



Paper on Compost Machine

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ABSTRACT

The paper here presents the systematic and detailed study of the work performed by our team on the process and working principal of Automatic compost Machine. In present time the problem of waste management is big deal for people so we need a technology to manage our waste in proper direction, and the compost machine is one of them. Compost machine convert the food waste into fertilizer which is useful for increase fertility rate of soil and give a strong product. Basically, the machine is fully automatic, there is lot of operation occur inside with the help of component and convert our waste in useful product. There is lot of benefit of people from this compost machine, people easily biodegrade his waste and use after making fertilizer or either they can sell the product, another one is machine help to decreased pollution in our area. Machine is converted our waste in specific time that is 24 hours maximum. We can also collect our product in 22 hour and 20 hours but within 24 hour we can take maximum benefit from the compost for our soil. Inside the machine humidity sensor and temperature sensor present which is help to sense the term and and humidity which is provide definite temp and moisture and then special microorganism start decomposing the waste into compost and this happen in 24 hour.

Keyword-Compost, organic waste, composting

1 Introduction

This compost machine is fully automatic and highly compact compost machine where lot of process occur inside the machine and help to make compost. In India food wastage is big problem, according to the source in India individually every person is thrown at least 50 kg food per year that is saddest reality for food wastage. So, we need to convert those waste in some useful product. Where we can add some value in our daily life and the compost machine is one of them. Food waste compost machine is a waste composting machine which is easily break down organic waste by microorganism inside in machine. The main quality of machine is their reduction rate is very less, all kind organic waste converted into compost within 24 hours with the reduction volume of 80 to 90 percent. No pollution occurs in the making of compost. Machine is fully automatic so anyone can operate this machine after taking some guidance. The main aim to build this product anyone can easily convert food waste in compost. The machine of property is understandable for every person where anyone can operate according to his convince.

Basically, the designed machine is system where user interaction is less during the whole process. Now days mostly people don't know about composting and its process mainly in rural are that's why the machine is allow to minimum interaction with user and operatable easily so the device is going to more famous and interesting around us. The designed product is based on lot of automatic feature inside the machine, where user only feed food waste with right combination of material and just for 24 hour or 22 hour and then collect the proper composition of compost. Just we should fix the temperature and humidity and process is going further inside machine, the work of user is only to collect the compost after specific time. Machine is totally based on the convince of people, where the people is not stuck in between the process only simply feed the food waste inside the chamber. Obviously if people is enjoy product with less effort our machine is going to more successful as well people aware about the food wastage. Our machine is customer friendly so they can add the value in his life. Composting is of two type but we are talking about the aerobic composting process, in this case our organic material is decomposed with the help of microorganism in the present of oxygen and that is called compost. Basically, we are talking about the compost not fertilizer, because fertilizer is uses in the growth of plant there is no connection to increase the fertility rate of soil. But the main working principal of compost is to increase the growth of soil and make our soil healthy. Most of people is not aware about the compost they use only fertilizer. But compost make the soil healthy and strong for better plantation. That's why compost is important for soil, compost is affordable as compare to fertilizer. we can easily convert our daily food waste in compost for using in soil growth.

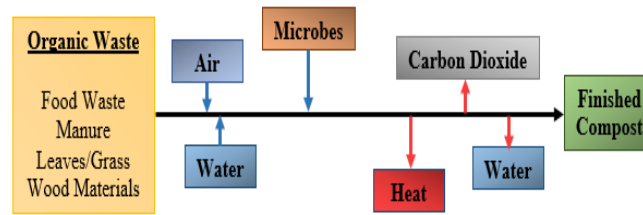


Fig:1 Aerobic composting process

2. Need of Machine

The basic problem in world is to wastage of food that is one of the reasons of pollution. And still there is not taken any serious move towards it. Every problem has a solution and compost machine is one of them. People can use his wastage food for making in compost that is help to prevent pollution as well as diseases. Our main aim is to reduce pollution and diseases around us that is produce because of food wastage. At the place of feed the wastage in earth or anywhere machine makes the work simple. We need to feed the wastage in machine and after specific time they convert into compost, so we can use in our soil and land. Another benefit of machine is to make compost and you can sell it in good prices either use it as a personal need. In rural area this machine is much needed, people is not aware about composting, once they are aware about composting. They are take initiative in making compost from composting machine. Across the world food wastage is problem this technique is to help people for reduce pollution.

3. Component and specification Material Selection

In any project the selection of material is important factor of our product is going to success either failure in market. In compost machine stainless steel is main material is used for component inside or outside. Because of his low density property that is light in weight and strong as well, where young's modulus is 203 GPa. Stainless steel is more suitable material in our machine his property is match our requirement to make machine more user friendly as well as good working process. Inside the machine blades are important to divide or wastage in small part and the material of blade is also stainless steel, in future there is no more problem of corrosion because steel has good corrosion resistance.

3.1. Design the Chamber

Chamber is the place where waste is going to stuck in this machine the capacity of chamber is 18.5 kg inside the chamber blade is attached for divide our big waste in small part. Chamber is basically made from stainless steel. We can remove our total wastes from chamber within a week because of the proper composition of compost. Wet food waste as well as dry food waste both are taken in chamber for making compost.

3.2. Design the Cutting and Mixing Hand

Compost machine equipped lot of component inside the machine and cutting blade is one of them, which is present inside the chamber. We feed food waste inside the machine, sometimes there is big part present in between wastage. We need small part of waste for proper composition of compost so blade help to divide big particle into small particle also help to mix the waste with microbes. The designing of blade is in specific type where mix blade touch more and more with particle. So, waste easily divided in small sizes. The blade is also made from stainless steel.

3.3. Design the Shaft

Shaft is basically used for hold the mixing blade where blades are attached to the shaft. During the composting process we need to mix the waste in proper manner so our quality of compost is good. When shaft is designed some properties keep in mind like vibration of shaft as well as stress and torsion. We could use to bearing for support that's ignore the unwanted vibration.

3.4. Design of the Motor

The main work of Motor is to rotate our shaft for mixing process. This compost machine is approx. 20 kg waste observation properties. We need 1 hp motor is sufficient for rotation of shaft. That speed is approx. 1400 rotation per minute. When motor is started, we need voltage here we supply 220-230 Amp voltage. Motor shaft is connected through belt for which provide rotation of mixing blade shaft for divide the waste in small size.

4. Methodology

Compost machine is fully automatic, first of all we can feed our food waste where inbuilt shredder is dividing all the big waste into small one and the process is continuing further.

Waste is reaches in chamber where inbuilt heater is present inside it, the work of heater is to dry our compost according to make proper compost Normally waste has 80 percent moisture that is not good for making better compost so our sensor is sensed the moisture quantity in waste and heater is start automatically.

After this process waste is going further and touched with mixing blade so blade is mixed all the waste in proper manner.

After 22 to 24 hours, we can collect our compost and used in farming and increase the fertility of soil.

5.Design Criteria

This compost machine is designed our customer to keep in mind, how we could make this machine easily use for everyone after taking little guidance. that is fully automatic just we should input our waste and set the specific temperature for good quality compost.

Product collection: In cities people has no more time on daily basis, so they can do one thing. The small quantity of vegetable and food waste is input in machine daily. and after 5 to 6 days, they can collect within a week. either after collect lot of waste and once input in machine and after 24 hour they can collect easily.

Compost handling: compost is basically collected in tray or bucket after specific time, after collection we can use for gardening as well as increase health of soil.

Product location: This compost machine is more flexibility, we need only little space 5 to 6 feet length and height. we paced this machine in outside home for daily use and just supply 220 Amp voltage to run this machine.

Product size: dimension of this Machine is 3 feet wide and 4 feet length.so, we can easily pace in small balcony and outside the home.

Less noise: the compost machine is produced very less noise during the composting process and also there are no harmful gases produced.

6.Parameter affecting the performance of composting

Temperature:In the process of making compost temperature is the main factor for find proper compost, for best compost their minimum temperature is 15 and the maximum is 70 degree we can also increase or decrease according to our requirement, if temperature is exceeding above 70 degree then our decomposing bacteria is died due to high temperature and we cannot collect proper compost.

C/N ratio: Basically C/N ratio is related to composition of carbon and nitrogen present in compost, the good quality of compost prepares under the composition of 30:1 C/N ratio.

Moisture: Moisture affect the microorganism because in this composting process we need definite amount of water to survive microorganism that is in between 40% to 65% for proper compost.

pH esteem: It empowers us to follow the interaction of deterioration. The fertilizer contains microorganisms that work under better in nonpartisan to acidic conditions implies in a pH scope of 5.5 to 8.

7.Literature review

Previous Work

Food garbage removal is the most serious issue for natural reason for the most part individuals arrange squander through landfill, this strategy is taking speed of climate corruption and produce hurtful gases around us like methane gas is for the most part answerable for influenced on the human and create an unnatural weather change in impending time is predominantly liable for influenced on the human and create a worldwide temperature alteration in impending time, in the event that we don't make any move on this issue so in future we will confront more regrettable circumstance.

Treating the soil strategy is to most ideal approach to exploit from food squander where's regular waste around us. Food wastage is serious deal for government just as individual for control contamination and a worldwide temperature alteration. In large urban communities' huge loads of food squander biodegradable material produced on regular schedule and the principal issue making in removal of waste. We have attempted to discover diverse technique for fertilizing the soil that is help in diminish contamination and dieses. Fertilizing the soil interaction, the most ideal alternative to make some pay however produces our food squander in fertilizer. In bygone era our rancher is use wastage to expand fruitfulness soil. Treating the soil is effectively strategy, anybody utilize effectively subsequent to taking little information. The need of fertilizing the soil is genuinely necessary in this time since manure is best compost to expand force of soil normally monetarily. In the event that our dirt is more fruitful our plant is better.

In this fragment we endeavored to look for different treating the dirt strategies and machines to find their capacity and how they work, these subsections under are occurrences of different treating the dirt connection that we will analyze in nuances to have the alternative to balance them with our arranged machine.

WEMI-4000:

Ohio University turned into the college with the biggest in-vessel fertilizer office in the United States with The Wright Environmental Management, Inc. WEMI-4000 that was introduced in 2009. A 2 ton in-vessel treating the soil framework, the passage inside the framework is controlled for air supply and temperature, a stockpile and exhaust fan and an air course shows that Composting material travels through a bunch of spinners that demonstration to modify, homogenize, shake and stack the material into the following zone. water will be included along with the blend during material cross-blending if necessary to raise dampness levels to the ideal levels Material remaining parts in the second tone for an extra r of days comparable to

the maintenance time in zone 7 days in Zone 1 and 7 days in Zone 2 equivalents 14 maintenance days) while huge adjustment occurs through control of air supply. Water and temperature the best temperature range for fertilizing the soil natural waste in this framework is 50 degrees Celsius to 65 degrees Celsius. Any dampness that channels out of the fertilizing the soil material streams into the pl that run along the foundation of the passage and from the plenums to sump boxes through pipes situated along the edges of the passage. Filter ate is siphoned back on to the treating the soil material from the sump box through pipe situate at aggregate box.

Ohio University's In-Vessel Composter

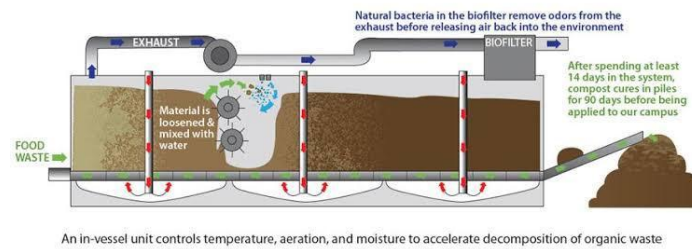


Fig: -2

At the point when the manure is at long last eliminated from the framework, the fertilizer needs for something like 90 days. The windrows are gone routinely to offer a more homogenous blend to the fertilizer. The subsequent supplement rich soil is utilized nearby intramural athletic fields, gardens utilized by Plant Biology understudies, Eco house local area garden, and so on

The Earth Flow

The college has put resources into a completely mechanized fertilizing the soil framework called the Earth Flow. This treating the soil machine is situated at the lower region's grounds. Completed manure is utilized in finishing project nearby.

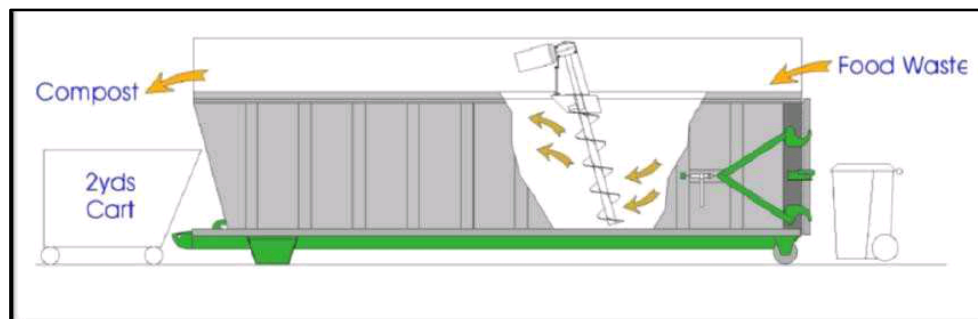


Fig-3

The Earth Flow measure 11 The Earth Flow Capacity is up to 900 Kg squander each day. Fig-2. Shows the Waste is stacked into one finish of the vessel by putting the assortment compartment on a mechanized tipper. Each time food squander is added, building material is included a 1 proportion. Straw, wood chips and pony fertilizer from the Foothills grounds are the essential building materials. The slanted drill blends and advances the manure down the vessel with each pass. The control board permits the administrator to choose the times each day that the manure is blended just as naturally adds dampness to the fertilizer. Material manures in 1-21 days inside the machine. The drill releases the completed manure through an end entryway of the vessel. The manure is to remedy for somewhere around 3 a month prior being utilized in finishing projects nearby as a dirt compost.

Ridan Composter: The Ridan food composter utilizes regular fixings and cycles to establish a warm climate in which food squander (nitrogen) and wood (carbon) can blend in with air and water. In contrast to other composters, this occurs without the requirement for power, making your Ridan modest and simple to utilize Fig-3. shows that warmth is made when miniature organic entities, (counting microorganisms and growths) separatethe natural matter, bio food waste and wood. The warmth draws in significantly more hyper dynamic microorganisms. Which make the treating the soil interaction speedy and productive.

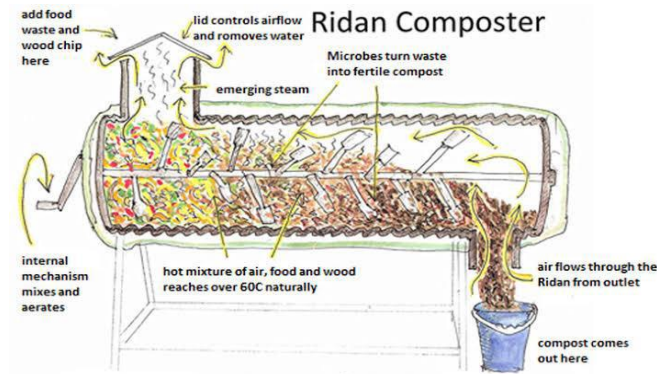


Fig-4

8.CONCLUSION

Food squander treating the soil machine is to diminish carbon impressions and abatement methane outflow from landfills. Food squander fertilizing the soil machine is to enhance the dirt. It additionally further develops the dirt's construction fruitfulness, surface, dampness and supplement holding limit. The result of this report is the fundamental information on working of substantial machines and the measures behind their working in a concise way



Fig:5 Organic Compost

Reference

- [1]. J.C. Hargreaves, "A review of the use of composted municipal solid waste in agriculture", Agriculture ecosystems and environment, 2016
- [2]. Talia. K. R., "A review on composting of municipal solid waste", Journal of Environmental Science IOSR, Toxicology and Food Technology (IOSR-JESTFT), 2015
- [3]. Tom L. Richard, Cornell Waste Management Institute, 2016.
- [4]. Aruna, G.; Kavitha, B.; Subashini, N.; Indira, S. An observational study on practices of disposal of wasteGarbages in Kamakshi Nagar at Nellore. Int. J. Appl. Res. 2018, 4, 392–394.
- [5]. Alam, P.; Ahmade, K. Impact of Solid Waste on Health and The Environment. Int. J. Sustain. Dev. Green Econ.2013, 2, 165–168.
- [6]. Ogwueleka, T.C. Municipal solid waste characteristics and management in Nigeria. Iran. J. Environ. HealthSci. Eng. 2009, 6, 173–180.
- [7]. Lasaridi, K.-E.; Manios, T.; Stamatiadis, S.; Chroni, C.; Kyriacou, A. The Evaluation of Hazards to Man andthe Environment during the Composting of Sewage Sludge. Sustainability 2018, 10, 2618. [CrossRef]
- [8]. Khan, M.; Chniti, S.; Owaid, M. An overview on properties and internal characteristics of anaerobicbioreactors of food waste. J. Nutr. Health Food Eng. 2018, 8, 319–322.
- [9]. Toledo, M.; Siles, J.; Gutiérrez, M.; Martín, M. Monitoring of the composting process of different agroindustrialwaste: Influence of the operational variables on the odorous impact. Waste Manag. 2018, 76, 266–274.
- [11]. Christiana OI (2014) Design, development and evaluation of a small-scale kitchen waste-composting machine. IOSR J Eng 4: 29-33.
- [12]. Karnchanawong S, Suriyanon N (2011) Household organic waste composting using bins with different types of passive aeration. ResourConservRecycl 55: 548-553.