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

Eco Friendly Utilizations of Cow Dung for Making Bricks

Mr. Nishchay R. More[1], Rajkumar Gopnar[2], Aryan Ambekar[3], Athrav Kamble[4], Aditya Modak[5]

[1]*Civil Department, Jayawantrao Sawant Polytchnic, Pune*
[2]*Civil Department, Jayawantrao Sawant Polytchnic, Pune*
[3]*Civil Department, Jayawantrao Sawant Polytchnic, Pune*
[4]*Civil Department, Jayawantrao Sawant Polytchnic, Pune*
[5]Civil Department, Jayawantrao Sawant Polytchnic, Pune

Abstract - This study focuses on making eco-bricks using cow dung as an environment-friendly alternative to traditional bricks. Nowadays, the demand for affordable housing is increasing, and the cost of conventional building materials is also rising. Therefore, it is important to find sustainable and low-cost construction methods. Bricks are one of the most basic materials used in construction. Usually, bricks are made from clay, and they can be either sun-dried or burnt in a kiln. Sun-dried bricks are cheaper and easier to produce, especially in rural areas. In this research, cow dung is used as a natural material mixed with clay to improve the strength and durability of sun-dried bricks. Cow dung contains natural fibres that help the bricks become stronger and reduce cracks after drying. The study mainly focuses on making bricks suitable for low-cost housing, especially in areas near Nagpur, where local materials are easily available. Clay has good properties such as easy shaping when wet and maintaining its shape after drying. By mixing clay with sand, silt, water, and cow dung, eco-friendly bricks can be produced which require less energy and cause less environmental pollution. The study also examines the use of other binding materials like lime, cement, and agricultural waste to further improve the quality, strength, and durability of eco-bricks. These materials help in making construction more sustainable, economical, and environmentally safe.

Key Words: Cow dung bricks, Low-cost Building, Sustainable construction, Rural construction, Green building materials

1.INTRODUCTION

Due to the high cost of building materials and the growing demand for low-cost housing, there is a need to use sustainable and economical construction methods. Clay bricks have been used in construction since 4300 BC and are still one of the most common building materials today. Bricks can be made by sun-drying or burning in a kiln, but kiln burning requires more energy, cost, and effort. Sun-dried clay bricks are cheaper, but they sometimes have lower strength and durability. To improve their properties, fibrous materials can be added. Fibres help in reducing cracks and increasing strength of the bricks. In this study, cow dung is used as a natural fibrous material to improve the quality and performance of clay bricks. Cow dung is easily available in rural areas and is environmentally friendly.

The study focuses on preparing improved clay bricks suitable for low-cost housing, especially in communities around Nagpur. Brick-making usually uses soil available at or near the construction site, which reduces transportation cost. Adding natural fibres like cow dung helps to stabilize the bricks and improve their durability. The main aim of this research is to develop energy-saving, eco-friendly, and sustainable construction techniques. Natural materials like earth (soil) can be used as alternatives to conventional building materials. Industrial waste materials such as blast furnace slag and pulverized fuel ash (fly ash) can also help in saving energy during the production of cement and lightweight construction materials. Overall, this research promotes the use of locally available, low-cost, and environment-friendly materials to support sustainable construction and affordable housing.

Aim:-To produce and analyze eco-friendly bricks made from cow dung for sustainable construction.

Objective:-

1. To reuse waste material
2. To produce environment-friendly bricks by replacing a portion of natural clay with cow dung
3. To examine how different proportions of cow dung affect the physical and strength properties of bricks

4. To study the environmental advantages and cost effectiveness of cow dung bricks in comparison with traditional clay bricks.
5. To provide practical suggestions for using these sustainable bricks on a larger scale, especially in rural and semi-urban areas for affordable housing.

2. REVIEW OF LITERATURE

J Prnomo et.al (2019) experimented to think about the changes on compressive strength of concrete and the setting time of concrete in which they used citric acid as a retarder with different percentage like 0%, 0.15%, 0.3%, 0.45% according to weight of cement and the results show that citric acid extend the hardening of concrete and increase workability of concrete. The maximum value of compressive strength as found in sample added with 0.15% citric acid with increase compressive strength up to 82.2% as compared to normal concrete.

Mohammad Ibrar et.al (2021) used cow dung logs for cremation in place of wooden logs to avoid air pollution. For making cow dung logs they made two types of machines first for creating logs and second for drying logs. Drying machine can dry 500 kg of dung and the weight of one log is up to 1 kg. Cow dung logs are mixture of cow dung, sugar cane bagasse and wood shavings. These logs can create 900oC heat around. According to them 13% CO emission and 7% NO gas are reduced by using this cow dung logs. Pius Rodeny Fernando et.al (2019) created fire clay bricks with different percentage of cow dung ash like 0%, 5%, 10%, 15% and 20% by total weight of mixture and traditional dimension of brick is taken 18.5*8.5*6.5 cm3. This fire bricks are made of clay with partially constituted of cow dung ash and are low cost and durable. In this bricks are well mixed with suitable amount of water and then allowed to dry in sunlight for 2 days. Then bricks are fired in traditional kiln. Now the physical properties of bricks were tested with standard specification. Result shows that the average density of fire clay bricks was 1447 kg/m3, water absorption capability was 17%, compressive strength was 150 kg/cm2 and the flexural strength was 0.82 kg/cm2. This result was for 10% cow dung ash mixed clay brick.

Tara Radvand et.al (2020) analyzed the guar gum effect on concrete as an ecofriendly additive which enhances the mechanical properties of concrete like compressive and tensile strength when cement is removed by guar gum up to 0.8%. Slump test is carried out for fresh mortar and compressive and tensile strength were seen for fifteen different mixture designs with two different curing times. Scanning electron microscope (SEM) was used to see the bonding between guar gum and aggregates. Increase in water cement ratio has been noticed. Result shows the increase in mechanical properties of concrete as shown in SEM results which is due to formation of guar gum strings.

3. METHODOLOGY

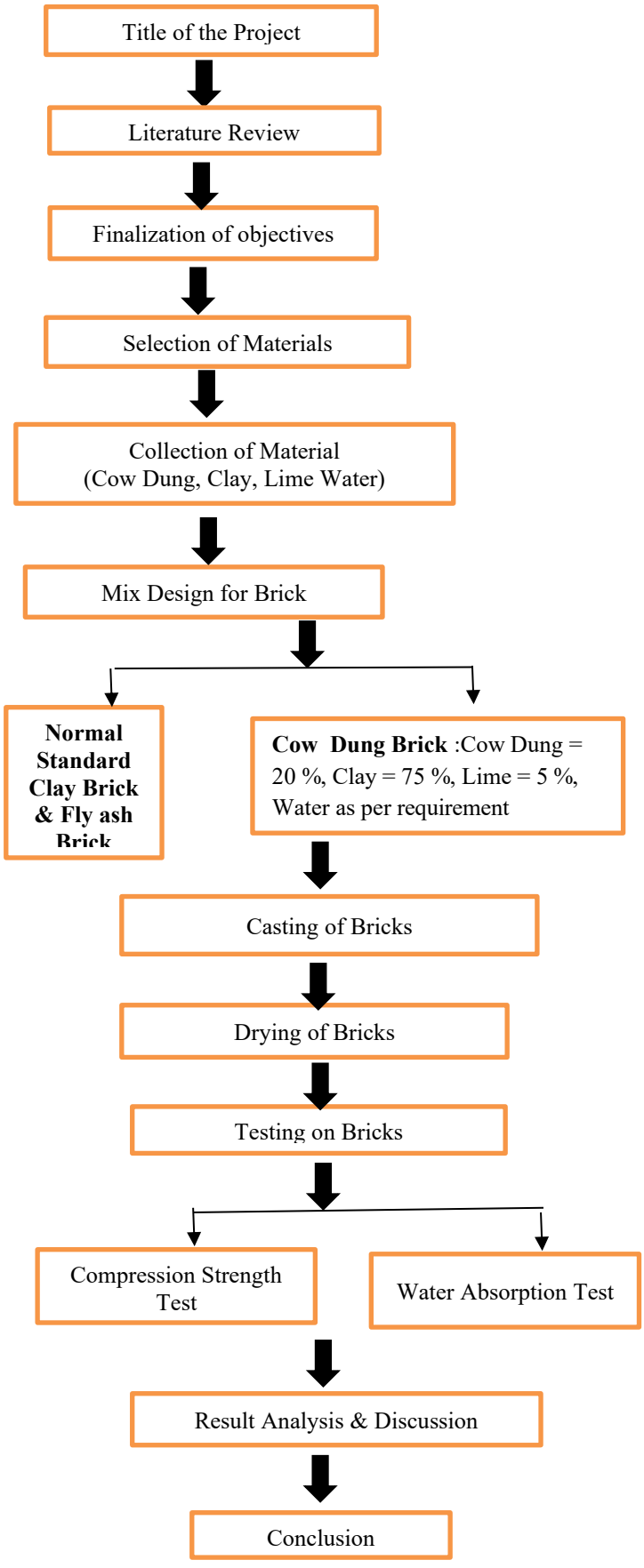

Fig 1: Methodology of Cow Dung Brick

Preparation of Clay:

Pure clay is selected for brick preparation. The topsoil layer, approximately 200 mm deep, is discarded to eliminate potential impurities. Once the top layer is removed, clay is excavated from the ground and evenly spread over a flat surface. Any visible impurities such as stones, plant materials, or other debris are manually removed. Large clay lumps are broken down by hand. The cleaned clay is then left exposed to the atmosphere for natural softening, with a weathering period of approximately four weeks.

Fig 2: Clay Preparation

Mixing:

In this study, only hand mixing is applied to combine the materials. Clay is mixed with cow dung and lime in varying proportions, with lime content maintained consistently at 5%. Both cow dung and lime are added as supplementary materials beyond the base clay composition.

Fig 3: Mixing

Drying:

After moulding, the bricks are subjected to a drying process to prevent the formation of cracks. They are arranged in stacks with adequate spacing to ensure proper air circulation between them. The bricks are then placed under a sunshade and allowed to dry for a period of three days. This drying process helps improve their rigidity and further minimizes the risk of cracking.

Fig 4: Drying of Bricks

4. TESTING

In this experimental study, 15 samples of cow dung bricks were prepared with standard brick dimensions of 220 × 105 × 75 mm**.** For comparison, 15 samples of commercially available red bricks of the same size were also tested. Both types of bricks were examined to determine their compressive strength and water absorption capacity**.**

A) Compressive Strength Test

For the compressive strength test, three bricks from each group without visible cracks or defects were selected. The dimensions of each brick were measured carefully. The bricks were then placed in **a** compression testing machine (CTM), where the load was applied slowly and continuously until the brick broke. The maximum load carried by the brick at the time of failure was noted. The compressive strength was calculated by dividing the failure load by the cross-sectional area of the brick.

Fig 5: Compression Test on Cow Dung Brick

B) Water Absorption Test

The water absorption test is carried out to find how much water a brick can absorb. First, the brick is dried properly and its initial dry weight is measured. Then, the brick is immersed in clean water for 24 hours. After soaking, the brick is taken out, wiped gently to remove surface water,

and weighed again. The difference between wet weight and dry weight indicates the amount of water absorbed by the brick. The result is expressed as a percentage of the dry weight. Generally, the acceptable water absorption limit for good quality bricks is not more than 20%.

Fig 6: Water Absorption Test on Bricks

5. RESULT AND DISCUSSION

Following results were obtained after testing.

A) Compressive Strength Test

Compressive strength in (N/mm^2)			
Sample	**Cow dung bricks**	**Red bricks**	**Fly Ash Brick**
Sample 1	13.45	10.54	11.82
Sample 2	14.92	8.87	12.24
Sample 3	12.64	9.12	12.56
Average	13.67	9.51	12.20

Table -1: Compression Strength Test Result

The average compressive strength of cow dung brick is 13.67 N/mm^2 & the the average compressive strength of red brick & Fly ash brick are 9.51 N/mm^2 & 12.20 N/mm^2.

B) Water Absorption Test

Table -2: Water Absorption Test Result

Water absorption in %			
Sample	**Cow dung bricks**	**Red bricks**	**Fly Ash Brick**
Sample 1	18.96	21.67	22.37
Sample 2	17.55	22.78	22.83
Sample 3	18.29	20.98	21.14
Average	18.26	21.81	22.11

The average water absorption test of cow dung brick is 18.26% & the average water absorption test for red bricks & fly ash bricks are 21.81% & 22.11%.

6. CONCLUSIONS

Cow dung bricks show greater compressive strength when compared to conventional red bricks. The improved strength is mainly due to the fibrous and layered structure formed by natural fibres and partially digested materials present in cow dung. These fibres help in reducing sudden breakage and provide a certain level of flexibility, allowing the bricks to perform better under load than ordinary red bricks.

Another advantage of cow dung bricks is that they are lighter in weight than traditional red bricks. Due to their lower weight, they can be beneficial for construction in earthquake-prone areas, as lighter materials reduce the load acting on the structure.

Cow dung bricks also show lower water absorption, which indicates that they contain fewer pores or voids inside. This may be because of the compact layered structure formed during brick preparation. Reduced water absorption improves durability and helps in maintaining the strength of bricks over time.

In addition, cow dung bricks perform satisfactorily in rainy or humid conditions. The change in size due to moisture absorption and drying is very small and is almost similar to conventional red bricks. Because of this, these bricks can maintain good stability and performance even when weather conditions change.

REFERENCES

1. Tara R advand and Vahab Toufigh (2020) European Journal of Environmental and Civil Engineering“Properties of concrete containing guar gum”
2. J Prnomo, S Sumarni, I N Saputro (2019)-effect of citric acid on setting time and compressive strength of concrete
3. Pius Rodeny Fernando, Somasundaram Krishanth, Nilantha Bandara Rathnayaka, (2019) Manufacturing, Physical and Chemical Characterization of Fire Clay Brick Value Added with Cow Dung Ash.
4. Hou, X. et al. (2020). "Development and Study of Cow Dung Bricks." International Journal of Scientific Research in Engineering and Development, 7(4), 55-62.
5. Sanjay, K. & Pardeep, K. (2023). "Analysis of Cow Dung Brick and Compare with Other Bricks." International Journal of Scientific Research in Development, 11(11), 59-65.

6. Adekanmi, S.J., Popoola, O.O. & Afolabi, S.M. (2016). "Short-term Investigation to the Effectiveness of Cow Dung Powder on Lime Stabilised Tropical Soil in Road Construction." Nigerian Journal of Technology, 35(2), 345-352.
7. Ganesan, K. et al. (2024). "Utilization of Cow Dung as a Partial Replacement for Clay in Brick Manufacturing." International Journal of Research and Analytical Reviews, 11(2), 1533-1540.
8. Venkatesh, M. & Reddy, P. (2025). "Development and Study of Cow Dung Bricks." Zenodo Repository.