

# Utilization of Cow Dung Ash as Construction Material

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**Abstract-** In 21<sup>st</sup> Century, advanced construction materials and technologies are well invented. As scarcity as well as economic scenario of traditional resources, quality of materials and its availability is less. Aiming towards economy as objective, we decide to utilize Cow dung ash as an additive. Cow dung ash is partially replaced with raw material cement. Laboratory experiments performed to study effects of additive with varying percentage by weight of cement by constant period of curing to achieve desired compressive strength. Scientifically, Cow dung is undigested residue of plant matter which is rich in minerals like Potassium, Magnesium, Sodium and Manganese. The materials present in cow dung enhance the quality and durability. Cow dung ash is eco-friendly cheaper material obtained by drying under sunshine and further burning. Partial replacement with cow dung ash by weight of cement as 5%, 10%, 15% and 20% in concrete shows remarkable results. Increase in percentage of additive in cement, compressive strength will increase. Cement was replaced by 10% of additive with increase in same percentage of cow dung ash. Best conclusion that the 10% by weight of cement can be replaced with additive as cow dung ash for manufacturing of concrete.

**Keywords – Cow dung ash, Compressive Strength, Durability, Sustainability**

## I. INTRODUCTION

It is well accepted by everyone that concrete executes outstanding responsibilities for the development of recent infrastructures and industrialization. Attempt has been made by various researchers to take care of the sturdiness, strength and stability of concrete structure while also reducing the value of production. The cement industry has one among the very best carbon footprints which make traditional concrete unsustainable within the future. Materials like cow dung Ash, Fly Ash, Slag, and Silica Fume, are often used as partial replacement for cementing material. Cow Dung Ash is obtained from cow excreta which is dried by sunlight and subjected to burning as a result, ash is obtained in black color. It bulky and features a large ash content containing a Nitrogen rich material, Potassium, Phosphorous and Calcium. Trash is essentially the rejects of herbivorous matter which is acted upon by symbiotic bacteria residing within the animal's rumen. Cow dung was habitually used in concrete to achieve particular benefits in its inclusion. As per earlier research publications, dung may improve workability and durability or may act as an additional binder. Dung available in fresh, old or wet conditions effectively utilized. Since there is no historic reference as dung being old or weathered. Well dried and fresh dung shows change in water content which affects only the amount of water when added during mixing of the concrete.

## II. LITERATURE REVIEW

Binding material of concrete, cement was replaced with Cow dung ash up to 30% and gets the experimental results such as setting time, slump test and compressive strength. As the workability decreases, cow dung ash will increase. Partial replacement of Cement about 15% can be considered for the production of strong and quality concrete.

1. P. Thej Kumar, R. Harshini Reddy and Dvs. Bhagavanulu explained in "A study on the replacement of cement in concrete by cow dung ash" that changes in strength variation may be due to the pozzolanic activity of ash. We can add upto 5% cow dung ash with cement as partial replacement. Further elaborated study is essential to find out compressive strength at greater percentage.
2. O. Y. Ojedokun, A. A. Adeniran, S. B. Raheem and S. J. Aderinto explained in "Cow dung ash as Partial Replacement of Cementing Material in the production of concrete" that results of study for the use of Cow Dung Ash as partial replacement in manufacturing of concrete. With the experimental results, effects of adding Cow Dung Ash in percentages by weight (10%, 20% and 30%) of cement and cure for the periods of 7, 14 and 28, days respectively to achieve desired Compressive strength.
3. S. Barathanand and B. Gobinath explained in "Evaluation of Wood Ash in partial replacement of cement" that compressive strength of cement will increase with respect to hydration time. The compressive strength of 20% wooden ash shows more strength at 28 days than the OPC sample. Requirement of water will increase with increase in amount of wooden ash. Almost 20% wooden ash sample shows higher degree of hydration and compressive strength than OPC.
4. V. S. R. Pavan Kumar, Rayaprolu, P. Polu Raju explained in "Incorporation of Cow dung Ash to Mortar and Concrete" results shows that study of cow dung ash will be a supplementary cementing material in mortar and concrete. To get sustainable development, utilization of waste materials to make sustainable concrete and mortar for constructing the green buildings in future is most necessary.

## III. METHODOLOGY

The application of additive binder material named as cow dung ash to cement in various percentages is to be done by replacing 0%, 5%, 10%, 15% and 20% individually for achieving objectives. Constructions materials like fly ash and additive material like cow dung ash were used for preparing concrete cubes by partially replacing different amount of cement percentage. The cow dung ash was collected from cow shed, Lonavala, Pune, Maharashtra. Cow dung ash is a good binding material reducing voids in concrete. This study was planned to find out the compressive strength of concrete by partial replacement of cement with cow dung ash. Partial replacement of cement at various percentages was used in this investigation to observe the effects of different cow dung ash percentage in cement to find compressive strength of concrete at various ages of curing.

Physical properties of Cow Dung Ash:

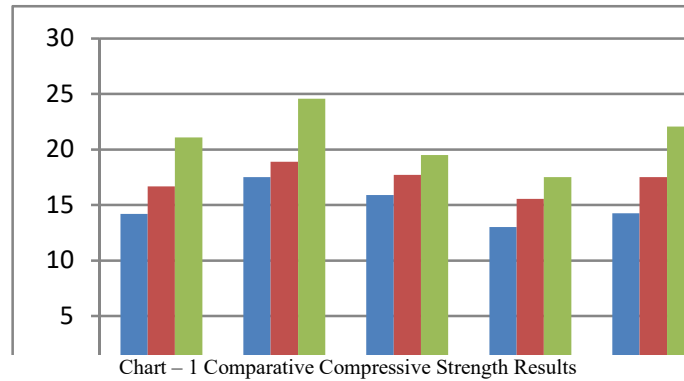
- It is Bulky.
- It has large ash content.
- It has low volatile content after burning.
- Carbon content and Burning Ratio is low.

## IV. EXPERIMENTAL RESULTS

Laboratory test results of Compressive strength test for modified concrete cubes show a measure of its ability to resist static load. Testing carried out to calculate 7, 14 and 28 days compressive strength on three specimens having size 150x150x150 mm and the average strength was taken as the cube compressive strength of concrete.

Table – 1 Compressive Strength Test Result

Sr. No.	Mix (%)	Average Compressive Strength (N/mm <sup>2</sup> )		
		7 days	14 days	28 days
1	0	14.24	17.52	22.07
2	5	14.20	16.68	21.08
3	10	17.50	18.88	24.56
4	15	15.89	17.72	19.50
5	20	13.00	15.56	17.50



## V. CONCLUSION

Laboratory Test results for strength of concrete shows enhancement in concrete properties due to the partial replacement of cow dung ash with cement. Cement was partially replaced with four percentages (5%, 10%, 15%, and 20%) of cow dung ash by weight. Test specimens are tested after curing period of 7, 14 and 28 days curing respectively. The compressive strength is increased when the cement was replaced by 10% with cow dung ash and decreased with increase in further addition of cow dung ash. Hence, it is concluded that the 10% cement can be partially replaced with cow dung ash for manufacturing of Concrete. Based on test results we conclude the partial replacement of cement with 10% of cow dung ash increase the compressive strength of the concrete than that of conventional concrete. Modified concrete will shows sustainable approach in construction sector.

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