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COMPARATIVE STUDY ON COMPRESSIVE STRENGTH OF MODIEFIED CONCRET BY ADDITION OF AGROWASTE ASH

Dinesh S. Ther[1]

[1]U.G. Student, S. S. P. A. C. E. Wardha, Maharashtra, India. dineshther76@gmail.com

Pratish S. Nakshine[2]

[2]U.G. Student, S. S. P. A. C. E. Wardha, Maharashtra, India. pratishnakshine57@gmail.com

Salim Kha[3]

[3]U.G. Student, S. S. P. A. C. E. Wardha, Maharashtra, India. salimmaliq7@gmail.com

Divyani V. Bhand[4]

[4]U.G. Student, S. S. P. A. C. E. Wardha, Maharashtra, India. divyanibhand55@gmail.com

Komal A. Bhagat[5]

[5]U.G. Student, S. S. P. A. C. E. Wardha, Maharashtra, India. komalbhagat7257@gmail.com

Shrikant R. Nagoshe[6]

[6]Proffesor, S. S. P. A. C. E. Wardha, Maharashtra, India. shrikantnagoshe@gmail.com

***ABSTRACT**: This paper aims of studying and analyzing the various properties of concrete by partially replacement of cement with RHA, Sugarcane Bagasse Ash, Cotton Plant Ash, Giant Reed Ash and Saw Dust Ash. These are the some solid waste produced by Human Beings for their day to day utilities. The study investigated the physical and chemical composition of ash as well as the workability and compressive strength properties of the concrete produced by replacing 5% 10% 15% 20% 25% and 30% by weight of ordinary portland cement with Saw dust ash (SDA), Rice husk ash(RHA),Giant reed ash, Cotton plant ash, Slump and compacting factor tests were carried out on the fresh concrete and compressive strength test on hardened concrete. The concrete cubes were tested at the ages of 3, 7 and 14 days, Which gives maximum compression strength, spilt tensile strength and flexural strength over normal concrete.*

1. INTRODUCTION:

Due to rapidly growing civilization, day by day the amount of solid waste is increasing so there are only two way to control or to recycled it and reused it. This industrial waste RHA is a great environment threat causing damage to thev land and the surrounding area in which it is dumped. Lots of ways are being thought of for disposing it by making commercial use of this RHA, In the present investigation, Portland cement was replaced by Saw dust ash(SDA), Rice husk ash(RHA), Giant reed ash, Cotton plant ash and SCBA at various percentages to study compressive , Tensile and Flexural strength. About 20 million tons of RHA is produced annually. Sugar cane bagasse is an industrial waste which is used worldwide as fuel in the same-sugar cane industry. The combustion yields ashes containing high amounts of unburned matter,

silicon and aluminium oxides as main components. Giant reed is an aggressive agricultural species with remarkable reproductive abilities allow it to out competenative species of plants for land and food resources. The results confirm that using giant reed offers a sustainable approach to solve the pollution problems. The cotton species recognized in the world are about 50, of which 4 are cultivated Two of these are diploids, and two are tetraploids. More than 80% of world cotton area is covered by tetraploids. Sawdust is the term given to the product formed after cutting the wood log. It occurs various sizes and shape depending upon the way it cut. It occurs in abundant quantity in universe about 1to 13% of wood log is processed intob sawdust such as proficient amout of sawdust waste is mostly fed to landfill disposal.

2. EXPERIMENTALS AND METHODS:

2.1 Materials Used :

2.1.1. Cement :

The Cement used was Ordinary Portand Cement . it was sourced Wardha and it conformed to the requirements of BSEN 197-1:2000

2.1.2. Fine Aggregate

The sand use for the research work was sourced from Wardha. The impurities were removed and it conformed to the requirements of BS 882(1992).

2.1.3. Coarse Aggregate

The Granite used for this research work was 20mm size. It was source from wardha.

2.1.4. Rice Husk Ash

The Rice Husk used was obtained from Gondia. After collection, the Rice Husk was burnt under guided or enclosed place to limit the amount of ash that will be blown off.. The ash was ground to the required level of fineness and sieved through 90µm sieve in order to remove any impurity and larger size particles**.**

2.1.5.Sugarcane Bagasse Ash.

The Sugarcane Bagasse ash used was obtained from Wardha (Jamani). After collection, the sugarcane Bagasse Ash was burnt under guided or enclosed place to limit the amount of ash that will be blown off.. The ash was ground to the required level of fineness and sieved through 90µm sieve in order to remove any impurity and larger size particles**.**

2.1.6. Sawdust Ash

The Sawdust ash used was obtained from Wardha. After collection, the Sawdust Ash was burnt under guided or enclosed place to limit the amount of ash that will be blown off. The ash was ground to the required level of fineness and sieved through 90µm sieve in order to remove any impurity and larger size particles**.**

2.1.7. Giant reed Ash

The Giant reed Ash used was obtained from Ralegaon (Yavatmal). After collection, the Giant reed Ash was burnt under guided or enclosed place to limit the amount of ash that will be blown off.. The ash was ground to the required level of fineness and sieved through 90µm sieve in order to remove any impurity and larger size particles**.**

2.1.8.Cotton plant Ash

The Cotton plant ash used was obtained from Ralegaon (Yavatmal). After collection, the Cotton Plant Ash was burnt under guided or enclosed place to limit the amount of ash that will be blown off.. The ash was ground to the required level of fineness and sieved through 90µm sieve in order to remove any impurity and larger size particles**.**

2.1.9. The water used for the study was obtained from a free flowing stream. The water was clean and free from any visible impurities**.**

2.2. Batching and Mixing :

Baching of maerial was done by weight. The percentage replacement of Ordinary Portland Cement (OPC) by Rice Husk ash, Shugarcane Bagassas Ash, Sawdust Ash, Giant reed Ash and Cotton Plant Ash. As 0%, 5%, 10%, 15%, 20%, 25% and 30% . The 0% replacement was to serve as control for other samples.

2.3. Concrete Mix Design

The Concrete used in this research work was made using cement, sand, and arrogate. The concrete mix proporation was 1:1.64:3.05 by weight. **2.4.**

2.4. Casting of samples

Cubic cylinder & beam specimens of concrete with size 150 x 150 x 150 mm, dia150 x 300mm & 150 x 150 x 600 mm respectively were cast for determination of all measurements. Six mixes were prepared using different percentages of 0, 5, 10, 15, 20, 25 and 30 with addition of Agrowaste ash in Cement. The concrete was mixed, placed and compacted in three layers. The samples were remolded after 24 hours and kept in a curing tank for 3, 7 and 14 days as required.

3. CHEMICAL PROPERTIES OF AGROWASTE ASH

Oxide Composition (% by mass)	Ordinary Portland Cement	Rice Husk Ash	Saw Dust Ash	Sugarcane Baggase Ash	Cotton Plant Ash
SiO_2	20.99	88.32	50.20	45.34	18.79
AL_2O_3	6.19	0.46	1.02	0.98	6.01
Fe_2O_3	3.86	0.67	14.23	1.20	3.92
CaO	65.96	0.67	5.45	2.73	26.93
MgO	0.22	0.44	0.09	2.51	6.61
Na_2O_3	0.17	0.12	0.079	0.20	2.51
K_2O	0.60	2.91	9.57	6.27	17.62
LOI	1.73	5.81	2.16	3.7	3.90
Specific gravity	2.94	2.11	2.51	2.68	1.54

4. RESULT

4.1. Compressive Strength For Saw Dust Ash

Sr. No	% Of Cement	% Of Saw Dust Ash	Compressive Strength After 3 Days (N/mm^2)	Compressive Strength After 7 Days (N/mm^2)	Compressive Strength After 14 Days (N/mm^2)
1	100	0	8.86	17.89	26.75
2	**95**	**5**	**11.20**	**16.67**	**20**
3	90	10	9.28	15.91	23.64
4	**85**	**15**	**10.31**	**14.80**	**19.11**
5	80	20	9.06	13.33	16.88
6	75	25	8.44	10.66	11.59
7	70	30	8.03	9.36	11.51

4.2. Compressive Strength For Cotton Plant Ash

Sr. No	% Of Cement	% Of Saw Dust Ash	Compressive Strength After 3 Days (N/mm^2)	Compressive Strength After 7 Days(N/mm^2)	Compressive Strength After 14 Days (N/mm^2)
1	100	0	8.86	17.89	26.75
2	**95**	**5**	**16.08**	**16.28**	**19.11**
3	**90**	**10**	**14.82**	**14.19**	**17.33**
4	85	15	11.11	13.15	14.67
5	80	20	8.44	9.78	11.56
6	75	25	6.89	7.55	8.71

7	70	30	5.55	8.44	8.00

4.3.Compressive Strength For Giant Reed Ash

Sr. No	% Of Cement	% Of Saw Dust Ash	Compressive Strength After 3 Days (N/mm^2)	Compressive Strength After 7 Days (N/mm^2)	Compressive Strength After 14 Days (N/mm^2)
1	100	0	8.86	17.89	26.75
2	**95**	**5**	**12.70**	**14.67**	**15.24**
3	**90**	**10**	**10.31**	**14.82**	**13.85**
4	85	15	11.11	10.23	10.71
5	80	20	6.36	6.86	10.16
6	75	25	5.37	6.44	8.22
7	70	30	4.81	4.37	4.60

4.4.Compressive Strength For Shugarcane Bagasse Ash

Sr. No	% Of Cement	% Of Saw Dust Ash	Compressive Strength After 3 Days (N/mm^2)	Compressive Strength After 7 Days (N/mm^2)	Compressive Strength After 14 Days (N/mm^2)
1	**100**	0	8.86	17.89	26.75
2	**95**	**5**	**9.25**	**18.89**	**21.95**
3	**90**	**10**	**10**	**17.54**	**19.17**
4	**85**	**15**	**11.1**	**16.40**	**20.62**
5	80	**20**	**8.25**	**15.25**	**19.5**
6	75	25	7.95	13.85	16.2
7	70	30	6.87	11.54	14.51

4.5.Compressive Strength For Rice husk Ash

Sr. No	% Of Cement	% Of Saw Dust Ash	Compressive Strength After 3 Days (N/mm^2)	Compressive Strength After 7 Days (N/mm^2)	Compressive Strength After 14 Days (N/mm^2)
1	100	0	8.86	17.89	26.75
2	**95**	**5**	**10**	**15**	**28**
3	**90**	**10**	**12.75**	**17.24**	**29**
4	**85**	**15**	**14**	**21.87**	**34.45**
5	**80**	**20**	**11.65**	**17**	**26**
6	75	25	9.45	16	21.75

7	70	30	8.14	14.73	19.54

5. CONCLUSION

From the Above Activities And Result We concluded that

- Use of agrowaste ash in concrete will help in waste and pollution reduction.
- Its use in concrete construction will help in relieving the potential issue of dwindling natural resources.
- Its use will also help to reduce the material cost in construction. Therefore, it becomes necessary for sustainable and clean environment that the agrowaste would be used in low costing housing, in rural areas and places where agrowaste is abundant.

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