Experimental Project Based on artial Surrogating of Concrete Using lastic Wastes, Date Kernel and Corn Cob Ash

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Abstract — Now-days there is a demand of river sand. it is not economical. So, we are using natural soil in concrete, if we using natural soil in concrete means the compressive strength go down for that we are adding the Date Kernel Powder, Plastic Wastes and Corn Cob Ash as an alternative material to improve (or) attain the normal strength of concrete.

Keywords— *Compressive Strength, Plastic Wastes, Date Kernel Powder and Corn Cob Ash.*

I. INTRODUCTION

The cost of concrete depends largely on the availability and cost of its constituent with the cost of cement in a cubic meter of concrete being higher than other constituent. In order to reduce the cost of concrete production there is a need to employ the use of Corn cob ash (CCA), Date kernel and Plastic wastes as replacement of cement, fine aggregate and coarse aggregate in concrete respectively. Provision of housing for developing countries is one of the most important basic needs of the low-income groups. It is a very difficult requirement to meet because the two main conventional or classical construction materials (concrete and steel) are imported and their prices are considerably beyond the reach of the average (low-income group).

Polypropylene fiber

Polypropylene is a synthetic hydrocarbon polymer, the fiber of which is made using extrusion processes by hot drawing the material through a die. Its use enables reliable and effective utilization of intrinsic tensile and flexural strength of the material along with significant reduction of plastic shrinkage cracking and minimizing of thermal cracking.

I. METHODOLOGY

This chapter deals with the methodology adopted for the present study.

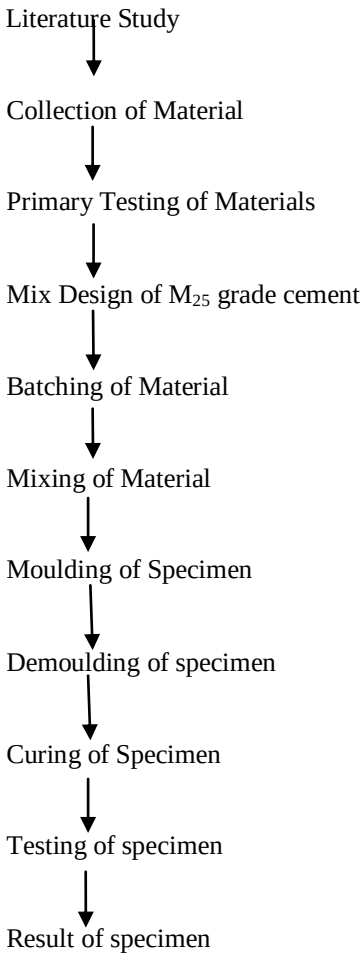


Fig 1: Schematic representation of our project

II. MATERIAL USED AND ITS PROPERTIES

A) CEMENT

Cement is an integral part of the urban infrastructure. It is used to make concrete as well as mortar, and to secure the infrastructure by binding the building blocks. Concrete is made of cement, water, sand, and gravel mixed in definite proportions, whereas mortar consists of cement, water, and lime aggregate. These are both used to bind rocks, stones, bricks and other building units, fill or seal any gaps, and to make decorative patterns.

Fig 2:Cement

B) AGGREGATE

Aggregates are the important constituents in concrete. They give body to the concrete, reduce shrinkage and effect economy. Earlier, aggregates were considered as chemically inert materials but now it has been recognised that some of the aggregates are chemically active and also that certain aggregates exhibit chemical bond at the interface of aggregate and paste. The mere fact that the aggregates occupy 70-80 per cent of the volume of concrete, their impact on various characteristics and properties of concrete is undoubtedly considerable. To know more about the aggregates which constitute major volume in concrete.

Aggregates are divided into two categories from the consideration of size:

- Coarse aggregate
- Fine aggregate

❖ **FINE AGGREGATE**

Aggregates passing through 4.75mm sieve are defined as fine. The smallest size of fine aggregate is 0.06mm. Fine aggregate is added to concrete to assist workability and to bring uniformity in mixture. Usually, the natural sand is used as fine aggregate. Important thing to be considered is that fine aggregate should be free from coagulated lumps.

Grading of natural sand or crushed stone i.e. fine aggregate shall be such that not more than 5% shall exceed 5mm in size, not more than 10% shall IS sieve No.150 not less than 45% or more than 85% shall pass IS sieve No.1.18mm and not less than 25% or more than 60% shall pass IS sieve No. 600 micron.

Fig 3: River sand

❖ **COARSE AGGREGATE**

Coarse aggregate is chemically stable material in concrete presence of coarse aggregate reduces the drying shrinkage and other dimensional changes occurring an account of movement of moisture. Coarse aggregate contributes to impermeability of concrete, provided that is properly graded and the mix is suitably designed.

Fig 4: Coarse aggregate

C) WATER

The pH value of water should be in between 6.0 and 8.0 according to IS 456-2000.

✓ *Effect of Mixing Sea Water in Concrete:*

The sea Water generally contains salinity of about 3.5% in which about 80% is sodium chloride. Many researchers have been conducted to study the corrosion problem of steel Embedded in concrete where sea water is used as mixing water in concrete nevertheless the Indian standard is adamant & do not permit using sea water for mixing or curing in reinforced Concrete constructions, but allows for using of sea water only for PCC work that too under unavoidable circumstances.

✓ *Quality of Water for Curing Concrete Cubes:*

The water that is fit for mixing and curing of water for concrete is also fit for curing of cubes which are cured under water. However the curing water should not to be allowed to remain in stagnant condition in water tanks for long time. As a guideline the water tanks shall be cleaned twice a week or when ph value of water reaches a value more than 9. The cleaned Water tanks shall be refilled with fresh water every time.

The cleaning of water is necessary to remove algae and fungus materials developed inside the water tanks which otherwise alters the setting and strength gaining properties of Concrete. The low results of such cubes may call for in situ tests resulting in consequential Delay of the project.

III.REPLACEMENT MATERIALS

DATE KERNEL POWDER:

As part of contribution to the on-going research in utilization of waste as solution to the high cost of construction materials, this research was carried out on Date Seed (DS) to investigate its suitability as light weight aggregate material in concrete production since little or no work exists on it. Date kernel powder is used as an alternative material for fine aggregate partially to improve the strength of concrete.

Based on previous research the properties of date kernel powder are concluded that, the fineness modulus of date kernel powder is comparable to that of fine sand is 2.30 -3.60.The coefficient of uniformity for fine sand is generally should less than 6.

Fig 5:Date Kernel Powder

POLYPROPYLENE FIBER:

The polypropylene fiber reinforced (PFRC) contains randomly distributed shot discrete polypropylene fiber which act as internal reinforcement so as to enhance the properties of the cementitious composite concrete.

The research reported in this study includes an experimental investigation for measurement of workability of PFRC using two standard test methods to characterize consolidation, an experimental investigation to characterize selected mechanical properties of PFRC. The comparison of the compressive strength and flexural strength of beam is done with various tests and the result is judged to be good.

The principal reason for corporating the polypropylene fibre into a cement matrix is to reduce cracking in the elastic range, and to increase the tensile strength and deformation capacity and increase the flexural strength of the resultant concrete. These properties of PFRS primarily depend upon length and volume of propylene fibres (PPF) used in the concrete mixture.

Fig 6 : Polypropylene Fiber

CORN COB ASH:

In order to reduce the cost of concrete production there is a need to employ the use of agro waste scientifically known as pozzolana as a replacement of cement in concrete, which in this case we are attempting with (CCA).

The analysis of the Corn Cob Ash (CCA) showed that a combination of its chemical constituents qualified it as a pozzolana. Pozzolana are “siliceous and aluminous material which in themselves have little or no cementitious properties but in finely divided form and in the presence of moisture they can react with calcium hydroxide (CaO) which is liberated during the hydration of OPC at ordinary temperatures to form compounds possessing cementitious properties.

Fig 7 : Corn Cob Ash

ADMIXTURES:

Conplast SP 430 NE is used as an admixture for this concrete.it is used to gain the strength early.it is also to improve the workability of concrete. Conplast SP 430 (NE) is used where a high degree of workability and its retention are required, where delays in transportation or placing are likely or when high ambient temperatures cause rapid slump loss. It facilitates production of high quality concrete.

Conplast SP 430 (NE) is primarily highly efficient superplasticizer giving large increase in workability without significant change in compressive strength.

Conplast SP 430 (NE) may be used to produce substantial water reduction resulting in a considerable increase in compressive strength.

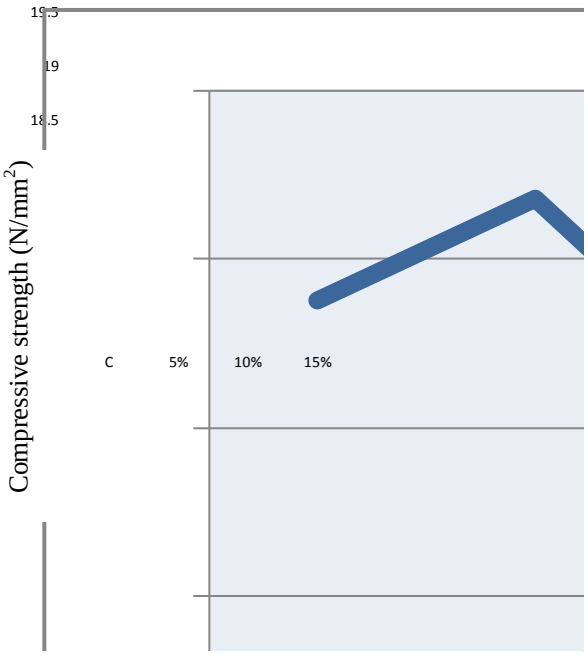
Reduction in W/C ratio enables increase in density and impermeability thus enhancing durability of concrete.

IV.TESTING RESULTS:

COMPRESSION STRENGTH AT 7 DAYS.

TABLE 1 Compressive Strength Of Various Mixes At 7 Days

Mix Ratio	Trial 1	Trial 2	Trial 3	Average
Conventional concrete	18.66	19.11	18.88	18.88
Mix1 PW,DK,CCA -5%	19.55	18.66	19.33	19.18
Mix 2 PW,DK,CCA-10%	18.05	18.50	19.20	18.58
Mix3 PW,DK,CCA – 15%	17.10	17.85	18.04	17.66



Percentage of Replacement

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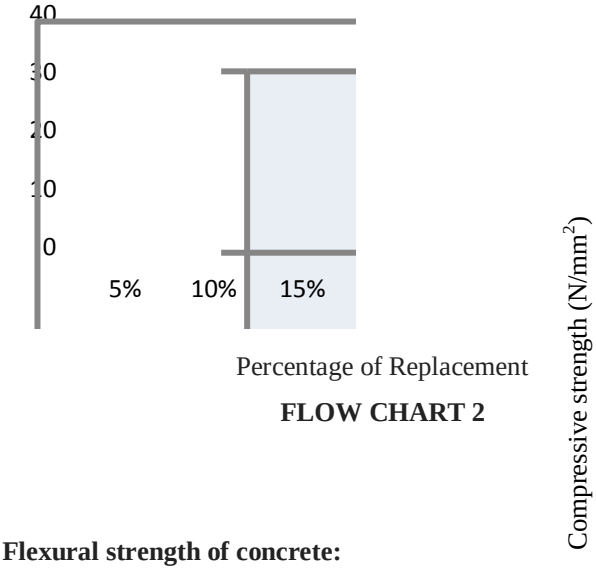
COMPRESSION STRENGTH AT 28 DAYS.

TABLE 8.2 Compressive Strength of Various Mixes At 28 Days

Mix Ratio	Trial 1	Trial 2	Trial 3	Average
Conventional concrete	27.11	28.00	27.77	27.62
Mix1 PW,DK,CCA -5%	26.12	25.80	27.12	26.14
Mix 2 PW,DK,CCA-10%	28.68	28.08	29.02	28.59
Mix3 PW,DK,CCA – 15%	21.65	21.96	23.65	22.42



Percentage of Replacement

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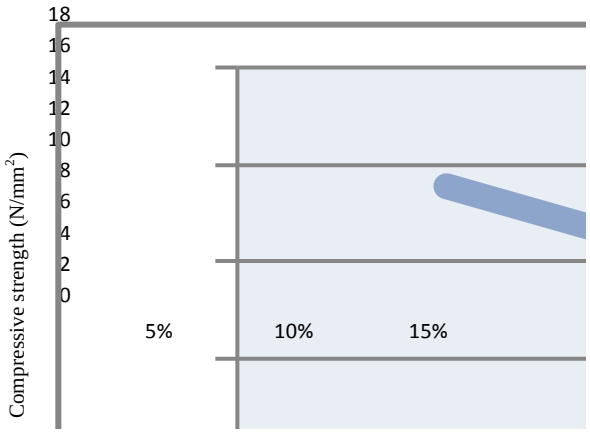
Flexural strength of concrete:

TABLE 3 Comparison of 7 days and 28 days of flexural strength

Mix Ratio	7 days (N/mm^2)	28 days (N/mm^2)
5%	5.58	9.98
10%	4.6	8.5
15%	4.5	7.82



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V.CONCLUSION:

The following conclusions were drawn from the study. The setting time of cement increased with increase in corn cob ash (CCA) from 258minutes to 277minutes, when cement was replaced with 10%CCA.CCA can be used to partially replace cement in the production of concrete to a maximum of 10%, because replacement beyond this reduced the concrete strength beyond the control. The strength of concrete cubes and beams produced from replacement revealed that partial replacement of cement with CCA can be used to withstand some structural loads. Out of which the aggregate percentage is 60 to 70 % in concrete and from the above observation, it is computed to use the 20% Recycled plastic aggregate in concrete which does not affect the properties of concrete. From the above observation it is possible to use the plastic in concrete mix up to 20 % weight of coarse aggregate. Looking in to above aspect we come to the conclusion that plastic can be in cement concrete mix increase the % in plastic to decrease the strength of concrete. By using the plastic in concrete mix to reduces the weight of cube up 15%.From the above observation it is possible to use the plastic in concrete and bonding admixture in concrete and also increase the % of plastic in concrete. Replacement of this nature can also be used for walls and beams unit of buildings so as to reduce the use of cement, fine aggregate and coarse aggregate and its high cost.

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