

Solar Operated Multipurposed Agriculture Machine

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ABSTRACT:Energy demand is one the major thread 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 is the only alternate solution for conventional energy demand. Now a day the concept and technology employing this non-conventional energy becomes very popular for all kinds of development activities. One of the major area, which finds number applications are in agriculture sectors. Solar energy plays an important role in drying agriculture products and for irrigation purpose for pumping the well water in remote villages without electricity. Here we are fabricating the agriculture multipurpose machine is a new innovative model which is mainly used to water spraying, weeding and the seed sowing. Our main aim of this concept is to reduce the man power and also avoid time consumption and to utilize solar energy.

KEYWORDS:Multi Operational, Energy Saving, Cutting, Dusting, Spraying.

I. INTRODUCTION

For the proper growth of plants like tomato, cotton, graphs etc. there is need of keeping away this plants from different disease and also the unwanted grass should be removed from the farm field after the specific interval of time. For this lot of effort are require and also the different agriculture equipment's which needed lot of money. The agriculture equipment like spraying machine, dusting machine, cutting machine are used to spray 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 and dusting machine is required. Agriculture is the backbone of India. Paddy and Wheat is one of the new targets in agriculture where still, not many researchers and manufacturers participate. This field faces some problems such as how to maximize the profit, how to increase productivity and how to reduce the cost. In India, two types of agricultural equipment are used, manual method (conventional method) and mechanized type. Mechanization involves the use of a hybrid device between the power source and the work. This hybrid device usually transfers motion, such as rotary to linear, or provides ample of mechanical advantages such as increase or decrease or leverage of velocity. Agricultural machinery is machinery used in farming or other agriculture. Mechanized agriculture is a process of using agricultural machinery to mechanize the work of agriculture, greatly increasing farm worker productivity. In modern times, powered machinery has replaced many farm jobs formerly carried out by manual labour or by working animals such as oxen, horses, and mules. The entire history of agriculture contains many examples of the use of tools, such as the hoe and the plough. But the ongoing integration of machines since the Industrial Revolution has allowed farming to become much less labour-intensive. The biggest profit of automation is that it saves the labour. However, it also saves energy and materials and to improve the quality, accuracy,

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and precision. The seed feeding, pesticides sprinkling and crop cutting are the important stages in the agriculture field. The design of multipurpose agro equipment machine will help Indian farmers in rural side and small farm. It will reduce the cost of seed feeding, pesticides sprinkling and crop cutting the field and will help to increase economic standard of an Indian farmer. Most of the increase in the area of irrigated land in the world has been through the increasing use of engine-driven pumps. However, the increasing price of oil-based fuel has reduced the margin to be gained by farmers from irrigation, since food prices have generally been prevented from rising in line with energy costs. Despite present short-term fluctuations in oil prices, conventional oil-based engine-driven power sources and mains electricity are expected to continue to increase in the longer term. If we are to decrease our dependence on imported oil, we have to find methods for energizing irrigation pumps that are independent of imported oil or centralized electricity. Solar radiation as a source of energy is Of course, the epitome of the clean. Sustainable energy technology except for residues possibly arising out of the manufacture of solar component (e.g. semiconductors), solar technology have very low environmental impacts. The environmental impacts of solar system in operation are very low and the source is, for us inexhaustible.

II. WHY EFFICIENCY IS SO IMPORTANT TO SOLAR

Power conversion efficiency has certainly been a very popular topic in solar industry. PV inverter manufacturers have invested significant amount of effort to achieve even a 0.1% higher efficiency year over year. But just how important is efficiency to a solar system?

The U.S. installed more than 7 GW of solar in 2014. Every single installation required some type of power conversion from DC (solar panel) to AC (grid). To simplify the discussion, if we assume 97% efficiency for the inverter loss, that equals about 6.86 GW of AC power generated. If all the inverters performed at 98% power conversion efficiency, and all else being equal, that number would be 6.93 GW. That is a 70-MW difference and equivalent to a large utility-scale PV plant! Higher efficiency equates to more energy harvest and is therefore critically attributed to the total revenue stream of the PV system.

The PV inverter is a complex piece of equipment made up of thousands of components. Roughly 80% of losses come from a switching device and AC inductors. One of the most critical components within PV inverter is this “switching device” or semiconductor device being used to perform DC to AC conversion.

III.NEED OF DEVELOPMENT OF MACHINE

The main aim behind this is to construct the equipment which are essential for the farm field with the suitable cost which will be affordable for the poor farmer and also the efficiency of the equipment should be high, so that all farmer can prefer it first rather going to the convectional equipment's. The other need is the labour availability, now a day the labour is not being easily available. Also if they are available the working cost of them is very high and the efficiency of the labour is very low. This can cause the working time to be increase. Therefore the work will not be completed in the given time. When we use the convectional machine like the diesel machine the main problem caused by this machine is the pollution. The pollution is the main problem now a day. Because of the pollution the human life is getting disturbed and also the temperature of the environment is increasing this disturbed the human comfort. Also there are very much nonconventional energy source available in our surrounding which can be used rather than the convectional source of energy. We are using the solar energy as the main source for completing the different operation. If we don't use the solar energy it will be wasted. Also it has no harmful effect like polluting the surrounding environment. And also the solar energy is freely available, we has to not pay for it. The trapping of solar energy is very easy and also conversion of it into the electricity is very easy. The equipment's required for the conversion of solar energy is easily available in the market with the suitable low cost.

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IV. PROBLEMS IN AGRICULTURE FIELDS EQUIPMENTS

The main problem we observed was that the cost of equipment's likes spraying machine, dusting machine and cutting machine. Also the availability of such machine in the single unit. Also the convectional equipment's used, required the fuel for their working this increase the maintenance of the equipment. Also the problem like pollution is caused by the convectional equipment's. If the equipment's are working on the electricity then the work is stopped during the time when the electricity is not present this cause delay in the working, which can increase the disease in the plant if electricity is not present for the several days. Also the cutting the grass in the farm field requires number of labours which is quite difficult now a day, also the charges to be pay are increasing day by day which cannot be affordable for the poor farmer. And also the work is not done in time. Also the convectional dusting machine is very costly and it works on the tractor machine. The cost of tractor machine in very high. This tractor machine and dusting machine is out of beget of poor farmer. The cutting machine price is also very high and cutting of grass in the farm field has to be done continuously this requires lot of labours means more increase in the cost while doing the farming. The spraying machine is the most important now days due to which the price is increasing, also it is operated with the help of electricity of diesel machine means it will not be able to operate without the electricity or the diesel machine. The diesel machine will cause pollution. The drenching is also the main function to be performed in case of tomato farm field in the Rainey season. The maintenance equipment is very costly of all this instruments. The breakdown of a single part will cost too much to the farmer.

Construction of spraying machine

It consist of solar plate, battery, on off switch, centrifugal pump fluid caring pipe or tube, nozzle, fluid containing tank, one 12 volt dc motor, power transmitting wire. The engine operated sprayers typically produce more consistent sprayer's outputs, covers the sprays swath more uniformly, operate at constant speed and results in much more uniform coverage than the hand spraying. Motorized sprayers are also capable of higher pressure spray useful to provide a better coverage.

Working of spraying machine

The solar energy is trapped with the help of solar plate this energy is stored in the battery. When the on off switch is on at that time the power is given to the centrifugal pump the pump get operated it pumps the fluid from the fluid tank this fluid is passed through the tube towards the nozzle where the nozzle will spray the fluid uniformly over the plant. We can use this machine as a drenching machine by removing the nozzle, as per requirement in the farm field. The 12volt dc motor is used to adjust the angle of spraying machine as per operation to be performed.

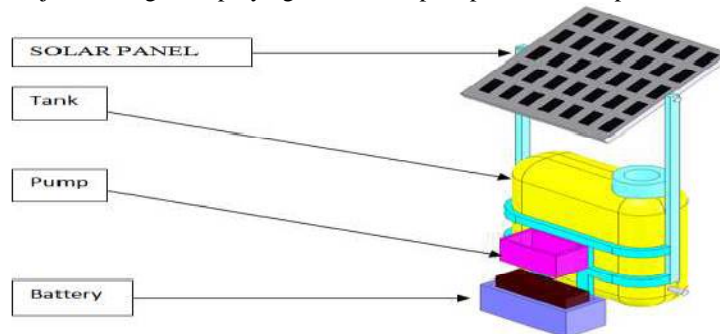


Fig 1: Solar Operated Sprayer

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Construction of dusting machine

It consists of rotary fan, gearing arrangement, dusting pipe, solar plate, battery, motor, powder containing container, switch, adjusting rod.

Working of dusting machine

The solar plate trappers, traps the solar energy and the power is stored in the battery. This power is used to drive the system. The switch is on and the power is given to drive system which operates the rotary fan. The powder to be spray falls down in front of the rotary fan by mean of air pressure the powder is forced out of the pipe. The adjusting rod is used to adjust the powder falling from the powder container according to requirement.



Fig 2: Dusting Equipment

Construction of cutting machine

It consists of motor, cutting blades, switch, solar plate, battery, adjusting stand. This project aims at developing a portable solar operated grass cutting device as there is power shortage. So we have decided to make a solar energy operated device. Solar panel is connected to battery. Then by connecting inverter to battery DC current is converted into AC current. This will run the AC motor. This motor is connected to blade shaft by the help of belt drive. This will rotate the blade in high speed, cut the grass. This device will helping building of eco-friendly system.

Working of cutting machine

The solar energy trapped in the solar plate is stored in the battery. This energy is given to the motor due this the motor start running. The cutting machine is attached to the motor, when the supply is given to motor, motor start running due to which the cutting machine starts. The grass is trapped in the cutting blades because of this the grass is being cut.

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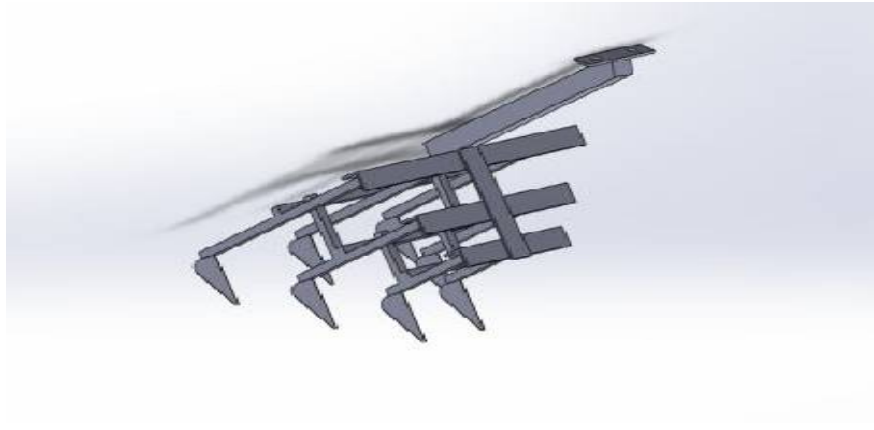


Fig 3: Grass Cutter

Solar Panel

A **solar panel** (also **solar module**, **photovoltaic module** or **photovoltaic panel**) is a packaged, connected assembly of photovoltaic 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. Each panel is rated by its DC output power under standard test conditions, and typically ranges from 100 to 320 watts. The efficiency of a panel determines the area of a panel given the same rated output - an 8% efficient 230 watt panel will have twice the area of a 16% efficient 230 watt panel. Because a single solar panel can produce only a limited amount of power, most installations contain multiple panels. A photovoltaic system typically includes an array of solar panels, an inverter, and sometimes a battery and or solar tracker and interconnection wiring.



Fig 4: Solar Panel

V. EXPERIMENTAL RESULTS

This machine includes functionalities like dusting. Spray, cutting this machine includes three parts agricultural dusting system, spray system, and cutter system to perform these activities respectively. These three parts gets power from solar

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panel. Spray system has liquid tank to fill it with liquid to spray. Control unit manages is used to operate whole system. The convectional equipment's used, required the fuel for their working this increase the maintenance of the equipment. Also the problem like pollution is caused by the convectional equipment's

Future Scope

There could be continuous supply of liquid pesticides/fertilizer generated for sprinkler. The solar panel unit could be enhanced in order to generate more prolonged electric supply. Moreover, the electricity could be stored; to be at night or in no sun condition. A more with greater efficiency could be used. More equipment like soil testing task could be added to this project.

VI. CONCLUSION

The top concentration of our design is the cost and operational ease in case of small farm units. This multipurpose agro equipment is thus designed to reduce the cost of harvesting, spraying and seed feeding. In the development of multipurpose agro equipment we utilize the past data and techniques. In this way the design of multipurpose agro equipment is safe. Such human powered machine systems will help to a great extent in improving the production per acre and increase profitability of small and middleclass farmers. A new type of multipurpose mechanism is fabricated which is different from other machines and will work on non-conventional energy source which is purely human operated. Such systems are of much importance in Asian countries, as almost all Asian countries are facing electricity and power scarcity which results in twelve to fourteen hours load shedding in rural areas especially in India. Therefore, there is the need to develop a locally, fabricated multiple multipurpose agro equipment's.

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