



Design and Fabrication of Portable Dry Organic Kitchen Waste Decompose Machine

M.Kiruthika¹, N.Jagadheswari², S.Srianushiya³, R.Vaishnavi⁴, M.Vijayalakshimi⁵

Department of Agricultural Engineering, Muthayammal Engineering College Namakkal, Tamil Nadu, India¹

Department of Agricultural Engineering, Muthayammal College of Engineering Namakkal, Tamil Nadu, India^{2,3,4,5}

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ABSTRACT: Food wastes are organic materials that are high in nutrients and calories and are home to the microorganisms that produce methane. In most rural and urban areas, organic waste is disposed of carelessly or thrown in landfills, which frequently pose a risk to public health (Edeh, Ozioko, Obilor, Nwosu, & Okafor, 2024). In addition to having an offensive smell, the methane gas produced from bio-waste is a primary greenhouse gas that causes worldwide (Enweremadu & Ojediran, 2004). Solid waste management is currently one of the world's most pressing issues. Organic garbage makes for almost half of all waste produced worldwide. India, the world's second most populous nation, generates about 100 tons of solid trash every day. It is a combination of organic food waste as well as inorganic waste (Jayaprakash, Lohit, & Abhilash, 2018). Food waste is a state-wide issue. It includes things like spoiled greens, culmination skins that have been peeled and trimmed, and more. Waste materials can be used for anaerobic digestion, composting, land-filling, and other processes because of their high moisture content and natural composition. Therefore, improving food waste management is crucial to lowering dangers to people and the environment (Thi, Kumar, & Lin, 2015). The natural process of turning organic materials, such food scraps and yard trash, into compost, a nutrient-rich substance, is called composting. This process involves microbes, fungus, and worms breaking down the materials, changing them into humus, which is needed for good soil.

KEYWORDS: Portable waste decomposer, kitchen waste management, organic waste recycling, composting machine, sustainable waste solution, dry composting technology, eco-friendly waste disposal

I. INTRODUCTION

1) Alhashimi, M. T. M., Jawad, Y., Nukhailawi, K., & Ali, A. (2019). **Review on Electrical Wiring (Types, Sizes and Installation)**. no. December, 2019.

Author (Alhashimi, Jawad, Nukhailawi, & Ali, 2019) have studied the selection of electrical wiring will be influenced by a number of factors, including color and the labeling of data with applications. The information printed on the wire shell is all you need to choose the appropriate wire for your house. The terms "wire" and "cable," which are really quite different, are most frequently used to refer to similar objects. A cable is a collection of wires covered in sheath, while a wire functions as a single electrical conductor. In addition to being used in an electrical context, cables—which resemble wires—are used to transfer electrical currents. The term "cable" later came to refer to a nautical line of several ropes used to anchor ships. According to standard building codes, electrical or power supply cables (such as computer networking) that are run through or within office buildings' plenums must either be covered in metal conduit or tested for low flame and smoke production.

2) Beyer, G. (2021). **The global cable industry: materials, markets, products: John Wiley & Sons.**

A thorough overview of cable products, markets, and materials the most recent advancements in automotive, nuclear power plant, underwater, coaxial, optical, medium-, and high-voltage cables are all covered in detail in The Global Cable Industry. The book contains information on material advances for polymers, crosslinked elastomers, and flame-retardant non-halogen cable compounds, all of which were contributed by renowned researchers and developers in the field. Within the framework of the Construction Product Regulation, the contributors offer field experiences of the new cable fire test, an overview of foam polymers, and details on technologies to crosslink polymers his important book



3) Edeh, J., Ozioko, R., Obilor, C., Nwosu, J., & Okafor, I. (2024). Development and Performance Evaluation of an Integrated Bio-degradable Kitchen Waste Comminution and Drying Machine. *FUOYE Journal of Engineering and Technology*, 9(1), 84-89.

Author study used locally sourced standard materials to design, build, and assess a kitchen waste comminution machine for transforming biodegradable trash. The machine is divided into two units: the drying unit, which uses a heating element to remove moisture from the ground material, and the comminution unit, which uses grinding discs to crush and shred biodegradable household garbage. A single phase 2 HP electric motor drove the modules, which were integrated and synchronized for continuous operation using a pulley-belt configuration. To avoid excessive heat loss, the drying unit with an auger-like shaft for material stirring and conveying/evacuation was lagged. Tuber peels, fruit peels, vegetable stalks, and grain chaffs were among the kitchen wastes used to assess the machine's performance in terms of dryness, throughput capacity, and shredding efficiency. A force of 150 N and heat of 2 kW were needed for the corresponding grinding and drying of an average mass of 5.87 kg of the biowaste, so the approximate values of the developed machine were determined (Edeh et al., 2024).

4) Christiana, I., & Olusegun, A. S. (2014). Design, development and evaluation of a small-scale kitchen waste-composting machine. *IOSR journal of engineering*, 4(04), 29-33.

(Christiana & Olusegun, 2014) waste material recycling is widespread in poor nations, the treatment and application of biodegradable organic fraction—particularly for kitchen garbage—remains relatively restricted. Compost plants are a great way to avoid wasting valuable natural resources and causing environmental issues while also producing a high-quality and affordable soil amendment. International and local authorities are increasingly looking at new ways to manage their organic solid waste through the introduction of compost plants (in developing countries). Composting is the biological breakdown of organic substrates, either aerobically or anaerobically, at temperatures and moisture levels that allow microorganisms to flourish. The end product is stable enough to be stored and applied to soil without having a negative environmental impact.

5) Enweremadu, C., & Ojediran, J. (2004). Evaluation of energy potential in husks from soy-bean and cowpea.

The energy content of husks from cowpea and soybean processing facilities was investigated. Evaluating each of these possible contributions to farm-processing energy was the goal. The ultimate and proximal analyses were determined, and the energy content was assessed using the Dulong-Petit equation. Cowpea husk samples have an average moisture content of 21%, compared to 18.88% for soybean samples.

II. MATERIAL AND METHODOLOGY

Material

Preparation of Feedstock

To create a uniform aggregate of feedstock, kitchen trash is frequently collected from the main dormitory mess at Muthayammal Engineering College in Rasipuram, India, for a period of one week. Because it included all types of food waste, the collective meal trash was regarded as a representative sample of the waste generated in the hostel mess

Experimental setup:

A laboratory scale in-vessel compost bioreactor made of plastic with a complete running potential of 10 kg become commissioned and used. Dimensions of the reactor have been: top 63.5, diameter 66.6 cm and thickness 10 mm.

III. COMPONENTS

1. WIRE:

Insulating materials like varnish, rubber-like polymers, or plastic are used to coat electrical wires.

2. FILTER :

Using a filter material with a complicated structure that only the fluid can flow through, filtration is a physical separation technique that separates solid matter and fluid from a mixture.

3. BARREL :

Usually, sturdy HDPE (high-density polyethylene) plastic is used to make it.

4. STAND :

A frame for a kitchen waste composting machine is created to ensure structural integrity, enhance cleanliness by raising the unit, and promote user convenience.

5. BLADE:



Blades function as a mechanical shredder and mixer in kitchen decomposition machines (also known as electric composters or food recyclers).

6. PIPE :

The handle serves as the main interface for rotating the internal mixing blades (agitators) in a manual kitchen waste breakdown machine or organic waste converter (OWC)

7. HANDLE:

A central drive shaft that passes through the centre of the composting chamber connects the handle to the blades.

8. BOLT:

Bolts are necessary for coupling the motor to the mixing unit, fastening internal blades to the drive shaft, and fastening the mounting assembly to the sink in a kitchen decomposition machine

IV. RESULTS AND DISCUSSION

1. RATIO WASTE: (1:2:1)

| | | |
|----|-----------------------------|---------|
| 1. | Fruits and Vegetables Peels | 1 (2kg) |
| 2. | Coco Peat | 2 (4kg) |
| 3. | Soil | 3 (2kg) |

2. SOIL:

Soil plays an important role in the decomposition of organic waste such as waste, fruits peel and vegetables scrap.

3. COCOPEAT:

Coco peat is a natural organic material obtained from the fibrous husk of coconut. It is a by-product of the coconut processing industry and is widely used as a growing medium in agriculture.

4. FRUITS AND VEGETABLES PEELS:

Fruit and vegetable peels are biodegradable kitchen wastes that can be converted into organic manure through decomposition or composting.

5. AVOID FORMATION OF BAD ODOR:

► Provide holes in the pipe to avoid the formation of bad odour.

6. LEMON ADDING IN PROCESS

Adding lemon (or lemon peels/juice) during kitchen waste decomposition helps reduce bad odour due to its natural chemical properties and antimicrobial.

COMPOSITION OF KITCHEN WASTE DECOMPOSE MACHINE

A kitchen waste decomposition machine consists of several mechanical and structural components that help convert organic kitchen waste into organic manure efficiently.

The main components are:

1. Feeding Hopper.
2. Shredding unit.
3. Mixing chamber.
4. Rotating blade.
5. Bio filter.
6. Stand or Frame.
7. Bolt and fastener.

STAGES OF DECOMPOSITION UP TO DAY 14:

Day 1-3:

1. Fresh waste stage. Microorganisms begin breaking down easily degradable materials.
2. Slight temperature rise starts.

Day 4-7:

1. Active decomposition stage. Frequent blade rotation increases oxygen supply.
2. Temperature rises significantly, and rapid breakdown occurs.

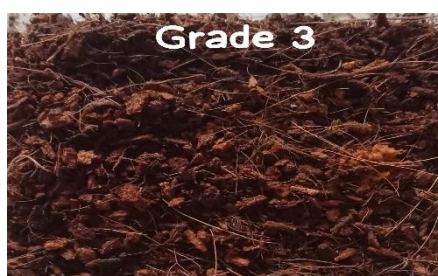
Day 8-12:

1. Advanced decomposition stage.
2. Waste volume reduces, smell decreases, and material becomes semi-dry and dark.
3. Waste turns into a coarse, granular, and partially decomposed material.
4. Original waste is no longer easily identifiable.

Day 13-14:

1. Stabilization stage.
2. The material turns into dark, crumbly, soil-like organic manure with minimal odour.
3. Final product is loose, dry, and easy to handle.
4. No sticky or wet material.
5. Nutrients like Nitrogen (N), Phosphorus (P), Potassium (K) become stable and ready for plant use.

ORGANIC MANURE IN GRADE



V. CONCLUSION

India is the main market for the product, which is intended for use in Indian home kitchens. It will face competition from companies like Eco Bin and Daily Dump. The design has temporary look while adhering to an organic geometry. The product will be composed of bio-plastic ingredients like cellulose and starch and weigh between 6 and 7 kg. It will come in black and brown hues and have a dry, smooth texture. The product should last about eight years, and it needs to be maintained once a month. The proportion of fruit and vegetable peel waste that was gathered for the research. There were 200 g of peel waste from beetroot, 150 g from carrots, 150 g from onions, 100 g from ginger, and 150 g from garlic. 200 g of peel waste came from cabbage and 150 g from potatoes. Orange peel trash was 200 g, watermelon waste was the highest at 250 g, banana waste was 200 g, lemon waste was 100 g, and papaya waste was 150 g. 2,000 g (2 lb.) of peel waste were gathered from all of the chosen fruits and vegetables.

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