



St Jude Secondary School

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Abstract:

The research question, "Are there possible alternatives towards human waste hair management?" drove us towards various experimental researches to generate solutions in the increasing environmental problems brought about by poor disposal of waste hair. This project report is an overview of alternative methods we experimentally founded in application of human hair as fiber reinforcement in concrete and use of human hair to produce fertilizer and pesticide solution. Considering human hair as fiber from lessons in Biology and the concept of fiber reinforcement that existed for a while, addition of human hair in different proportions; 0%, 1.5% and 2.5% of human hair weight in relation to cement weight, an overall increase in the strength of concrete was observed by laboratory tests conducted on concrete samples. Though various experiments we saw possibilities of partially replacing amount of cement used. The experiment has provided a way through having stronger concrete used in civil construction. The report further shows a success in production of fertilizer out of human hair chemically hydrolyzed solution. Its application has proved increase in growth, enhancement of green color and resistance to pests.

Method:

All the specimens that is; concrete with 0% 1.5% and 2.5% hair were produced using the same amount of cement, fine aggregate and coarse aggregate.

The collected hair from saloons and beauty parlors needs treatment before it is added in concrete specimens. The treatment follows the following stages.

Separating: Hair was separated from other waste depending on the source.

Washing: after sorting the hair was washed first with water and then with acetone to remove any contamination.

Drying: The hair was then dried under sun. The hair can then be stored without any deal of decay.

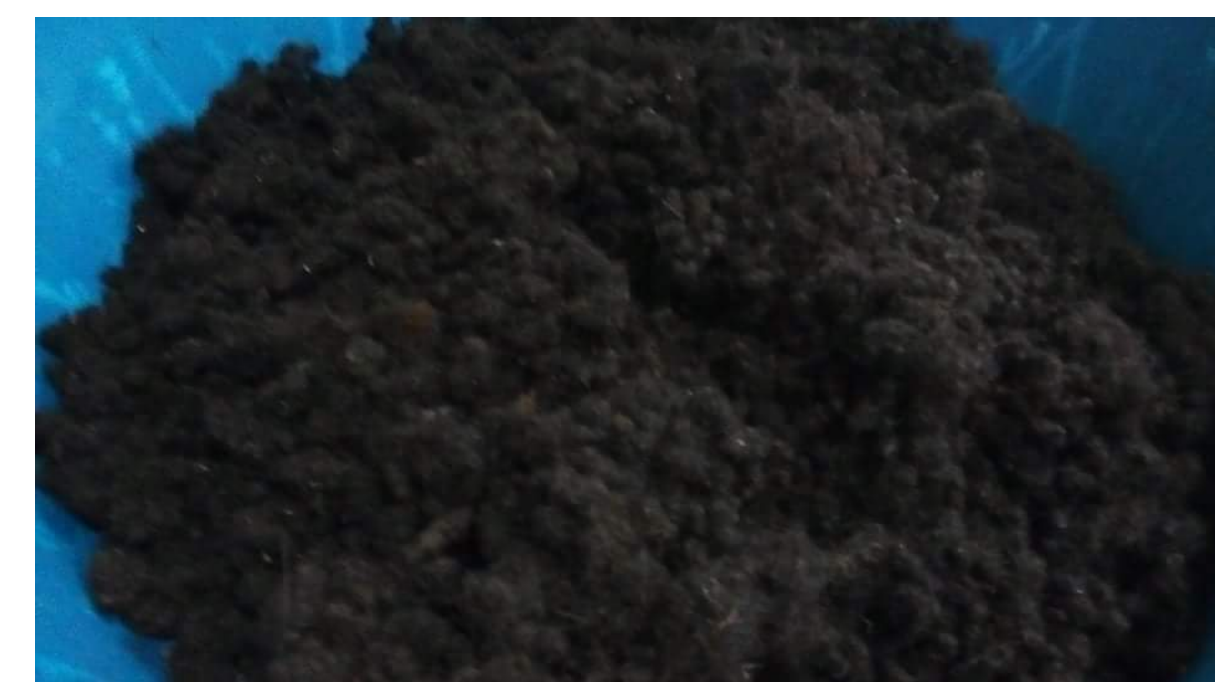
Sorting: Hair was then sorted at random according to length, color and quality.

The specimen preparation considered M15 concrete design. 0%, 1.5% and 2.5% amounts of hair were added in the concrete mixture.

The concrete was placed in molds. The molds were designed to cubes (150mm x 150mm x 150mm) and beams (100mm x 100mm x 500mm).

After 24 hours the concrete was removed from the molds and soaked in water.

After 3, 7 and 28 days, the samples were then tested for flexural strength, tensile strength and compressibility test.



COMPONENTS	AMOUNTS
Portland cement	6.7(kg)
Fine aggregate	13.4(kg)
Coarse aggregate	26.8(kg)
Water-cement ratio	0.44(kg)
Water	3(L)
1.5% hair	0.1005(kg)
2.5% hair	0.1675(kg)

TABLES AND GRAPHS

Table of Results:

3 DAYS			
	0%	1.50%	2.50%
COMPRESSIVE STRENGTH	6.36	7.01	7.15
TENSILE STRENGTH	1.35	1.73	1.82
FLEXURAL STRENGTH	1.42	1.82	1.96

Table 2: The above table shows the results of 3 days test

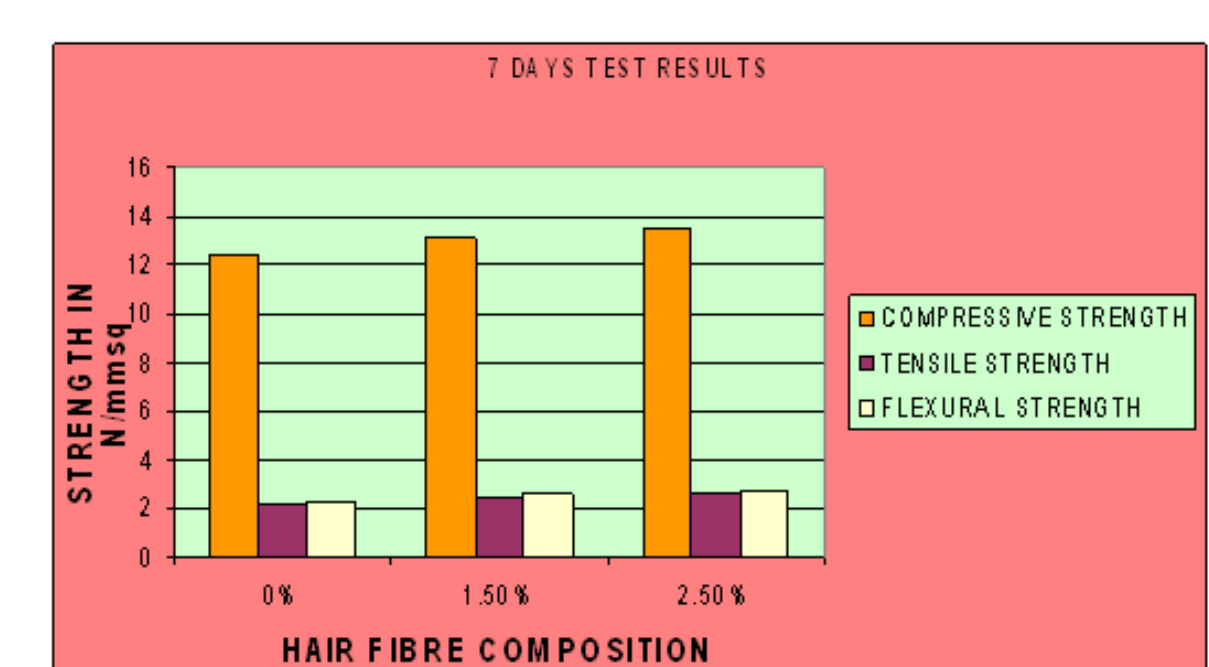
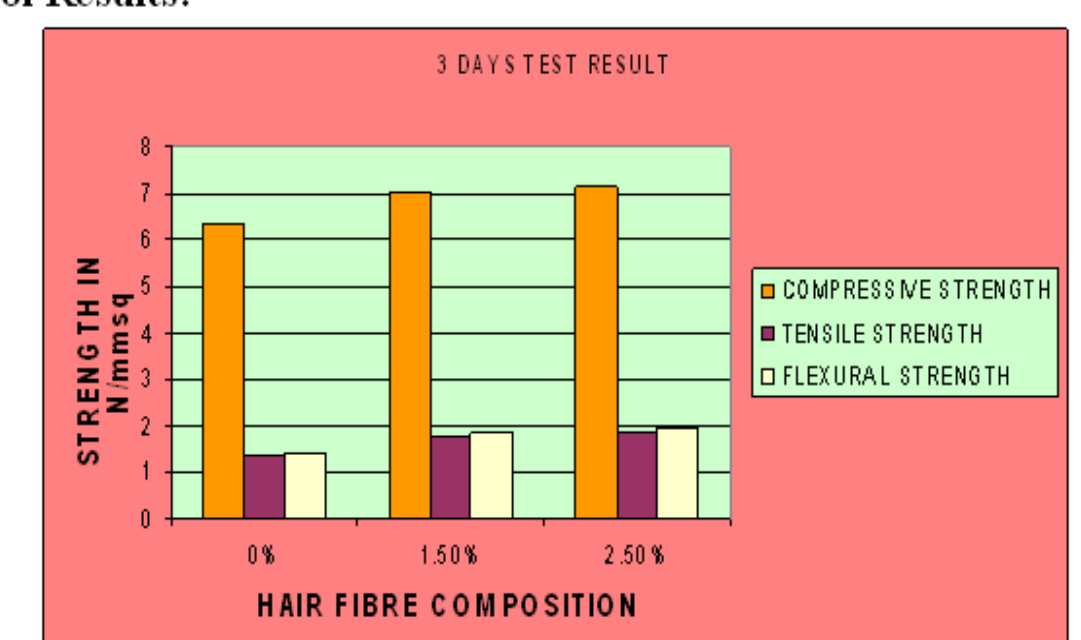
7 DAYS			
	0%	1.50%	2.50%
COMPRESSIVE STRENGTH	12.42	13.12	13.46
TENSILE STRENGTH	2.24	2.46	2.58
FLEXURAL STRENGTH	2.31	2.61	2.73

Table 3: The above table shows the results of 7 days test

28 DAYS			
	0%	1.50%	2.50%
COMPRESSIVE STRENGTH	24.32	25.31	25.63
TENSILE STRENGTH	3.16	3.41	3.52
FLEXURAL STRENGTH	3.28	3.81	4.05

Table 4: The above table shows the results of 28 days test

Graphs of Results:



Conclusion:

From the result of the experiment, an overall conclusion made is that hair can preferably be used to increase the strength of concrete and prevent cracking in concretes. Hair is therefore an alternative in fiber reinforcement of concrete. Furthermore, a partial replacement of cement was observed during the experiment. These results give a way forward in use of human hair fiber as a reinforcement material in concrete. It also gave a positive result as an alternative to waste hair management.

References:

- Block RJ, Bolling D (1952) The amino acid composition of proteins and foods. Charles C. Thomas, Springfield, IL
- C. R. Robbins. (2012). Chemical and Physical Behavior of Human Hair. 5th edition. Springer, Heidelberg, Germany.

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