

Effect of Sisal Fibre in Concrete

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Abstract— Customary cement is solid in pressure and powerless in strain with a specific end goal to conquer the shortcoming steel fortification is being given. Scrutinizes endeavored to acquire the malleable property by presenting engineered filaments, for example, poly propylene, asbestos and so on., and steel strands, yet they are costly. Henceforth they are endeavoring to utilize the common strands, for example, straw, elephant grass, palm leaf, coconut coir and so forth to consolidate rigidity in traditional cement. So that the customary steel fortification on cement can be decreased. In this exploration, sisal is being utilized as a part of cement. In this way, the mechanical properties, for example, compressive quality, split-elasticity, and modulus of burst of M40 evaluation concrete and by changing the measurement of fiber substance from 0.1%, 0.2%, 0.3%, 0.4%, and 0.5%, by volume of bond with ideal length of 35mm got from writing survey, were found. The ideal dose of sisal fiber was observed to be 0.3%. The flexural conduct of fortified solid shafts with 0.3% sisal fiber was contrasted and customary solid properties of M40 evaluation.

Key words: Sisal Fibre, Concrete, Compressive Strength, Workability

I. INTRODUCTION

Regular fiber has uncommon advance in the field of structural designing. The expense of normal fiber is relied upon to be cost aggressive. The benefits of normal fiber materials are quality, better toughness, focused expense, ecological similarity and bio degradability. The utilization of characteristic fiber in cement is prescribed following a few sorts of filaments are accessible locally and are abundant for eg. Straw, coconut coir, palm leaf, cotton, sisal, sugarcane, bamboo, jute, wood and so forth.. Of every single common fiber, sisal is hard and extreme fiber, polygonal to round in area has the best tearing quality and holds this property even in wet condition. Sisal is a bio degradable natural fiber material containing 46% lignin, 54% cellulose. Since its high substance of lignin, sisal is a great deal a larger number of favorable than other characteristic strands.

Filaments can be added to bond based grids as essential or auxiliary fortification. Filaments function as essential support in dainty items in which traditional strengthening bars can't be utilized. In these applications, the filaments demonstration to increment both the quality and the sturdiness of the composite. In parts, for example, chunks and asphalts, filaments are added to control breaking impelled by mugginess or temperature varieties and in these applications they fill in as auxiliary fortification.

Vegetable filaments, including sisal, coconut, jute, bamboo and wood strands, are forthcoming fortifying materials and their utilization up to this point has been more observational than specialized. They have been attempted as fortification for concrete lattices in creating nations essentially to deliver minimal effort meager components for use in lodging plans. Vegetable filaments require just a low

level of industrialization for their preparing and in correlation with a proportional weight of the most widely recognized engineered fortifying strands, the vitality required for their creation is little and consequently the expense of manufacturing these composites is additionally low (Aziz et al., 1984). Also, the utilization of an arbitrary blend of vegetable strands in bond lattices prompts a method that requires just a little number of prepared work force in the development business. The utilization of such strands in cement gives an energizing test to the development business for lodging, for giving material sheets and to add to the quick advancement of a nation's foundation. Vegetable fiber concrete composites consequently represent the test and the answer for joining unusual building materials with customary development strategies

The utilization of sisal, a characteristic fiber with improved mechanical execution, as support in a bond based framework has appeared to be a promising open door. The bond grids can comprise of glue, mortar or cement. The greater part of the studies on sisal fiber cement includes the utilization of common Portland bond. Be that as it may, high alumina concrete, bond with added substances, for example, fly fiery debris, slag, silica smoke have likewise been utilized to enhance the strength of the composites.

II. METHODOLOGY

The bond utilized as a part of this trial examination was 53 grade OPC produced by Chettinad concretes. The sand utilized for test project was privately secured and fitting in with zone II. The sand was initially sieved through 4.75 mm strainer to evacuate any particles more noteworthy than 4.75 mm. The fine totals were tried according to Indian Standard Specification May be: 383-1970. Locally accessible coarse totals were utilized as a part of this work. Totals going through 20mm sifter and held on 4.75mm strainer were sieved and tried according to Indian Standard Specifications Seems to be: 383-1970. The utilization of sisal, a characteristic fiber with upgraded mechanical execution, as fortification in a concrete based framework has appeared to be a promising open door.

Solid blend configuration is a procedure by which the extents of the different crude materials of cement are resolved with a plan to accomplish a sure least quality and sturdiness, as financially as would be prudent. Taking into account the disentangled blend outline method, M-40 Concrete blend is composed and blend was planned according to IS 10262:2009 for M40 evaluation of cement. 3D square forms of size 150x150x150 mm were utilized. The block molds were cleaned altogether utilizing a waste fabric and afterward legitimately oiled along its countenances. Cement was then filled in mold and after that compacted utilizing a standard packing pole of 600mm length having a cross sectional territory of 25mm² and curing is done in clean water in room temperature. Fresh concrete mix is gone through slump cone test for workability and compressive strength test is done to

evaluate compressive strength after 7th, 14th and 28th day of curing.

III. RESULT AND DISCUSSION

A. Workability

The droop quality diminished with expansion in rate of sisal fiber. The graphical representation is appeared in chart 1. Crisp solid or plastic cement is a newly blended material which can be formed into any shape the relative amounts of concrete, totals and water combined control the wet state and additionally in the solidified state. Test result values are given in table 1.

S. No.	Percentage of Sisal Fibre	Mix Name	Slump (mm)
1	0.00%	Mix 1	53
2	0.10%	Mix 2	57
3	0.20%	Mix 3	61
4	0.30%	Mix 4	65
5	0.40%	Mix 5	55
6	0.50%	Mix 6	48

Table 1: workability of concrete

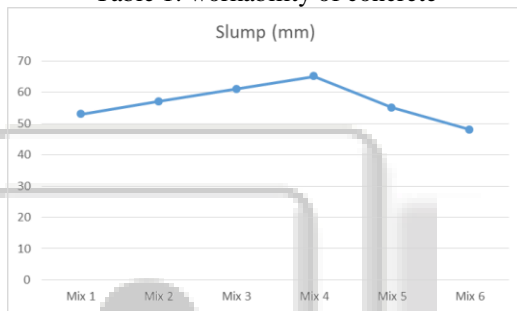


Fig. 1: Graph 1: workability of concrete

B. Compressive Strength

From the compressive quality results got for both 7 days and 28 days it was watched that the compressive quality expanded by including 0.3% of sisal fiber and there was a diminishing in quality upon further expansion in rate of sisal fiber in cement. Henceforth 0.3% expansion of From the compressive quality results got for both 7 days and 28 days it was watched that the compressive quality expanded by including 0.3% of sisal fiber and there was a diminishing in quality upon further expansion in rate of sisal fiber in cement. Henceforth 0.3% expansion of sisal fiber in volume of bond in cement was considered as ideal. The seventh day and 28th compressive quality of cement for expansion of sisal fiber in volume of concrete by different rate is appeared in Graph 2. Test result are given in table 2.

S.No.	Percentage of Sisal Fibre	Mix	Compressive Strength N/mm ²		
			7 Days	14 Days	28 Days
1	0.00%	Mix 1	35.75	43.49	51.23
2	0.10%	Mix 2	36.82	45.14	53.45
3	0.20%	Mix 3	37.45	45.79	54.12
4	0.30%	Mix 4	38.50	47.19	55.88
5	0.40%	Mix 5	34.74	42.97	51.20
6	0.50%	Mix 6	34.20	41.50	48.80

Table 2: Compressive Strength of the Concrete

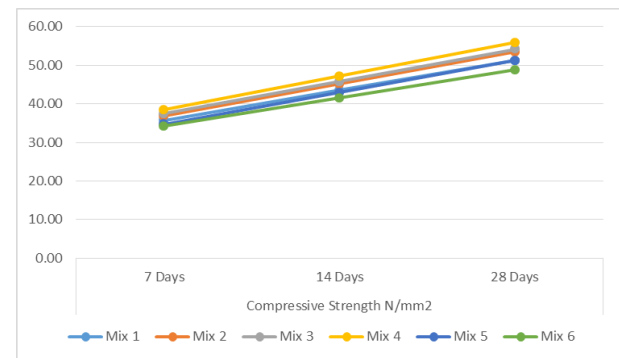


Fig. 2: Graph 2: Compressive Strength of the Concrete

IV. CONCLUSION

From the present study we concluded that, Workability of the concrete decreased with increase in percentage of sisal fibre in concrete. It has been found that 0.3% sisal fibre mix gives maximum compressive strength. All mix of sesal fibre concrete possess good compressive strength as well as good slump, so as a whole we can say upto 0.5% sesal fiber can be used but 0.3% is optimum.

REFERENCES

- [1] Kuruvilla Joseph., George Leslie and Khosrow Ghavami.(1999), 'The use of Sisal Fibre as reinforcement in cement based composites', Revista Brasileira de Engenharia Agrícola e Ambiental, Vol. 12, pp. 245-256.
- [2] Nilsson and Kavin G.(1975), 'Study on flexural and toughness behavior of natural fibres in concrete', Journal of Composite Structures, Vol. 23, pp. 95-115.
- [3] Yogesh Ravindra Suryawanshi.(2013), 'Study Of Sisal Fibre As Concrete Reinforcement Material In Cement Based Composites', International Journal of Engineering Research & Technology (IJERT), Vol. 2,pp. 22-26.
- [4] Ramakrishna G., Sundararajan T. and Kothandaraman S.(2011), 'Strength of corrugations of a roofing sheets reinforced with sisal fibres', ARPN Journal of Engineering and Applied Sciences, Vol. 6, pp. 12.
- [5] IS 15658:2006, Precast concrete block for paving, "Bureau of Indian Standard", New Delhi.
- [6] IS 10262: 2009, "Bureau of Indian Standard", New Delhi.
- [7] IS 456: 2000, "Bureau of Indian Standard", New Delhi.