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PARTIALLY REPLACEMENT OF FINE AGGREGATE IN THE CONCRETE BY USING AGRICULTURAL WASTE TO THE BUILT ENVIRONMENT

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Abstract— **The High demand of natural resources due to rapid urbanization and the disposal problem of agricultural wastes in developed countries have created opportunities for use of agro-waste in the construction industry. Many agricultural waste materials are already used in concrete as replacement alternatives for cement, fine aggregate, coarse aggregate and reinforcing materials. This research optimal some of the agro-waste materials used as a partial replacement of fine aggregate in concrete. COFFEE HUSK and TABACO as partial replacement of OPC for M20 concrete grade production. Different properties of fresh and hardened concrete. concrete with up to 40% replacement satisfies the compressive strength of M20 grade however higher the percentage replace of agro waste reduces the strength of concrete .The workability of concrete increased with the increase in agro waste content of fine aggregate replacements at same water cement ratio**

Keywords— **Agro waste, Coffee husk, Tabaco, Agriculture**

I. INTRODUCTION

IJEAST Water Concrete is a mixture of cement, fine aggregate and coarse aggregate, which is mainly derived from natural resources. Increasing population, expanding urbanization, climbing way of life due to technological innovations has demanded a huge amount of natural resources in the construction industry, which has resulted in scarcity of resources. This scarcity motivates the researchers to use, solid wastes generated by industrial, mining, domestic and agricultural activities. It is observed that in India more than 600 MT wastes have been generated from agricultural waste, which is seriously leading to a disposal problem. Reuse of such wastes as sustainable construction materials take care of the issue of contamination, as well as the issue of area filling and the expense of building materials. The Major quantity of solid wastes generated in India is reported in 2014 expressed that research on the utilization of agricultural waste, as an aggregate substitution is generally new and more research is needed for long term durability properties of concrete. Large quantities of tobacco waste are produced annually by processing and cigarette making (Shafigh et al., 2014). Fig. 9 shows the shape of tobacco waste used in concrete. Ozturk and Bayrakl (2005) carried out a study to determine the possible use of tobacco waste in concrete. They tested different properties with varying percentage replacement of tobacco waste and pumice. Based on density, lightweight concretes are divided into three groups. Low density and low compressive strength which is used in isolation, middle density and middle compressive strength concretes used for briquette producing and the carrier lightweight concretes are used in constructing

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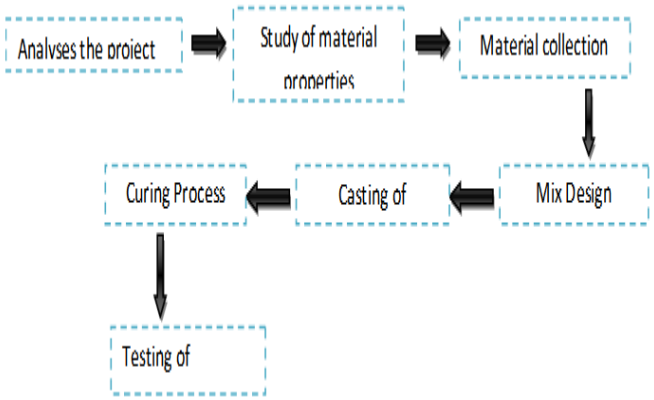
foundations and supporting parts (Short et al., 1978; Bhatty and Reid, 1989). Ozturk and Bayrakl (2005) found the low density and compressive strength of tobacco waste which can be used as an isolation material in concrete

II. PROPOSED METHODOLOGY



Sl.No	Material Used	Amount/mould
1	Cement	383 kg/m3
2	Water	191.6 kg/m3
3	Fine Aggregate	825.22 kg/m3
4	Coarse Aggregate	1004.4kg/m3
5	Water-Cement ratio	0.50

Table.1: Material Used

SL.NO	PARTICULARS	TEST RESULT
1)	Specific Gravity of Cement	3.15
2)	Specific Gravity of Sawdust	1.18
3)	Specific Gravity of Coarse Aggregates	2.75
4)	Specific Gravity of Fine Aggregates	2.63
5)	Initial and Final Setting time of cement	Initial :48 min, Final :10hr 40min
6)	Fineness modulus for fine aggregate	3.18
7)	Fineness modulus for coarse aggregate	4.97
8)	Impact strength of coarse aggregate	14.6%
9)	Aggregate crushing value of coarse aggregate	2.06%
10)	Water absorption test	Coarse Aggregates 0.5%,Fine Aggregates 1.0%

Table.2: Laboratory test results of Aggregates

The Mixing of ingredients of concrete is done for the designed mix proportions for various grades of concrete mixes by replacing the fine aggregate with different percentages (0%, 20%, 25%, and 30%) of tobacco waste and coffee husk. Slump cone test and compacting factor test measures the workability of fresh concrete mix. The workability tests are carried out as per specification of IS: 1199-1959.The materials which are free from the organic impurities were sieved and the weigh batching for ingredients was done. The concrete ingredients were weighed and mixed. The concrete cubes of (150x150x150) mm dimension were casted with 0%, 20%, 25% & 30% of tobacco waste and coffee husk as partial replacement for fine aggregate was casted.
The specimens are stored in the laboratory atmosphere for 24 hours from the time of adding water to the ingredients. Temperature was maintained at 27 +/- 2o C. The specimens are of solid cubes and beams were kept immersed in clean water for curing after 24 hours of casting.

III. EXPERIMENT AND RESULT

The materials which are free from the organic impurities were sieved and the weigh batching for ingredients was done. The concrete ingredients were weighed and mixed. The concrete cubes of (150x150x150) mm dimension were casted with 0%, 20%, 25% & 30% of tobacco waste and coffee husk as partial replacement for fine aggregate was casted.
The specimens are stored in the laboratory atmosphere for 24 hours from the time of adding water to the ingredients. Temperature was maintained at 27 +/- 2o C. The specimens are of solid cubes and beams were kept immersed in clean water for curing after 24 hours of casting. Test results were tabulated below

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Percentage Replacement	w/c ratio	Compressive strength Mpa
0%	0.5	13.12
20%	0.5	14.23
25%	0.5	14.58
30%	**0.5**	**15.01**

Table 3: Compressive strength Mpa 7days using tobacco waste

Percentage Replacement	w/c ratio	Compressive strength Mpa
0%	0.5	17.38
20%	0.5	17.87
25%	0.5	17.70
30%	**0.5**	**17.63**

Table 4: Compressive strength Mpa 14 days using tobacco waste

Percentage Replacement	w/c ratio	Compressive strength Mpa
0%	0.5	19.12
20%	0.5	19.62
25%	0.5	19.70
30%	**0.5**	**19.32**

Table 5: Compressive strength Mpa 21 days using tobacco waste

Percentage Replacement	w/c ratio	Compressive strength Mpa
0%	0.5	**20.13**
20%	0.5	**21.24**
25%	0.5	**21.56**
30%	**0.5**	**22.12**

Table 5: Compressive strength Mpa 28 days using tobacco waste

Percentage Replacement	w/c ratio	Compressive strength Mpa
0%	0.5	13.12
20%	0.5	15.14
25%	0.5	15.37
30%	**0.5**	**15.01**

Table 6: Compressive strength Mpa 7 days using coffee husk

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Percentage Replacement	w/c ratio	Compressive strength Mpa
0%	0.5	17.38
20%	0.5	16.93
25%	0.5	17.27
30%	**0.5**	**17.84**

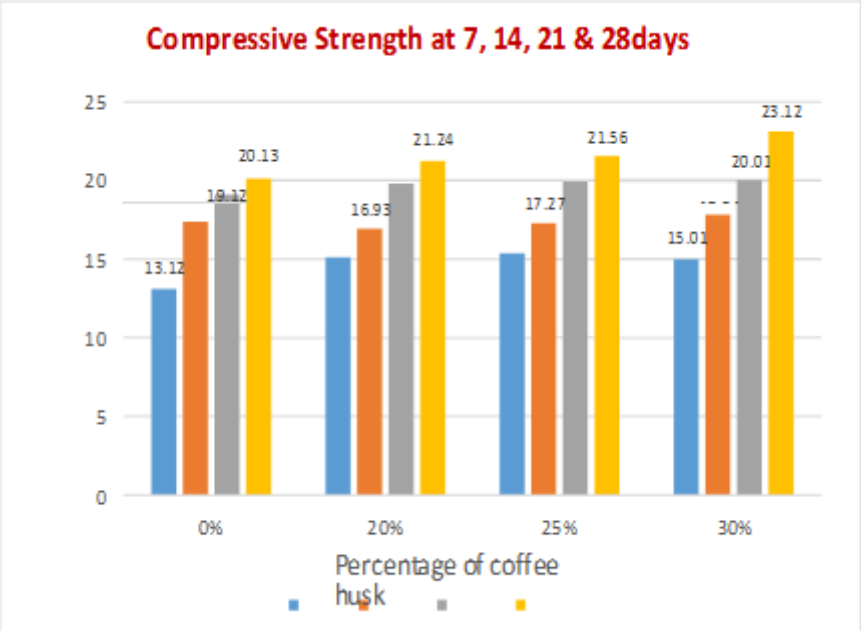
Table 6: Compressive strength Mpa 14 days using coffee husk

Percentage Replacement	w/c ratio	Compressive strength Mpa
0%	0.5	19.12
20%	0.5	19.81
25%	0.5	19.94
30%	**0.5**	**20.01**

Table 7: Compressive strength Mpa 21 days using coffee husk

Percentage Replacement	w/c ratio	Compressive strength Mpa
0%	0.5	**20.13**
20%	0.5	**21.24**
25%	0.5	**21.56**
30%	**0.5**	**23.12**

Table 8: Compressive strength Mpa 28 days using coffee husk



Graph 1: Compressive Strength at 7, 14, 21 & 28 days by using coffee husk

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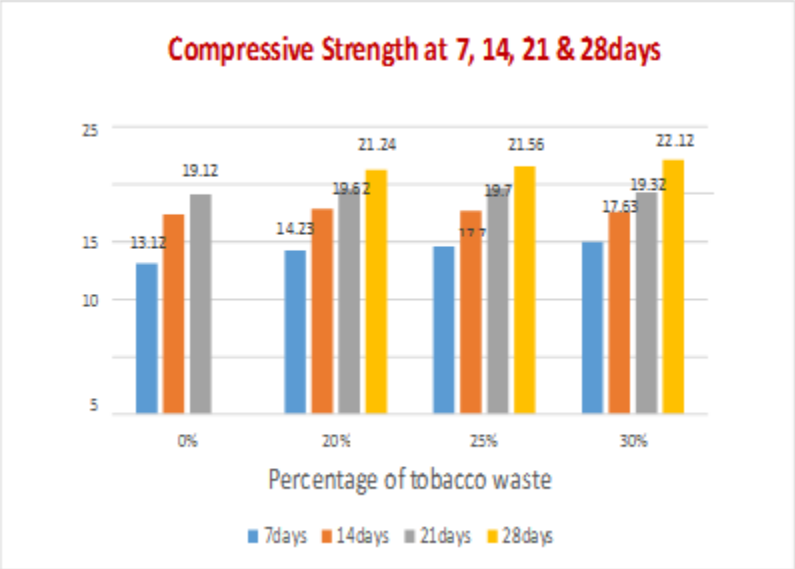

Graph 1: Compressive Strength at 7, 14, 21 & 28 days by using tobacco waste

IV. CONCLUSION

The test results show clearly that the agriculture waste can be as a partial replacement material for cubes the optimum replacement of sand by agro waste is found to be 40% in the present study. The concrete with up to 40% replacement satisfies the compressive strength of M20 grade however higher the percentage replace of agro waste reduces the strength of concrete. The workability of concrete increased with the increase in agro waste content of fine aggregate replacements at same water cement ratio. The replacement of aggregate using agro waste in concrete increases the density of concrete there by increases the self-weight of the concrete. Thus due to replacement we can utilized an Agro West effectively also we can get a replacement approach towards natural material which are conventional it also shows the minimization the cost of concrete hence economy also achieved.

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