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# Design Of Wet Waste Composter And Management Of Wet Waste At Household

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***Abstract***: This project aims to design a user-friendly composter for household wet waste, addressing the increasing need for efficient waste management. It will focus on developing a compact composter using aerobic composting techniques to produce nutrient-rich compost for gardening. Additionally, the project will provide education and resources on waste segregation and composting methods. Evaluation will consider waste diversion, compost quality, and user feedback to promote environmental stewardship and community sustainability.

***Index Terms*** - composter, household wet waste, nutrient-rich compost, waste segregation, composting methods, community sustainability

## 1. Introduction

There has been a growing concern about environmental sustainability and the need to manage waste more effectively. One significant challenge in waste management is the proper handling of organic waste, commonly referred to as wet waste, which includes food scraps, garden waste, and other biodegradable materials. Improper disposal of wet waste not only contributes to environmental pollution but also represents a missed opportunity for resource recovery and sustainable practices.

The aim of this project is to address the issue of wet waste management at the household level by designing a user-friendly wet waste composter and implementing effective waste management strategies. By empowering households to compost their organic waste at home, we seek to reduce the volume of waste sent to landfills, mitigate greenhouse gas emissions, and promote a circular economy approach to waste management.

Throughout the project, data will be collected and analysed to evaluate the effectiveness of the wet waste composter and household waste management strategies. Key performance indicators will include waste diversion rates, compost quality, user satisfaction, and environmental impact metrics such as greenhouse gas emissions reduction.

By designing a practical and accessible solution for wet waste management at home and fostering community engagement in composting practices, this project aims to contribute to a more sustainable and resilient society. Through collaboration between researchers, engineers, community members, and local authorities, we can work together to address the challenges of waste management and promote a healthier environment for future generations.

## 2. Literature reviews

According to Prof. Swati Kedar Nadgaundi, Pranali Swanne, Megha Chakraborty, Sanskruti Vaity, the design of a composting machine based on a micro-controller platform, aimed at optimizing the composting process by controlling temperature and air-flow. The system, cantered around a PIC16F micro-controller chip, utilizes simple hardware components to achieve compactness, speed, and cost-effectiveness. Test results demonstrate effective autonomous control, with potential for further enhancement into a network-controlled system. The primary focus is to introduce a new prototype design for an automatic composter.

According to the study of Dr. V. S. Shende, Piyush N. Dafale, Pranit S. Ghagare, Rohit S. Dakre, Tejas R. Nagpurkar, Kunal W. Khekale, Kartik S. Dhande, the article proposes utilizing compactors to reduce the volume of waste streams, thereby saving money, decreasing the frequency of trash collection, and lowering collection fees. The focus is on identifying and analysing concepts and strategies for waste recycling to mitigate their adverse effects on the environment, human health, and natural resources.

According to Er Alok Gupta, Dr. Anupam Jain, the summary outlines the global challenge of waste disposal faced by countries due to various sources such as industries, households, restaurants, and hotels. With limited dumping areas available, governments are focusing on treating waste before disposal, with India initiating the Swachh Bharat Mission. The Indian government emphasizes waste segregation into biodegradable (green/wet waste) and non-biodegradable (dry waste), with various composting techniques and methane treatment identified as solutions. The case study aims to analyse different composting techniques prevalent in the Indian market to determine the most effective method based on daily waste generation from different sources.

Abhishek Raj, Gagan RA, Dhanush J, Darshan Patel, Dr. GP Shivashankara, discusses a study on home composting techniques for solid waste generated at households, aiming to address issues related to landfill space consumption and fire hazards caused by organic waste. Various methods for household composting are compared to determine the most effective approach. The proposed solution involves starting composting at home using an economical model, utilizing cow dung as a starter for the composting process. Vertical pipes are employed to optimize space usage in homes. The resulting compost can be used as manure for plant growth. Anaerobic decomposition is utilized to minimize odour production, and the closed system design helps mitigate fly problems. Certain waste items are identified to enhance composting rates and improve compost quality. Detailed analysis of compost properties and waste composition will be conducted.

According to Shoaib Kazi, Rohan Kulkarni, Chinmay Mulay, Satyajeet Bhosale, Omkar Siras, the shortcomings of current composting techniques, which are time-consuming, environmentally harmful due to gas emissions like methane and carbon dioxide, and pose health hazards to residents. Additionally, incomplete treatment of wet waste leads to the generation of harmful acetic acid, while transportation requires heavy-duty vehicles consuming fossil fuels. To address these issues, there's a need for new, environmentally friendly methods at the grassroots level, designed with future needs in mind. The objectives include overcoming existing composting problems and designing a composting machine with parameters such as process time, ease of use, compactness, Odor lessness, automation, rapid composting, and energy efficiency.

**3. Problem Statement:** Identify the challenges associated with managing wet waste at the household level, such as space constraints, odour control, vermin attraction, and user behaviour.

**4. Aim:** This study aims to Design Wet Waste Composter and Management of Wet Waste at Household.

**5. Objectives:**

1. To identify various wet composting techniques and design used in the household and in environment.
2. To identify the most cost-effective and popular technique of wet-waste management.
3. To study and utilize of the manure generated in composting.
4. To study the level of awareness and opinion of the people regarding waste management

**6. Methodology:**

1. Collection Of Wet Waste
2. Segregation Of Wet Waste
3. Shredding Of Wet Waste
4. Preparation of Wet Waste Composter
5. Layering & Mixing
6. Maintaining Moisture Content
7. Turning Of Semi Compost Waste
8. Obtaining Pre-Compost
9. Shredding Of Compost
10. Final Compost for Utilization

**6.1 Collection of Wet Waste:**

The project aims to assess existing waste collection infrastructure and integrate organic waste collection efficiently. It involves designing and implementing a separate collection system or modifying existing practices, engaging with local communities for support, and organizing events to promote participation and educate residents. A logistical plan for regular collection, operational procedures, and monitoring mechanisms will be established. Periodic evaluations will refine strategies. The goals include establishing an effective organic waste collection system, increasing participation, and gathering data for the design and implementation of a household waste composter.

The successful implementation of the organic waste collection program will lay the foundation for sustainable waste management practices at the household level, promoting environmental conservation, resource recovery, and community engagement in waste reduction efforts.

**Collection of Wet Waste**

### 6.2 Segregation of Wet Waste:

The project involves designing educational programs and materials to raise awareness about segregating organic waste for composting, assessing and improving waste segregation infrastructure, providing tools and guidelines for households, conducting training sessions, engaging with communities, organizing events, monitoring effectiveness, and collecting feedback. Its goals include increasing awareness, promoting effective segregation practices, and ensuring availability of segregated organic waste for composting.

Implementing organic waste segregation at the household level promotes sustainable waste management, environmental conservation, and compost production for soil enrichment. It fosters community engagement in waste reduction efforts, enhancing overall environmental health.

### 6.3 Shredding of Wet Waste:

The project aims to develop a simple and efficient method for shredding organic waste at the household level to facilitate composting. It involves evaluating existing shredding methods, designing a user-friendly mechanism, testing prototypes, and refining based on feedback. The objective is to increase adoption of shredding practices, improve composting efficiency, and integrate the shredding mechanism with household composters for seamless waste management.

Implementing a household shredding mechanism for organic waste promotes sustainable waste management, environmental conservation, and compost production for soil enrichment. It empowers households to participate in composting initiatives, reducing their environmental footprint by diverting organic waste from landfills.

**Shredding of Wet Waste**

### 6.4 Preparation of Wet Waste Composter:

The project aims to design and implement a household waste composter focusing on compactness, user-friendliness, and safety. Key steps involve:

- Designing a compact composting machine considering size, capacity, functionality, and safety.
- Selecting appropriate components and materials based on compatibility, durability, and cost-effectiveness.
- Assembling the components into a functional composter, ensuring optimization and alignment.
- Conducting initial testing to evaluate performance and efficiency and making necessary adjustments.
- Implementing a user-friendly interface and control system for easy operation, monitoring, and adjustment of composting parameters.
- Incorporating safety features like emergency shut-off switches and warning indicators to prevent accidents.
- The outcome will be a functional, user-friendly composter suitable for household organic waste management.

The waste composter machine's success will enable households to engage in composting, fostering environmental conservation and soil enrichment. This empowers households to partake in local sustainable waste management initiatives.

**Preparation of Wet Waste Composter**

### 6.5 Layering & Mixing:

This project aims to develop guidelines and educate households on proper waste segregation, layering, and mixing for effective composting at the household level. It includes techniques for layering diverse organic waste materials, managing moisture levels, mixing for aeration, and balancing nutrient contents. The objectives are to increase awareness, optimize the composting process, and produce high-quality compost for soil enrichment.

### 6.6 Maintaining Moisture Content:

This project focuses on developing strategies to maintain optimal moisture levels in household waste composters. It involves implementing monitoring mechanisms, selecting appropriate tools, and providing guidance on adjusting moisture levels. The goal is to ensure efficient decomposition and high-quality compost production by preventing both dryness and excessive moisture.

### 6.7 Turning of Semi Compost Waste:

This project aims to develop guidelines and techniques for turning semi compost waste in household composters. It involves determining optimal turning frequency, developing turning techniques, recommending tools, and integrating moisture management. The objective is to promote further decomposition, maintain aerobic conditions, and produce fully matured compost for soil enrichment.

Effective turning of semi compost waste in household composters supports sustainable waste management, environmental conservation, and production of valuable compost for soil enrichment.

### 6.8 Obtaining Pre-Compost:

This project focuses on developing a method for obtaining precompost from household waste composters. It involves monitoring composting progress, determining maturity indicators, harvesting techniques, and optimizing maturation processes. The goal is to ensure that the precompost is properly aged and suitable for further composting or soil application, promoting efficient waste management and soil enrichment.

### 6.9 Shredding of Compost:

This project aims to develop a method for shredding compost obtained from household waste composters to improve its texture and quality for gardening or soil amendment. It involves assessing compost texture, determining desired particle size, developing shredding techniques, recommending equipment, and conducting quality assessments. The objective is to increase awareness about optimizing compost texture and usability for efficient gardening and soil enrichment.

The successful shredding of compost obtained from a waste composter at the household level will enhance the usability and effectiveness.

### 6.10 Final Compost for Utilization:

The aim is to create a method for crushing household waste in order to improve its texture and quality fo r use in gardening or land development. It includes evaluating components, determining the required size , developing the connection process, certifying equipment and performing quality tests. The aim is to im

prove knowledge of the quality of good hay for good agriculture and soil enrichment.

Proper crushing of the compost obtained from domestic waste compost machines will increase its useful ness and efficiency.

The effective utilization of household-level compost contributes to sustainable waste management, environmental conservation, and healthy soil ecosystems. By empowering households to participate in composting initiatives and use compost for gardening and agriculture, it fosters a greener, more sustainable environment.

**Final Compost for Utilization**

## 7. Conclusion:

In conclusion, the design of a wet waste composter and the management of wet waste at the household level present significant opportunities for promoting environmental sustainability and reducing the burden on landfills. Through careful consideration of the problem statement components outlined earlier, innovative and practical solutions can be developed to address the challenges associated with wet waste management.

Sustainability: The importance of designing composters and waste management systems that prioritize sustainability by minimizing environmental impact, conserving resources, and promoting circular economy principles.

User-Centric Approach: Acknowledging the importance of engaging and educating users to ensure the successful adoption and long-term viability of the wet waste management solutions, emphasizing user-friendly design, educational initiatives, and community participation.

Innovation: Highlighting the role of innovation in overcoming challenges such as space constraints, odour control, and vermin attraction, by leveraging technologies, modular design, and creative approaches to enhance efficiency and effectiveness.

Evaluation and Monitoring: Emphasizing the need for ongoing evaluation and monitoring to assess the performance of the composting systems, gather user feedback, and make iterative improvements to optimize functionality and user satisfaction.

Collaboration and Partnerships: Encouraging collaboration among stakeholders including households, local governments, NGOs, and private sector entities to leverage collective expertise, resources, and networks in implementing and scaling up wet waste management initiatives.

Impact: Recognizing the potential positive impact of effective wet waste management on public health, environmental quality, and community resilience, while also acknowledging the broader significance in advancing global sustainability goals.

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