International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)
doi : https://doi.org/10.32628/IJSRSET2310132

Design and Fabrication of Solar Powered Tiller with Seed Sowing

Manjunathan R[1], Shylesh B[2], Sridhar S[3]

* [1,2,3]Department of Mechanical Engineering, VelTech HighTech Dr.Rangarajan Dr.Sakunthala Engineering College, Chennai, Tamilnadu, India

Article Info

Publication Issue :
Volume 10, Issue 1
January-February-2023
Page Number : 182-187

Article History
Accepted : 10 Jan 2023
Published: 29 Jan 2023

ABSTRACT

Agriculture is very important for the Indian economy. India being a developed nation, where agriculture plays a major role in developing the nation needs in all outcomes, The present project aims to develop Solar Powered tiller to reduce the time of the farmer by digging into the soil for multiple times in a certain area, where it's having an attachment of seed sowing. The chain sprocket is a motorized by wiper motor and tiller blade will break the soil into small pieces, which helps improve the aeration of soil and prevents weeds from growing. Here the power to accelerate the equipment is utilized from the solar panel and stored in the battery for further purpose, where the panel is fixed at the top of the tiller for continuous rays of energy absorption. The multimeter is fixed to check the solar panel output voltage. By using the power, it tends to run the tiller in a proper manner. The seed sowing hopper is fixed at back side of wheel, where the seeds are flow in ground by reciprocating motion by means of rotating wiper motor. Now this project's major focus is on creating a functional operating system. High safety reduced human effort, improved soil tiller efficiency, decreased work load, less worker fatigue, and lower maintenance costs are all achieved by the project.

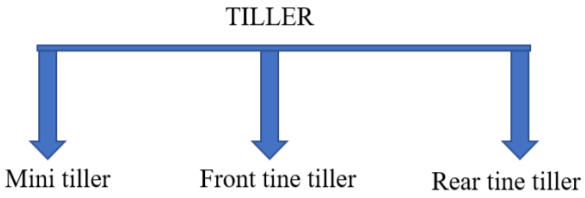
Keywords: Solar Panel, Chain Mechanism, Wiper Motor, Battery, Tiller Blade, Seed Sowing.

I. INTRODUCTION

Agriculture is very important for the Indian economy. India being a developed nation, where agriculture plays a major role in developing the nation needs in all outcomes. Farming is the modern technologies in our agriculture routines. The tiller was first inverted by Arthur Clifford Howard in 1919. He introduced different modes of rotary hoe cultivators. In 1930 the tiller is first introduced in Germany and Switzerland. The tiller is also named as cultivator. The tiller and cultivator both use for same purpose digging and stirring the soil. A cultivator is smaller and easier to operate and when it is compared to tiller it has powered to digging. It is mainly used for loosening the soil in an existing planting area. This project deals with design of machine and development of Chain and sprocket, bearing, electric wiper motor, bicycle wheel,

wheel angles, battery, solar panel, electrical wiring, seed sowing, supporting frames, screw and fitting. Power tiller are widely used for rotary and revolving cultivation in wet puddle soil. Power tiller is the best choice for small and marginal farmer. Power tiller are working capacity is 8 to 10 hours and weighting up to 30 to 40 kg are tiller machine. The Power Tiller presented in this project. This Power Tiller that we presented in this report is meant for cultivator farms with minimum interwork this of machine is 3 hours in 100 meter distance are cover and changeable battery 12 volt are used. The battery is getting charged from solar panel within 3 to 4 hours and same 12V wiper motor would be used in the machine. This machine is easy to operate cheap portable and simple in construction and maintenance available space. In this project, the tiller use to stirring the soil and seed sowing in required area. The seed sowing is done by reciprocating by use of chain arrangement.

CLASSIFICATION OF TILLER



1. MINI TILLER – It is suitable for garden with limited strength.
2. FRONT TINE TILLER – It is used in home garden & moderate tiller work in great case.
3. REAR TINE TILLER – It is used in larger field areas.

MINI-TILLER

The mini- tiller is a mechanized plow the prepare the land for agriculture production. It can plow land more efficiently then animal draft. At the same time reduces the drudgery. This tiller is used to break up the soil by turning it upside down with help of blade. In addition to breaking the soil, this device is also help in removing the grass as well. The tiller is compact and portable to use. The type of fuel used in mini tiller is gasoline. The Mini Tiller is really just a Front Tine Tiller that is smaller. Because it can combine the soil more thoroughly, it is sometimes referred to as a soil blender. This type is more lightweight and portable when compared to the others. Fundamentally, this type is not intended for new hard ground or rocky soil; rather, it is intended for tiny gardens and rather loose soil.

The Mini Tiller is good for:

- Raised bed gardens that incorporate the soil before planting
- Weed growth reduction
- Smaller gardens with considerably looser soils.

FRONT TINE TILLER

The front tine tiller is also plow prepare the land for agriculture. Only the small difference the tiller blade is fitted in front. In this type the blade is fitted on tractor on front side. Its efficiency is more compare to mini tiller. The engine fitted to this type is small to medium engine. The gasoline fuel is used in engine. Its weight is small compare to rear tine tiller. In this type we use 1.5HP, 2.5HP motor is also used. The tines are located at the front of the Front Tine Tiller. Usually, when the tines dig ahead, the machine is physically pulled forward by the movement of the soil. The operator must maintain control of the machine by holding the upper handle to prevent it from propulsion. In general, this kind of tiller is simple to control. It should be noted that a front tine tiller may find it difficult to work firm, virgin ground since the tines have a tendency to skip over the soil. Counter-rotating versions would be more suited for this.

This kind is more reasonably priced, lighter, and more maneuverable than a back tine tiller.

REAR TINE TILLER

Rear tine tiller is one of the fastest and quick preparing the soil from agriculture. In rear tine tiller, the tiller blade is fitted at back of the tiller. In this type there is a tractor, at back of tractor the cultivator or tiller blade is fitted. The size of tiller is about 2-3 feet. Here also the gasoline fuel is used in engine. In this type we use the diesel engine for cultivation.

Front tine tiller is good for

• Managing gardens that have been developed or somewhat hard ground.

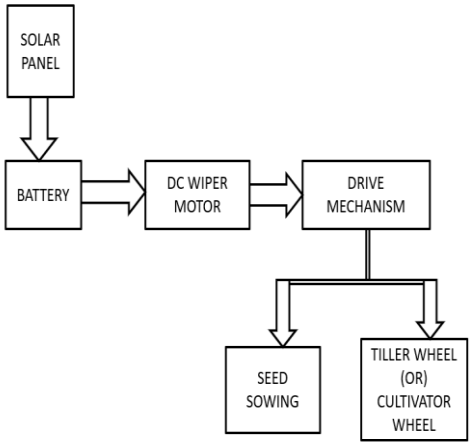
• Chopping the clods into smaller pieces and incorporating the organic matter into the soil.

• As well as being appropriate for gardens with tight corners, small to medium sized regions.

USES

- Power tiller used for cultivation, sowing, weeding, and tillage.
- It used with attachments that enhance its priority sewing machine, Spray machine, router, and blood.
- Further, power tiller uses in Sugarcane farming, Rice cultivation, Wheat farming, and Paddy cultivation.

II. BLOCK DIAGRAM OF SOLAR POWERED TILLER



This block diagram shows that the working principle of solar powered tiller. The sunlight passes through the solar panel and the battery get energised. The motor is gets supply from battery and tends to rotate the shaft. In shaft the driver gear tends to rotate the tiller rim and plant the seed by seed sowing.

III. EXPERIMENTAL SETUP

The basic components needed to fabricate an Solar powered Tiller machine is shown below, where the detailed view of this project components are displayed in following figures, where it contains 12 volt solar panel where solar energy plays an important role in this project solar energy is utilized as the primary power source where it absorbs energy and transfer the power to the battery where it act as a power source, Here we use 12V DC Wiper Motor to run the total tiller setup by using solar panel. Frame length, breath & width is about 91.4mm, 609.6mm & 5mm. Here we use low speed wiper motor to run the tiller. By rotating the tiller, the cultivator or tiller blade will dig the soil in proper manner. High safety reduced human effort, improved soil tiller efficiency, decreased work load, less worker fatigue, and lower maintenance costs are all achieved by in this project.

IV. COMPONENTS

The components of solar powered tiller are listed below;

1. Solar panel
2. 12V Battery
3. DC wiper motor
4. Square tube
5. Funnel
6. RIM
7. Chain sprocket
8. Bed switch
9. Tiller or cultivator blade
10. Multimeter

V. WORKING OF SOLAR POWER TILLER

The square tubes are welded and form a required frame we need. The U-shape tiller blade is welded at bottom of the frame. The solar panel is fitted in clamp. When the sunlight light passes through the solar panel, the battery gets energized and power is stored. After the power is stored, the power is used in wiper to move the shaft. In shaft the chain sprocket and reciprocating shaft of seed sowing is fitted. In chain is one end is connected the shaft and other end id connected to rim of tiller wheel. When the switch on, the wiper motor tends to rotate the tiller wheel. At back side of tiller wheel, the tiller blade is fitted and tends to stir the soil in proper manner. We can stir the soil upto2- 3mm depth. The stirring process is done the seed sowing operation is started. In seed sowing by reciprocating motion the seeds are planted under the soil. By using the tiller we can reduce the man effort. The gear-driven Direct Current motor with a 100rpm draws power from the intercultural blades. Unwanted plants are continually removed by tiller blades. With the aid of the screw rod, the depth of imbecilitating is adjustable using the screw and nut mechanism. This contraption makes use of a bicycle power tiller. At this point, a motorized tiller with a manual push is in use. At the rear of the tiller, a shaver is employed with a steady static blade. However, we changed the tooling system in this machine, steadily into a rotating motion that is powered by an electric dc motor 150 rpm and 7.2 nm of torque. This engine is fuelled by pack of batteries this rotary tool is rotated counter clockwise of the full mechanism that is efficient for moving soil in between two rows of agricultural crops. The solar energy is produced by the panel and used to power this device.

VI. DIAGRAM OF SOLAR POWER TILLER WITH SEED SOWING

SIDE VIEW

FRONT VIEW

TOP VIEW

VII. CONCLUSION

The greatest way to reduce emissions is to use renewable energy. The utilization of different non-renewable energy sources. Various references lead us to the conclusion that solar. Compared to other energy sources, energy consumption has more advantages. Solar power is taken in by solar panels, stored in batteries, and then used to power a variety of devices. We consequently made the decision to create the solar-powered blade harrow machinery, which is useful for farmers in their agricultural operations.

VIII. REFERENCE

1. Prashant Rahat et al (2021) Design “portable electric power tiller machine”. The portable battery-powered electric tiller machine was the subject of this study.
2. Shabbir J. Karjatwala et al (March 2018) Design development and fabrication of mini cultivator and tiller.
3. Zakariya et al (June 2021) published in Research and Reports performModification of Portable Power Tiller.
4. Tamirudibaba; RabiraWiru; wasihun Mitiku; TeklewoldDabi (2021) A review Design & Construction and Evaluation of Engine Operated Rotary Tiller.
5. F.A. Adamu, B. G. Jahun and B. Babangida [2014] in his paper authors draws our attention towards the performance factor of a power tiller.
6. Mr Mahesh Gavali et al (April 2014) published in International Journal design In India, a comparison of portable welders and power tillers.
7. F.A. Adamu, B. G. Jahun and B. Babangida [2014]. In his paper authors draws our attention towards the performance factor of a power tiller.
8. D.A. Mada, Sunday Mahai, [2013] A concluded that the importance of mechanization in agricultural.

Cite this article as :

Manjunathan R, Shylesh B, Sridhar S, "Design and Fabrication of Solar Powered Tiller with Seed Sowing", International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET), Online ISSN : 2394-4099, Print ISSN : 2395-1990, Volume 10 Issue 1, pp. 182-187, January-February 2023. Available at doi : https://doi.org/10.32628/IJSRSET2310132
Journal URL : https://ijsrset.com/IJSRSET2310132