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"Strength Inference Of Quaternary Concrete By Sugarcane Bagasse Ash, Copper Slag And Hatchery Waste"

1) Sumitkumar Ukey,
2) Pratik Darwade,
3) Swapnil Sapate,
4) Durgesh Wadhai.
5) Dr. Akola Udaykumar (Guide)
6) Vivek Nandgavkar (Co-Guide)
7) Parag Koche (HOD)
B-Tech Department of Civil Engineering,
Madhukarrao Pandav College of Engineering Bhandara

ABSTRACT –

This paper focuses on the Strength inference of concrete along with the durability study with sugarcane bagasse ash, Copper Slag and Hatchery Waste as an alternate material testing of ingredients of concrete such as cement fine aggregate, coarse aggregate aggregate and eggshell powder, Sugarcane Bagasse Ash and copper slag. Concrete cubes with various trail.

KEYWORDS: Introduction, Materials, Methodology, Strength, Conclusion, Reference.

1. INTRODUCATION: -

1.1 SUGARCANE BAGASSE ASH

Sugarcane bagasse ash (SCBA) is used as a pozzolanic material in concrete. It has good blending in cement and partial replacement of sugarcane bagasse ash in cement it gives same strength in concrete. In order to effectively utilize sugarcane bagasse ash in concrete and prevent it from being thrown of as trash in large quantities, a thorough assessment of its pozzolanic activity is required. Looking for a renewable energy source from agriculture, sugarcane is at the top of the list. Many experimental works carried out on similar studies has been reviewed before initiating the work. The blending of other particle also along with main particles which has been successful studies nowadays (Sathawane et al 2013), (Senhadji et al 2014). Around 250 kg of bagasse is produced from 1000 kg of sugarcane. This drives us to have interest over SCBA. This study attempts in partial replace of cement in the concrete with sugarcane bagasse ash (SCBA) and the effects on concrete. The work is extended to study the flexural behaviour of the concrete.

1.2 COPPER SLAG

Slag that is quenched in water produces angular granules which are disposed of as waste or utilized.

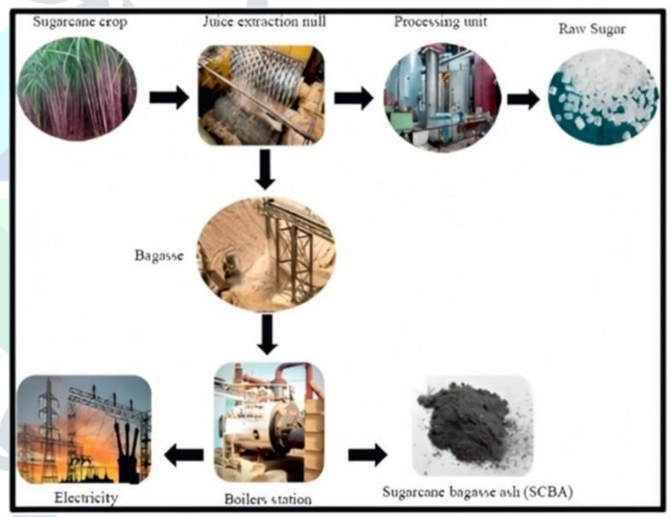
1.3 HATCHERY WASTE

Hatchery by-product meal results from the processing of poultry hatchery wastes, such as shells of hatched egg , infertile eggs, dead embryos and dead or culled chicks. It is an Effective Calcium SupplementEggshells consist of calciumcarbonate, along with small amounts of protein and other organic compounds. Calcium carbonate is the most common form of calcium in nature, making up seashells.Egg shells are agricultural throw away objects produced from chick hatcheries, bakeries, fast food restaurants etc.

2. MATERIALS: -

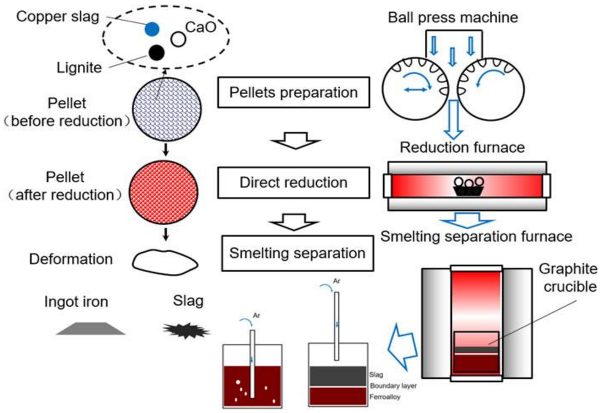
2.1 SUGARCANE BAGASSE ASH

Sugarcane bagasse was collected from several local sugar mills and the collected waste was washed with clean water to remove any unwanted contaminants. The cleaned bagasse was then equally spread and dried in sunlight to remove any moisture content. Following the grinding of the dry bagasse with a grinding machine, it was placed inside an electric furnace and heated at a temperature of 1200 °C for four hours.



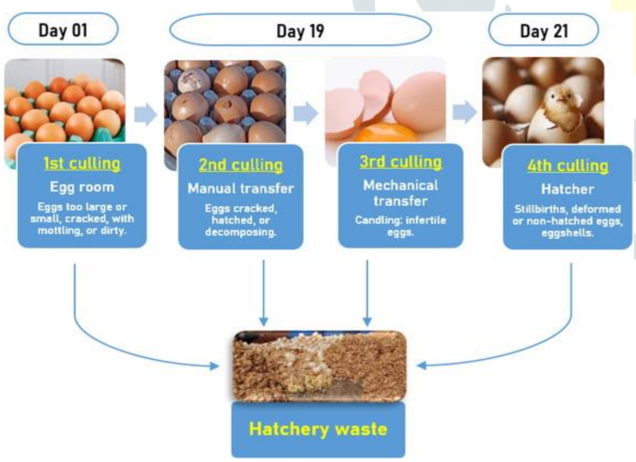
2.2 COPPER SLAG

production reaps many environmental benefits, such as waste recycling, and solves disposal problems. During smelting, impurities become slag which floats on the molten metal. Slag that is quenched in water produces angular granules which are disposed of as waste or utilized as replacement material.



2.3 HATCHERY WASTE

Ordinary Portland Cement of 53grade confirming to IS 12269- 1987 was used in this study. River sand confirming to grading zone III of Is 383-1970 was used as a fineaggregate. graded coarse aggregate passing through 20mm sieve Well according to IS 383-1970 was used. Egg shell procured from local industry. It grained and sieved to the required size before used in concrete mix. Saw dust was obtained from sawmill and saw dust ash was obtained by incineration process and sieved before used. Fly ash was collected from Salem steel Plant, Salem, Tamilnadu and sieved before used confirming to IS 3812 (part I). Micro silica was a by product of the silicon and Ferro- silicon production. Portable water was used in the investigations for both mixing and curing purposes



3. METHODOLOGY

3.1 SUGARCANE BAGASSE ASH

The prepared proportion of different mortar mixes. The replacement has been carried out as 2.5%, 5.0%, 7.5%. 10.0%. 12.5%, 15.0% and 20.0%. Mix ID has been developed accordingly.

The first mix is the control mortar mix containing 100% of ordinary Portland cement as a binder and is designated as C Similarly the mix has been done up to 20% replacement and casted accordingly. The hardened concrete studies such as compressive strength, split tensile strength, modulus of rupture along with water absorption test, UPV test and acid attack test has been performed.

3.2 COPPER SLAG

In past the specifications for concrete prescribed the proportions of cement, fine and coarse aggregates. These offer simplicity and under normal circumstances, have a margin of strength above that specified.However, due to variability of mix ingredients the nominal concrete for a given workability varies widely in strength.

3.3 HATCHERY WASTE

Determination of strength for M20 grade concrete, using Ordi- nary Portland cement (OPC) with 5% egg shell powder and increasing admixtures content as a part replacement of cement. The different proportion of admixtures (Fly ash, Micro silica, Saw dust ash) will be 0%, 10%, 20%, 30%. The different mixes are conveniently designates as C, F10, F20, F30, M10, M20, M30, S10, S20 and S30 respectively. The cubes of 150 x 150 x 150 mm size and Beam of 100 x 100 x 500 mm were tested. The concrete specimens will be tested for following strengths: i) Compressive strength for 28 days curing using standard cube specimen and ii) Flexural strength after 28 days curing using standard beam specimen.

4. STRENGTH

4.1 SUGARCANE BAGASSE ASH

Compression tests are conducted on the cube specimens. The strengths are seen during the curing period of 3 days, 7 days, and 28 days. Three specimens in each mix in each corresponding curing period have been tested under a compression testing machine. A total of 72 samples are tested. This mean value is similar within 10% variations, which is well below the standards.

The compressive strength of the SCBA blended cement composites shows good performance. It has been observed that the strength increases consistently up to 10% replacement and starts decline after 10%. This is mainly due to its micro size and crystallographic nature.

4.2 COPPER SLAG

In these the performance of the concrete is specified by the designer but the mix proportions are determined by the producer of concrete, except that the minimum cement content can be laid down. This is most rational approach to the selection of the mix proportion's with specific materials in mind processing more or less unique characteristics. The approach results in the production of concrete with the appropriate properties most economically. However, the designed mix does not serve as a guide since this does not guarantee the correct mix proportions for the prescribed performance. For the concrete with undemanding performance nominal or standard mixes may be used only for small jobs, when the 28 days strength of concrete does not exceed 30 N/mm2 .

4.3 HATCHERY WASTE

Ordinary Portland Cement of 53grade confirming to IS 12269- 1987 was used in this study. River sand confirming to grading zone III of Is 383-1970 was used as a fineaggregateEgg shell procured from local industry. It grained and sieved to the required size before used in concrete mix. Saw dust was obtained from sawmill and saw dust ash was obtained by incineration process and sieved before used. Fly ash was collected from Salem steel Plant, Salem, Tamilnadu and sieved before used confirming to IS 3812 (part I). Micro silica was a by product of the silicon and Ferro- silicon production.

5. CONCLUSION

(a) The atoms are arranged in crystallographic structure which can be seen from XRD analysis.

(b) UPV test shows almost all concrete is in good and

(c) The energy absorption has also improved by 20% which is also a significant contribution. The energy ductility factor denotes the plastic toughness of the beams has been improved by 39%.

nature. The replacement of 10% SCBA results in overall better performance. The tests

5.2 COPPER SLAG

Compared to the normal mix, there was a slight increase in the concrete density of nearly 5% with the increase of copper slag content. replacement or reuse of it can be done in several manner. Based upon the results obtained it was concluded that 10 percent of copper slag can be used as replacement of fine aggregates. Results can indicates that the use of copper slag(CS) in construction industries is presented as an alternative not only for improving the quality of mortars, but also for mitigation of the adverse effects of copper mining in the environmental and reducing the shortage of aggregates that exists while construction. Due to the physical and mechanical properties, of copper slag it has various reuse applications. Reuse of copper slag has the dual benefit of safe disposal and in construction resource management. Application in concrete as an admixture, replacement of cement and as a fine aggregate has very good scope.

5.3 HATCHERY WASTE

Egg shell powder obtained from industrial wastes is added in various ratios for cement replacement and it was found that replacement of 5% Egg shell powder + 20 % Microsilica can be added without any reduction in compressive strength proper- ties of conventional cement. And replacement of 5% Egg shell powder + 10% Microsilica replacement in cement yields simi- lar flexural strength as in conventional concrete. And replace- ment of 5% Egg shell powder + 10% Microsilica replacement in cement yields higher SplitTensile strength as compared to other compositions.

7. REFERENCE

1. Madhavi T.Ch. International Journal of Chem Tech Research, 8(12), 442 449, 2015.

2. Patil M. V. Performance of Copper Slag as Sand Replacement in Concrete. International Journal of Applied Engineering Research, 11(6), 4349-4353, 2016.

3. R.Elamaran, Srinivasan, Vimala (2019)"Use of Copper Slag for Partial Replacement to Fine aggregate in Concrete"

4. Adesina A and Das S 2020 Drying shrinkage and permeability properties of fibre reinforced alkali-activated composites Constr. Build. Mater.

5. Ataie F F and Riding K A 2016 Influence of agricultural residue ash on early cement hydration and

6. Balachandran G B, David P W, Alexander A B, Mariappan R K, Balasundar P, Parrthipan B K, Saravanakumar S S and Kannan P S 2021 Saccharum barberi grass bagasse ash-based silicone rubber composites for electrical insulator applications Iran. Polym. J.

7. Sathish Kumar.R, "Experimental Study on the Properties of Concrete Made With Alternate Construction Material", International Journal of Modern Engineering Research (IJMER), Vol. 2, Issue. 5, Sept.-Oct. 2012, pp-3006-3012

8. L. O. Ettu, K. C. Nwachukwu, J. I. Arimanwa, C. T. G. Awodiji

9. C.Marthong, "Sawdust Ash (SDA) as Partial Replacement of Cement", International Journal of Engineering Research and Applications (IJERA), Vol. 2, Issue4, July- August 2012, pp.1980-1985

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