

EXPERIMENTAL ANALYSIS ON SPLIT TENSILE STRENGTH OF CONCRETE WITH TWD AND RCA

Chhamakant Tripathi¹, Prof. Kirti Chandraul², Prof. Manindra Kumar Singh³

¹M.Tech Scholar Jawaharlal Nehru College of Technology Rewa, M.P.

^{2,3}Assistant Professor, Dept. of Civil Engineering, J. N. C.T. College, Rewa, M.P., India

ABSTRACT:- In this project main objective is to study of the Split Tensile strength of concrete with the partial replacement of the coarse aggregate by recycled aggregate and fine sand with Teak Wooden Dust with the various proportion and to check the different properties of the concrete by comparing with the controlled concrete. The replacement of Fine aggregate (sand) with certain Teak wooden dust in concrete that makes the structure more light in weight. For making M20 grade of concrete replacing of the coarse aggregate by recycled aggregate and fine sand with Teak Wooden Dust in 0%, 15%, 25%, 35% and 45%. The Workability, strength and durability test are studied in this project. The most important properties of concrete is the strength against Tension. Also, increasing the teak wooden dust incorporation caused decreases in unit weights and strength values of mortars with a parallel increase in water absorption values at all ages.



Fig 1. Formation of Recycled Aggregate

Key words: Teak Wooden dust, fine aggregate, Recycled aggregate, Workability Test, Split Tensile strength Test

UNIT I INTRODUCTION

Over recent years a speedy development within the field of concrete technology has taken place. Concrete has become the most popular construction material. Even folk have started exploitation concrete in a very huge means. Thus, supported natural minerals combination it's currently attainable to provide concrete with Split Tensile strengths. over recent years but several comparatively new concrete structures and industrial product have shown a poor performance. It is great challenge, therefore both to utilize and apply and also further develop existing technology on high performance concrete to the benefit of both the concrete industry and the society. In recent study several new material are use as a partial replacement material in concrete which may increase its properties of the concrete such material as sedimentary rock, marble dust, wooden husk, rice husk etc.

Teak is tall evergreen tree. It has yellowish blonde to reddish brown wood. It attains the height of about 30 meter. The fruit is a drupe. It has bluish to white flowers. The side of the tree is rough to the touch and also the inner surface has hairs. The fruit is closed by the bladder like ringlet, which is light brown, ribbed and papery. It is employed in the piece of furniture creating, boat decks and for indoor flooring. It is wide accustomed create the doors and house windows. It is resistant to the attack of termites. Its wood contains scented oil that is that the repellent to insects. The leaves yield the dye that is employed to color the garments and edible. Teak is perhaps the simplest protected industrial species within the world. This is the light weight material which can be carried easily. The chemical and physical properties of one tree to another tree saw dust will varies from one tree to another tree. In this project, the saw dust is carried out from sawmill in two forms

1. Powder form
2. Chips form

The powder form wooden dust is used for replacement of fine aggregate (sand) with a treatment, this is named as

Dry TWD. The chips form or skin form of TWD is used to replacement for cement after a burning process this form of TWD is named as TWD Ash.



Fig. 2 Formation of Teak Wood Dust (TWD)

Now in this work we use Teak Wood Dust in Place of fine aggregate and Recycled Aggregate is used in place of Coarse aggregate. And applying test on following material and find the Split Tensile strength of material with different percentage mixing material.

UNIT II LITERATURE REVIEW

For the work we are studied many of research papers but some papers are very useful so we are adopting following papers for work as a reference As per Mr. Goudappa recycled aggregates concrete utilizes materials from concrete and masonry constructions. Reuse of demolition waste avoids the problem of waste disposal and is also helpful in reducing the gap between demand and supply of fresh aggregate. Mix designs can be made using recycled aggregate for structural concrete elements instead of disposing off the recycled concrete to achieve economy. Based on the results Mr. Goudappa obtained from the experiment, the Split Tensile of the recycled aggregate concrete is found to be lower than the natural aggregate and the strength of recycled aggregate concrete can be improved by the water and acid treatments. after experiment result of author G. Murali, C.M. Vivek Vardhan etal the split tensile strength of recycled aggregate was decreased by 9.55% than the natural aggregate. The strength of water treated recycled mixture was multiplied 3.25%, strength of nitric acid treated recycled aggregate is increased by 5.69% , sulphuric acid treated recycled aggregate increased by 3.66%, and acid treated recycled mixture multiplied by 7.17% than the recycled aggregate. As per author M. Nuruzzaman &M. Salauddin, the waste from non-biodegradable material like demolished concrete

or this type of project would end up in a landfill, costing a huge amount of space. Auspiciously, the scenario is not the same any longer. In recent years, the researchers have found that it is possible to recycle the old concrete. Even though the word “recycled concrete” can be a little bit unclear, this recycled concrete is extremely robust and reliable. Review of several studies suggested that the use of recycled materials has a positive impact on different aspects. This includes the advantages in enhancing the property of the development trade whereas reducing value, providing solutions to environmental pollution and reducing the need for natural resources.

UNIT III MATERIAL AND METHODOLOGY

CEMENT

Cement may be a binding material, a substance that sets and hardens independently, and can bind other materials together. OPC is used.

SAND

Sand may be a present granular material composed of finely divided rock and mineral particles. In terms of particle size as used by geologists, sand particles range in diameter of 2 mm.

AGGREGATE

20mm ranked combination of irregular shape is employed.

TEAK WOOD DUST

Teak Wood Dust (TWD) is the waste material from the timber saw mills. Where the timbers are sawed for the specific purpose and the waste powder which extract from them is called saw dust. The TWD is acquired in abundance in tropical countries. This TWD is used as fuel limitedly. The main method of disposal is by open burning method. In some countries, the usage of TWD for the construction has been in process for several years ago.

UNIT IV RESULT AND DISSCUSSION

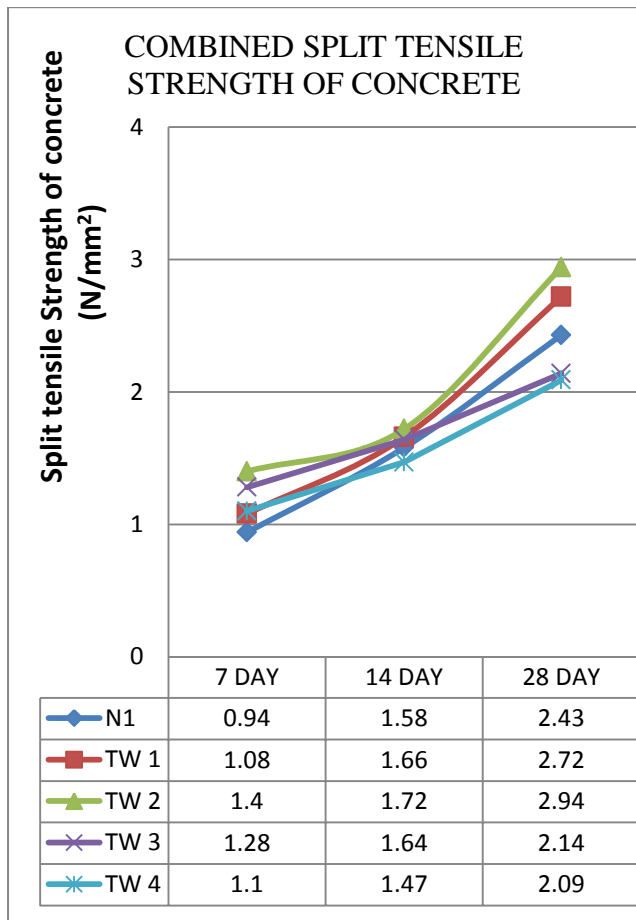
SPLIT TENSILE STRENGTH OF CONCRETE

Split Tensile Strength Of Sample - 1 : Sand replaced by Teak Wood Dust with different percentage

S.No	Name	Teak Wood Dust		Average Split Tensile strength In MPa		
		%	QTY	7	14	28
				Days	Days	Days
1	N ₁	0	-	0.94	1.58	2.43

2	TW ₁	15	30.7	1.08	1.66	2.72
3	TW ₂	25	61.4	1.4	1.72	2.94
4	TW ₃	35	92.1	1.28	1.64	2.14
5	TW ₄	45	122.8	1.1	1.47	2.09

As per test result graph is plotted between Split Tensile strength and number of days



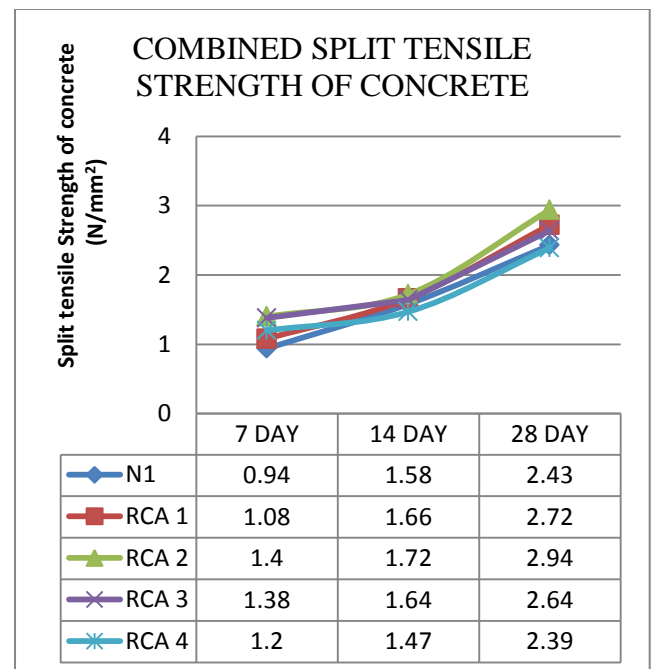
Graph 1. Combined Split Tensile strength of concrete for Sand replaced by Teak Wood Dust with different %

It is noted that the replacement of sand with teak wood dust in various proportions gives the variations in results. The graphical representation of Split Tensile Strength results shows that the strength increases upto a limit, then it starts decreasing. At 25% of replacement of sand with teak wood dust gives the maximum result. By using teak wood dust the strengths increases by 17.34% with respect to normal concrete.

Split Tensile Strength Of Sample - 2 : Coarse Aggregate replaced by Recycled Aggregate with different percentage

S. No	Name	RCA		Average Split Tensile strength In MPa		
		%	QTY	7 Days	14 Days	28 Days
1	N ₁	0	-	0.94	1.58	2.43
2	RCA ₁	15	30.7	1.08	1.66	2.72
3	RCA ₂	25	61.4	1.4	1.72	2.94
4	RCA ₃	35	92.1	1.38	1.64	2.64
5	RCA ₄	45	122.8	1.2	1.47	2.39

As per test result graph is plotted between Split Tensile strength and number of days



Graph 1. Combined Split Tensile strength of concrete for Coarse Aggregate replaced by Recycled Aggregate with different percentage

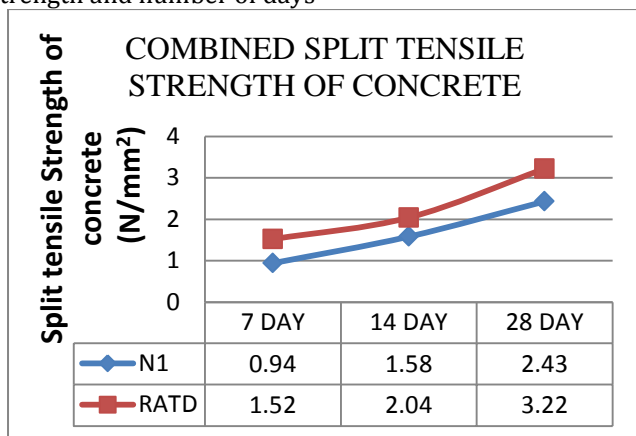
It is noted that the replacement of aggregate with recycle aggregate in various proportions gives the variations in results. The graphical representation of Split Tensile strength results shows that the strength increases upto a limit ,then it starts decreasing. At 25% of replacement of aggregate with recycled aggregate gives the maximum result. By using recycled aggregate the strengths increases by 2.18% with respect to normal concrete.

Split Tensile Strength Of Sample - 3 : Sand replaced by Teak Wood Dust and Coarse Aggregate replaced by Recycled

From all the above results it is found that at 25% replacement of sand with teak wood dust and 25% replacement with coarse aggregate with recycled aggregate gives maximum strength. Thus by using both the combination the new concrete is made and compared with normal concrete at 7th day, 14th day and 28th day.

S.No	Name	Quantity per cubic meter (Kg)		Average Split Tensile strength In MPa (Days)		
		TWD	RCA	7	14	28
1	N	0	0	0.94	1.58	2.43
2	RATD	153.5	316	1.52	2.04	3.22

as per test result graph is plotted between Split Tensile strength and number of days



Graph 2. Split Tensile Strength Of New Concrete

It is noted that the new combination of concrete has more strength than the normal concrete. The strength of normal concrete and new concrete at 28th day of curing is 2.43 MPa and 3.22 MPa respectively. The strength is increases by 24.17%.

UNIT V CONCLUSION

1. From the test result it is observed that the Workability of concrete with partial use of teak wood increases.
2. The Split Tensile strength of partially replaced sand by teak wood in concrete of grade M 20 for proportions of 0%, 15%, 25%, 35% and 45% are 2.43MPa, 2.76MPa, 2.85MPa, 2.64MPa and 2.39MPa respectively at 28th day of curing. The Split tensile Strength increases upto 25%.

3. The Split Tensile strength of partially replaced aggregate by recycled aggregate in concrete of grade M 20 for proportions of 0%, 15%, 25%, 35% and 45% are 2.43MPa, 2.72MPa, 2.94MPa, 2.14MPa and 2.09MPa respectively at 28th day of curing. The Split tensile Strength increases upto 25%.
4. The Split tensile strength of concrete with new combination is 3.22MPa where as the strength of conventional concrete is 2.43MPa. The strength is increased by 24.53%.
5. Water absorption capacity increases with increasing percentage of wooden powder. Larger absorption of water causes the reduction in the strength.
6. Teak wood is obtained at very low no cost, the cost of concrete can potentially be reduced by replacing sand with TWD in concrete.

UNIT IV REFERENCE

1. Code of practice for plain and reinforced concrete – IS 456 : 2000
2. Code of practice for 53 grade Ordinary Portland Cement - IS 12269 : 1987
3. Graf. S. H and Johnson. R. H., "The Properties of Cement-SAWDUST Mortars, Plain, and with Various Admixtures", 1930.
4. Layla Muhsan Hasan Bdeir., "Study Some Mechanical Properties of Mortar with SAWDUST as a Partially Replacement of Sand", Anbar Journal for Engineering Sciences
5. Blumfield, T. (2007). Improving silvicultural and economic outcomes for community timber plantations in the Solomon Islands by interplanting with *Flueggea flexuosa* and other Pacific agroforestry species. Full proposal to ACIAR, Project No. FST/2007/020.
6. Curling, S. F., Clausen, C. A. and Winandy, J. E. (2002). Relationships between mechanical properties, weight loss, and chemical composition of wood during incipient brown-rot decay. Forest Products Journal 52: 7-8.
7. FAO (2001). Global Forest Resources Assessment 2000. Food and Agriculture Organisation, Rome Main Report 140.
8. Halkett, J., Turner, J., Penfold, S. and Dickinson, G. (2011). Future direction of forestry and forest products industry in northern Australia. In prep, RIRDC.

UNIT V BIOGRAPHIES



Chhamakant Tripathi
M.Tech Student
J.N.C.T. Rewa, M.P., India



Prof. Kirti Chandraul
Assistant Professor
J.N.C.T. Rewa, M.P., India



Prof. Manindra Kumar Singh
Assistant Professor
J.N.C.T. Rewa, M.P., India