International Journal of Recent Trends in Engineering & Research
ISSN (ONLINE) : 2455 – 1457
IMPACT FACTOR : 4.101

ICNSCET20- International Conference on New Scientific Creations in Engineering and Technology

EXPERIMENTAL INVESTIGATION ON PARTIAL REPLACEMENT OF FINE AGGREGATE BY WOOD ASH ON CONCRETE

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Abstract- This project work intends to investigate the possibility of producing low costs enhanced performance concrete by wood ash. By taking the enormous amount of sand in river beds, it affects the environment badly and demand for fine aggregate is increase day by day. So by partially replacing Prosopis juliflora ash with fine aggregate in construction field, it can serve both the purpose of meeting the demands of construction industry and at the same time providing a green and clean environment. This expectation of partial replacement of fine aggregate by using wood ash in concrete gives the general characteristics like density, strength, workability and durability. The conventional concrete mixture consists of cement, course aggregate, fine aggregate and water in the project wood ash is used with different percentage 0f 10%,20%,30%. The total number of 9 cubes of 150-150mm is casted using the grade of concrete M20. The mixture is prepared for concrete cubes and conduct the compressive strength on 7 days, 14 days and 28 days.

Keywords-cement, course aggregate, fine aggregate, Prosopis juliflora ash

I. INTRODUCTION

Generally, The fine aggregate is an essential component of concrete. The most commonly used fine aggregate is natural river sand. The global consumption of natural river sand is very high due to the extensive use of concrete the demand of natural river sand is quite high in developed countries owing to infrastructural growth. The non – availability of sufficient quantity of Ordinary River for sand for making cement concrete is affecting the growth of construction industry is many parts of the country recently. In Tamil Nadu government (India) has imposed restrictions on sand removal from the river beds due to unsafe impacts threating many parts of the state. On the other hands the granite was generated by the industry has accumulated over years. It is considered that these energy resources will be the CO2 neutral energy resource when the consumption rate of the fuel is lower than the growth rate. Also, the usage of wastes generated from the biomass industries (sawdust, woodchips, wood bark, saw mill scraps and hard chips) as fuel offer a way for their safe and efficient disposal. Wood wastes are commonly preferred as fuels over other herbaceous and agricultural wastes as their incineration produces comparably less fly ash and other residual materials. It is commonly observed that the hard wood produces more ash than softwood and

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the bark and leaves generally produce more ash than softwood and the bark and leaves generally produce more ash as compared to the inner part of the trees.

II. RAW MATERIALS

1.Cement

Ordinary Portland concrete grade 53, conforming in order to I.S 12269-1987 has been used .Cement acts as a holding agent for materials. Cement is the most pricey materials in concrete and its available in several forms. Any time cement is mixed together with water, a chemical effect takes place therefore regarding which the cement substance sets and hardens into a stone mass. The properties regarding cement that have been studied usually are standard consistency, initial establishing time and specific gravitational pressure

2. Fine Aggregate

The size of fine aggregate should not less than 150 microns and not more than 4.75mm.The pycnometer test was conducted to find the specific gravity. The specific gravity of fine aggregate is 2.67.

3.Coarse Aggregate

The material which is retained on 4.75mm size IS sieve is termed as a coarse aggregate. Broken stone is generally used as an aggregate. Natural crushed aggregate with maximum size of 20mm is used.

4. Wood Ash

In the current trends of energy production, power plants which run from biomass have low operational cost and have continuous supply of renewable fuel. Prosopis juliflora ash is obtained from biomass waste power plants as a waste material. Prosopis juliflora ash does not have cementatious property by itself which is responsible for strength generation.

III.MIX DESIGN AND MIXING OF CONCRETE

Wood Ash in the order of 10%, 20% and 30% is used in concrete with the mix ratio of M25. As per Indian standard . Guidelines the mix design was carried out. The mix proportions of the concrete were 1.5:2.75:4.92:0.5 (Cement, Fine aggregate, Coarse aggregate and water/cement ratio).The mixing can be done by manual

IV. COMPRESSIVE STRENGTH TEST

The compressive strength results at the age of 7 days, 14 days and 28 days at the partial replacement percentages such as 0%, 10%,20%,30% of wood ash are presented in chart 7.1, chart 7.2, chart 7.3and chart 7.4. It was noticed from the results that there is steep increase in compressive strength with addition of wood ash in concrete. Based on the comparison of partial replacement percentages such as 10%,20%,30% compressive strength it can be concluded that 20% replacement is optimum.

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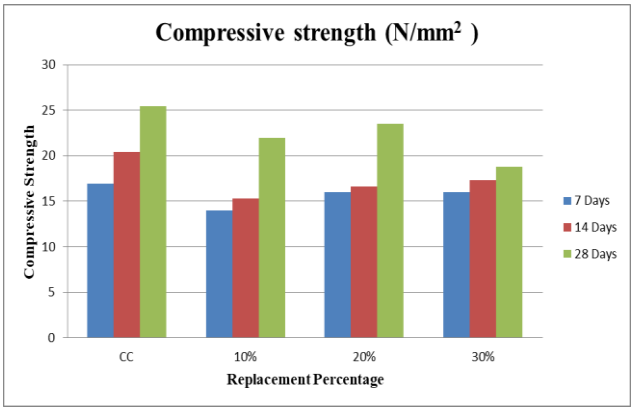

VI. CONCLUSION

The basic properties of materials were tested and results tabulated. The concrete mix proportions are determined by using various trial and error method. The concrete is achieved by Cement, Prosopic juliflora ash are replaced in cement at 20%,30%,40%. The concrete test are conducted and to find out the workability. On comparing the results, it is understand that the concrete with 20% fine aggregate partially replaced by Prosopis juliflora wood ash gives better values than the other% of replacement. The maximum compressive strength of 20% replacement on concrete is about 23.5 N/mm2. Which is nearly equal to the compressive strength of M20 conventional concrete. Therefore in future aggregate may be replaced partially with Prosopis juliflora wood ash to reduce the cost of construction. We are trying to find the optimum proportion of the Prosopis juliflora wood ash by which one is the maximum strength achieved and the concrete will have lighting weight compared to the normal concrete and environment friendly.

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