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Influence of Utilizing Prosopis juliflora Ash Assessment on Mechanical Properties of Concrete

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Abstract: The rising cost of building construction materials is a factor of great concern. We all want our building to be strong and should be built with construction material at reasonable rates. Nowadays, most of the researches are doing research on the material which can reduce the cost of construction as well as increase the strength. Waste materials are used in concrete in the replacement of any ingredient, are selected according to their properties. This project paper is written to show the effect of concrete with partial replacement of Cement with prosopisjulifloratreash. The ash is replaced in cement with prosopis juliflora tree ash in various proportion by weight like 5%, 10%,15%, instead of Cement in M20 concrete and the compressive strength , Split tensile strength and flexural strength of concrete were find at different curing periods (7,14 and 28 days). Various tests are conducted on samples like determination of Sieve test , Specific gravity test and Workability of prosopis juliflora tree ash in different proportion. Prosopis juliflora tree ash is economical in terms of cost &this reduces the environmental risk, maintaining the ecological balance.
Keywords: Cement OPC 53 grades, M – Sand, Coarse Aggregate, Water, Prosopisjuliflora tree ash

I. INTRODUCTION

Concrete is a composite material consisting of aggregate (gravel and sand), cement, and water. As a construction material, concrete can be cast in almost any shape desired, and once hardened, can become a structural (load bearing) element. In any Construction project, the cement will take the major share in construction cost. So that, the replacement of Cement with any alternate material is essential to make the construction as economical one. Pozzolana is one of the widely used alternate material for replacing the cement. Pozzolana is nothing but an Ash like Fly ash, Rice husk Ash, etc. In this way, we also try to use the prosopis juliflora ash as a Pozzolana for replacing the cement and study the Characteristics of Concrete. Much research is undergoing in the construction industry to reduce the pollution in the environment. We carry out the project of to check the availability of cementation of prosopis juliflora ash as admixture, ProsopisJuliflora is nothing but is small tree is commonly known as Seemaikaruvelam in villages. This tree is increasing rapidly in our Tamil Nadu state and makes environment problem such as reduction of ground water level. We are giving alternate solution for removing these trees. So, we are using this tree ash in civil engineering field.

II. OVERVIEW OF PROSOPIS JULIFLORA PLANTASH

To Find & verify the prosopisjuliflora ash as an alternate Cementations material Instead of Cement.
To Study & Compare the Characteristic strength of concrete cube by replacing the prosopis juliflora ash at various percentage against Cement.
To compare the Cost of Concrete perm^3 for the various proportion of replacement of ProsopisJuliflora ash with Conventional concrete. There by, it can be reducing the cost of the Construction and make the Construction as Economical one.
To control water depletion and water scarcity.
To increase the ground water table.

III. LITERATUREREVIEW

P.Packialakshmi et al (2016) the paper discusses the effects of using hypo sludge and wood ash (prosopis juliflora ash) as a partial cement replacement in concrete. An experimental study of concrete made with Ordinary Portland Cement (OPC) and 10% of OPC, replaced by hypo sludge. The hypo sludge 10% take as constant and further adding of wood ash from 0% to 30% as cement replacement for concrete. To determine the effect of these materials on concrete properties and was compared to control M20 mix. Concrete specimens were tested for compressive strength, tensile strength, and flexural strength at the age of 28 days.

Etaveni Madhavi et al (2016) the objective of this research work is to reduce the cost of the construction. Now a days the industrial wastes are rapidly increasing. To utilize such materials and to reduce such types of waste in the environment. The cement is replaced by wood ash. Wood ash limited to the grain size of less than 90 micrometer is added to cement by weight percentage of 0%, 5%, 10%,15%,20%,25%and30%bythemethod of replacement by weight. The samples were hydrated at direct time intervals ranging from one hour to 4 weeks. From this research the results are much better as compared to ordinary Portland cement.

IV. MATERIAL ANALYSIS

The prosopis juliflora plant ash are provided as the percentage given above. Aggregates are the major ingredients of concrete. They constitute 70-75% of the total volume; provide a rigid skeleton structure for concrete, and act as economical space fillers. The aggregates form the main matrix of the concrete. The aggregate particles are glued together by the fly ash and water paste with cement and water the entire matrix binds together into a solid mass called concrete. Aggregates influence the properties of concrete such as water requirement, cohesiveness and workability of the concrete in plastic stage, while they influence strength, density, durability, permeability, surface finish and colour in hardened stage. It is therefore significantly important to investigate the various properties of aggregates. Aggregates are generally inert and broadly divided into two categories, i.e. fine and coarse, depending on their size. Aggregates with grain size below 4.75mm are termed fine aggregates and above4.75mmaretermed as coarse aggregates. I.S.383-1963 defines the requirement of aggregates.

MIX DESIGN FOR PROSOPIS JULIFLORA PLANT ASH

With Reference to Dhir's Method of Designing Fly ash Concrete mix

Step 1: Target mean Strength. fct = fck+ (t xs)fct=20+(1.65x4.6)fct =27.59N/mm2

Step2: Selection of Water/cement Ratio The Free Water/Cement ratio is 0.7.

Step3: Determination of Water content For Considerable work ability of 60– 120mm Slump, The required water content = 195kg/m^3

Step 4: Determination of Cement content Cement Content=W/(W/C) =195/0.7 =278 kg/m^3

Step 5: Flyash Content F/(F+C) = 10/100 [F/(F+278)]=0.10 After solving, F=92kg/m3

Step 6: Calculation of Plastic/wet Density S=[(2.53+2.63)/2]=2.58 From the Graph Wet density,P=2290kg/m3 Total Aggregate Content, A= [p- (C+F+W)] After solving, A=1789.2Kg

Step 7: Fine and Coarse Aggregate Content Fine Aggregate =(40/100)x 1786 =714kg

Coarse Aggregate = 1786–714 =1010.6Kg

V. CONCLUSION

As per our project prosopis juliflora tree ash is effectively used in construction as a replacement to the binding material cement. We are using prosopisjuliflora tree as has 5%, 10%, 15% to the weight of cement in our construction industry. By adding this prosopis juliflora tree ash. We have done the test on the material like cements and, aggregate and ash of the juli flora plant. We are going to reduce the cost by adding the juliflora plantash in the given percentage by weight it will be eco friendly. In phase II casting of Cube, Cylinder, and prism are carried out by testing of the compressive strength, splittensile strength and flexural strength of concrete were found at different curing period comparison with conventional concrete is determined. It can be easily affordable for all the poor people in the world.

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