

EXPERIMENTAL INVESTIGATION ON CONCRETE BY PARTIAL REPLACEMENT OF CEMENT BY PROSOPIS JULIFLORA ASH

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ABSTRACT- The experimental investigations are carried out to study the effect of prosopis juliflora ash in RCC structure by partial replacement with cement. To introduce a concrete by adding prosopis juliflora ash with different levels of 25%, 30%, 35%. The compression strength of concrete taken for 14 days and 28 days. The grade of concrete M40 is used. To perform and compare the compression strength of concrete with and without replacement of cement. prosopis juliflora ash possesses similar properties to that of cement.

Key words: Prosopis juliflora ash, M40 grade concrete, Compressive strength, cement.

1. INTRODUCTION

Prosopis juliflora ash is one of the species that has performed much better than many native woody species. These species has become naturalized and spread over the greater part of north-west, central, west and south India. Prosopis juliflora is xerophytic and is adapted to many soil types under a wide range of moisture conditions. Prosopis juliflora has been used to arrest wind erosion and stabilize sand dunes on coastal areas. It is fast growing, nitrogen-fixing and tolerant to arid conditions and saline soils. Under the right conditions. Prosopis juliflora can produce a variety of valuable goods and services, construction materials, charcoal, soil conservation and rehabilitation of degraded and saline soils. The plant is removed by uprooting and is burnt. Prosopis juliflora ash is partial replaced with cement. Materials was produced, tested and compared with conventional concrete in terms of workability and strength. To carry out the study about the effect of compression strength behavior of cement with prosopis juliflora ash.

1.1. LITERATURE REVIEW

P. Packialakshmi et al., [1] an experimental study of concrete made with Ordinary Portland Cement (OPC) and 10% of OPC, replaced by hypo sludge. 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 age of 28 days.

Etaveni Madhavi et al., [2] 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 scale back such sort of waste in environment. The cement is replaced by the 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% and 30% by the method of replacement by weight. The samples were hydrated at different time intervals ranging from one hour to 4 weeks. From this research the results are much better as compared to ordinary hydraulic cement.

B.R. Harini et al., [3] an experimental investigation is carried out on a concrete containing waste prosopis juliflora ash in the range of 0% to 20% by weight for M-20 grade concrete. These tests were carried out on standard cube of 150*150*150 mm for 28 days to determine the compressive strength of concrete.

Raghu K et al., [4] in this paper they are investigated about the current situation of increasing cement producing industries produces large extent of carbon dioxide to nature and due to industries the large extent of industrial by products (waste) are being accumulated to environment and economic concerns related to their disposal (land filling). Utilization of wastes

materials like wood ash, risk husk ash, saw dust ash, coconut shell ash are used partial in concrete to minimize environmental and ecological problems.

A.Durai Murugan et al.,[5] in today's world the main emphasis is on green and sustainable development. Cement industry is one among the main contributors to pollution by releasing CO_2 . So by partially replacing cement with pozzolanic material like algarroba ash, the cement industry can serve both the needs of meeting the stress of housing industry and at the same time providing a green and clean environment. Juliflora ash doesn't have cementitious property by itself which is liable for strength generation. But in presence of water it reacts with free lime obtained from cement and form hydrated products (C_2S and C_3S) which helps in attaining the strength and also improving the durability. As the ash is extremely fine in structure, it fills more voids and provides superior pore structure and thereby improves its strength at later stages because of reduced permeability.

K.V.Boobala Krishnan.,[6] This paper describes about an experimental investigation conducted to study the behavior and strength of concrete by replacing cement with wood ash and fine aggregate with wood powder. Use of wood ash and wood powder in concrete is an interesting possibility for economy on conservation of natural resources. Cement is partially replaced by 5% of Wood Ash and Fine aggregate is partially replaced by 5%,10% and 15% of wood powder.

2. MATERIALS

2.1. CEMENT- Ordinary Portland cement is composed of calcium silicates and aluminate and aluminoferrite. Its main purpose is to bind concrete. Cement is partially replaced with Juliflora ash before mixing. The specific gravity of the obtained cement is 3.15

2.2. FINE AGGREGATE- Fine aggregate consists of sand and m sand which passes through 4.75 IS Sieve. Normally, the natural river sand is used as fine aggregate. The specific gravity of obtained fine aggregate is 2.36

2.3. COARSE AGGREGATE- Coarse aggregate normally consists of naturally occurring gravel or crushed stone. It should be hard, dense, durable, and free from clay or loamy admixtures or quarry refuse. The specific gravity of obtained coarse aggregate is 2.73

2.4. PROSOPIS JULIFLORA ASH- The ash is obtained by burning Prosopis Juliflora plant at high temperature. The specific gravity of the obtained ash is 2.2.



FIG.1 Prosopis Juliflora ash

2.5. WATER- Fresh water free from chemicals is used for mixing the concrete.

3. MIX PROPORTION AND MIX DETAIL

M40 grade of concrete is designed as per the guidelines specified in IS10262-2009 & IS456-2000 is used. Mix design obtained is [1.33: 2.16: 3.75]. Water cement ratio is taken as 0.5. Prosopis Juliflora ash partially replaced with cement by 0%, 25%, 30%, 35% respectively. This is given in the table below:

% OF ASH	CEMENT (Kg)	SAND (Kg)	CA (Kg)	ASH (Kg)
0	1.33	2.16	3.75	0
0	1.33	2.16	3.75	0
0	1.33	2.16	3.75	0
0	1.33	2.16	3.75	0
0	1.33	2.16	3.75	0
0	1.33	2.16	3.75	0
0	1.33	2.16	3.75	0
0	1.33	2.16	3.75	0
0	1.33	2.16	3.75	0
0	1.33	2.16	3.75	0
25	1	2.16	3.75	0.33
25	1	2.16	3.75	0.33
25	1	2.16	3.75	0.33
25	1	2.16	3.75	0.33
25	1	2.16	3.75	0.33
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25	1	2.16	3.75	0.33
25	1	2.16	3.75	0.33
25	1	2.16	3.75	0.33
25	1	2.16	3.75	0.33
25	1	2.16	3.75	0.33
30	0.931	2.16	3.75	0.399
30	0.931	2.16	3.75	0.399
30	0.931	2.16	3.75	0.399
30	0.931	2.16	3.75	0.399
30	0.931	2.16	3.75	0.399
30	0.931	2.16	3.75	0.399
30	0.931	2.16	3.75	0.399
30	0.931	2.16	3.75	0.399
30	0.931	2.16	3.75	0.399
30	0.931	2.16	3.75	0.399
30	0.931	2.16	3.75	0.399
35	0.864	2.16	3.75	0.466
35	0.864	2.16	3.75	0.466
35	0.864	2.16	3.75	0.466
35	0.864	2.16	3.75	0.466
35	0.864	2.16	3.75	0.466
35	0.864	2.16	3.75	0.466
35	0.864	2.16	3.75	0.466
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35	0.864	2.16	3.75	0.466



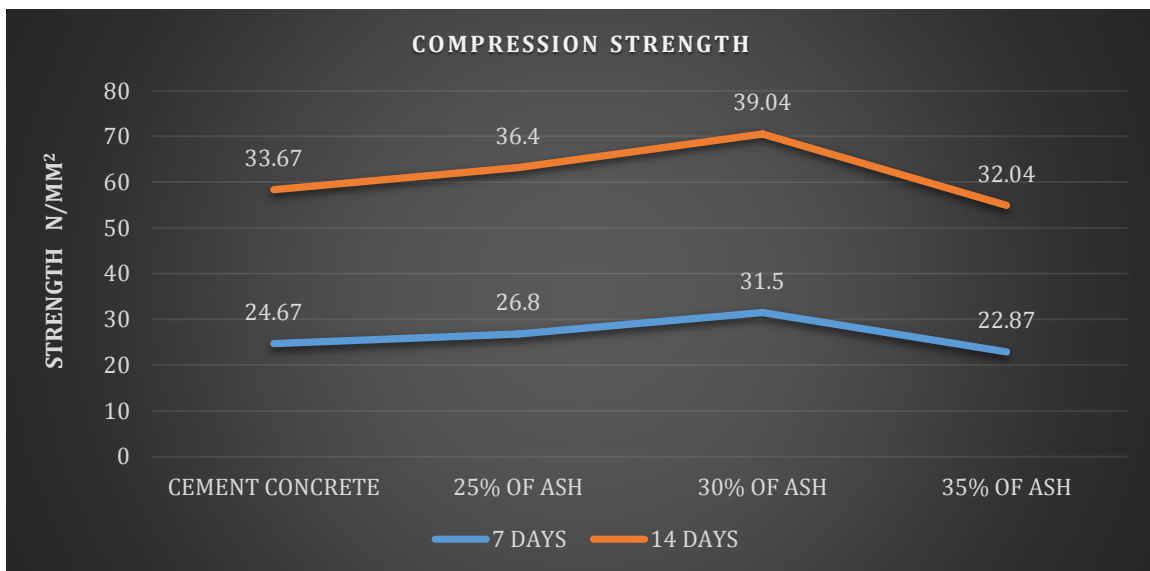
Fig.2 Casting of cubes

4. RESULT AND DISCUSSION

The compressive strength test was carried out using compression testing machine. We will discuss the results we got in various cases.

GRADE OF CONCRETE	DAYS OF CURING	0% OF ASH	25% OF ASH	30% OF ASH	35% OF ASH
M40	14	24.67	26.8	31.5	22.87
M40	14	33.67	36.4	39.04	32.04

4.1 GRAPH



5. CONCLUSIONS

The following conclusions are drawn from this investigation

- It is observed that the compressive strength of concrete can be increased by partial replacement of ash in place of cement.
- From the above experimental results it is evident that compressive strength can be increased by partial replacement of cement with prosopis juliflora ash
- The compressive strength of concrete is higher when the ash used is 30% in replacement of cement.
- High performance concrete using prosopis juliflora ash is effective because high strength is achieved.

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