IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Pedal Powered Compost Shredder

Aryan G. Bhagat, Utkarsh A. Late, Satish B. kachave, Omkar Alte, Prof. Tushar S. Ghatge,Prof.Ramchandra B.Chavan

Department of Mechanical engineering, Shri.Shivaji Polytechnic institute Parbhani

Abstract

The pedal powered compost shredder is a sustainable and cost-effective machine designed for organic waste management, especially in rural and urban garden environments. It operates without the need for electricity or fuel, relying on human power to shred biodegradable waste into smaller pieces to accelerate composting. This paper explores the design, applications, advantages, and limitations of this eco-friendly machine while highlighting its relevance in promoting green technology and reducing carbon emissions.

- **KeyWords:** Sustainability, Composting, Waste Management, Pedal Power, Shredder,Eco-friendly Technology, Ergonomics, Organic Waste,

1. Introduction

Composting is a natural process that transforms organic waste into nutrient-rich fertilizer. One major challenge in composting is the slow decomposition of large waste materials. Shredding the waste significantly speeds up this process. The Pedal Powered Compost Shredder offers a practical and green solution, especially in areas with limited electricity. By utilizing human pedaling effort, this machine efficiently reduces the size of organic materials, making the composting process faster and more effective.

2. Types of Compost Shredders

Compost shredders are generally classified into the following types:

1. **Electric Shredders:**
   Operate using electric motors, suitable for urban areas.

2. **Fuel-based Shredders:**
   Use petrol/diesel, ideal for large-scale composting but not eco-friendly.

3. **Manual Hand-cutters:**
   Labor-intensive and less efficient.

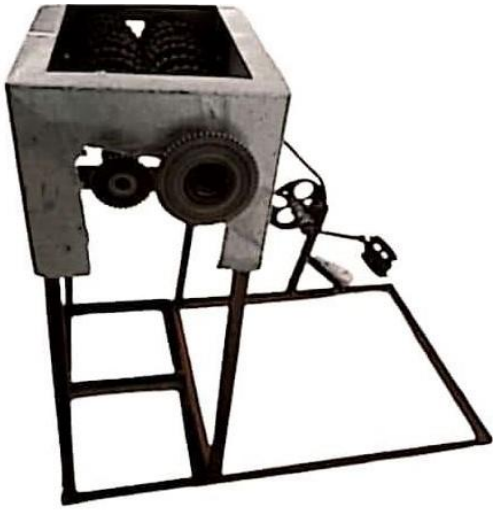
4. **Pedal Powered Shredders:** Human-powered, cost-effective, and environment-friendly, suitable for small to medium-scale composting.

3.Applications

Pedal Powered Compost Shredders are useful in:

- Organic farming
- Community composting projects
- Rural households
- Municipal solid waste management
- School and college eco-clubs

4. Design of pedal powered compost shredder machine



-

- **Components:**

1. Frame
2. Pedal Mechanism
3. Chain and Sprocket
4. Shredding Chamber
5. Cutting Blades
6. Hopper
7. Output Tray

- **Specifications:**

1.Frame

Mild Steel (MS) square pipe welded structure for stability.

2.Pedal Mechanism

Bicycle crank system to rotate blades manually.

3.Chain & Sprocket

Transfers motion from pedal to blade shaft.

4.Blades

High-carbon steel for durability and sharpness.

5.Hopper

MS sheet, directs waste into shredding area.

6.Output Tray

Collects shredded compostable material.

5. Advantages of pedal powered compost shredder

- Electricity-free operation
- Low maintenance
- Promotes physical activity
- Portable and easy to operate
- Eco-friendly and promotes sustainable practices
- Affordable for rural and semi-urban users

6. Limitations of pedal powered compost shredder

- Labour intensive
- Limited throughput compared to electric models
- Not suitable for large-scale composting
- Blade sharpening required over time
- Efficiency depends on operator strength

7.Technological Advancements and Future Trends

Modern improvements in pedal-powered shredders include:

- **Ergonomic Design:**

Comfortable seating and pedal positioning.

- **Adjustable Blade Settings:**

For different waste types and sizes.

- **Hybrid Models:**

Incorporating small solar motors for dual operation.

- **Safety Enhancements:**

Blade guards, emergency stops, and enclosed chambers.

- **Modular Design:**

Easy to dismantle, repair, or upgrade components.

8. Result

The Pedal Powered Compost Shredder effectively reduces biodegradable waste size, thereby enhancing the composting process. It has proven efficient in small-scale and community-based composting efforts, offering a green and affordable alternative to conventional shredders.

9. Conclusion

The Pedal Powered Compost Shredder is a viable solution for sustainable waste management. Its affordability, simplicity, and eco-friendly design make it suitable for diverse users. While it has limitations in terms of capacity and manual effort, the benefits in promoting green practices and supporting local composting initiatives outweigh the drawbacks.

- **References**

1. Smith, J., & Patel, R. (2021). Sustainable Waste Management Practices. Journal of Environmental Technologies, 14(3), 120-128.

2. Kumar, M., & Thomas, D. (2020). Design and Development of Eco-Friendly Machines. International Journal of Green Tech, 8(1), 45-52.

3. Rao, P. (2019). Pedal Power: A Renewable Energy Approach. Energy and Innovation Review, 6(2), 99-104.

4. Sharma, R., & Deshmukh, P. (2022). Role of Shredding in Composting Efficiency. Agro-Engineering Journal, 10(4), 233-240.