

Fabrication Of Solar Composting Machine

Keval Patil

Assistant Professor, Mechanical
Engineering
Saraswati College of Engineering,
Navi Mumbai, India
Kevalpatil@gmail.com

Manasi Sawant

Student, Mechanical Engineering
Saraswati College of Engineering
Navi Mumbai, India
manasisawant30@gmail.com

Rupali Pawar

Student, Mechanical Engineering
Saraswati College of Engineering,
Navi Mumbai, India
rupalipawar4519@gmail.com

Tausif Shaikh

Student, Mechanical Engineering
Saraswati College of Engineering,
Navi Mumbai, India
ShaikhTauseef330@gmail.com

Waruse Amir Hamza

Student, Mechanical Engineering
Saraswati College of Engineering
Navi Mumbai, India
Amirhamza777.k@gmail.com

Abstract— A waste converter is applied for the treatment and to recycle of solid and liquid waste material. Composting is an aerobic method of decomposing organic solid waste. This work involves decomposition of organic material into compost which is the good fertilizer for plants. This work presents sustainable and low cost solution for organic waste disposal. Method is simple and effective. The work utilized solar energy to effectively convert wet waste into compost. Solar is the energy free source which utilizes and save the cost of electricity and dispose waste. This machine saves initial capital investments due to its lower cost than electrical machines. It gives good quality compost without any problems related to pest, insect, rodents. This work involves the method of aerobic decomposition adding bacterial action on bio degradable organic waste with heating 50-60 degree Celsius, results in good quality control. This paper works on fabricating a semi automatic composting machine using solar technology which uses home waste material and converts it useful fertilizer used for the development of plants. It uses 30 days for the whole process which consists of heating, mixing, ventilation, and addition of culture.

Keywords—ACP sheet, Acrylic sheet, Organic waste, Decomposition, fertilizers

I. INTRODUCTION

Composting is a biological process carried out under controlled aerobic conditions (requires) oxygen. composting organic waste such as leaves, manure, paper, food waste convert into organic fertilizer. Composting biodegrades organic waste i.e food waste, manure, leaves, grass, paper, wood, crop residue etc and turns it into a valuable organic fertilizer. there are three types of composting i.e aerobic, anaerobic and vermicomposting. Profits of composting are such as enriches soil, helping retain, moisture and suppress plant diseases and pests. This leads to production of beneficial bacteria and fungi that breaks the organic matter to create humus, a rich nutrient filled component, reduces methane emission from landfills and lowers your carbon footprint. Compost improves soil fertility so that soil can easily hold the correct amount of moisture nutrients and air. Sir Albert Howard, father of organic method (Indore method) 1905-1934 helps soil hold or sequester carbon

di-oxide in addition to emission reductions compost replenishes and revitalizes exhausted farm soils by replacing trace minerals and organic materials. Compost makes the improvement in soil textures and makes the soil nutrients. Some people like to make their own compost rather than buying it there are numerous methods of producing compost. Solar composting is one of the methods to produce compost. It is one of the best methods because it saves electricity, as solar energy is used. We can get solar energy freely in the environment. It utilizes less time as compared to other methods. It has less initial cost. The compost produced by this method is of good quality. Sun's radiations are used for the composting process. Solar composting is of two types (a) Semi automatic (b) Fully automatic. This work is done by using Semi automatic solar composting machine for our project work. L.C. Jayawardhana, Aruna Manipura [1] Developed BESTCOMP a better management composting machine in Sri Lanka by local authorities. M.F. Homada, H.A. Abu Qdais, J. Newham [2] Experimentation on interdependence between physical biological and chemical factors was done by using scale reactors having composting conditions under control. Jaya Nair, Vanja Sekiozoi, Martin Anda [3] testing was done on vermicomposting and thermo composting improving treatment efficiency and produce good quality compost. H. Jouhara, N. Spencer, H. Gazal [4] Studied the biological and physicochemical methods of waste utilization. This machine saves initial capital investments due to its lower cost than electrical machines. It gives good quality compost without any problems related to pest, insect, rodents. This work involves the method of aerobic decomposition adding bacterial action on bio degradable organic waste with heating 50-60 degree Celsius, results in good quality control. We are fabricating a semi automatic composting machine using solar technology which uses home waste material and converts it useful fertilizer used for the development of plants.

II. MATERIAL AND MACHINE SPECIFICATIONS

It is basically a solar system working on solar energy having a solar panel of 12 volts and 50 watts. The dimension of the solar composting machine is 500mm*400mm*400mm. The shaft used is SS304 having a dimension of 10mm. SS 304 is the most common grade for stainless steel. 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 made up of ACP sheet. Aluminum composite are made of aluminum composite material (ACM), are flat panels consisting of two thin coil-coated aluminum sheets bonded to a non-aluminum core. ACPs are mainly used for external cladding or facades of buildings, insulation, and signage. The blade is made up of material SS202 having size 100mm*75mm*50mm. It is one of the most used precipitation hardening grades, and has good corrosion resistance, toughness, high hardness, and strength. The top cover is made up of Acrylic sheet and side cover is made up of aluminum composite sheet. The compost used in the machine is culture powder and saw dust. The machine can hold input waste of 1 kg and output waste of 0.5 kg. the capacity of the machine to produce the fertilizers is 1kg/day. The type of heating is direct heating. The duration of conversion process of waste into useful fertilizers is 30 days.

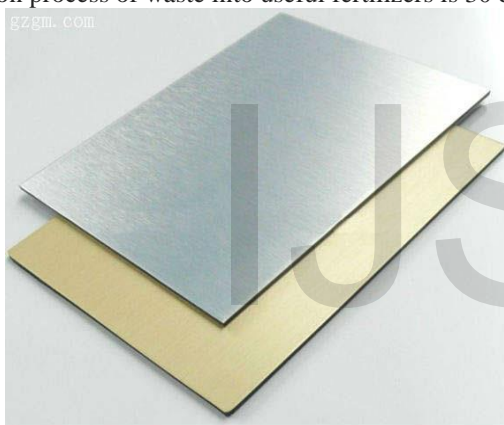


Fig. 1.AC-P sheet

III. FABRICATION WORKIND AND MACHINE CALCULATIONS

In fabrication of the machine firstly fixed all the support with screw and fixed all required size sheets. Connect solar panel and made connection with fan to the solar panel. Then making proper slope for drainage of slope water. It works on manual and electrical fan. There are two bins in machine each has 25-30kg capacity, put your waste into first bin till it gets filled, when you put your waste to into machine rotate handle provided once or twice, you will require 25-30days to fill one bin after using one bin you take second bin and follow same using one bin you take second bin and follow same procedure, when second bin get filled, compost will be ready in first bin.

Remove compost from first bin and you can use it for plantation.

Table..2.1 CALCULATIONS

Formula used	Volume=mass*density
Size of the first bin	400*200*400
Volume	L*w*h
Volume of half cylinder	3.14*rl
Volume of cube(first part bin)	200*400*200=1600 cm ³
Volume of half cylinder(second part in first bin)	0.5*3.14*200*200*200 =1256 cm ³
Volume of first bin	1600+1256=2856 mm ³
Mass=volume*density	=2856 cm ³ * 0.48g/cm ³ =1371g =14kg(approx)

IV RESULTS AND CONCLUSIONS

The solar composter working on solar energy is fabricated and tested .The solar composter gives useful fertilizer within 30 days of span,. Compost produced is odour free and has no maintenance, so it can be used for plantation, gardening\, and farming. The capacity of the composter can be increased according to the need. The machine makes quality compost.

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