



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 4, April 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

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Partial Replacement of Crushed Date Seeds with Fine Aggregate in Concrete

Prof. Shaikh S. J.¹, Siddhant Bankar², Siddhi Deshmukh³, Rupali Gughe⁴

Diploma Student, Department of Civil Engineering, MGM's Polytechnic College, Aurangabad, Maharashtra, India¹

Diploma Student, Department of Civil Engineering, MGM's Polytechnic College, Aurangabad, Maharashtra, India²

Diploma Student, Department of Civil Engineering, MGM's Polytechnic College, Aurangabad, Maharashtra, India³

Associate Professor, Department of Civil Engineering, MGM's Polytechnic College, Aurangabad, Maharashtra, India⁴

ABSTRACT: Concrete is widely used construction material, its manufacturing including utilization of ingredients like cement, sand, aggregates, water and if required admixtures. Natural resources such as river sand are depleting at an alarming level in developing countries like India. There is a need to explore and to find out Suitable replacement material to substitute natural sand. More than 1,000 dates may appear on a single bunch weighting 8Kg and it is light weight material. Fine aggregates are partial replace by crush date seeds in 4 different percentages 0%,1%,2%,3% and 4%. M25 grade of concrete is adopted and we designed it. 150X150X150 mm size of mould is used. The important parameter that influences the strength of concrete such as water cement ratio (0.40) are considered for the investigation. The compressive strength of concrete was tested on a cube of 150X150X150 mm size at 7and 28 days.

KEYWORDS: Concrete, Date Seeds, Replacement, Compressive strength.

I. INTRODUCTION

Concrete is the most commonly used construction material in the construction industry , importance and usage in the modern society cannot be ignored , concrete is the product of mixing cement , fine aggregate , coarse aggregates , water and required admixtures . No time has come to think of some alternative materials for sustainable used in concrete mix .Day by day amount and type of waste material has increased accordingly creating environmental issues . The usage of Date Seeds (DS) in concrete manufacturing will not just reduce the issue of Farming waste away in the societies although will significantly decrease the cost of concrete manufacturing. This is in the light of this study to investigate the appropriateness of Date Seed when used as coarse aggregate in concrete production Date Seeds (DS) is a renewable source and hence, has considerable potential in the building industry where Date Seeds (DS) are in plenty. This is especially the case in Libya. Presently, the large amount of DPS waste has resulted in concentrating on the potential use of this waste as aggregates in unique structural lightweight concrete. Due to rapid industrialization and constructions in developing country like India , natural resources are depleting constantly . Search of alternative material for making concrete is a prime need in present scenario . Unfortunately , the extraction of natural aggregates has led to establishing human made quarries that have drastic environmental impact on the nature and surroundings . The high demand for concrete in the construction normal weight aggregates such as gravel and granite drastically reduce the natural stone and deposits and this has damaged the environment thereby causing ecological imbalance . Coconut shell may offer itself as a coarse aggregate as well as a potential construction material in the field of construction industries and this would solve the environmental problem of reducing the generation of solid wastes simultaneously . Utilization of concrete is increasing at a very high rate due to infrastructural development activities in the world . Concrete is one of the world's most widely construction material . In addition , concrete is second most consumed substance in the world after water . Approximately 10 billion tons of concrete is produced every year .There are some negative impacts of more production of concrete like continuous extensive extraction of aggregate from natural sources will lead to its depletion and ecological imbalance .Therefore, there is need to explore and to find out suitable replacement material The purpose of this research is to disseminate awareness of using coconut shell as partial replacement of coarse aggregate in concrete and determining its compressive strength .The goal of this study is to discuss on the strength of coconut shell of concrete at high demand for concrete within construction mistreatment traditional weight aggregates like granite and gravel extremely decreases the deposits of natural stone which broken the atmosphere .

II. RELATED WORK

In this project, we were strated the study on date seed concrete and we have not use admixture . We studied all the properties of date seed ,coarse aggregate, fine aggregate, cement. M25 grade of concrete is adopted for mix design of concrete for mix design we refer IS10292- 2009. 150X150X150mm size of mould is used for testing of concrete blocks we assume 30% of wastage while mix designing. OPC 25 grade of cement, the aggregate passing from 20mm sieve and retained on 10mm sieve is used, fine aggregate passing through 4.75 mm sieve is used, crushed date seeds passing from 4.75 is used in this study.

An optimum percentage replacement of crushed date seed with fine aggregate were conducted in the present investigation. Fine aggregate partially replace in different percentages 0%, 1%,2%,3% and 4% . After 7and 28 days of curing the specimen is removed from the water and then compressive strength test are performed on the concrete cubes. M25

III. METHODOLOGY

Cement

Ordinary Portland Cement (OPC) 53 Grade (IS 1489-1991)In this study we used ordinary Portland cement (OPC) Ordinary Portland Cement (OPC) the most widely and commonly used cement in the world. This type of cement is manufactured to powder by mixing limestone and other raw materials which consist of argillaceous, calcareous and gypsum. It is preferred in places where there is need of fast construction. This cement is available in the market in three grades namely OPC 33, OPC 43 and OPC 53.These grades Simply the maximum strength of the particular cement after 28 days. The OPC -53 is produced using a highly specialized process that allows optimum distribution of each particle, thereby allowing superior crystalline structure and balanced composition . the result is better strength and durability.

Uses of OPC (Ordinary Portland cement)

It is used for general construction purposes where special properties are not required .

It is used for the reinforced concrete buildings , bridges , pavements , and where soil conditions are normal .

It is used for most of concrete masonry units and for all uses where the concrete is not subject to special sulfate hazard or where the heat generated by the hydration of cement is not objectionable .

It has great resistance to cracking and shrinkage but has less resistance to chemicalattacks .

Physical properties of cement :-

1. Fineness in m² /kg – 351
2. Soundness by Le chatelier method in mm- 0.4
3. Intial setting time in minute – 35
4. Final setting time in minutes – 240
5. 3 days compressive strength in MPA – 28.75
6. 7 days compressive strength in MPA – 54.47
7. Specific gravity – 3.15

Fine aggregates are basically natural sand particles from the land through the mining process,the fine aggregates consist of natural sand or any crushed stone particles that are 4 “ or smaller . The particle size less than 4.75 mm classified as fine aggregates . The maximum size used is 80 mm and the range of 80 mm to 4.75 mm is known as coarse aggregate and 4.75 to 150 μm is called fine aggregate . Fine aggregate is the essential ingredient in concrete that consists of natural sand.

Qualities of fine aggregates

1. Fine aggregates should be clean i.e., it should be free from lumps, organic material, etc.
 2. It should be strong and durable
 3. Also, it should be strong have a tough floor
 4. It should not absorb greater than 5% of water.
 5. These types of aggregates should not be soft and porous.
- Properties of fine aggregate
1. Specific gravity - 2.65
 2. Fineness modulus- 2.86
 3. Water absorption – 1.8%

Coarse aggregate in concrete occupies 65 % to 70 % of the volume of the concrete , smaller sized aggregates produced higher concrete strength Particle shape and texture affect the workability of fresh concrete . Usually , an aggregate with

specific gravity more than 2.55 and absorption less than 1.5 % can be regarded as being of good quality . Where aggregates strength is higher , concrete strength is also higher , Fractions from 20 mm to 4.75 mm are used as coarse aggregate . Coarse aggregate shall consist of naturally occurring materials such as gravel , or resulting from the crushing of parent rock , to include natural rock , slag's,expanded clays and shale's (lightweight aggregates) and other approved inert materials with similar characteristics , having hard , strong . durable particles , conforming to the specific requirements of the materials . The coarse aggregate retained on 4.75 mm sieve classified as coarse aggregate . The sieve analysis is conducted to determine the particle size distribution the aggregates passing from 20 mm sieve and retained on 10 mm sieve is used for making the concrete .

Properties of Coarse Aggregates

1. Specific gravity.
2. Sieve analysis as per IS code limit.
3. Water absorption.

Date Seeds

The Date seeds are the by-product of date stoning, either for the production of pitted dates or for the manufacture of date paste. The date seed is a hard coated seed, usually oblong, ventrally grooved, with a small embryo. Date pits weigh 0.5 g to 4 g and represent 6 to 20% of the fruit weight depending on maturity, variety and grade. Date seeds are traditionally used for animal feed. They can also be used as a source of oil (which has antioxidant properties valuable in cosmetics), as a coffee substitute, as a raw material for activated carbon or as an adsorbent for dye-containing waters. Date by-products are usually fed to animals during winter, though they can be used at any time of the year .

Advantages of date seeds

1. It is light weight material.
2. There is no need of treating date seeds before uses
3. As it is waste material it will reduced garbage
4. It is ecofriendly to environment

- #### Disadvantage of date seeds
1. It can not use in large proportion in concrete
 2. It is not useful for high rise building.

Water

The amount of water in concrete controls many fresh and hardened properties in concrete including workability , compressive strengths , permeability and watertightness , durability and weathering , drying shrinkage and potential for cracking . For these reasons , limiting and controlling the amount of water in concrete is important for both constructability and service life . Water is an important factor of concrete as it actually participates in the chemical reaction with cement . Water used for all the experimental study is obtain from the laboratory and it is portable water , adequate for drinking . Thus , it is assumed for making good should be fit for drinking . The water is used for mixing as well as for curing the samples . It should not have high concentrations of sodium and potassium and there is a danger of alkali aggregate reaction . Natural waters that are slightly acidic are harmless , but water containing humid or other organic acids may adversely affect the hardening of concrete . Such water as well as highly alkaline water should be tested . Water satisfactory for mixing is also suitable

IV. EXPERIMENTAL RESULTS

Result of compressive strength obtained from crushed date seeds concrete cube as follows: Table no. 2: Compressive strength of concrete.



Percentage of crushed seeds	Cube No.	Compressive strength 7days (N/mm ²)	Average (N/mm ²)	Compressive Strength 28 days (N/mm ²)	Average (N/mm ²)
0%	1	18	16.70	26.93	27
	2	16.89		27	
	3	15.23		28	
1%	1	15	13.33	22.89	24.14
	2	12		24.98	
	3	13		24.56	
2%	1	13	13.16	25.32	25.02
	2	14		24.97	
	3	12.5		24.78	
3%	1	15	14.16	27.85	26.32
	2	14.5		24.38	
4%	3	13	12.33	26.73	23.73
	1	12		22	
	2	13		25.75	
	3	12		23.46	



Fig No.1 Concrete mixing



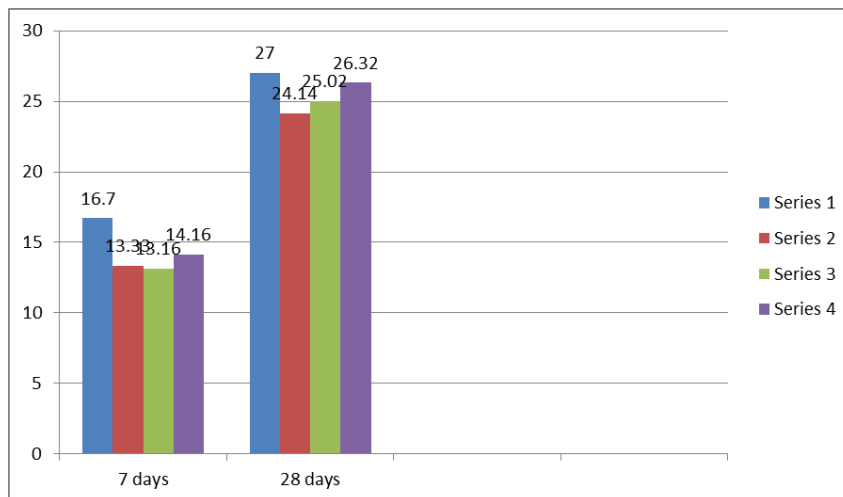
Fig No. 2 Measurement of material



Fig No.3 Filling of mould



Fig No. 4 Compressive Strength testing



V. CONCLUSION

The fine aggregate was partially replaced by crushed date seeds in this study. Crushed date seeds concrete is Obtained. At 3% of fine aggregate with crushed date seeds concrete gives maximum strength for 7 days and 28 day Mix design of M25 grade of concret is determine maximum strength is obtained in 7 days 14.16 N/mm² and for 28 days 26.32. As per result we got strength for 1%,2%and 3% and for 4% we got less strength so we consider 3% strength as Optimum value.

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Impact Factor: 8.423



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