INVESTIGATION ON CONCRETE BY USING KENAF FIBERS WITH PARTIAL REPLACEMENT OF CEMENT WITH BAMBOO LEAF ASH

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***Abstract*: The Ordinary Portland cement was replaced by BLA at 0%, 2.5%, 5%, 7.5% And 10% by weight and the cubes were crushed to get the various Compressive strength of the concrete at different curing days. The result revealed that, the workability and strength properties of the resulting concrete was dependent on the water cement ratio, total days of curing, and percentage of replacement of BLA for OPC. It was however noticed that the result of 10% and 20% BLA were closer to the concrete with only OPC at 28 days. It is therefore hope that this research work will provide a quick reference to practicing engineer, who will find BLA as good partial replacement for cement in concrete, thus reducing cost of concrete production. The mechanical properties of concrete adding Kenaf fiber. M40 grade concrete mixed with different quantity of fiber such as 0%, 0.5%, 0.75%, 1% and 1.25%, respectively is undergone compressive, flexural and split tensile strength test.**

***Keywords*: Bamboo leaf ash, kenaf fibers, split tensile strength, compressive strength.**

I. INTRODUCTION

The interest for concrete is next just to water with the progression of innovation and expanded field of utilization of cement and mortars, different properties of the common cement required alteration to make it progressively appropriate for different circumstances, prudent and eco-friendly. This has prompted the utilization of cementitious materials. Conclude that BLA can be used as a natural pozzolan to replace cement in concrete production the maximum load and compressive strength of 5%, blended concrete was higher than That of OPC (0%) concrete. but only 5% and 10% blended concrete reached the target Strength. An experimental investigation will be carried out to examine the impact of Partial replacement of BLA on the mechanical and physical properties of concrete such as consistency, and settling time workability, compressive strength micro structure, and durability. The chemical and physical properties of BLA, workability properties of fresh concrete, the specific gravity, bulk densities and compressive strength of the hardened concrete under uniaxial compressive load. Kenaf is a warm-season annual fiber crop growing in temperature and tropical areas. It is related to cotton, okra and hibiscus due to systematic. It is a fibrous plant, consisting of an inner core fiber (75-60%), which produces low quality pulp and an outer bast fiber (25-40%), which produces high quality pulp, in the system.

II. OBJECTIVES

The objectives of this study are as follows

a) To optimize the usage of cement with bamboo leaf ash in concrete.
b) To evaluate the compressive and spilt tensile strength of concrete.

III. MATERIALS

The properties of cement are presented in Table 1.

Table 1 Physical properties of cement

S. No.	Property	Cement (53 grade)
1	Specific gravity	3.18
2	Normal consistency	29%

3.1 Bamboo Leaf Ash:

Jute is a long, delicate, glossy vegetable fiber that can be spun into coarse, solid strings. It is created fundamentally from plants in the sort Corchorus, which was once arranged with the family Liliaceae, and all the more as of late with malvaceous the essential wellspring of the fiber is Corchorus olitiau's, yet it is viewed as mediocre compared to Corchorus capsularis "jute" is the name of the plant or fiber used to make burlap, hessian or gunny fabric. Jute is one of the most affordable natural fiber, and second only to cotton in the amount produced and variety of uses. Jute fiber is composed primarily of the plantmaterials cellulose and lignin. It falls into the bast fiber category(fiber collected from bast, the phloem of the plant, sometimes called the "skin") along with kenaf, industrial hemp, flax (linen), ramie, etc. The industrial term for jute fibre is raw jute.

3.2 Kenaf Fibers: -

kenaf fibers is a traditional, third world crop after wood and bamboo that is poised to be introduced as a new annually renewable source of industrial purpose in the so -called developed economies. Kenaf is a warm-season annual fiber crop growing in temperature and tropical areas. It is related to cotton, okra and hibiscus due to systematic. It is a fibrous plant, consisting of an inner

core fiber (75-60%), which produces low quality pulp and an outer bast fiber (25-40%), which produces high quality pulp, in the system. Kenaf fiber has emerged as an important plant cultivated in third-world countries and has been regarded as an industrial crop. It has a great potential for replacing synthetic fiber such as glass fiber. The use of kenaf fiber can provide mechanical properties, i.e., tensile strength, comparable to those of synthetic fiber with lower density than traditional materials, resulting in lightweight and eco-friendly polymer composites.

IV. EXPERIMENTAL INVESTIGATIONS

4.1 Compressive strength results

The compressive strength conducted in compression testing machine for the cast and cured specimens and the results are furnished in table 2 to 4.

Table 2: Compressive strength of concrete with bamboo leaf ash as partial replacement of cement in concrete

Sl.no	Bamboo leaf ash	7 days	28 days
1	0%	34.63	49.55
2	2.5%	33.6	49.01
3	5%	32.59	48.32
4	**7.5%**	31.36	47.13
5	10%	30.61	46.48

Table 3: Compressive strength of concrete as partial replacement of concrete with kenaf fibers

Sl.no	Kenaf fiber	7 days	28 days
1	0%	34.63	49.55
2	0.5%	35.42	50.62
3	0.75%	35.10	51.77
4	1%	35.71	52.64
5	1.25%	35.01	52.34

Table4: Compressive strength of Concrete with bamboo leaf ash and kenaf fibers

Sl.no	Bamboo ash+ kenaf fibres	7 days	28 days
1	0%	34.63	49.55
2	7.5%BA+1%KF	35.94	51.43

4.2 Split tensile strength results

The split tensile strength conducted in compression testing machine for the cast and cured specimens and the results are furnished in table 5 to 7.

Table 5: Split tensile strength of concrete with bamboo leaf ash as partial replacement of cement in concrete

Sl.no	Bamboo leaf	7 days	28 days
1	0%	3.44	4.94
2	2.5%	3.30	4.83
3	5%	3.17	4.71
4	7.5%	3.01	4.53
5	10%	2.88	4.41

Table 6: Split Tensile strength of concrete as partial replacement of concrete with kenaf fibers

Sl.no	Kenaf fiber	7 days	28 days
1	0%	3.44	4.94
2	0.5%	3.51	5.01
3	0.75%	3.62	5.11
4	1%	3.82	5.31
5	1.25%	3.68	5.28

Table7: Compressive strength of Concrete with bamboo leaf ash and kenaf fibers

Sl.no	Bamboo ash+ kenaf fibres	7 days	28 days
1	0%	3.44	4.94
2	7.5%BA+1%KF	3.65	5.10

V. CONCLUSION

In this study, the concrete has a partial replacement of cement with bamboo leaf ash of 2.5%, 5%, 7.5%, 10% and kenaf fibers is added to concrete at a percentage of 0.5%, 0.75%, 1%, 1.25% and we got the optimum values of strength at the particular percentages given below:

- At 7.5% partial replacement of bamboo leaf ash with cement the compressive strength of concrete at 7 and 28 days are 31.36 and 47.13 N/mm^2.
- At 7.5% partial replacement of bamboo leaf ash with cement the split tensile strength of concrete at 7 and 28 days are 3.01 and 4.53 N/mm^2.
- At 1% addition of kenaf fiber the compressive strength of concrete at 7 and 28 days are 35.71 and 52.64N/mm^2.
- At 1% addition of kenaf fiber the split tensile strength of concrete at 7 and 28 days are 3.43 and 5.31N/mm^2.
- By the combination of 7.5% bamboo leaf ash +1% kenaf fibers with cement the compressive strength of concrete at 7 and 28 days are 35.94and 51.43N/mm^2.
- By the combination of 7.5% bamboo leaf ash +1% kenaf fibers with cement the split tensile strength of concrete at 7 and 28 days are 3.65 and 5.10N/mm^2.

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