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Study on Green Concrete using Eco Sand and Sugarcane Bagases Ash a Review

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INRODUCTION

In India, solid waste management is currently a burning issue that demands attention. Around 4.4 billion tonnes of solid wastes generate yearly, However, in India agricultural sector alone has generated about 600 million tonnes of biomass waste.

Currently, in India, around 960 million tonnes of residual solid waste have been generated from the agricultural, mining, industrial, and municipal processes yearly.

Concrete is a composite material which consists eccentrically of a binding medium. Concrete is no longer made of aggregate Portland cement and water only. Often but not always it has to incorporate at least one of the additional ingredients such as admixture or cementitious material to enhance its strength and durability within which are embedded particles or fragments of relative inert filler in Portland cement concrete. The binder is a mixture of Portland cement. The filler may be any of a wide variety of natural or artificial. Fine and coarse aggregate and in some instances an admixture. Concrete is presently one of the most essential materials that have been used in the civil engineering construction works. When concrete is reinforced with steel, it has got a higher capacity for carrying loads. Concrete being a heterogeneous mix of several ingredients, the quality of the constituent material and their respective proportions in the concrete, determine its strength and other properties.

BAGASSE ASH

Bagasse Ash was burnt for approximately 72 hours in air in an uncontrolled burning process. The temperature was in the range of 700- 6000 ^{0}C.The ash collected was sieved through BS standard sieve size 75 µm and its colour was black. Bagasse ash is taken from the nearing Sugar mill factory. Specific gravity given by the manufacturer is about 1.84. Sugarcane Bagasse Ash was collected during the cleaning operation of a boiler operating in the Sugar Factory, chemical composition of bagasse ash is listed in Table 1.1.

ECO SAND

Eco sand is a by-product of cement manufacturing process and it poses a serious land fill problem. Hence, as a solution to the above mentioned issue, it can be used as an aggregate in concrete depending on its property. The Eco sand does not absorb moisture and it can be made as a fine aggregates replacement in concrete. It acts as an inert materials and being very small particle 530 nm range, it can fill pores and add physical durability to concrete.

LITERATURE REVIEW

Many works have been carry out to explore the benefits of using various waste materials such as granite dust, marble dust, Eco sand, Stone Dust and Sugar Bagasse Ash in making and enhancing the properties of concrete. The work done by various authors describe below:

- **Khairul Nizar Ismail, Kamarudin Hussin and Mohd Sobri Idris 2007** Sugar Bagasse Ash is the finely divided mineral residue resulting from the combustion of coal in electric generating plants. Fly ash consists of inorganic, incombustible matter present in the coal that has been fused during combustion into a glassy, amorphous structure. Fly ash particles are generally spherical in shape and range in size from 2 µm to 10 µm. They consist mostly of silicon dioxide (SiO_2), aluminium oxide (Al_2O_3) and iron oxide (Fe_2O_3). Fly ash like soil contains trace concentrations of the following heavy metals: nickel, vanadium, cadmium, barium, chromium, copper, molybdenum, zinc and lead. The chemical compositions of the sample have been examined and the fly ash are of ASTM C618 Class F.

- **Abdul Hyee. 2010** have studied that the compressive, split tensile and flexure strengths of concrete containing cement kiln dust as a replacement for ordinary Portland cement. The replacement levels considered for the study were 20, 40, 60 and 80%. Plain concrete with cement kiln dust was also produced for reference purposes. From the results fo the work, it was observed that there was generally a decrease in strength of cement kiln dust concrete compared to the reference concrete. However, it was noted that the percentage reduction in strength was minimal when up to 20% of OPC was replaced by cement kiln dust in the concrete. The results of the study also confirmed the previous report that the setting time

of cement paste increases when cement kiln dust is used as a replacement for cement.

- **Joseph O. et al., (2012)** concluded that the flexural and tensile strength properties were found to compare closely with those for normal concrete. Hence, concrete with mixtures of lateritic sand and quarry dust can be used for structural construction provided the proportion of lateritic sand content is kept below 50%. Both flexural and tensile strengths were found to increase with increase in laterite content. Further work is required to get data for long-term deformation characteristics and other structural properties of the experimental concrete. These include: shear strength, durability, resistance to impact, creep, etc. Also, it may be necessary to investigate the optimum contents of lateritic sand and quarry dust in relation to the structural properties of the concrete. These will assist engineers, builders and designers when using the materials for construction works.**P.P.Shanbhag , V.G.Patwari 2017** The present study is aimed at utilizing Waste marble powder and quarry sand as partial replacement of cement and fine aggregate in concrete and comparing it with conventional concrete. This experimental investigation is carried out in three phases in 1st phase M20 grade of concrete is produced by replacing cement with 0%, 5%, 10% & 15% of Marble Powder. In 2nd phase concrete is produced by replacing sand with 0%, 30%, 40% & 50% of quarry sand and in 3rd phase concrete is produced by replacing cement and fine aggregate in the percentage of 0%, 5%, 10% & 15% of Marble Powder and 0% , 30%, 40% & 50% of quarry dust respectively. It is found that the studies of concrete made of waste marble powder and quarry sand increases at 10% and 40% respectively. Therefore the quarry dust and waste marble powder should be used in construction works, then the cost of construction would be saved significantly and the natural resources would be used efficiently.

- **Khushal Chandra Kesharwani 2017** Fly fiery remains use in concrete as incomplete substitution of bond is picking up significance step by step. Mechanical upgrades in warm power plant tasks and additionally gathering frameworks of fly fiery remains enhanced the nature of fly cinder. To examine the utilization of fly slag in solid, bond is supplanted mostly by fly fiery debris in cement. In this exploratory work solid blend arranged with substitution of fly powder by 0%, 25%, half, 75% and 100%. Impact of fly fiery remains on functionality, setting time, compressive quality and water content are considered. To examine the effect of halfway substitution of bond by fly cinder on the properties of solid, tests were led on various cement blends.

- **Dharshnadevi 2017** The experimental work mainly concentrates with compressive strength and flexural strength. M30 grade of concrete was used and the specimens were tested at 7, 14 and 28 days. It was concluded that replacing about 25 percent of ecosand for fine aggregate will not have any adverse effect on the strength of the concrete. Effective use for waste material and thus cost effective and performs as well as naturally occurring sand.

- **Chandra Rathor 2018** Self–compacting concrete is one of "the most progressive improvements" in solid research; this solid can stream and to fill the most restacked spots of the frame work without vibration. There are a few strategies for testing its properties in the new express: the most regularly utilized are Slump–flow test, L–box, U-box and V–funnel. This work presents properties of self–compacting concrete, blended with various kind's added substances: fly powder, miniaturized scale silica, metakaolin. So we included admixture air conditioning hypercrete and air conditioning viscocrete around 0.5% and 0.2% of aggregate cementitious content in each blend from that point. The compressive quality conveyed in the compressive testing machine. The increments of fly slag were 20%, 25%, 30% and 35% of cement. It was seen that expansion the level of fly powder brought about the decline of compressive strength.

- **Subham Gupta (2019)** One of the constituent of concrete is natural sand or river sand. The issues of environmental degradation and expensive nature of the river sand are increasing day by day. The Global consumption of natural sand or river sand has become more due to excessive use of concrete so that the demand of river sand is very high and there is shortage of good quality of river sand. These reasons make us to switch on the alternative sources. Many researches has been done yet to replace the river sand. The objective of this research is to an experimental study of concrete using eco sand as a replacement of fine aggregates. So Eco Sand is replaced with 5%, 10%, 15% and 20% by weight of fine aggregates and mechanical properties such as Compressive strength, Spilt Tensile strength and Flexural strength are investigated. Eco sand acts like filler minerals which helps to reduce pores, reduce moisture resistivity. M40 grade of concrete is taken for study. The rheology studies are also made in detail as the fine content of concrete increases, the water demand increases to make it workable. Hence to overcome this problem, 1% of chemical admixture (water reducer) i.e., super plasticizer is used. The compressive strength, flexural strength and split tensile strength increase when fine aggregate was replaced by eco sand at 5, 10, 15, and 20%. The Optimum percentage of replacement is 15%.

- **Subham Gupta (2019)** The experimental work mainly concentrates with compressive strength and flexural strength. M30 grade of concrete was used and the specimens were tested at 7, 14 and 28 days. It was concluded that replacing about 25 percent of ecosand for fine aggregate will not have any adverse effect on the strength of the concrete. Effective use for waste material and thus cost effective and performs as well as naturally occurring sand.

PROBLEMS IDENTIFICATION

From the Study of Literature review there is a need of Eco-Friendly and reliable development for construction consists the use of non-conventional and different waste materials and recycling of waste material for reducing

Objectives

The objectives of the research are outlined below:

- To investigate the effect of Eco sand & Sugarcane Bagasse Ash waste materials of concrete on its strength.

CONCLUSION

The compressive, flexural & split tensile strength of the concrete by replacing the sand by Eco sand and cement by the Bagasse Ash the strength increases.

REFERENCES

[1] ASTM C 618, Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete (2005).

[2] B. Durga, and M. Indira (2016), experimental study on various effect of replacement of fine aggregate with silica sand at different proportions in cement concrete and cement mortor, (IJETT), Vol.33(5), pp.243-248

[3] Chuslip. N., Jaturapitakkul. C., & Kittaikomal. K., Effects of LOI of ground bagasse ash on the compressive strength and sulfate resistance of mortars, Construction and Building Materials 23: (2009), 3523–3531.

[4] Committee Board of sugar cane and sugar Summary of sugar cane and sugar industry in Thailand in 2003/2004, Division of sugar cane and sugar industry Policy, Ministry of Industry,Vol.2 (2004). Bangkok Thailand (in Thai). 4

[5] Cordeiro, G. C., Toledo Filho, R. D. & Fairbairn, E. M. R., Effect of calcination temperature on the pozzolanic activity of sugar cane bagasse ash, Construction and building materials, 23: (2009), 3301-3303.

[6] Cordeiro, G. C., Toledo Filho, R. D., Tavares, L. M. & Fairbairn, E. M. R., Experimental characterization of binary and ternary blended-cement concretes containing ultrafine residual rice husk and sugar cane bagasse ashes, Construction and Building Materials.

[7] Govindarajan, D. & Jayalakshmi, G., XRD, FTIR and microstructure studies of calcined sugarcane bagasse ash, Advances in applied science and research, 2: (2011), 544-549.

[8] H. S. Otuoze, y. D. Amartey, b. H. Sada, h. A. Ahmed, m. I. Sanni and m. A. Suleiman," Characterization of sugar cane bagasse ash and ordinary portland cement blends in concrete" procs 4th West Africa Built Environment Research (WABER) conference, 2012,pp 24-26.

[9] Hernandez, J. F. M., Middendorf, B., Gehrke, M. & Budelmann, H., Uses of wastes of the sugar industry as pozzolan in lime-pozzolan binders: Study of the reaction, Cement and concrete research, 28: (1998), 1525-1536.

[10] IS: 10262-2009 and SP 23:1982. Recommended Guidelines for concrete Mix. Bureau of Indian Standards, New Delhi. [15]. IS: 516-1959. Indian Standard Methods of Test for Strength of concrete. Bureau of Indian Standards, New Delhi.

[11] IS: 12269-1987, Bureau of Indian standards, New Delhi, India, 53grade Ordinary Portland Cement-specification.

[12] IS: 1489-1991. Portland Pozzolana cement Specification Part 1: Fly Ash Based, Bureau of Indian Standard Institution, New Delhi.

[13] IS: 383-1970. Specification for coarse and fine Aggregates from natural sources for concrete. Bureau of Indian standards, New Delhi.

[14] IS: 5816-1999. Method of Test Splitting Tensile Strength of Concrete. Bureau of Indian standards. New Delhi, India.