

“Design and Fabrication of Organic Wastage Recycling Machine”

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ABSTRACT

Organic waste and especially food waste is worldwide problem. The objective of this project are to design a composting with certain parameters for the design, process time, easy to use, odourless and power saving the designed food waste decomposition system is manufacture for rapid composting performance. It can be used by households, restaurants, hotels, schools, apartment building, communities, offices and cafeteria depending on capacity of machine. The system employs high temperature, microorganism to decompose food waste and organic matter. The machine build with an induction motor with rated power input of 0.75 KW and heater with a temperature up to 60 °C. The machine is able to decompose organic waste in a time frame of 4 to 5 days with minimum harmful gases emission and orders an it's almost a plug-play machine but with an average power consumption rate of 96-120 hours.

Keywords: Organic waste, Recycling machine, Chopping machine, composting machine, Agriculture waste.

1. INTRODUCTION

The machine is semi-automatic and compact recycling (composting) machine, which uses for special microorganisms to break down all kind of organic waste into compost within 110 hours, with a volume reduction of 85-90%. The entire process is natural and biological. The microorganisms we used to thrive in high temperature and are effective even in high acidic or salty condition. The machine has U-shaped composting tank, with a heater, mixing blade and exhaust system. When organic waste is added to it and the heater turns on then composting tank get heated. Due to this, the water content in the organic waste is evaporated and is goes out to the atmosphere as water vapor through exhaust system. As any organic waste contains 70-80% water content, we achieve 70-80% volume reduction at this stage itself. At the same time, the special micro-organism then decompose the organic waste into compost, and this happens within 48 hrs. That is how we achieve 85-90% volume reduction. The process is quite noisy as there is use of crusher and the blades are just for evenly mixing the waste.

India faces major environmental challenges associated with waste generation and inadequate waste collection, transport, treatment and disposal. Current systems in India cannot cope with the volumes of waste generated by an increasing urban population, and this impacts on the environment and public health. The potential for energy generation from landfill via methane extraction or thermal treatment is a major opportunity, but a key barrier is the shortage of qualified engineers and environmental professionals with the experience to deliver improved waste management systems in India [1]. The main objective of this study was to develop models for accurate prediction of municipal solid waste (MSW) generation and diversion based on demographic and socio-economic variables, with planned application of generating Canada-wide MSW inventories. Models were generated by mapping residential MSW quantities with socio-economic and demographic parameters of 220 municipalities in the province of Ontario, Canada. Two machine learning algorithms, namely decision trees and neural networks, were applied to build the models. Socio-economic variables were derived from Canadian Census data at regional and municipal levels. A data pre-processing and integration framework was developed in Matlab computing software to generate datasets with sufficient data quantity and quality for modeling. Results showed that machine learning algorithms can be

successfully used to generate waste models with good prediction performance. Neural network models had the best performance, describing 72% of variation in the data. The approach proposed in this study demonstrates the feasibility of creating tools that helps in regional waste planning by means of sourcing, pre-processing, integrating and modeling of publically available data from various sources. [2] To address this, manually operated kitchen waste shredder was developed and its performance was evaluated. The developed shredder was tested using different parameters such as rotational speed and feeding rate. Among the different cylinder liners used, the small iron bar with specified dimension was selected for the final fabrication of the shredder. Resulting in maximum shredding efficiency (96.24 %), capacity (46.8 kg/h) & size reduction efficiency (96.86 %) for vegetable waste. For fruit waste it was observed to be 94.70 %, 40.8 kg/h and 97.47 %, respectively and for mixed waste it was 92.86 %, 44.4 kg/h and 96.34 %, respectively [3] Waste from Electric and Electronic Equipments (WEEEs) is currently considered to be one of the fastest growing waste streams in the world, with an estimated growth rate going from 3% up to 5% per year. The recycling of Electric or electronic waste (E-waste) products could allow the diminishing use of virgin resources in manufacturing and, consequently, it could contribute in reducing the environmental pollution. [4] To make traditional compost, an alternate different type of shredded plant materials in 6 to 8 inch layers is done. Layering helps compost reach the correct nitrogen balance. Waste fodder etc. 2-inch layers of fine materials are used & processed through a machine shredder. Traditional composting includes soil as one of the layers. Water is added to the compost after every few layers of material. Live stock manure also can be added which supplies some nitrogen. The microbes that are naturally found on the plant waste ultimately cause decomposition [5]

1.1 Outline of the Project:

The machine design is semi-automatic and compact recycling (composting) machine, which uses for special microorganisms to break down all kind of organic waste into compost within 24 hrs. with a volume reduction of 85-90%. The entire process is natural and biological. The microorganisms we use thrives in high temperature and are effective even high acidic or salty condition. The machine has U-shaped composting tank, with a heater, mixing blade and exhaust system.

1.2 Problem Statement:

Organic waste recycling system greenbelt resources is an innovator of sustainable energy product system that delivers modular solution design for localized processing of locally generated waste into locally consumed product. The machine is semi automatic and highly compact recycling machine which uses special microorganisms to break down and decompose all kinds of organic waste into compost within 48 hours. The entire process is natural and biological. The microorganisms we use thrives in high temperature and are effective even in high acidic or salty condition the machine has U-shaped composting tank with heater, mixing blades and an exhaust system. When organic waste is added to it, switch on the heater and the composting tank get heated. Due to this the water content in the organic waste is evaporated and it goes out to the atmosphere as water content, we achieve 70-80% volume reduction at this stage itself. At the same time, our special microorganisms then decompose the organic waste into compost, and this happens within 48 hours. That is how we achieve 85-90% volume reduction.

1.3 Objective

1. Design and manufacturing of organic wastage recycling machine.
2. Recycling machine is semi-automatic.
3. Natural and efficient process.
4. It is portable machine.

1.4. Methodology

1. Gathering information of the necessity organic waste composting machine.
2. Collecting the data from the literature review for the development of specific mechanism.
3. Existing research and recycling machine studied & various modification required in them are to be focused.
4. Identification of mechanism to be attached & their role in machine to get the desired outputs.
5. Fabricate the portable recycling machine to overcome various problem in the existing recycling machine.

6. Verification of specified need.

2. RELATED WORK:

Organic waste and especially food waste is a worldwide problem. Composting has proven to be a valid solution to this problem. The designed food waste decomposition system is designed for rapid composting performance.

1. Our machine aim is to make natural compost.
2. First organic waste added in hopper, were saw cutter are mounted on shaft, which chops the organic waste.
3. The chopped material mixed and heated to 60⁰ C, for removing moisture content from it.
4. Which minimize the decomposition rate of organic waste, there is addition of enzymes and compost will be made in 4-5 days and increases fertility of soil.

3. EXPERIMENTAL PROCEDURE:

Figures 1 shows the (a) Organic wastage from kitchen (b) Experimental setup (c) Hopper: Where organic waste put for chopping (d) Seven 110 mm diameter Saw Cutter (e) Rectangle tank which transfer chopped material from hopper to shredder tank (f) Shredder tank where waste material heated up to 60⁰C and mixed by using I-shaped blade (g) 3-phase induction motor which has 1380 RPM speed. (h) Pulley drive used for speed reduction ratio. (i) Compost material.



Fig. 1 Experimental setup (a) Organic Waste. (b) Model (c) Hopper (d) Saw Cutter (e) Rectangle box (f) Shredder tank (g) 3-phase induction motor (h) Pulley Drive (i) Compost

4. CONCLUSION

At the start of this project we set our objectives and goals into finding solution for food waste disposal problem, those objective were that the solution should be eco-friendly and it should help to decreasing the garbage volume and the disposal cost. It also should be suitable and socially responsible. Those objectives were all met choosing composting to deal with the food waste disposal problem. When trying to design the composting machine, objectives were that the machine reduce the processing time as much as possible which was not more than 4 days in most of our experiments.

5. REFERENCES

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