International Journal of Latest Research in Science and Technology **ISSN (Online):2278-5299**
Volume 6, Issue 6: Page No. 12-14,November-December 2017
https://www.mnkpublication.com/journal/ijlrst/index.php

SUBSTITUTION OF BAGASSE IN CONCRETE- A REVIEW

Er. Narinder Singh[1], Er. Kshipra Kapoor[2]
[1]M.Tech Scholar, [2]Assistant Prof. & Head,
[1,2] Department of Civil Engineering, Universal Institution of Engineering and Technology, Lalru, Chandigarh-140501

Abstract – ***This paper summarizes the continuous explores about the trial research on the utilization of bagasse ash. Increasing the demand and consumption of cement, researchers and scientist are in search of developing with increasing demand and consumption of cement, investigators and scientist are in search of developing alternate binders that are sustainable and contribute towards waste management. The use of mechanical and rural waste delivered by modern procedures has been focus of waste lessening research for monetary, natural and specific reasons. Bagasse ash has been artificially and physically represented and partially supplanted by weight of cement concrete that is slump test, compressive strength test and flexural strength test were attempted.***

Keywords : Coarse and Fine aggregate, Sugarcane bagasse ash, *Partial replacement.*

I. INTRODUCTION

As we realize that the quantity of industrial or agricultural waste has slowly increased over the years. Utmost of this waste can be reused.Scientists everywhere throughout the world today are concentrating on methods for using either industrial or agricultural waste.

One such potential use is regularly perceived by numerous analysts from the farming waste called sugarcane Bagasse of sugar enterprises which by consuming outcomes in sugarcane Bagasse ash (SCBA). Sugarcane is to a great extent created in the conditions of Punjab, Haryana, Uttar Pradesh and Tamil Nadu. The province of Uttar Pradesh is known as the "Sugar Bowl" of India. Countless handling enterprises are situated in these zones. Be that as it may, a huge amount of squanders called as bagasse is created from these sugarcane handling businesses.

At the point when this waste is singed under controlled conditions, it additionally gives ash having silica, which has pozzolanic properties. The investigation of pozzolanic movement and their reasonableness as binders have been done on the ash in supplanting cement. There is a possiblility in utilizing sugarcane bagasse ash as cement material to increase quality and lessen the cost of building materials, for example, mortar, concrete pavers, solid rooftop tiles and concrete interlocking block.

As generation of sugar cane is more than 1500 million tons on the planet and in India around 10 million tons of sugarcane bagasse ash is dealt with as a waste material.

Sugar Cane Bagasse Ash (SCBA) which is dealt with as waste and unutilized. Sugarcane bagasse comprises of around 50% of cellulose, 25% of hemicelluloses and 25% of lignin. The utilization of sugarcane bagasse as bio fuel or consuming in open fields has represented an incredible natural risk of contaminating air and water. Indeed, even after strict limitations by the administration of these above said states, there is no conclusion to handle fires as individuals just need to get free off these massive and tremendous squanders. Amid rains these squanders start creating exceptionally hostile gasses, in this manner again causing irritation. The smoke delivered additionally causes imperceptibility. It can therefore be helpful to utilize the construction of pavements to alleviate the disposal problems as well as to limit the use of natural aggregate (sand) and binding material (cement, bitumen), so as to construct the low volume economic road pavements

The bagasse ash was found to enhance a few properties of the mortar and concrete including compressive strength and fineness. The higher silica content in the bagasse ash was proposed to be the important source for these renovations.

This carbonated bagasse was composed and burned for 6hours at 600oC. After burn a layer of light colored ash was observed on the surface and then an ash of black color and heterogeneous composition was observed, consisting of leftovers of the sugarcane bagasse that was not burned as well as charcoal particles. The second burn of CBC lasted for 3hours at 700oC. After this reburn the CBC was cooled naturally. Six samples of ash were collected and dried in the oven for 24 hours at 70oC.

Bagasse ash is very dark material. Bagasse ash can used as farm compost. Bagasse ash is also suitable for making clay products increases workability of fresh concrete. Compressive strength, tensile strength and flexure can be increased with 10% replacement of SCBA at 28 days.

These roads can be built in those zones where there is accessibility of sugarcane bagasse. In Uttar Pradesh and Haryana, there is an extensive scale development of sugarcane and in this manner the sugarcane bagasse can be effectively obtained to be utilized as a part of the development of low volume traffic roads.

The fibrous residue (around 40– 45%) of sugarcane in the wake of pulverizing and extraction of its juice is known as

Publication History
Manuscript Received : 5 November 2017
Manuscript Accepted : 12 December 2017
Revision Received : 20 December 2017
Manuscript Published : 31 December 2017

"bagasse". The bagasse is reused as fuel in boilers for heat generations which abandons 8– 10% of cinder, known as.

II. LITERATURE REVIEW

Different investigations have been completed in the current past on the utilization of sugarcane bagasse in the improvement of modified concrete.The different discoveries in this field are as classified underneath:-

R.Srinivasan and K.Sathiya, Fall 2010, ISSN 1555-9033 [1] the results show that the SCBA in blended concrete had significantly higher compressive strength, tensile strength, and flexural strength compare to that of the concrete without SCBA. It is found that the cement could be advantageously replaced with SCBA up to maximum limit of 10%. Although, the optimal level of SCBA content was achieved with 1.0% replacement. Partial replacement of cement by SCBA increases workability of fresh concrete; therefore use of super plasticizer is not substantial. The density of concrete decreases with increase in SCBA content, low weight concrete produced in the society with waste materials (SCBA).

Mr. H.S. Otuoze et al. (2015) [2] had researched on classification of Sugar Cane Bagasse Ash (SCBA) and Ordinary Portland Cement (OPC) mixes in concrete. The SCBA was acquired by burning Sugar Cane Bagasse (SCB) between 600-700 degrees Celsius. The total percentages of SiO2, Al2O3 and Fe2O3 is 74.44%.For quality test , mix proportion of 1:2:4 was utilized and OPC partially supplanted with 0% ,5%, 10%, 15%, 20%, 25%, 30%, 35% and 40% by weight in concrete. Compressive strength values of hardened concrete were attained at the ages of 7, 14, 21 and 28 days. In light of the tests directed, it can be reasoned that SCBA is a good pozzolanic material for concrete cementation and partial mixes of it with OPC could give good quality improvement and other engineering properties in concrete. An optimum of 10% SCBA mixes with OPC could be utilized for reinforced concrete with solid aggregate. Higher mixes of 15% and up to 35% of SCBA with OPC are not acceptable. The qualities missed the mark concerning meeting necessities.

Mrs.U.R.Kawade, Mr.V.R.Rathi, Miss Vaishali D. Girge (July 2013) [3] The results show that the SCBA concrete had significantly higher compressive strength compare to that of the concrete without SCBA. It is found that the cement could be advantageously replaced with SCBA up to maximum limit of 15%. Although, the optimal level of SCBA content was achieved with 15.0% replacement. Partial replacement of cement by SCBA increases workability of fresh concrete; therefore use of super plasticizer is not essential.

R.Vandhiyan, K. Ramkumar and R. Ramya (May 2013) [4] determined the compressive strength of concrete cube up to a replacement proportion of 10% of cement. In case of cement mortar the strength improves up to 15% replacement of cement. There was marginal improvement in the Split tensile strength. A considerable improvement in the flexural strength was seen at 10% replacement of cement. It can be concluded form the above result that 10% replacement of cement by glass powder is the best proportion. Alkali-silica reactivity effect is controlled when glass powder with high Na2O is used. Further investigation can be done by using plasticizers to improve the workability and strength. Also durability investigation can be done to see the long term effect of glass powder replacement.

T.Subramani , M.Prabhakaran (May 2015) [5] studied the bagasse ash belongs to zone lV as per IS code. Water requirement increased as the percentage of BA increased. Unit weight of the mixture produced decreased as the percentage of BA increased. Workability of the mixtures depended primarily on the percentage of BA used. This is consistent with the porous nature of BA particles whereby a greater surface area and larger. Average particle size serve to enhance absorption of water. Only the slump properties of the control and 10 precent BA mixture were acceptable, while the other mixtures were compromised by a decrease in slump relative to the amount of BA present .The compressive strength results represent that the strength of the mixes with 10% and 20% and 30%bagasse ash increased at later days (28 days) as compared to 7 days that may be due to pozzolanic properties of bagasse ash. The greatest compressive strength, split tensile strength and flexural strength were achieved when the mixture contained 10% of fine aggregate replacement of BA with the water cement ratio of 0.43. Hence we concluded that the fine aggregate up to 20% can be effectively replaced with sugarcane bagasse ash without considerable loss of workability and strength. Based on the conducted experiment and according to the results obtained, it can be concluded that: Bagasse ash can increase the overall strength of the concrete when used up to a 30% sand replacement level with w/c ratio of 0.35.Bagasse ash is a valuable pozzolanic material and it can potentially be used as a partial replacement for sand. This could reduce the environmental problems and minimize the requirement of land fill area to dispose BA.

U.G.Harshali S. Hire, Prof. V.S. Bhalerao (March 2017) [6] studied that the replacement of cement by bagasse ash reduce industrial waste and to save cement. By saving cement reduced greenhouse gases emission and makes environmental green. 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. Water requirement increased as the percentage of BA increased. Bagasse ash is a valuable pozzolanic material and it can potentially beused as a partial replacement forcement.And make construction cheaper. This could reduce the environmental problems and minimize the requirement of land fill area to dispose BA.

III.CONCLUSIONS

Following conclusions have been drawn in light of the present examination:- Sugarcane bagasse ash remains altered concrete performed better when contrasted with standard concrete up to 20% for cement substitution and 10% of sand substitution in ordinary concrete. Substitution of cement by bagasse ash remains diminish industrial waste and to save cement. By sparing cement decreased greenhouse gases emission and makes nature green. As the level of sugarcane bagasse ash remains develops the compressive strength of concrete tends to increment up to certain rate and after that diminishing with the increase of ash content. A best of 10% SCBA mixes with OPC could be used for reinforced concrete

with fresh aggregate. Higher mixes of 14% and up to 30% of SCBA with OPC are not acceptable. Partial replacement of cement by SCBA raises workability of fresh concrete; therefore use of super plasticizer is not satisfying. The density of concrete decreases with increase in SCBA content, low weight concrete produced in the society with waste materials (SCBA). In the case of bagasse ash paver block, the life of bagasse ash paver block roads is long as compared with traditional flexible pavement and furthermore the support of bagasse ash paver blocks street is simple when contrasted with flexible pavement. The result of harm is less in bagasse ash paver blocks street and it is anything but difficult to remove and amend the street with less cost.

The burrowing and reestablishment of trenches for repairs to utilities is less demanding on account of block pavement. Utilization of penetrable block pavements in urban communities and towns can help renew exhausting underground sources of water, filter toxins before they achieve water sources, help diminish storm water runoff and declining the quantum of seepage structures. Concrete block pavement confine the speed of vehicles to around 60 km per hour, which is beneficial in city roads and convergences. The blocks are perfect for crossing where speeds must be confined and restricting stresses are high. Aside from these things, bagasse ash is a promptly accessible waste material and is additionally an eco-accommodating material. Design life of bagasse ash paver blocks street is 20 years, while plan life of flexible pavement is just 10 years. So usage of the waste material sugarcane bagasse ash is profitable as a substitution of cement or fine aggregate in the planning of concrete paver blocks.

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