

Use of Sugarcane Bagasse Ash in Mortar and Concrete Work

Narendra Kumar¹ Mrinank Pandey²

¹M.Tech Scholar ²Assitant Professor

^{1,2}Department of Civil Engineering

¹SIIT Gorakhpur, India ²ITM Gorakhpur, India

Abstract— An agro-industrial waste of sugar mills - pulp Ash was accustomed replace cement in concrete, up to an exact extent. Laboratory take a look at results show that cement are often replaced by the pulp ash while not adverse impact on the concrete. It is over that pulp ash doesnt offer improvement of concrete strength. As a result, the employment of pulp ash as concrete additive or cement replacement might have to be combined with alternative bonding materials, like ash or dross.

Keywords: Sugarcane Bagasse Ash, Mortar, Concrete Work

I. INTRODUCTION

The helpful use of waste merchandise from industries looks to be the new trend currently. Inges and Metcalf (1972) reportable the employment of ash, whereas Osinubi (1998, 2000, 2006) showed that phosphatic waste, a by-product from the assembly of superphosphate plant food, small-grained coal bottom ash and furnace dross are often effectively used.

Bagasse (the fiber of sugar cane) is that the by-product or residue of edge the cane, which may even be created by manduction the cane by native people. concerning thirty third of the pulp created, provides the fuel for the generation of steam (Bilba et al 2003). With gift various sources of fuel, sugar factories have associate way over pulp, that alongside domestically generated pulp, create serious environmental production downside, that once inhaled in excess, causes respiratory illness called bagassiosis (Laurianne 2004). In Nigeria, the calculable land beneath sugar cane cultivation is twenty three - thirty, 0000ha, whereas giant scale cultivation is finished at Bacita associated Numan with an calculable annual output of ninety six,000t (Misari et al 1998). per Ahmad and shaikh (1992), the physical and chemical properties of sugar cane pulp ash ar found to be satisfactory and adapt to the wants for sophistication N pozzolana (ASTM C618-78). the foremost Oxides in pulp ash being Al₂ O₃, Fe₂ O₃, CaO, MgO, Na₂O, K₂O, P₂O₅ and MnO and having loss on ignition but the required worth of 100 percent. though reports by writing paper 1983, Osinubi 1998a, 2000a, b, 2006 has shown use of phosphate waste and small-grained coal bottom ash, the employment of pulp ash as pozzolana has received very little attention.

In India, there's very little or no management over cement prices, particularly as each bulk and bagged cements ar principally foreign at terribly high interchange rates. Economic use of cement in concrete will so principally be achieved in African country by thought of partial replacement of the cement needs in concrete by cheaper native pozzolana like pulp ash.

II. METHODOLOGY

The bagasse obtained from Sahjanwa Steel plant was air dried, burnt to ashes and passed through BS No 200 sieve.

The specific gravity of the bagasse ash was 1.91. The detectable oxide composition of the bagasse ash obtained is summarized in table 1.

S/No	Property	Concentration (% by weight)
1.	C _a O	3.20
2.	S ₁ O ₂	41.15
3.	Al ₂ O ₃	7.00
4.	Fe ₂ O ₃	2.70
5.	M _g O	0.12
6.	K ₂ O	8.75
7.	SO ₄	0.03
8.	T ₁ O ₂	1.10
9.	Loss on ignition	17.55

Table 1: Detectable oxide composition of bagasse ash

Pozzolana cements square measure obtained by mixing or intergrading a combination of standard Portland cement and a Portland pozzolana conformist to baccalaureate nut 196-5:2011. within the preparation of all specimens, the specified amounts of pulp ash by dry weight of cement were measured and mixed within the dry state before addition of water. For determination of unconfined compressive strength, the pulp concrete was compacted into a detachable mould (150m x 150m x 150m), specimens removed and wrapped with synthetic resin sheets to forestall wet loss. After finding out the physical and analysis of pulp ash, totally different percentages of its presence in cement and cement concrete were studied with relation to customary consistency, initial and final setting time and with relation to compressive strength of the hardened concrete. result of pulp Ash on Consistency and Setting Time

The variations in customary consistency, initial and final setting time with pulp ash in cement is shown in Table a pair of and Fig.1

Serial No.	Percentage Replacement	Standard Consistency	Initial Setting Time	Final Setting Time (min)
1	0%	30.00	104	218
2	15%	31.75	103	210
3	10%	32.00	107	220
4	5%	33.25	110	233

Table 2: Variation in standard consistency, initial and final setting time with bagasse ash in cement

A. *Effect of Bagasse Ash Content on Compressive Strength*
Variation in 7 days and 28 days compressive strength is shown in Table 3, fig 2 and fig 3.

III. DISCUSSION & CONCLUSION

The initial setting time at 15% bagasse content is almost the same as for 0% but increase thereafter, may be due to reduction in the density of the mixture. The water cement ratio of 0.4 is unbroken constant for the various share

replacement of cement by pulp ash. , it's ascertained that compressive strength diminished with increase in pulp ash content at seven days set amount compared to seven days strength of pure cement concrete (i.e. 1/3 replacement). However, it is ascertained from table three, that the compressive strength at a pair of pulp ash replacement for twenty eight days set amount is nearly a similar values as for the 1/3 pulp ash content, with a normal decrease within the compressive strength of zero.6%, whereas in the least alternative pulp content there's forceful decrease within the compressive strength. a pair of replacement is thus taken because the optimum pulp ash replacement for the concrete combine.

As a pair of replacement is very tiny, it should not be of abundant amount, replacement solely a pair of of the cement. It might thus be all over that no concrete strength increase was found by adding pulp ash to concrete. As a result, the employment of pulp ash as concrete additive or cement replacement might have to be combined with alternative bonding materials like, ash or scum. solely the pozzolanic reaction between SiO₂ within the ash or scum and CaO within the pulp ash, beside the addition of water reducer or super plasticiser will improve the strength of pulp ash concrete.

REFERENCES

- [1] Payá, J., et. al., "Sugarcane pulp ash (SCBA): studies on its properties for reusing in concrete production", *Journal of Chemical technology and Biotechnology*, vol.77, pp321-325, 2007.
- [2] Ganesan, K., Rajagopal, K., & Thangavel, K. 2007. analysis of pulp ash as supplementary building material. *Cement and Concrete Composites*, 29, 515
- [3] N. Chusilp, C. Jaturapitakkul, and K. Kiattikomol, "Utilization of pulp ash as a pozzolanic material in concrete," *Construction and Building Materials*, vol. 23, no. 12, pp. 3523–3531, Dec. 2009.
- [4] K. Ganesan, K. Rajagopal, and K. Thangavel, "Evaluation of pulp ash as supplementary building material material," *Cement and Concrete Composites*, vol. 29, no. 6, pp. 515–524, Jul. 2007.
- [5] Ajay Goyal and Anwar A.M., Hattori Kunio, Ogata Hidehiko, Properties of Sugarcane pulp ash and its potential as cement-pozzolana binder, *Ain Shams University*, December 2007.
- [6] K. Ganesan, K. Rajagopal, and K. Thangavel, "Evaluation of pulp ash as supplementary building material material," *Cement and Concrete Composites*, vol. 29, no. 6, pp. 515–524, Jul. 2007.
- [7] Marcos oliveira First State paula, Sugarcane pulp ash as partial hydraulic cement replacement material, *University Federal of Viçosa*, march 20, 2009.
- [8] Noor Ul Amin, Chemical activation of pulp ash in building material system and its impact on strength development, *J.chem.soc.pak*, No 4, Abdul Wali Khan University, Pakistan, 2010.
- [9] Moises Frias, Villar-Cocina E. and Valencia-Morales E., Characterization of sugarcane straw waste as pozzolanic material for construction: calcining temperature and kinetic parameters, *Eduardo Torroja Institute (CSIC)*, 2007.
- [10] Nuntachai Chusilp, Napongsatorn Likhitsripaiboon and Chai Jaturapitakkul, Development of pulp ash as a pozzolanic material in concrete, *As. J. Energy Env.*, 10(03), 149-159, 2009.
- [11] Martinera Hernandez JFM, Middeendorf B, Gehrke M, Budelmann H. "Use of waste materials of the sugar business as pozzolana: study of the reaction. *Cement Concrete Res* 1998:1525–36.
- [12] Marcos oliveira First State paula, Sugarcane pulp ash as partial hydraulic cement replacement material, *University Federal of Viçosa*, march 20, 2009.
- [13] S. J. S. Wansom, "pozzolanic activity of commercial sugar cane," vol. 17, no. 4, pp. 349–357, 2010.
- [14] Marcos oliveira First State paula, Sugarcane pulp ash as partial hydraulic cement replacement material, *University Federal of Viçosa*, march 20, 2009.
- [15] IS : 2250 – 1981 Indian normal code of observe for preparation and use of masonry mortars
- [16] Pitre et al [1995] instructed the use of waste materials - ash, kiln ash, surkhi, cinder and crushed stone in building construction together with lime and cement offered a viable various. *Journal of Chemical technology and Biotechnology*, vol.77, pp321-325,1995.