. CONCLUSION

This project is more suitable for a common man as it is having much more advantages i.e. no fuel cost, no pollution and no fuel residue, less wear and tear because of less number of moving components and this can be operated by using solar energy. This will give much more physical exercise to the people and can be easily handled.

The prepared solar operated spray pump is environment friendly and cost efficient. Our modern solar spray pump system is most suitable over conventional energy devices.

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