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AN EXPERIMENTAL INVESTIGATION ON SUITABILITY OF COW WASTE IN CONSTRUCTION MATERIAL.

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Abstract - In this study how we can use cow wastage as a building material is specified. Study said that it is right time to give best option to conventional Cement and Brick in building construction. It is useful to the society. Due to the urbanization most of the building and road construction are made of conventional cement and brick, while making cement and brick co_2 emission percentage is high and it cause damage to the environment and it is our duty to save our mother earth from the greenhouse gases and gave proper option to the society. In this study we studied about cow dung plaster as well as cow dung brick. Cow dung is eco-friendly material in which potassium, magnesium and phosphorus like rich minerals are found in it and which are act as a good binder material according to the study. According to study cow dung is anti-thermal and anti-radioactive. Which helps to reduce the harmful radiations. The fibers present in the cow dung also helps for binding. In this study how bricks and plaster is made from cow dung is studied. The main objective of the study is to save environment from greenhouse gases. And reduce the sale percentage of cow as well as bull. And join them directly to the economy.

Index Terms: **- Cow Dung, Cow Urine, Gypsum, Lime.**

I. INTRODUCTION

The forts which are built in ancient period by our Maharaja are found in good condition because the materials and the techniques which were used at that time are superior. The material which is used in ancient time are much stronger than the today's construction material. There are many alternative traditional materials which can be used in place of the modern materials. Cow dung, gypsum and lime are the materials use in the ancient time to build the fort or houses. Because these materials are used to decrease the conduction of heat and also, they are waterproof. In Indian villages the paste of the white soil and the cow dung is applied on the floor and wall for thermal insulation purpose. The ingredients use for making cow dung plaster are gypsum, cow dung powder, white soil and last but on least citric acid and for cow dung brick are cow dung, lime, cow urine and last white soil. In this study we know about what is cow dung plaster and cow dung brick and its advantages.

Today we are live in house which is made up of the concrete which is not totally heat proof and also good conductor of heat. In north India there is 8 months of the summer season and 4 months of the winter season. Our human body can live up to 25^0c temperature. In summer season temperature is rises up to 40 to 45^0c and to protect our self we use appliances like cooler AC for reducing the temperature of the room. And in winter season concrete house temperature fall down which required heating of room. Cow dung plaster has lower density and thermal conductivity due to this it confesses cool temperature in summer season and hot temperature in winter season. That why cow dung plaster can save 24% of operational energy as compared to conventional cement plaster. It reduces up to 7 to 10^0 C temperature of the room. One of the greatest advantages of the plaster and brick that there is no need to curing the plaster as well as brick due to these there is no need to pump the water therefore it can save electricity. Cow dung bricks are 100% sun dried due to this fuel consumption is not there. Cow dung plaster we can also apply to floor in o5ur homes. In our homes on floor, we lie tiles and these tiles are very harmful to us in the winter season. In winter season due to low temperature the temperature of the tiles is fall down and when we walk on tiles there may be chances of the "Arthritis disease". To over such problems this study suggests us to use cow dung plaster as well as cow dung brick for our good.

II. MATERIALS AND METHODOLOGY

2.1Cow Dung Plaster

2.1.1 Materials use in cow dung Plaster: -

- Cow dung
- Gypsum
- Citric acid
- Gawargum Powder
- White soil

1.Cow dung: -
Cow dung is waste resource that comes from cows which can be define as undigested residue of consumed food that is excreted by cows (K. R. Gupta). In cow dung rich minerals like potassium, magnesium, phosphorous are present and which are act as a good binder. Fibres present in the cow dung which are even in size protect the plaster from the cracking. According to the Berman Science the mixture of the cow dung, white soil and water released Hormone known as the Serotonin hormone which is also called as Happy hormone and creates positive energy in the environment.

2.Gypsum & Citric Acid: -
Cow dung plaster in which gypsum is used with some additives. We all know the cost of the cow dung and the gypsum is very less and also bad conductor of heat. Gypsum has been used in Pyramid and ancient churches. Gypsum based structure has life in thousands of years. For formation of the cow dung plaster gypsum plays an important role because it is sound proof, heat proof, fire proof and protects from harmful radiations. Citric acid and gypsum provide strength to the plaster.

3.Gawargum powder: -
Gawargum powder is provide smoothness to the plaster.

4.White soil: -
It is a type of soil which is very soft in nature. And helps to decrease heat conduction.

2.1.2 Methodology of cow dung plaster: -

1.The method of making plaster is very simple just mixed the above noted ingredients in proper proportion.
2.Mixed them in proper manner.
3.Add required amount of water and mixed the paste with the help of mixing machine.
4.After that with the help of putting plate apply it over the wall. (8mm coat)
5.After 3 to 4 hours apply one more coat of 2 to 4 mm for finishing purpose.

6.Leave the wall for drying.

2.1.3 Testing on plaster: -

Compression Test

Objectives: -

- To conduct compression test on a specimen using a compressive testing machine to determine ultimate compressive strength of the material.
- To determine batch quality.
- To aid in the design process.
- To reduce material costs.
- To achieve lean manufacturing goals.

Fig 2.1 Sample for compaction testing

Result of compression test: -

a) After 7 days – 18 N/mm².
b) After 28 days – 22 N/mm².

2.2 Cow Dung Brick

2.2.1 Materials used in the cow dung brick: -

- Cow dung
- Lime
- Cow urine

1.Cow dung: -

Cow dung is waste resource that comes from cows which can be define as undigested residue of consumed food that is excreted by cows (K. R. Gupta). In cow dung rich minerals like potassium, magnesium, phosphorous are present and which are act as a good binder. Fibres present in the cow dung which are even in size protect the plaster from the cracking. According to the Berman Science the mixture of the cow dung, white soil and water released Hormone known as the Serotonin hormone which is also called as Happy hormone and creates positive energy in the environment.

2.Lime: -

Lime is added for increase the strength of the brick and for binding purpose.

3.Cow urine: -

Cow urine is also used as an additive in brick for its anti-fungal property. It is added for that cow dung worm should not form on it.

2.2.2 Methodology of cow dung brick: -

1.Take the mixture of cow dung, cow urine and lime in proper proportion.
2.Mixed it in proper way.
3.The mixture is keep covered with the help of the cotton cloth for 24 hours.
4.After 24 hours mixture is ready for the brick making then take mould and pour mixture into mould before moulding apply water to inner surface of the mould. After proper compacting remove mould.
5.Place the bricks in environment for sun drying purpose for 14 days after that we can use brick as construction material.

Fig 2.2 Cow dung brick

2.2.3 Testing on Brick

1. Compression Test

Objective

- To conduct compression test on a specimen using a compressive testing machine to determine ultimate compressive strength of the material.
- To determine batch quality.
- To aid in the design process.
- To reduce material costs.
- To achieve lean manufacturing goals.

Result Of Compression Test: - After 14 Days

Sample 1: -4.5 N/mm^2.
Sample 2: - 4 N/mm^2.
Sample 3: - 5 N/mm^2.

2. Tolerance Test: -

The dimensions of bricks when tested in accordance with shall be within the following limits per 20 bricks:

Tolerances Test: As per IS 1077:1192			
	Measurement by Length(mm)	**Measurement by Width(mm)**	**Measurement by Height(mm)**
Brick Size	225 x 100 x 75	225 x 100 x 75	225 x 100 x 75
Measurement According to Tolerance Test	225x20(Bricks)=4500	100x20(Bricks)=2000	75x20(Bricks)=1500
+/- Consideration	80	40	40
Our Measurement	4450	2010	1475
Figure			

Table 2.1 Tolerance test

3. Water Absorption Test: -

The bricks, when tested in accordance with the procedure laid down in IS 3495 (Part 2): 1992 after immersion in cold water for 24 hours, water absorption shall not be more than 20 percent by weight up to class 12'5 and 15 percent by weight for higher classes.

20% water absorption = Lower class brick
15% Water absorption = Higher class brick

Table 2.2 Water absorption % after 12 Hours

Sr. No	**Initial Weight (W_1) gm**	**Weight after 12 hours (W_2) gm**	**Water absorption %**	**1st class brick water absorption**
1	900	1058	14.93	15%
2	870	1023	15	
3	907	1069	15.2	

Table 2.3 Water absorption % after 24 Hours

Sr. No	Initial Weight (W_1) gm	Weight after 24 hours (W_2) gm	Water absorption %	2nd class brick water absorption
1	900	1114	19.21	20%
2	870	1080	19.44	
3	907	1125	19.37	

From above result we conclude that after 12 hours cow dung brick absorbs water up to 15% which is as similar to 1st class brick and after 24 hours cow dung brick absorb water in between 19 - 20% which is similar to 2nd class brick.

3.CONCLUSION

After a study we understand that cow dung can be use as construction material after adding some additive in it. Without harming the nature from cow dung, we can make building construction materials. Huge usage of cement and modern materials will not lead the future of construction to good ecology. Cow dung is most worthy materials. It is easily available in daily basis and can be used as building material. In India from ancient time cow dung use in their lives. In India cow wastage use in agriculture field, for flooring purpose and also in medical use. Cow dung is very light material. Its most important property that building material which is made from cow dung have breathy property. Its breath harmful gases and neutralised it. It is durable. Scientists have studied that the mixture of cow dung and lime gives better strength and it can replace the concrete and fly ash bricks. In Bikaner Dr. Shivdarshan Malik Sir research on the cow dung and he got big achievement in it. Shivdarshan sir made plaster named as “Vedic plaster” as well as bricks named as “Gaucrete” which is totally eco-friendly building material without harming the nature.

Cow dung can play an important role in the future of human being. In future place of cement can be replaced by cow dung after adding some additives in cow dung. To give beautiful environment condition to our next generation we have to save the cow. Save cow for future it is very beneficial to environment as well as human being.

FUTURE SCOPE

The aim is to use the product on the walls of hospitals, mental asylums, meditation room, study room and other places where people get treatment or where people have some peace, so that, they can get the real benefits of the cow dung properties. The product should be globally launched in order to curb pollution and reduce global issue. The other economies can make most out of these innovations. Further experiments are to be conducted in this direction for meeting problems with sustainable solutions.

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