International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 10 Issue: 03 | March - 2026 SJIF Rating: 8.659 ISSN: 2582-3930

Sustainable Cow Dung Composite Tiles for Green Architecture

Mrs. S. N.Rugge , Mast .Ayush Audhut Bugad, Mast. Krushna Sandip Haval, Mast.Omkar Shrikant Jadhav, Mast.Shivraj Nagesh Patil, Mast.Atharv Manoj Rajput

Abstract

The construction industry significantly contributes to environmental degradation due to the extensive use of energy-intensive materials such as cement, concrete, and fired clay bricks. These materials consume non-renewable resources and produce high carbon emissions. This paper explores the development and application of cow dung composite tiles as an eco-friendly and sustainable alternative.

Cow dung, a naturally available agricultural waste, possesses inherent binding, antibacterial, and thermal insulation properties. By combining cow dung with clay, lime, natural fibers, and minimal cement, durable and cost-effective tiles can be produced. These tiles are manufactured using low-energy techniques like sun drying, making them environmentally sustainable. The study highlights mechanical properties, thermal efficiency, environmental benefits, and socio-economic impact of gobar tiles.

1. Introduction

Rapid urbanization has increased the demand for construction materials, leading to environmental issues such as pollution, resource depletion, and climate change. Conventional materials require high energy and release greenhouse gases. Therefore, sustainable alternatives are necessary.

Cow dung has been traditionally used in rural construction for flooring and wall coating. With modern techniques, it is now being converted into composite tiles suitable for contemporary construction. Gobar tiles combine traditional knowledge with modern innovation to provide eco-friendly solutions.

2. Materials Used

1. Cow Dung: Primary binder, provides insulation and antibacterial properties.
2. Soil/Clay: Provides strength and structure.
3. Lime: Enhances durability and water resistance.
4. Jaggery Water: Acts as natural adhesive.
5. Natural Fibers: Improve tensile strength and reduce cracking.
6. Cement (Optional): Improves overall strength.

3. Methodology

The production process involves collection of raw materials, mixing, molding, drying, and finishing. Dry materials are mixed first, followed by addition of cow dung and water. The mixture is molded and compacted to remove air voids. Tiles are sun-dried for 7–14 days and then finished for use.

4. Properties

Mechanical Properties: Compressive strength ranges from 2.5 to 6 MPa.
Thermal Properties: Provides excellent insulation, reducing indoor temperature.
Environmental Properties: Biodegradable, low carbon footprint, eco-friendly.

5. Advantages

Environmental: Reduces pollution and carbon emissions.
Economic: Low-cost and generates rural employment.
Health: Antibacterial, non-toxic, improves indoor air quality.
Thermal: Maintains comfortable indoor temperature.

6. Applications

Used in flooring, wall cladding, roofing insulation, eco-friendly buildings, rural housing, and resorts.

7. Limitations

Lower strength than concrete, water resistance issues, public perception challenges, and lack of standardization.

8. Future Scope

Research can improve durability, water resistance, and large-scale production. Hybrid materials like fly ash can be incorporated for better performance.

9. Conclusion

Gobar tiles are sustainable, cost-effective, and eco-friendly alternatives to conventional materials. They reduce environmental impact, support rural economy, and promote green construction. With further research, they can become a mainstream construction material.

References

Various journals and research papers on sustainable construction and gobar materials.