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STRENGTH AND DURABILITY CHARACTERISTICS OF CONCRETE BY PARTIAL REPLACEMENT OF ADMIXTURES

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ABSTRACT

Concrete has been used in various structures all over the world since last two decades. Recently a few infrastructure projects have also seen specific application of concrete. Recently a few infrastructure projects have also seen specific application of concrete. The development of concrete has brought about the essential need for additives both chemical and mineral to improve the performance of concrete. The main properties that are observed are water absorption capacity, the alkalinity test and the durability. It was observed that for the increase in the percentage of fly ash and steady increase in the water absorption and alkalinity which significantly indicates the makeable change in strength and durability characteristics of concrete. Hence varieties of admixtures such as surkhi, rice husk ash have been used so far. Objectives of the present investigation, Partial replacement of cement with, surkhi, and rice husk ash used in concrete by 15% to produce concrete. Water cement ratio is kept constant for all mixtures. The main properties that are observed are water absorption capacity, the alkalinity test and the durability.

KEYWORDS

Compressive Strength, Admixtures, Ricehuskash, Surkhi, Compaction and Slump Cone.

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INTRODUCTION

In last millennium concrete had demanding countries is over 1200 Kgs per person per year. Therefore our present consumption rate is very much behind than that of the advanced countries. Furthermore, with the increase in population, the requirement of various developing projects is likely to be increased in the future. Hence, the concrete material will need to be used much more extensively in the years to

come. This demand will be further increased for the repair and rehabilitation work that is required to maintain the existing structures in a longer period

OBJECTIVE

The objective of the present study is to know the suitability of Rice husk ash, Surkhi obtained from local stone crushers, Rice mills and brick manufactures respectively, partial replacement of cement without effecting workability, strength, air content and permeability coefficient of concrete of grade M15. These results are compared with regular mixes, surkhi, rice husk ash. Especially compressive strength, slump cone test, compaction factor test

MATERIAL

1. Cement
2. Fine Aggregate
3. Coarse Aggregate
4. Surukhi
5. Rice husk ash
6. Water

EXPERIMENTAL INVESTIGATION

1. At first Individual tests have been done on Cement, Fine Aggregates and Coarse Aggregates
2. In this study Rice husk Ash, Surkhi have been used to replace in cement in 20% percentage

3. For M15 grade Mix Design is done for the above mentioned percentages
4. M15 Concrete cubes have been prepared as per the mix design.
5. Workability tests have been done for Fresh Concrete
6. Cubes have casted to measure compressive strength on 7, 14, 21 and 28 days
7. Compressive strength test have been done for all the mix proportions of M25 grade concrete on 7, 14, 21 and 28 days
8. Equipment used for this tests are Sieves, Workability test apparatus, CTM, Cube Moulds, Pycnometer bottles, Specific gravity bottles.

RESULTS AND DISCUSSION

COMPACTION FACTOR TEST RESULTS

1. It is observed that the value of compaction factor for the mix rice husk ash (partial replacement of cement by rice husk ash) is decreased by 1.0% as compared with regular mix normal concrete.
2. It is observed that the value of compaction factor for the mix surkhi (partial replacement of cement by surkhi) is decreased by 1.5% as compared with regular mix normal concrete.

Table No.1: Material required for M.15grade concrete per cubic meter quantity of concrete

S.No	Material	Water		Cement		Fine aggregate		Coarse aggregate
1	Kgs/Cum	186		244.73		650.92		1211.07
2	Ratio	0.7600	:	1	:	2.36	:	4.406

Slump cone test results

Table No.2: The slump cone test results for M15 grade mix

S.No	Mix designation	Slump (mm)	% Increase or Decrease
1	NORMAL CONCRETE	80	-
2	RICE HUSK ASH	65	-15
3	SURKHI	50	-30

Table No.3: The compaction factor test results for M15 grade mix

S.No	Mix Designation	Compaction factor	% Increase or Decrease
1	NORMAL CONCRETE	0.6	-
2	STONE DUST	0.55	-0.05
3	FLY ASH	0.50	-1.0
4	RICE HUSK ASH	0.50	-1.0
5	SURKHI	0.45	-0.15

Table No.4: Compressive Strength

S.No	Mix Designation	Compressive strength in N/mm ²			
		7days	14days	21days	28days
1	NORMAL CONCRETE	20	20.4	22	24
2	RICE HUSK ASH	13.8	14.2	14.8	15.6
3	SURKHI	12	12.6	13.6	14.4

Observations on m15 grade mix

Table No.5: M15 Grade mix

S.No	Age	x axis	y axis - Normal Concrete	y axis - Rice Husk
1	7	7	20	13.8
2	14	14	20.4	14.2
3	21	21	22	14.8
4	28	28	24	15.6

Observations on m15 grade mix

S.No	Age	x axis – No of days	y axis – Compressive strength- Normal Concrete	y axis- Compressive strength - Surkhi
1	7	7	20	12
2	14	14	20.4	12.6
3	21	21	22	13.6
4	28	28	24	14.4

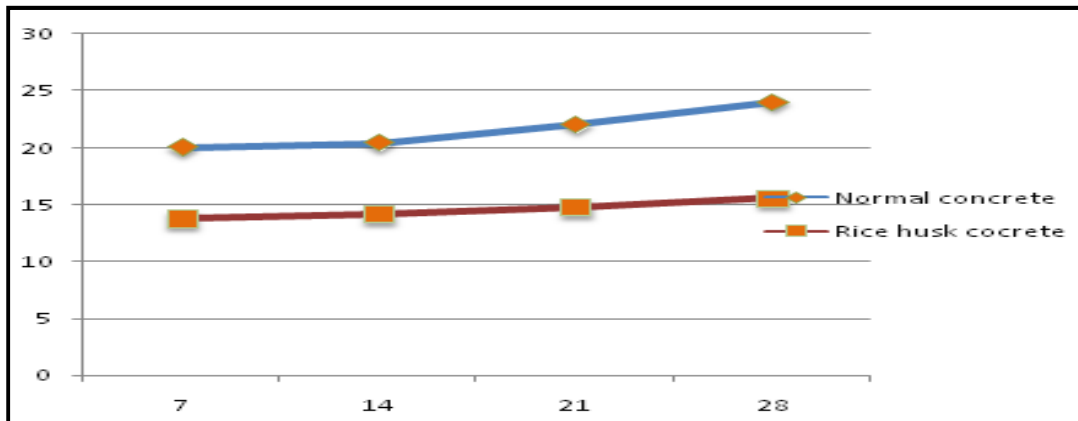


Figure No.1: Compressive Strength for Normal Concrete and Rice husk ash Concrete M15 Grade

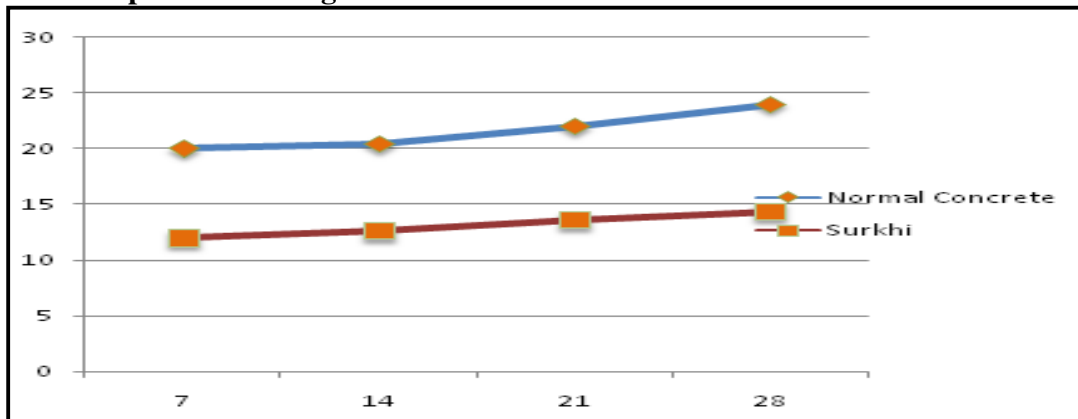


Figure No.2: Compressive Strength for Normal Concrete and Surkhi Concrete M15 Grade

CONCLUSION

1. Cement can be replaced by stone dust in M15 grade, and there is not much variation in strength among normal concrete.
2. Comparing to other admixtures like Rice husk ash, surkhi.
3. 20% of surkhi replacement is very less compressive strength compared to normal concrete. So proportion of surkhi should reduce required.
4. There are less chances for stone dust containing deletions substances as compared to natural river sand.
5. Admixtures partial replacement with cement for m15 grade is successful to use in construction.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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