Partially Replacement of Cement in Mortar Investigating Utilization of Raw Sugarcane Bagasse Ash

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Abstract: **The higher rate of infrastructure development increasing the requirement of concrete is also increasing propantinately, the higher demand for concrete and mortar is further increasing the consumption of their ingredients such cement sand and aggregate, cement industy play and important role in environmental pollution because of its C02 emissions.therefore itit's become essential to find out the substitute for cement. in proposed work sugarcane bagasse ash used as a partial replacement of cement in moratr.**

INTRODUCTION

Sugar production has emerged as one of the major agro industries all over the world during the last few decades. In India sugar production is under taken practically throughout the country and the reare well-established large scale factories in 18 out of 29 States. According to the reports for the last crushing season, there were 338 factories in operation which crushed about 60 million tonnes of cane, producing 6.1 million tonnes of sugar and 2.5 million tonnes of molasses. Average bagasse production is about 30 percent of the sugarcane crushed and about 90 percent of bagasse produced is used as fuel. After controlled burning of bagasse, the ash obtained is known as bagasse ash Nowadays, bagasse is also being used in the manufacturing of pulp and paper products. Previous researches have shown that for each 10 tons of sugarcane crushed; a sugar factory produces nearly3tonsofwetbagasse which is a waste product of the sugarcane industry.

Coarse Aggregate:

Aggregates should be kept moist or wet when high temperature is expected, If wet aggregates are used absorpt and moisture must be considered. Improper amount of free water can lead to excess drying or improper compact Adversely too much of water will make the paste or mortar too thin and improper.bond between aggregates and allowing paste/mortar seepage. The paste/mortar will result in lower permeability rates of system.

Water:-

Fresh portable water free from organic matter and oil is used in mixing the concrete. Water in required quantities were measured by graduated jar and added to the concrete. The rest of the material for preparation of the concrete mix was taken by weigh batching. The pH value should not be less than 7.

Sugarcane Bagasse Ash:-

Sugarcane bagasse ash which is obtained after burning of sugarcane it is a waste product which can be useful as partially replacing cement due various chemical property. Bagasse ash contains 40-50% moisture at the time of collection from factory. Bagasse is by product which burnt to generate power required for different activities in factory. Use of sugarcane bagasse ash as a replacement material to cement improves the quality and reduce the cost of construction. Sugarcane Bagasse Ash (SBA) is used as mineral admixture as it has high silica content, thereby helps in increasing the strength of concrete. Reduces the setting time of concrete as it has some properties of admixture due to presence of sugar content in SBA.

RESEARCH METHODOLOGY

Methodology of Making Bagasse Concrete:-

After controlled burning of bagasse, the ash obtained (SCBA) is Grinded and sieved through 150µ size sieve which provides fine bagasse ash .SCBA so obtained was characterized for its physical and chemical properties in pollution control board lab in pune. On the basis of characteristics of SCBA, suitability of SCBA to be used for replacement of cement in concrete production is accessed. For experimentation M-25 controlled concrete using locally available building materials (aggregates and sand) and OPC-53 grade cement is used with suitable dose of admixture (Fosroc conplast SP500). Mix designing of M-25 controlled concrete is done and results are validated by casting 8cube samples (150cm×150cm×150cm) and subsequently testing it for compressive strength after 7 days and 28 day.

LITERATURE REVIEW

The cement and concrete technology has shown various advancements during the past years. One of the best advancements is the use by-product materials as a cement replacement to alleviate environmental and economical impact of cement production. These cement replacing materials were reported to improve different properties of the mortar and the concrete [2, 12,13, 27]. Bagasse ash is one of these by-product materials found from sugar factories. Recently it has been studied for its feasibility as a cement. replacing material in some parts of the world and has been found to improve some of the properties of mortar and concrete. The performance of mortar and concrete is assessed by different tests on both the fresh and hardened concrete. These include workability, strength and permeability. This chapter is, therefore, dedicated in discussing about cement, different performance criteria of concrete, pozzolans and bagasse ash.

EXPERIMENTAL INVESTIGAITON

In the present experimental investigation sugar cane bagasse ash has been used as partial replacement of cement in concrete mixes. On replacing cement with different weight percentage of SCBA the compressive strength is studied at different ages of concrete cured in different environments like normal water.

Materials and Methods:-

Cement:-

In this experimental work Ordinary Portland cement (Grade53) conforming to IS 12269- 1987 in all trial mixes is used. The physical properties of the cement obtained on conducting appropriate tests conforming to process laid down in IS: 269/4831 has been performed. The results are mentioned intable1shown below

Table : Physical properties of cement:-

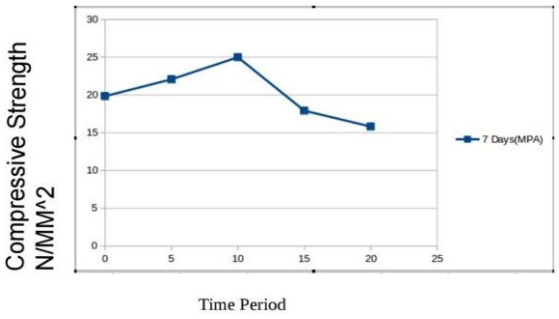
S. No	Property of cement	value
1	*Fineness of cement(m2/kg)*	320
2	Specific gravity of cement	3.15
3	Standard consistency of cement	35%
4	Initial setting time	90 mins
5	Final setting time	265 mins
6	Grade of cement(OPC)	53 grade Opc

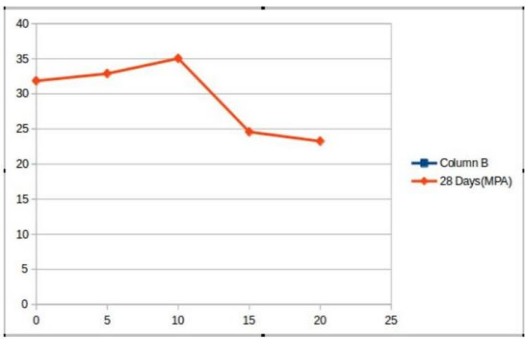
RESULTS AND DISCUSSIONS

Compressive strength Results:-

% of SBCA	7 Days (Mpa)	28 Days (Mpa)
0	19.84	31.85
5	22.07	32.88
10	24.99	35.04
15	17.92	24.58
20	15.82	23.25

Graphs : -





Test results :

As the percentage of sugarcane bagasse ash increases the compressive strength of concrete tends to increase up to certain percentage and then start's decreasing with the increase of ash content.

The strength of 10% sugarcane bagasse ash concrete is more than 5% sugar cane bagasse ash concrete and strength of 5% sugar cane bagasse ash concrete is more than normal concrete. This shows that till 10% sugarcane bagasse ash concrete the strength increases while percentage of sugarcane bagasse ash increases.The strength of cubes having 10% sugar cane bagasse ash is almost equal to 15% sugar cane bagasse ash concrete.
This increase in strength in Sugar cane bagasse ash concrete is due to presence of Silica in Sugar cane bagasse ash. Silica in Sugar cane bagasse ash react with residual CH after the formation of C-S-H gel, and increase

CONCLUSIONS

The results shows that Sugarcane Bagasse was added in M25 grade concrete in 10%, 20%, 30%, 40% replacement from this experimentation we have obtained various results of compressive strength was increased at 10% for M25 grade concrete as compared to ordinary concrete. SBA partially in concrete increase the workability of concrete as compared to ordinary concrete. The compressive strength of concrete is achieved at 7 th day as compared to ordinary one. The results for compression. Concluded that SBA can be used partially in concrete at 10% replacement. It was seen that due to use of artificial sand in concrete the strength achieved was less due to the brittle property of artificial sand for split tensile. Use of SBA in concrete also reduces overall co2 emission from concrete which is satisfactory. As the workability of concrete is increased therefore use of super plasticizer is not essential. Concrete mix can be made effective using the sugar industrial waste as it provides to be cheaper or economical for the cost of construction. It reduces of about 10% cost for 1m3 concrete production. Utilization of sugarcane bagasse ash in concrete also overcomes the problem of the disposal of the waste produced by the sugar industries. Due to the light weight property of the bagasse ash the density of the concrete mix is reduced.

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