

Comparative Evaluation of Strength Parameter of a Concrete for Various types of Fibre in Concrete

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Submitted: 01-05-2022

Revised: 04-05-2022

Accepted: 08-05-2022

ABSTRACT— Concrete is one of the most widely recognized development materials for the most part delivered by utilizing locally accessible ingredients. The present trend in concrete technology is towards increasing the strength and durability of concrete to meet the demands of the modern construction. The main aim of the study is to compare the evaluation of strength parameter of a concrete for various proportion of Fibres in concrete. FRC has the high compressive strength and fire-resistant properties thus reducing the loss of damage during fire accidents. In the present work the strength studies are carried out to compare the lots of Fibre concrete. The Fibre is added 0% to 5% are added in concrete. Result shows the percentage increase in compressive strength for 28days.

Keywords—Fibre Reinforced Concrete, Compressive Strength, SteelFibre, Glass Fibre, Nylon Fibre, PET Fibre, Carbon Fibre, Polypropylene Fibre, Coir Fibre, Jute Fibre, Banana Fibre, Palm Fibre, Bamboo Fibre, Sugarcane Fibre

I. INTRODUCTION

Utilization of Fibre in construction materials has a long history. The oldest form of Fibre used in construction materials such a bricks and masonry mortar, were straw and horsehair. Today, several types of Fibre are manufactured and are used in various engineering material including concrete and ceramics. Fibreare used in concrete to enhance various concrete properties such as compressive strength. Concrete is made up of three main ingredients which is cement, aggregate and water. However, there were also other materials put into the concrete mix which is known as additive to increase the strength of the concrete.

In order to study the basic concrete properties like compressive strength. This research was carried out to study the basic concrete properties such as compressive strength at 0% to 5% Fibre content in concrete and finally the results were compared with conventional concrete and degradable and non-degradableFibre concrete.

II. FIBRE TAKEN

- A. Non-Degradable Fibres
- 1) Steel Fibre
 - 2) Glass Fibre
 - 3) Nylon Fibre
 - 4) PET (Polyethylene Terepathalate) Fibre
 - 5) Carbon Fibre
 - 6) Polypropylene Fibre
- B. Degradable Fibres
- 1) Coir Fibre
 - 2) Jute Fibre
 - 3) Banana Fibre
 - 4) Palm Fibre
 - 5) Bamboo Fibre
 - 6) Sugarcane Fibre

III. NATURE OF WORK

Steel Fibre (M20 Grade of Concrete Used)

Sr. No.	Fibre Percentage	Compressive Strength
		28Days
1	0%	28.7
2	0.5%	32.98
3	1%	37.93
4	1.5%	41.02
1	0%	26.6
2	1%	29.34

3	2%	30.44
4	3%	31.46
5	4%	30.7
6	5%	29.2
1	0.5%	27.06
2	1%	28.46
3	2%	26.98
4	3%	26.108

4	1.5%	20.93
1	0.0%	26.28
2	0.5%	26.57
3	1.0%	26.85
4	1.5%	27.32
5	2.0%	27.04
1	0.5%	28.44
2	1.0%	29.63
3	1.5%	28.44
4	2.0%	26.37
5	2.5%	24.3
6	3.0%	22.81

Glass Fibre(M20 Grade of Concrete Used)

Sr. No.	Fibre Percentage	Compressive Strength
		28Days
1	0%	28.7
2	0.5%	32.98
3	1%	37.93
4	1.5%	41.02
1	0%	26.6
2	1%	29.34
3	2%	30.44
4	3%	31.46
5	4%	30.7
6	5%	29.2
1	0.5%	27.06
2	1%	28.46
3	2%	26.98
4	3%	26.108

Carbon Fibre(M40 Grade of Concrete Used)

Sr. No.	Fibre Percentage	Compressive Strength
		28Days
1	0	40
2	0.5	45
3	0.75	48.7
1	0	39.5
2	1	41.8
3	2	31.7
1	0.2	43.1
2	0.3	43.6
3	0.4	42
4	0.5	47.31

Nylon Fibre(M25 Grade of Concrete Used)

Sr. No.	Fibre Percentage	Compressive Strength
		28Days
1	0%	27.25
2	1%	33.11
3	2%	27.69
4	3%	22
1	0.0%	24.09
2	0.5%	24.97
3	1.5%	26.2
4	2.5%	24.19
1	0%	23.02
2	0.3%	25.88

Polypropylene Fibre(M30 Grade of Concrete Used)

Sr. No.	Fibre Percentage	Compressive Strength
		28Days
1	0	34.2
2	0.5	36.5
3	1	31.8
4	1.5	30
1	0	32.67
2	0.5	33.47
3	1	35.84
4	1.5	36.79
5	2	35.6
1	0	31.6
2	0.5	32.8
3	1	34.1
4	1.5	35.2
5	2	33.01

PET Fibre(M20 Grade of Concrete Used)

Sr. No.	Fibre Percentage	Compressive Strength
		28Days
1	0.0%	22
2	0.5%	24
3	1.0%	21.9

Coir Fibre(M60 Grade of Concrete Used)

Sr. No.	Fibre Percentage	Compressive Strength
		28Days
1	0%	64.93
2	1%	66.52
3	2%	62.7
4	3%	59.36
5	4%	56.36
6	5%	53.73
1	0.0%	58.27
2	0.5%	59.32
3	1.0%	60.39
1	0%	63.08
2	0.2%	43.84
3	0.4%	48.08
4	0.60%	47.08

Jute Fibre(M30 Grade of Concrete Used)

Sr. No.	Fibre Percentage	Compressive Strength
		28Days
1	0.0%	29.48
2	0.5%	28.44
3	1.0%	26.66
4	2.0%	24.88
1	0.0%	21.22
2	0.5%	26.75
3	0.7%	25.26
4	1.0%	24.98
5	1.4%	22.42
1	0.0%	27.34
2	1.0%	24.88
3	2.0%	27.22
4	3.0%	23.64

Banana Fibre(M40 Grade of Concrete Used)

Sr. No.	Fibre Percentage	Compressive Strength
		28Days
1	0%	39.22
2	0.2%	42.77
3	0.4%	47.66
4	0.6%	44.73
5	0.80%	41.84

Palm Fibre(M40 Grade of Concrete Used)

Sr. No.	Fibre Percentage	Compressive Strength
		28Days
1	0%	42.88
2	0.5%	41.64
3	1%	40.51
4	1.5%	36.29
5	2%	33.67
6	3%	34.78
7	4%	29.14
1	0%	34.58
2	0.5%	32.9
3	1%	24.01
4	2%	22.51

Bamboo Fibre(M35 Grade of Concrete Used)

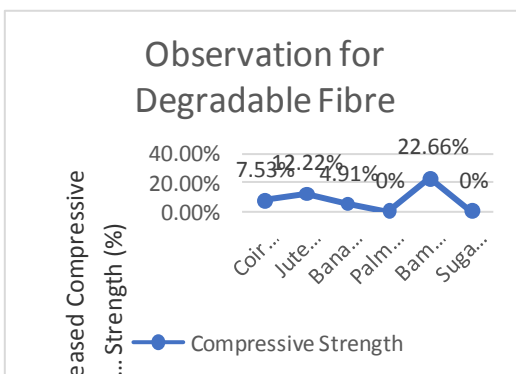
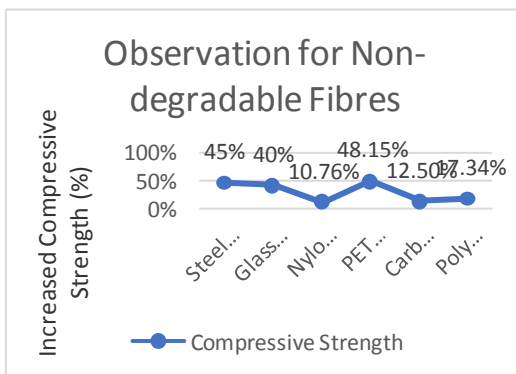
Sr. No.	Fibre Percentage	Compressive Strength
		28Days
1	0.0%	36.23
2	0.5%	36.54
3	1.0%	36.73
4	1.5%	36.87
5	2.0%	36.95
6	2.5%	36.36
1	0.0%	38.3
2	0.5%	39.49
3	1.0%	38.58
4	1.5%	38.5
5	2.0%	38.56
1	0%	32.8
2	0.50%	33.7
3	0.75%	36.8
4	1.00%	41
5	1.25%	38.9

Sugarcane Fibre(M30 Grade of Concrete Used)

Sr. No.	Fibre Percentage	Compressive Strength
		28Days
1	0.00%	28.59
2	0.50%	23.43

3	1.00%	20.21
4	1.50%	14.77
5	0.00%	17.92
6	0.50%	17.41
7	1.00%	13.8
8	1.50%	12.31
1	0.5%	27.96
2	1.0%	27.58
3	1.5%	27.98
4	0.5%	28.44
5	1.0%	29.04
6	1.5%	28.63
7	0.5%	29.22
8	1.0%	30.78
9	1.5%	28.62

IV. GRAPHS



V. OBSERVATIONS

A. Non-Degradable Fibres

1. Steel Fibre - 1% Fibre gives higher strength approx. 45% more.
2. Glass Fibre - 1% Fibre gives higher strength approx. 40% more

3. Nylon Fibre - 1% Fibre gives higher strength approx. 10.76% more
4. PET Fibre - 1% Fibre gives higher strength approx. 48.15% more
5. Carbon Fibre - 0.5% Fibre gives higher strength approx. 12.5% more
6. Polypropylene Fibre - 1.5% Fibre gives higher strength approx. 17.34% more

B. Degradable Fibres

7. Steel Fibre - 1% Fibre gives higher strength approx. 45% more.
8. Glass Fibre - 1% Fibre gives higher strength approx. 40% more
9. Nylon Fibre - 1% Fibre gives higher strength approx. 10.76% more
10. PET Fibre - 1% Fibre gives higher strength approx. 48.15% more
11. Carbon Fibre - 0.5% Fibre gives higher strength approx. 12.5% more
12. Polypropylene Fibre - 1.5% Fibre gives higher strength approx. 17.34% more

VI. CONCLUSION

- After studying all the details, we come to this conclusion that PET Fibre gives 48.15% highest strength as compared to other Fibres
- From the above observation we concluded that bamboo fibre gives highest strength out of the above Fibre when we add fibres approx. 1% . The bamboo Fibres can be used as innovative Fibres in concrete to increase the strength of the concrete and improve the ductility of concrete and its post – cracking load carrying capacity and strength difference between bamboo Fibre concrete specimens and control concrete specimens became high distinct in the beginning age of curing itself.

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