

Solar operated Paddy Harvester

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Abstract-Today, agriculture especially in India need to concentrate in some aspects such as how to increase the productivity and profit, how to reduce the cost and how to solve the problem of workers. When crops are ready and no manpower is available or no mechanical harvester is available and if available, no power supply. To overcome these, a new solar powered motor cutter is fabricated specially for cutting various crop varieties during the time of harvesting and in this we are making the cutter keeping in view of Paddy. It can be used for multipurpose crop cutting also if cutter type is changed.

Key Words: Solar Energy, Paddy Harvester, Crop cutting

1. INTRODUCTION

Solar energy is a renewable energy from the sun, which is available abundantly and freely every day. With fossil fuels disappearing rapidly and likely to be exhausted sooner or later, making use of solar energy is now more important than ever. Agricultural industry is surpassing greater heights. With the inventions of new machinery and new ways of getting better yield has exposed the concerned industry to the fire of competition. Today the farmers have become aware of the modern technologies that can fetch them better yields and also help them manage it with multiple machineries. But the mechanization of farming is not possible in India because here the farmers have very small piece of farm which is to be maintained for farming and investment on the machineries are not possible by small farmers. We have to devise the small machines or equipment's which farmer can afford.

We are well aware that during harvesting, cutting the crops by hand is by far one of the most laborious and difficult operations of the farmer's profession, and need labors for doing the same and now a days we find shortage in labor. However surpassing technologies have ensured that crop cutting will no longer be a sturdy task but various machines suitably designed for this purpose will perform the this action smoothly and in time. Besides

saving time and labor, these machine are designed to make agriculture a sophisticated profession. All these machines use diesel as fuel and we have to come with an alternate since fossil fuels are getting depleted and also it is costing us the nation exchequer heavily. The present crop cutting is done by manual process and in mechanized process, heavy machineries are used which are costly and a common farmer cannot afford for such machines. So we are Designing a machine where small farmers can afford it.

1.1 OBJECTIVES

- Design should be simple to operate and Safe.
- The design should be Robust and Reliable.
- It should have Low Cost of Maintenance.
- It should require Less Man Power.

2 .LITERATURE REVIEW

Jain et al. (2013) designed and fabricated small scale harvesting machine, consisted of motor and different mechanisms. The cost of the machine was Rs 30,000. The machine had a capacity to cut 3.75 ton of sugarcane per hour. Compared with manual harvesting 50% of harvesting time and 60% of labors are reduced (in manual sugarcane harvesting 15-16 labors are required). The cost of harvesting is reduced by 34% compared to manual harvesting.

Hossain and Faruque (2008) evaluated performance of self-propelled cereal reaper. The study showed that the effective field capacity, field efficiency and fuel consumption were 0.21 ha/h 80.76% and 0.45 L/h, respectively at forward speed of 2.15 km/h. The cutting width of the reaper was 1.2 m and total loss of crop was 3%. The labour requirement of mechanical harvesting was 15 man-h/ha against for manual harvesting was 240 man-

h/ha. Mechanical harvesting saved 94% labour requirement of manual harvesting. The reaping cost by reaper was Tk. 626/ha.

3. Proposed system

This is a four wheel base frame, both the wheels at the center, the front side of the machine is having the vertical pillar to hold the motor with the cutter, which is fixed on the arm according to the required height. The motor is holding the wheel cutter which is of 200mm diameter which is rotating at high speed of above 800rpm, backed by the dc battery, and powered by solar panel or module. The cutter holder is with the collet of the machine which holds the axle holding the cutter. A metal chute is made in front side to be able to divert the crop cut to the side when moving ahead, so that the crop cut is dropped aside without disturbing for the movement of this machine ahead. This chute is fixed on the vertical arm which is holding the rotary cutter as required. The motor working on DC batteries provided on this machine which are chargeable and is getting charged by solar module.

We are fixing the solar panel on the machine which will be charging the battery and these batteries can be recharged by A/c mains also.

We are providing the handle for pushing the machine ahead smoothly and all the equipments are placed in proper balancing of the machine, which has legs at the rear end to be able to keep it on rest when not required.

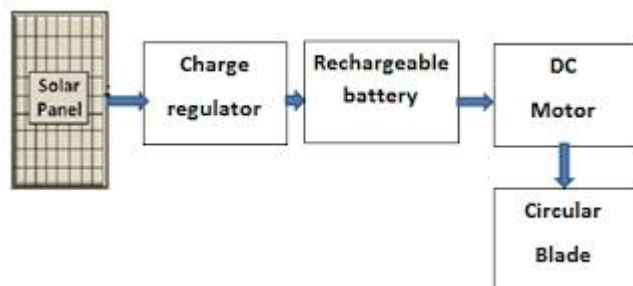


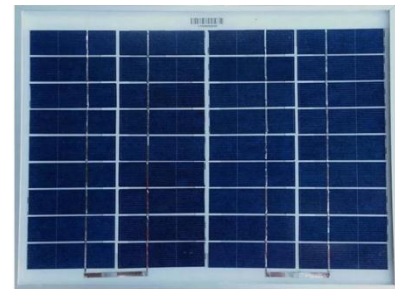
Fig 3 Block diagram of solar operated paddy harvester

4. Main Components required

4.1 Solar panel:

solar panel of 20watts 12volts,1.4amps. Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity.

Fig 4.1 Solar panel



4.2 DC battery:

Sealed lead acid battery with voltage 12v and nominal capacity of 7Amp is used for the energy storing purpose. The battery usage and maintenance is of free type. The battery is charged during the day in the presence of sun i.e., solar energy and use when necessary. The batter after charging can be used up to 5-6 hrs Continuously.



Fig 4.2 DC battery

4.3 DC Motor: The motor used for the controlling the cutter, the permanent dc motor with 12V is used having the speed 1800rpm. This single phase motor work on the Fleming hand rule and generate electric current and this electric current converted to mechanical work like to rotate the blade and cut the brush.



Fig 4.3 DC motor

4.4 Circular Blade: Different types of blades are used for operation to be done and these blades are made by cast iron, Stainless Steel, carbide steel. We are using Tungsten cutter blades for cutting purposes.



Fig 4.4 circular Blade

5. METHODOLOGY

It is the systematic, Theoretical analysis of the methods applied to a study or to the theoretical analysis of the method and principles associated with branch of study.

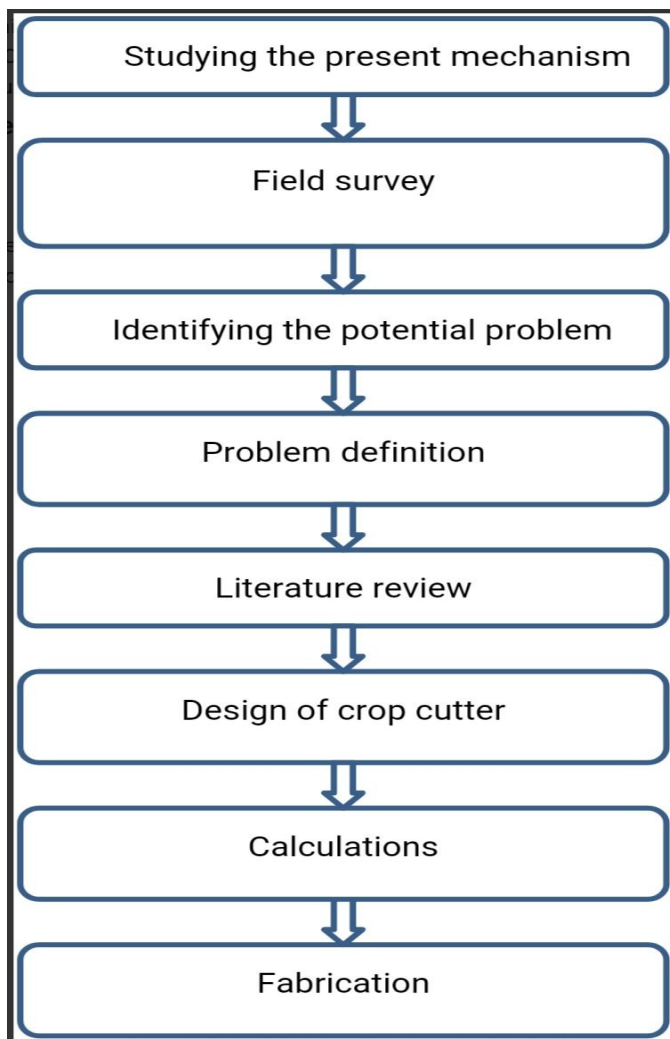


Fig 5 Flow chart process

6. ADVANTAGES

1. Use of non renewable energy for the crop cutting action.
2. Not using any fossil fuels which are depleting now and becoming costlier.
3. Low investment.
4. Cutting is very fast since cutting is working at high speed.
5. A single person can do the crop cutting faster than manual process which is tedious and hazardous also.
6. Easy to use.
7. Light weight makes it maneuverable for any aged people and also for women.

7.CONCLUSIONS

The main objective was to make simple, compact, efficient And low cost small scale harvester for small land holders. This machine fulfilled all objective and following conclusion Were drawn on based of work on the basis of literature review, all specification regarding Small scale harvester were meet. After assembling the Machine was tested on field for its efficiency and capability. The result got was as per our expectations from machine.

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