

EXPERIMENTAL STUDY ON MECHANICAL PROPERTIES OF CONCRETE WITH FIBER

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Abstract: - Concrete blocks, made of a mixture of silica fume and natural fiber known as (hemp fiber) have been casted by a recently projection process. The main observations are comparison of compressive strength variations within a given blocks. Mechanical properties increase with the use of different materials. Mainly focused on natural fiber which can replace the other material through which the eco-friendly concrete gets the new way.

Keywords — Hemp Concrete, Mechanical properties of concrete, Natural Fiber concrete, compressive strength of fiber concrete, properties of fiber concrete, mix design of fiber concrete.

I. INTRODUCTION

Developing propensities, motivated by natural and vitality sparing criterions for building envelopes, refocus on a modern challenge, utilization of plant materials as bio material in green concretes. Hemp concrete has not as it were a positive adjust in its climate alter marker, it too features a positive wellbeing affect. Expanding investigate, imaginative applications of characteristic filaments for the green building sector among which hemp concrete is one of the foremost promising. Cannabis is known as one of the foremost flexible crops and thus one of the most seasoned culture plants, affirmed by archeological discoveries dating from 6,000 a long time prior. The imaginative paper of hemp concrete as development fabric is its work as a multi execution fabric, supplanting totally the mineral totals, utilized in ordinary concretes, whereas in noteworthy applications characteristic strands were basically included in scanty sums to concretes and mortars, e.g. to dodge withdrawals in an earthen mortar or adobe brick. Hemp as a Building material:- Hemp and lime-based concrete-like blocks have been used as an insulating medium in building. These blocks are not sturdy enough to be used as structural elements; they require a brick, wood, or steel frame to support them. Hemp fibers, on the other hand, are extremely strong and flexible, and have been shown to be a viable substitute for wood in a variety of applications, including the development of extremely durable and breathable homes. Casting the hemp and lime mix when wet around a timber frame with temporary shuttering and tamping the mix to form a firm mass is the most common use of hemp lime in construction; after the temporary shuttering is removed, the solidified hemp mix is ready to be plastered with a lime plaster.

II. LITERATURE REVIEW

Meka Krishna Teja, S Karthiga (2018), Present study involve study of physical property of concrete with hemp and sisal fiber with using Meta kaolin with cement. Hemp and sisal fiber are used at 0.5%, 1%, 1.5 % and 2% by weight of cement and Meta kaolin used as 5%, 10%, 15%, 3420% with replacement of cement to carry out compression and tensile strength. As use of 0.5% of hemp fiber to the concrete the compression strength increases by 10.45% than the nominal concrete and 1% of sisal fiber the compression strength increases in the percentage of 3.2% than the nominal concrete (figure 2.1 and 2.2) and by partial replacement of cement by 15 % of Meta kaolin, compression strength increases 6.4% than the nominal concrete for M40 grade Mix. From these results we can conclude that optimum percentage of hemp fiber, sisal fiber, and Meta kaolin is 0.5%, 1%, 15%.

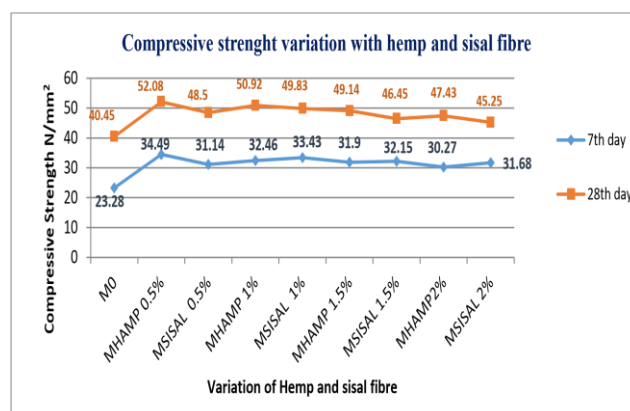


Fig 1

III. OBJECTIVE OF WORK

The objectives of work are as follow

- Our project is to determine the compressive strength of hemp concrete compared to other aggregate materials used in concrete.
- To find the alternative natural basic material which are used in construction from past many years.
- To make the material economic.

IV. SCOPE OF WORK

- Study of physical properties of aggregates: it includes determination of specific gravity, moisture content and sieve analysis of course and fine aggregates.
- This study also helps to understand the properties of hemp fiber and features of hemp concrete.
- Scheduling of works to be carried out.
- Concrete mix design as per IS: 10262-2019 will be carried out for M-20 grade concrete.

V. CASTING SCHEDULE

Concrete cubes of M40 concrete and size 150*150*150mm are casted on site with different batches. The casted cubes are hydrated for 7 & 28 days. After completion of respective period the cubes are tested for compressive strength. Every batch material performed a slump test before casting the cubes. Material used are sanghi cement, gajod plant water, mota bandra sand, hemp fiber, silica fume. Mix design of the concrete is designed as per the Indian standard BIS, 10262 2019, 'Concrete mix proportioning - Guidelines'.

Below casting schedule is for 7days & 28days and each batch contain 3 cubes

Batch (B1)	Batch (B2)	Batch (B3)	Batch (B4)
Normal concrete (M40)	Normal concrete + hemp fiber 0.5%	Normal concrete + 5% silica fume	Normal concrete + 0.5%hemp fiber+ 5% silica fume

Table 1

VI. RESULT

Compressive strength test of concrete performed under laboratory. Below are the results and observation visualized as per the test results.

Batch	7days	28 days
B1	28.82 N/mm ²	43.37 N/mm ²

B2	34.00 N/mm ²	43.06 N/mm ²
B3	33.62 N/mm ²	42.72 N/mm ²
B4	34.46 N/mm ²	43.38 N/mm ²

Table 2

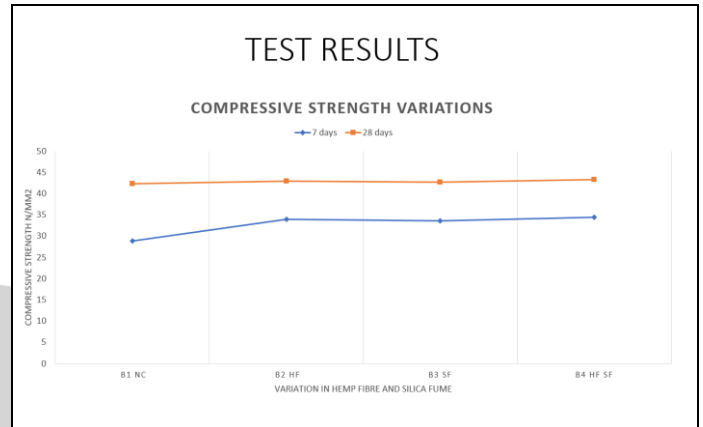


Fig 2

VII. CONCLUSION

- The weight of normal concrete (M40) is around 25.8 kg whereas the weight of B4 was observed to be 25.8 kg by replacing other material with hemp fiber.
- The strength obtained by B1 (7days) batch was observed to be 28.82 N/mm² and B4 (7days) batch which include hemp fiber was observed 34.46 N/mm², hence we can say that the strength is remarkable.
- There was no change observed in the workability nature of the concrete made.
- The strength obtained after 28 days of casting for B4 batch was examined to be 43.38 N/mm² which is slightly remarkable with the help of natural fiber.
- No honey combing observed.

VIII. ACKNOWLEDGEMENT

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