WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Solar powered garbage composter

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A B S T R A C T

In developing countries, reducing the amount of waste is one of the major challenges that must be solvedto improve living conditions. Through the application of management in waste recycling, may contribute to urban development, but we must keep into account that waste management involves considerable costs. Finally, we specify that in order to adopt management strategies in the field of waste recycling are necessary debates and discussions nationally and internationally. In this project we propose to identify and analyze the concepts for waste recycling with the help of solar energy. The work is accordingly on conceptof solar powered portable garbage composter machine. The objectives is to reduce their negative impacton the environment and human health, and the natural resources. Currently, the waste is an existential issue in India, which is why you must identify economic solutions

Keywords: Solar energy, Waste Management, Organic Composting, Composting process etc.

1.Introduction

In developing countries, reducing the amount of waste is one of the major challenges that must be solved to improve living conditions. Through the application of management in waste recycling, may contribute to urban development, but we must keep into account that waste management involves considerable costs. Finally, we specify that in order to adopt management strategies in the field of waste recycling are necessary debates and discussions nationally and internationally. In this project we propose to identify and analyze the concepts for waste recycling with the help of solar energy. The work is accordingly on concept of solar powered portable garbage composter machine. The objectives is to reduce their negative impact on the environment and human health, and the natural resources. Currently, the waste is an existential issue in India, which is why you must identify economic solutions.

Problem statement

Organic waste creates pollution to our surrounding and thus naturally it tries to decompose the waste and the process takes longer duration. While decomposing solid waste gets decomposed and pollutes the atmosphere, in order to overcome these issues our project is solution to these problems. To decompose waste here we not need to travel waste to the decomposing ground, in fact we can directly decompose the waste this device.
There is no more scope for organic farming which is required.
The machines available for preparing organic fertilizers are costly which farmers cannot afford to buy. Available machines are operate at high power consumption which indirectly increases the cost.
Available machines are very bulky.

Objectives

1) To Design and manufacture Garbage Composer which will make blocks of garbage for easy handling .
2) To analyze various forces which will be imparted on the parts of Composer while handling the garbage
3) To find solution to overcome and increase life of Composter parts
4) To developed this model on portable size and powered with solar energy.
5) To developed all function like, garbage crusher , garbage mixer , water spraying and heating incompact model .
6) To lesser the price so that it can be affordable to farmers.

Literature

The History Of Composting

Composting is not only a modern age matter, this practice took place long time ago. The earliest records state evidence that before the introduction of modern sewage systems, the major fertilizers were animal manure and composts of garden and kitchen wastes. Composting existed 10 000 years ago through the Akkadian empire which was located in modern day Iraq.

When the citizens noticed that their plants grew better in area where there was manure they started putting manure in their soil. The history of composting also states that early farmers in Scotland, during the Stone Age, used to put manure and vegetable compost in their soil. Moving to Ancient Asia, there is evidence that the tools found in Neolithic sites in northern china contained similar features as those used by the Scottish farmers. Ancient writings and early Hindu texts show that the ancient Chinese farmers used to put cooked bones, silkworm debris and manure in their soil.

In India, there are some method for preparation of composter. The first method was dunk composting where, compostable materials were layered by soil. The second method was composting while planting, where the nutrients were the fish parts or other animal parts. The third method was seed balls. In this method the seeds were balled in clay and compostable materials, which kept them moist, then they were thrown to plant the seeds.

Composting was since then known as a money saver. In 1943, George Washington Carver said "Make your own fertilizer, compost can be done with little labor and practically no cash outlay". Yet, composting was soon replaced in the early 20th century. Justus Von Liebig, a German scientist, proved in 1840 that the plants can get nourishment from the chemicals. Therefore, the vegetables' and animals' waste mixture was replaced quickly by artificial fertilizers, and that was the beginning of the scientific method of farming. But like all the artificial solutions, fertilizers had their opponents

Modern Composting

The management of solid wastes, particularly municipal solid waste (MSW), has undergone substantial changes over the last 30 years. Most of the changes have taken place in industrialized countries and address issues related to the protection of public health and of the environment as well as resource conservation.

The typical components of MSW include paper products, various types of plastics, metals, glass, biodegradable matter such as garden and yard trimmings, kitchen and food waste, and other miscellaneous components.
Advances have been made in the storage, collection, and processing for most of these materials to divert them from disposal in landfills. One of the more important developments in the waste processing industry has taken place in the treatment of the biodegradable components.

Advantages of composting

Nowadays, composting is known for its numerous advantages which involve:

- Reducing yard and food waste make up 30% of the waste stream and therefore diverting that waste away from the landfills.
- The plants from a well-done compost will look better, will produce better and will have a much greater ability to fight diseases.
- Adding organic matter to the soil improves moisture retention.
- Adding decomposed organic material to the soil feeds the soil's organisms.
- Compost provides a balanced source of nutrients that helps the soil hold nutrients long enough so that the plants can use them.
- Composting saves money.
- Composting improves our diet, the plants will have fair amount of nutrients.

Steps in composting

It is mandatory to be aware of the factors listed above and follow the next step in order to make a healthy compost:
1- Build a compost bin: its size will depend on how much compostable material we want to generate. 2- Choose the composter location: the area should be flat and sunny.
3- Alternate the layers: the first layer should contain twigs to allow air to get in.
The second layer is a cover of leaves, then we alternate layers of carbon and nitrogen until the bin is full. 4- Maintain the compost bin: We should make sure that the materials are adequately wet and the compost should be mixed once a week to help the breakdown process. This process can be easily performed without a mandatory agricultural experience. Indoor composting can be either a backyard composting, for this type we need a yard, fallen leaves or straw and grass clippings and food scraps. Or a worm composting (vermicomposting): A tiny yard or even an apartment will work, with enough food scraps**.**

Working of Composter

Composter is a simple mechanism involving use of solar energy to control the working of whole composter system. A compactor consists of cylindrical block in which the garbage is collected from the people in the society comes and through the garbage in the cylindrical block which is placed insidethe society.

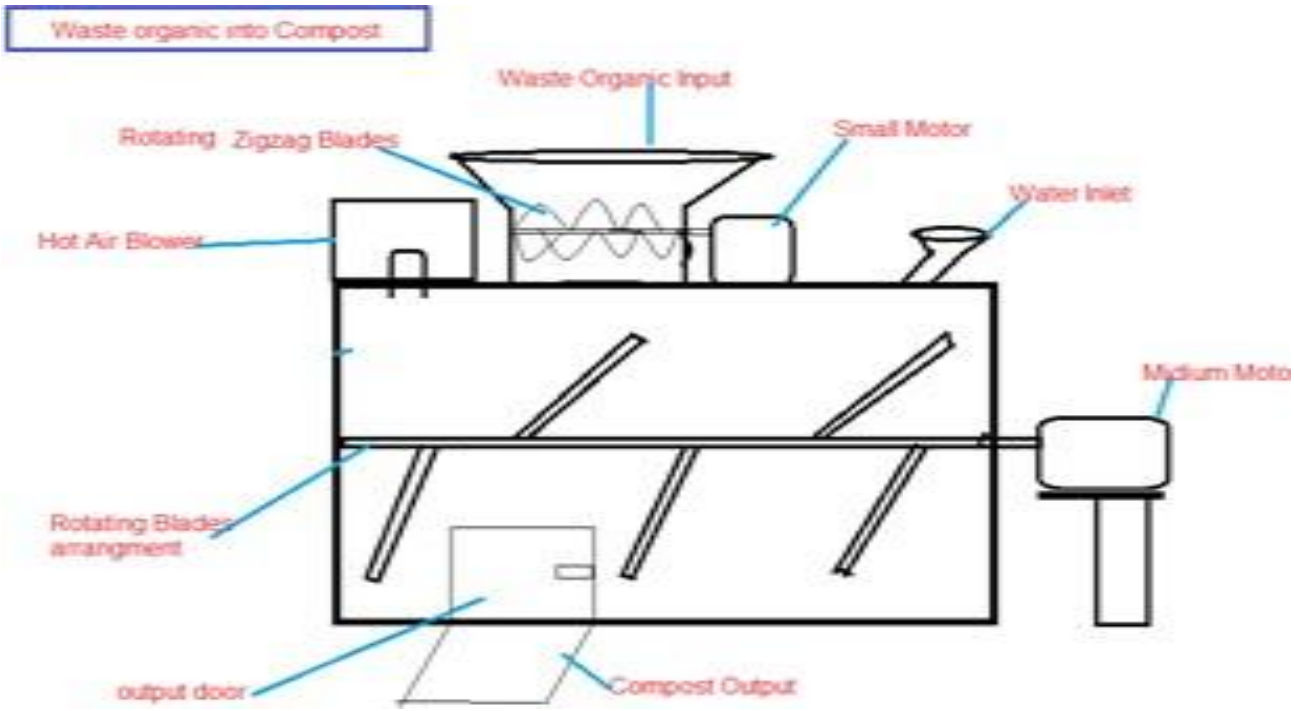
The first mechanism is crusher system , when garbage is insert through hopper, crusher starts crushing into small pieces and fall into main cylindrical drums. Inside the drums , mixer with connecting rods and belt –pulley mechanism works to mix all ingredients.

Composter mechanism is performed through the action of belt-pulley mechanism and high torque dc motor. The dc water pump with water tank is place on the top of machine. Whenever we need to wet the mixer inside drums, the pump system is sprayed the water on it.

Whole machine is heated by solar energy coming from sun. the whole machine is covered with aluminum frame. So that, it is easily heated. Also this energy is utilized by solar panel and convert into electrical energy. This electrical energy is stored into 12v battery. Further it is used to operate all functions.

There is window at bottom of drums, to collect the composter after few days of degradation process. The composter is to be designed and analyzed such that the whole system sustains the crushing ,mixing force and maintain structural stability.

Working Diagram



Components & Specifications

Through an intense research process of existing technologies and designs, we were able to develop the following machine components and characteristics.

It is basically a solar system working on solar energy having a solar panel of 12 volts and 20 watts. It is used to powered the whole operation of machine.

The dimension of the solar composting machine is 762mm*458mm*915mm. The frame is made with SS 304 square pipes.

The shaft/rod used is SS304 having a dimension of 10mm and length of 914mm. SS 304 is the most common grade for stainless steel. The shaft with connecting rods is used to mix the whole materials present in cylindrical drums. Type 304 stainless steel is a T300 Series SS austenitic. It has a min of 18%chromium and 8% nickel, combined with a maximum of 0.08% carbon. It is defined as a Chromium- Nickel austenitic alloy

The main body of the project is cover up of Aluminium sheet. Aluminium composite are made of aluminium composite material (ACM). It is non-corrosive material, so we used this sheet to cover whole structure of machine. Also it is good conductor of heat , so it is easily heated up in solar energy, thus provide d temperature for composting. ACM are mainly used for external cladding or facades of buildings, insulation, and signage.

The crusher/grinder mechanism is attached at the top of machine. Whenever garbage is inserted into hopper, sharp blade with high speed motor, crush/grind into small pieces. And thrown down the waste into cylindrical drums. The blade is made up of material SS202 having size 4 inch. It is one of the most used precipitation hardening grades, and has good corrosion resistance, toughness, high hardness, andstrength.

At the top water tank is placed , when dc water pump is ON, it spread the water inside the machine. Mixing portion of machine is runs with procket-

chain mechanism. 40 kg high torque dc motor is used. High Torque DC motor - DC motor is an electrical machine that utilizes electric power resulting in mechanical power output. Normally the motor output is a rotational motion of the shaft. This high torque dc motor rotates with speed of 150rpm and torque of 50 kg/cm .It can easily move the garbage materials inside the 40 kg cylindrical chamber.

Conclusion and Future Work

In conclusion, the project converts natural waste into organic compost using a solar-powered composting machine. Experimental studies were performed to test the composting process using real waste. There are effective outcomes, which means that heavy load can work effectively. The report contains steps and recommendations; nevertheless, in order for the project to move forward, subsequent work must be done at a high level. Because they have already taken the initiative to compost, people must maintain a compost machine. Kitchen garbage and other organic waste must also be separated before being added to the composting material. Finally, everyone in the community should be aware of the value of composting and take an active rolein its advancement.

Acknowledgment

We would like to express our gratitude to our Guide for providing support and guidance. We got to learn a lot more from this project ,which will be very helpful for us , in our future endeavours .

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