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STUDY ON STRENGTH OF CONCRETE BY THE PARTIAL REPLACEMENT OF CEMENT WITH SCBA : LITERATURE REVIEW

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Abstract

Concrete is the most important component used in construction industry through out the world. It consist of natural components such as Natural Sand and Aggregates, excessive use of this natural material directly leads to scarcity of the material where as the cement component which lead to the emission of carbon dioxide in air, made environment unhealthy. Approximately cement produced 1.8 tonnes per capita of carbon dioxide. Sugarcane bagasse ash is a solid waste generated from the sugar producing trade. India produced 342.56 million tonnes of sugarcane in the year 2017-2018, making it one of the world's biggest cane producers.

Index Terms: *Cement,SCBA.*

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1.INTRODUCTION

Initiatives are developing worldwide to control and regulate the supervision of sub-products, residuals and industrial wastes in order to preserve the environment from contamination. A good solution to the problem of recycling agro industrial excess would be by burning them in a controlled environment and use the ashes (waste) for more polite means. The use of business and nonindustrial (agricultural) waste made by industrial processes has been the attention on waste reduction. For years, scientists and researchers are finding out potential solutions to environmental issues of waste production and pollution. Many have found that replacing raw materials with recycled materials reduces our dependency on raw materials in the construction industry. Its aim is to scale back, re use, or recycle waste, the latter being the preferred option of waste disposal. A waste management plan directs the construction activities towards an environmentally friendly process by the huge quantity of concrete is consumed by construction industry all over the world. In India, the concrete is produced by using natural sand, cement, coarse aggregate, and water. One major challenge facing the engineering science community is to execute comes harmonized with nature exploitation the conception of property development involving the employment of high performance, environment friendly materials produced at reasonable cost. In the context of concrete, that is that the predominant artifact, it's necessary to spot more cost-effective substitutes. The waste from agro industries sugarcane bagasse ash can be harmful to environment and as well as for yielding of crops, For each ten tones of sugarcane crushed, a sugar factory produces nearly three tones wet bagasse ash.when bagasse ash waste is burned under the controlled manner, It also gives ash having amorphous silica, which has pozzolanic properties. The combustion yields ashes containing high amounts of unburned matter like silica and alumina oxides. sugarcane bagasse ash use as cementreplacement material to improve quality and reduce the cost of concrete

2.LITERATURE REVIEW

U.R.Kawade et al.[1] studied the effect of use of Bagasse Ash on Strength of Concrete; SCBA was chemically and physically characterized and partially replaced in the ratio of 0%, 10%, 15%, 20%, 25% and 30% by weight of cement in concrete. The properties for fresh concrete are tested like slump cone test and for hardened concrete compressive strength at the age of 7, 28, 56 and 90 days. The test result indicate that the strength of concrete increase up to 15% SCBA replacement with cement. . Partial replacement of cement by SCBA increases workability of fresh concrete; therefore use of super plasticizer is not essential.

Biruk hailu tekale et al.[2] Sugarcane bagasse ash is a byproduct of the sugar factories found after burning sugarcane bagasse which itself is found after the extraction of all economical sugar from sugarcane.This research was therefore, conducted to examine the potential of bagasse ash as a cement replacing material. The results of the mortar work have shown that, up to 10% replacement of the ordinary Portland cement by bagasse ash achieved a higher compressive strength at all test ages i.e. 3, 7 and 28 days, whereas the 15% replacement of the cement by bagasse ash in the concrete have shown a slightly lower compressive strength at 56 days.

Vijaya et al.[3] The aimed at utilizing sugarcane bagasse ash concrete, with partial replacement of cement. The replacement is done at various percentages like 0%, 5%, 10%, 15% and 20% and its effect on properties of concrete was investigated. Alumina imparts quick setting property to the cement. Clinkering temperature is lowered by the presence of the requisite quantity of alumina. Excess alumina weakens the cement.

G. Nithin Kumar Reddy et al.[4] The researches has shown that every one ton of cement manufacture releases half ton of carbon dioxide, so there is an immediate need to control the usage of cement. On the hand materials wastes such as Sugar Cane Bagasse Ash is difficult to dispose which in return is environmental Hazard. The Bagasse ash imparts high early strength to concrete and also reduce the permeability of concrete. The Silica present in the Bagasse ash reacts with components of cement during hydration and imparts additional properties such as chloride resistance, corrosion resistance etc. Therefore the use of Bagasse ash in concrete not only reduces the environmental pollution but also enhances the properties of concrete and also reduces the cost. This project mainly deals with the replacement of cement with Bagasse ash in fixed proportions and analysing the effect of magnesium sulphate on SCBA blended concrete. The concrete mix designed by varying the proportions of Bagasse ash for 0%, 5%, 10%, 15%, 20%, 25% the cubes are been casted and cured in normal water and 5% magnesium sulphate solution for ages of 7, 28 and 60 days, the properties like slump cone test and compaction factor test for fresh concrete and compressive strength for hardened concrete are verified and results are analyzed.

Dineshram.A.K et al.[5] This work is mainly focused on utilizing agricultural waste in the construction industry, which helps to create a sustainable and pollution free environment. In trying to make an economic alternative which provides a good solution to environment and also to the problems associated with waste management, sugarcane bagasse ash (an agricultural waste product) is used as a partial replacement of cement in concrete. The test specimen has been prepared by partially replacing cement with sugarcane bagasse ash in the ratio of 0%, 2%, 4%, 6%, 8% and 10% by weights of concrete. properties. The test results indicate that the sugarcane bagasse ash is an effective mineral admixture and pozzolana with 8 % optimal replacement ratio of cement.

3.MATERIALS

3.1Cement

Table-1

Chemical composition of Cement	
Compound	%
Aluminium Oxide (Alumina)- Al_2O_3	6.49
Silicon Dioxide (Silica)-SiO_2	21
Potassium OxideK_2O	0.56
Calcium Oxide –CaO	60.47
Iron Oxide Fe_2O_3	1.93
Sulphur SO_3	2.62
Others	<1

3.2 Sugarcane Baggase Ash (SCBA)

Table-1

Chemical composition of SCBA	
Compound	%
Aluminium Oxide (Alumina)- Al_2O_3	3.53
Silicon Dioxide (Silica)-SiO_2	69.33
Phosphorus OxideP_2O_5	2.66
Potassium OxideK_2O	10.09
Calcium Oxide –CaO	5.15
Titaniun Ti	1.21
Iron Fe	6.6
Sulphur S	0.73
Others	<1

4.FUNCTIONS OF CHEMICAL COMPOSITIONS OF CEMENT

4.1 Silica (SiO_2):- It holds 19-23% of cement mass. The function of silica is gives to strength the cement.

4.2 Alumina(Al_2O_3):- Cement contains 2-6% of its mass. It adds quick setting property.

4.3 Iron Oxide (Fe_2O_3):- It provide colour and hardness to cement And also provides some strength to cement.

4.4 Calcium Oxide (CaO):- It provides strength to cement and it make cement sound.

5.TEST CONDUCTED

a) Slump cone test
b) Compressive strength
c) Split tensile strength

6.CONCLUSION

From studying all these research papers, 10% and 15% replacement of cement with SCBA gives good strength. After studying all these research paper we concluded that if we can reduce or reuse some material in field of concrete production then it largely impact environment and leads to pollution free and soothing surrounding. It is observed that the usage of sugarcane bagasse ash in concrete helps in increasing the resistivity towards sulphate attack.

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