Experimental Study of Concrete with the use of Bagasse Ash And Saw Dust Ash

Priya Shankarrao Chaware[1], Dr. Valsson Varghesse[2],Mr. Anshul Nikhade[3]

[1](M.tech IV sem Student of Civil Engineering Department,K.D.K.College ofEngineering,Nagpur,Maharashtra,India)

[2](HOD & prof of Cvil Engineering Department,K.D.K.College of Engineering,Nagpur,Maharashtra,India)

[3](Assistant prof of civil Engineering Department,K.D.K,College of Engineering,Nagpur,Maharashtra)

ABSTRACT

A paper based on effect of using agricultural waste like Baggase as and Saw dust ash on concrete by replacing cement with it at different proportions .Cement which plays important role as construction material. Concrete use as structural material which have certain limits in case of strength, durability, ductility etc. Baggasse ash from sugar industry and Saw dust ash from saw mills and other sources can be re-used as cementitious material due its chemical property. It helps to improve the quality and strength of concrete, In this paper studies shall be conducted on strength of concrete for M25 grade for various sets of replacement ranges from 10% to 30% and number of tests are conduct for several curing days i.e.7,14,28 check out affect on mechanical properties of concrete .Finally conventional concrete obtained results compare with concrete blended with above two type of waste.

Key words: *Concrete, Agricultural waste, Baggase ash, Saw dust ash, Conventional concrete.*

1.INTRODUCTION

The world of construction industry is difficult to imagine without cement. Shelter, food and clothes are the basic essential needs of human beings which are automatically fulfilled by the nature itself on a large percentage except shelter .Now a days there is need for affordable building material to carry out construction work. Utilization of different supplementary cementious materials for the production of blended cements contributes to achieving durable and sustainable concrete .India is largest agricultural country ,rather than throwing it as waste product we can use this agricultural waste as economical cementious material for replacement of cement**.**

As the world wide population increase continuously, cost of each basic tings increase rapidly specially building material, Due to change in lifestyle and adaptation of modern techniques. As we all know India is one of the large agricultural country in the world. The whole economy and development ratio is depends on agricultural production. Every year millions tones of agricultural waste is generated in every part of our country rather than throwing them as a waste product we can reuse it as a effective and economical substitute. Agricultural waste like Saw dust ash and Bagasse ash have cementious property so we can easily use this product in manufacturing concrete ingredient like cement.

Bagasse Ash is obtained by burning the bagasse of sugar cane after exerting sugar juice from it .India is largest manufacture of sugar cane in the world and produces 300 million tone per year. To avoid the excess generation of waste and to use it effectively in economical way bagasse ash is used fuel, Raw bagasse ash has a large practical size and a high porosity so it contain more water contain in a concrete mix.

Fig(1): Bagasse Ash

Saw dust is produced from wood working operation such as sawing, milling. It contain fine particles of wood. It's ash is obtained by burning the saw dust wood by heating it at a particular temperature. Saw dust ash is economical and can be effectively use to avoid the environmental hazards.It used in a cement production which possess environmental friendly feature.

Fig(2):Saw dust ash

2. MATERIALS USED

2.1.Cement and Aggregates

Ordinary Portland cement of 53 grade(IS 8112) was used .Fine aggregate of 4.75mm size and Coarse aggregate of size 20mm was used conforming to Zone II as per IS383-1970 .specific gravity of respective aggregate computed as 2.55 and 2.68.

2.2 Saw Dust Ash and Bagasse Ash

Table-1:By-product from wood industry contains below chemical composition characteristics:

Oxide	Percentage(%)
SiO2	51.69
Al2O3	14.56
CaO	11.58
Fe2O3	11.78
MgO	5.24
SO3	0.06
Na2O	4.06
K2O	0.32
CI	0.16

Table-2: By-product from Sugar industry consist following chemical composition:

Oxide	Percentage(%)
SiO2	65.25
Al2O3	4.01
Fe2O3	2.29
CaO	9.3
MgO	5.6
MnO	0.02
Na2O	0.06
K2O	0.12
P2O5	0.40
SO2	0.46

Weight batching of material was done .Ordinary Portland cement of grade M25 replaced with Saw dust as and Bagasse ash with combination by 0%,10%,20%,30%.and 0% replacement was treated as control for other samples specimens.

3. METHODOLOGY:

1.Planning
2. Material collection
3.Mix Design
4.Testing of samples
5.Cating of samples
5.Comparision and analysis of result with standard M25 grade of concrete

4. EXPERIMENTAL INVESTIGATION

4.1. Mix proportion

Step by step procedure of determine various ingredients of concrete is called Mix design which was done by using IS10262 (10). M25 grade of concrete was used having water cement ratio of 0.45. The mix proportions drafted 1:1.57:2.80 for experimentation.

Table-3: Mix proportions of materials

Sr no.	SDA & BA %	W/C ratio	Water (liter)	Cement (Kg/m3)	FA (Kg/m3)	CA (Kg/m3)	Slump (mm)
1	0	0.45	186	413	651.25	1159.94	120
2	10	0.45	186	371	651.25	1159.94	105
3	20	0.45	186	330	651.25	1159.94	98
4	30	0.45	186	289	651.25	1159.94	90

4.2. Test on Fresh Concrete

Slump test is conducted to find workability of all concrete mixtures by utilizing metallic slump mould .The level difference between the height of inside poured concrete point and height of mould consider as slump. This test performed as per IS 1199-1959.

Table-4:slump result

% of SDA & BA	Slump (mm)
0%	120
10%	105
20%	98
30%	90

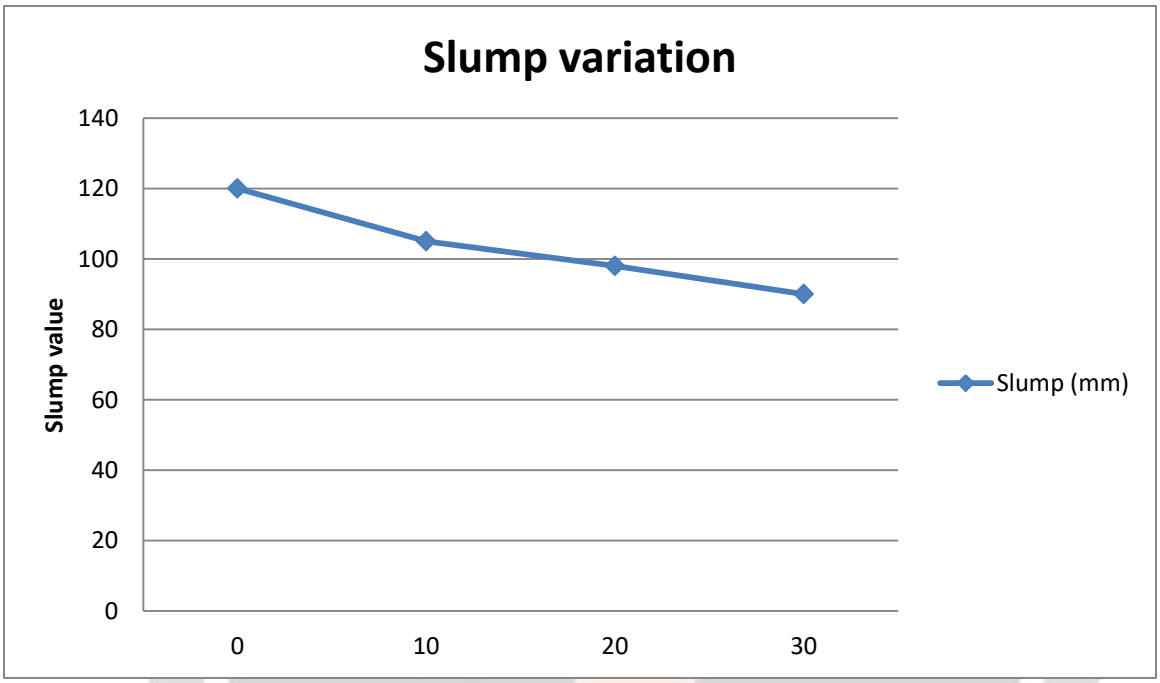

Chart-1:slump variation

4.3. Test on hardened Concrete

150mm x 150mm x150mm size of cube have been used to determine compressive strength.This specimen were cured as per IS 516-1959 and were tested for 14 and 28 days under normal condition.

Table-5:Compressive strength result

SDA & BA replacement (%)	Compressive strength (N/mm2)		
	7 days	14 days	28 days
0%	17.51	21.61	29.50
10%	22.18	26.48	31.26
20%	29.35	32.24	36.44
30%	16.28	19.20	22.38

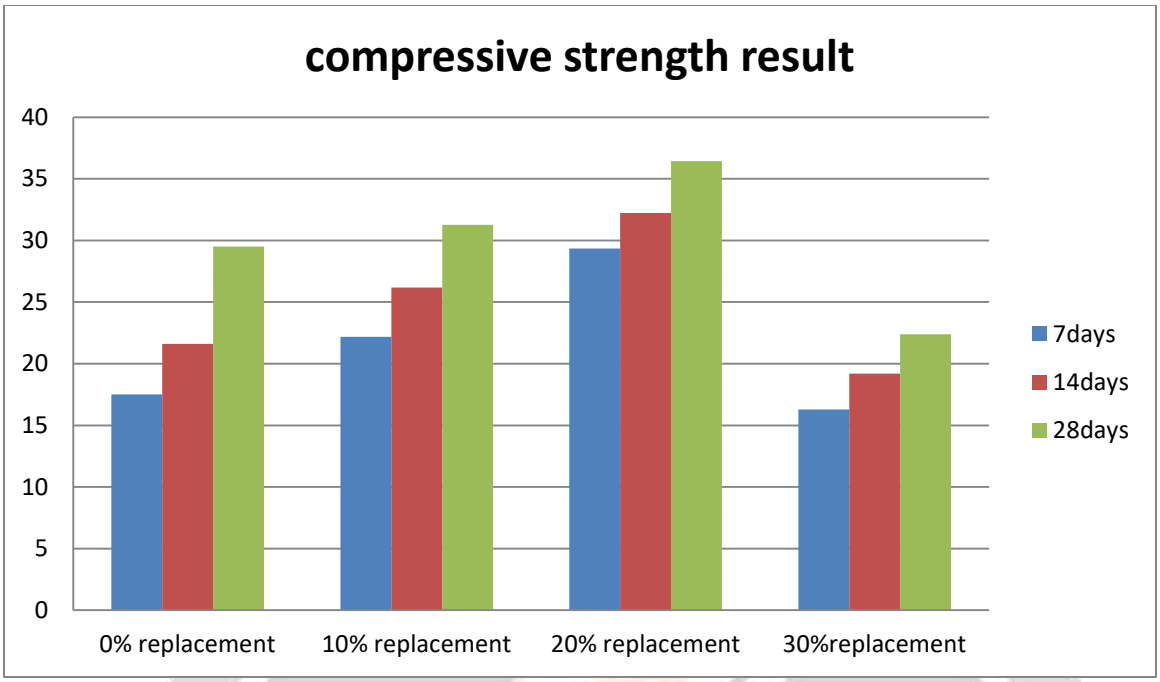

Chart-2:compressive strength result

4.4. Water absorption test

The percentage of water absorption of each concrete specimen is measured to calculate durability. Average weight of cube specimen cured in water for 28 days and average dry weight of cube specimen after removing from mould was measured**.**

CONCLUSION: Following result can be drafted from investigation that problem related to disposal of agricultural waste resulted by human activity have huge relevance so its effective to use this waste as replacement material for cement due to its cementious enrichment.

1. At 20% replacement of SDA and BA gives 29.35, 32.24, 36.44 compressive strength increases at 7, 14, 28 days
2. Concrete become less workable as SDA & BA% increases as more water is required to make concrete mix more workable and water demand remain high.
3. Use of SDA & BA are economical as they available widely at no cost.
4. Helps to overcome problem of disposal of agricultural waste and gives ecofriendly survival.
5. Compressive strength increases with curing period and decreases with increase amount of SDA & BA%. Only % of SDA & BA is adequate to gain maximum strength.

ACKNOWLEDGEMENT

I would like to gratefully acknowledge my guide prof. Dr. Valsson Vargesse and Co guide Mr .Anshul Nikhade for their help and fruitful views who helps to choose this project topic and provide all the detailed information regarding to carry out project work which helps me to enhance my knowledge related to various aspects of concrete industry and also effective use of this agricultural waste to obtained economical concrete.

REFERENCES

[1] S. Rukzon, P. Chindaprasirt, Utilization of bagasse ash in high-strength concrete, Mater. Des. 34 (2012) 45–50.
[2] A. Bahurudeen, M. Santhanam, Influence of different processing methods on the pozzolanic performance of sugarcane bagasse ash, Cem. Concr. Compos. 56(2015) 32–45.
[3] N.B. Singh, V.D. Singh, S. Rai, Hydration of bagasse ash-blended Portland cement, Cem. Concr. Res. 30 (2000) 1485–1488.
[4] K. Ganesan, K. Rajagopal, K. Thangavel, Evaluation of bagasse ash as supplementary cementitious material, Cem. Concr. Compos. 29 (2007) 515–524.
[5] H. Zanni, M. Cheyrezy, V. Maret, S. Philippot, P. Nieto, Investigation of hydration and pozzolanic reaction in reactive powder concrete (RPC) using 29Si NMR, Cem. Concr. Res. 26 (1996) 93–100.
[6] O. Bayard, O. Plé, Fracture mechanics of reactive powder concrete: Material modeling and experimental investigations, Eng. Fract. Mech. 70 (2003) 839–851.
[7] P.S. Ambily, C. Umarani, K. Ravishankar, P. Ranjan Prem, B.H. Bharatkumar, Nagesh R. Iyer, Studies on ultra-high performance concrete incorporating copper slag as fine aggregate, Constr. Build. Mater. 77 (2015) 233–240.
[8] A.S. El-Dieb, Mechanical, durability and microstructure characteristics of ultra-high-strength self-compacting concrete incorporating steel fibers, Mater. Des. 30 (2009) 4286–4292.
[9] M.K. Maroliya, C.D. Modhera, A comparative study of reactive powder concrete containing steel fibers and recron 3s fibers, J. Eng. Res. Stud. I (2010).
[10] E. Worrell, L. Price et al. Carbon Dioxide from the Global Cement Industry, Energy and the Environment 26 (2001) 303-329.

[11] Xin Y., Zhong T., Tian-Yi S., Zhu P., Performance of concrete made with steel slag and waste glass, Construction and Building Materials, 114 (2016) 737–746.

[12] J.-H., Xie, Y.-C., Guo, L.-S., Liu, Z.-H., Xie, Compressive and flexural behaviors of a new steel-fibre-reinforced recycled aggregate concrete with crumb rubber, Construction and Building Materials, 79 (2015) 263–272,
[13] M. Barbuta, M. Rujanu, A. Nicuta, Characterization of Polymer Concrete with Different Wastes Additions Procedia Technology, 22 (2016) 407–412.

[14] Celik T. Merer K. (1996). "Effect of crushed stone dust on properties of concrete, cement concrete" Res. 26(7), 1121-1130.