EXPERIMENTAL INVESTIGATION ON PARTIAL REPLACEMENT OF CEMENT BY USING TAMARIND KERNEL POWDER

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ABSTRACT

The conventional concrete has lost its usage in modern days. As it does not serve the present needs. Hence in the hardened state high performance concrete (HPC) is used. When using tamarind in concrete possess high workability, high strength, high dimensional stability, high durability, low permeability and resistance to chemical attack. This project deals with the conventional concrete is obtained by ordinary Portland cement replaced with the partial replacement of cement by tamarind powder from the experimental results, it is observed that concrete exhibits improved compressive strength when compared with the conventional mix.

Key words: Tamarind Kernel Powder, Special Concrete, Admixtures,Compressive Strength.

INTRODUCTION

1.1GENERAL

Civil Engineering practice and construction works in India depend to a Very large extent on concrete. Concrete is one of the major building materials that can be delivered to the job site in a plastic state and can be molded insitu or precast to virtually any from or shape. Concrete basic constituents are cement, fine aggregate (sand), coarse aggregate and water. Hence, the overall cost of concrete production depends largely on the availability of the constituents (and selected additives). Water reacts chemically with cement to form the cement paste, acts as binder holding the aggregate together which is an exothermic hydration reaction. Aggregates are usually described as inert “filler” material of either the fine (sand) or coarse (gravel) variety. It tends to represent a relatively high volume percentage of concrete, to minimize costs of the material. use of natural aggregates sources. In addition, operations associated with aggregate exaction and processing are the principal causes of environmental concerns. In light of this, in thecontemporary civil engineering construction, production makes concrete as suitable and environmentally friendly construction materials.

1.2.4 TAMARIND KERNEL POWDER

Tamarind is one of the highly cultivated trees in India. In fact India is one of the highest cultivator of Tamarind in the world. Tamarind is locally referred as „imli". The major areas of production are in Asian countries like India, Bangladesh, Sri Lanka, Thailand, Indonesia, and in the African and the American continents. Tamarind trees are more abundantly available in Tamil Nadu. Tamarind consists of 3 parts – tamarind fruit pulp which is edible, hard green fruit pulp, and tamarind seed. Tamarind seed powder generally known as Tamarind Kernel Powder (TKP) is already being used for manufacturing tamarind oil, tamarind gum, and tamarind starch. TKP is obtained by removing testa (tough shell) from seed and obtaining the kernel which is rich in starch

Fig 1 Tamarindkernel powder

MIX PROPORTION:

Mix design involves the determination of weight of constituent materials in the concrete batching was done by weight. The particle of the fine aggregate used in this experiment are those passing through 1.18mm sieve and retained on 150 m white the coarse aggregate is those with 20mm. The cement is opc with trade mark name Nagarjuna whose properties confirming to Indian standard IS.

Water Cement ratio : 0.45

Mix ratio : 1:1.65:2.64

Based on the preliminary test value, the design mix prepared as per IS:10262-2009 by using w/c ratio of 0.45 &superplastizer,

of (1:1.65:2.64) for M30 grade of concrete.

SLUMP CONE TEST VALUES

S. NO	CONCRETE TYPE	SLUMP VALUE (mm)
1	Conventional concrete	75
2	5% of TKP_	75
3	10% of TKP	74.5
4	20% of TKP	74
5	30% of TKP	73.5
6	40% of TKP	72
7	50% of TKP	71

CUBE CASTING

The total 60 numbers of cube (9 Nos. of conventional concrete & 9 Nos. cube for each 5% of TKP & 10% of TKP & 20% of TKP &30% of TKP & 40% of TKP

& 50% of TKP replacements) are casted of cube 150X150X150 mm for compressive strength test.

RESULTS AND DISCUSSION

GENERAL

This chapter examines the results of mechanical properties of concrete such as compressive strength test of concrete and comparative study on conventional concrete and their replacements are discussed here.

MECHANICAL PROPERTIES

Mechanical properties refer to the physical properties of a material when it is deformed by elastic or inelastic behavior when mechanical forces are used.
Among the different types of mechanical properties the compressive strength of theconcrete are determined.

COMPRESSSIVE STRENGTH TEST

A compression test is to determine the behavior or response of a material while itexperience a compressive load by measuring fundamental variables, such as strain,stress and deformation. By testing a material in compression the compressivestrength, ultimate strength, yield strength , elastic limit and elastic modulus amongother parameters may all be determined.
The test is carried out by the following steps.

The specimen are removed from the curing tank and left to dry for 2 to 3 hours and tested in universal testing machine with capacity of 2000kN.

The dimensions are noted nearest to 0.2mm, the weight is also noted. the cube specimen is placed in such a manner that the load is applied toopposite of cube as cast

The load applied at the rate of 140 Kg/ cm²/ min till the specimen fails

The maximum load is noted.

The compressive strength of the specimen is calculated.

The compressive strength for the concrete cubes were obtained by using the formula,

Compressive strength = P/A (N/mm²)

Where,

P is the load in N

A is the area in m

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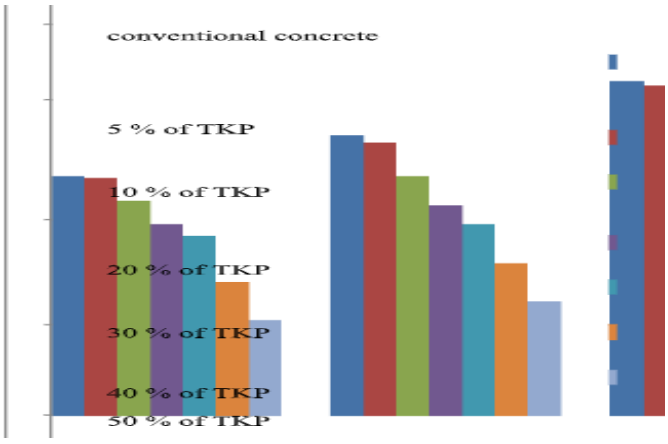
This graph shows the comparison of compressive strength of conventional concrete in various duration times.

COMPARISON OF COMPRESSIVE STRENGTH OF CONCRETE

The graph shows the comparison of compressive strength of concrete with conventional concrete cube made by 5 % of TKP & 10 % of TKP & 20 % of TKP & 30 % of TKP & 40 % of TKP & 50 % of TKP of replacements.



CONCLUSION

- In this project we tried to replace the cement partially by tamarind kernelpowder (5%,10 %,20%, 30%,40% and 50%) respectively to increase the Strength, workability, durability of the concrete.
- In general, the upcoming generations of this world, concrete structure is more important.
- So that material is more effective and free from environmentalpollution.
- So in this project we use the alternate materials to get optimumstrength.
- The mechanical behavior (compressive strength) of concrete with partialreplacement of cement by tamarind kernel powder.
- More than 10% of TKP in the concrete mix causes the difficulties to procedure dense concrete .
- So we conclude that cement with tamarind kernel powder at 5% is suitablefor construction.
- In this project, our aim is to replace the high cost (or) rarely available construction materials by using low cost (or) waste material.
- So we choosetamarind kernel powder. It is the cost effective and easily available materialand also good strength considerations.
- Moreover it reduces the construction cost by reducing the cost of cementand also reduces the environmental pollution.

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