Experimental Study On Aloe Vera Fiber Concrete With Admixture

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Abstract - The paper presents an experimental investigation conducted to study on the natural of aloe vera fiber in concrete. Theeffectoffiberweightfraction (10–20–30%) and fiber.Fly ash is not highly reactive, the hydration can be reduced. A composite material is made up of two or more constituent materials. The constituent materials differ in their physical andchemical composition. Nowadays researchers and engineers have begun to show their research interest in the field of natural fiber composites. The reason is that natural fibercomposites possess enhanced corrosion resistance, ease of manufacturing, environmental friendly.Aloe vera fibers are environmentally friendly and present important attributes, such as low density, light weight, low cost, high tensile strength, as well as being water and fire resistant. This kind of waste has a greater chance of being utilized for different application in construction and building materials. This focused on the use of aloe vera fiber and its effect on the compressive and split tensile strength.

1.Introduction

Investigations and uses of composites reinforced with natural fibershavebeengrowingoverthepastdecades.Thesecomposites offer economical, technical, societal and environmental advantages.Asaconsequence,theybecamepromisingalternatives toreplacesyntheticfibersfromnon-renewablesources.Inthis way,thestudyofthepropertiesofthesenaturalcompositesisof utmostimportancetoenableitsuse.Thecurrenteconomic growth and technological development are motivating the search for new material s to meet modern technological challenges and,at thesametime,preservetheenvironment. Natural fibers are a renewable resource, light in weight having high specific strength and stiffness, biologically degradable and abundantly available at low cost. Natural fibers are also processing friendly as they are non-abrasive as well as hypoallergenic.12–15Natural fibers can be derived from plants, animals and minerals. Plant-derived natural fibers are cellulose based and are generally classified according to the pastor type of plant from which they are extracted (as shown in Figure 1). Plant-derived natural fibers are also the most widely used natural fibers for fabrication of bio-composites.

2. Materials

2.1. Cement

Cement is a binding material which possess very good and cohesive properties which make it possible to bond with other materials to form a compact mass. Ordinary Portland cement is the most commonly used cement for general engineering works. The specific gravity of all grades namely 33, 43 and 53 grades. In this project Ordinary Portland Cement of 53 grades is used for experimental work. Initial and final setting time of the cement was 30 minutes and 600 minutes.

2.2. Fine aggregate

The fine aggregate used was locally available river sand without any organic impurities and conforming to IS: 383 – 1970. The fine aggregate was tested for its

physical requirements such as gradation, fineness modulus, specific gravity and bulk density. A concrete can be made from sand consisting of rounded grains as good as form that in which the grains or granular.

2.4 Water

Water is an important ingredient of concrete as it activity participates in the chemical reaction with cement and potable water available in laboratory with pH value of not less than 6.5 and not more than8.5, conforming to the requirement of IS 456 2000 were used for mixing concrete and curing the specimen. The water which is fit for drinking should be used for making concrete.

2.5 Aloe vera Fiber

Aloe vera fibers. Natural fiber saree xtracted from the plan tbyvarioustechniques like mechanica lretting, chemical rettingandwaterretting process (Kommula *et al.,* 2013). The aloe vera fibers are extracted by waterretting process wherelongspikyleavesfrom aloevera fiber crushed and soakedindistilledwaterfortwo weeks to separate the fiberandthefilament.Theextractedfibers are washed with distilled wate rthoroughlyformorethanseven timestore moveanypulpadheringtothem.Thefibersaredried in sunlight forabout10-12htoremovetheresidualmoisture. The fibers [Figure1(b)]were obtained from the aloevera plant [Figure1(a)].Aloe vera common in India.

Figure1(a)

Figure 1(b)

2.5.1 Characteristics of Aloe vera Fiber

- It has smaller elongation.
- It is light weight.

2.6 Fly Ash

Fly ash is a by-produced during the operation of coal-fiber power plant. The finely divided particles from the exhaust gases are collected in electrostatic precipitators. These particles are called Fly ash.

Figure 2

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2.6.1 Characteristics of Fly ash

1. High ultimate strength
2. Increased durability
3. Improved workability
4. Reduced bleeding
5. Reduced shrinkage

3. Experimental Work

3.1 Measurement of Workability

The workability of a fresh concrete is a composite property which includes the diverse requirements of stability, mobility, placing of ability and finishing

ability. There are different methods for measuring the workability. Each of them measures only particular aspects of it and there is no unique test which measures workability of concrete in its totality. The test measures the relative effort required to change a mass of concrete from definite shape to another by means of vibration.

3.1.1 Slump Cone Test

Slump test is the most commonly used method of measuring consistency of concrete which can be employed either in the laboratory or at the site of work. It is not a suitable method for very wet or very dry concrete. It does not measure all factors contributing to workability, nor is it always representative of conveniently as a control test and gives an indication of the uniformity of concrete from batch to batch.

Figure 3. Slump Cone Test

3.2 Compression Test on Concrete

Compression test is the most common test conducted on harden concrete, partly because it is an easy test to perform, and partly because most of the desirable characteristics properties of concrete are qualitatively related to its compressive strength.

The compressive test is carried out on specimen cubical or cylindrical in shape. Sometimes, the compression strength of concrete is determined using parts of a beam tested in flexure. The end parts of beam are left intact after failure in flexure and since the beam is usually of square cross section, this part of the beam could be used to find out the compressive strength.

Figure 4

4.Results and discussion

Figure 5shows some examples of the load vs elongation curves obtained from the Instron machine software. These curves display a typical elastic line followed by a sudden fracture of all the compositions, which discloses the brittle behavior of the matrix, as well as of the composites. It is important to mention that the polyester matrix composites presented similar behavior. The tensile strength and elastic modulus results for epoxy and polyester composites with different percentages of aloe vera fibers in respectively. It is possible to note that, within the standard deviation, the presence of aloe vera fibers did not affect the tensile strength but increased the elastic modulus of epoxy matrix composites. Indeed, the value of elastic modulus increased approximately 50 per cent for

epoxy matrix composites. By contrast, for polyester matrix composites, within the error bars, the introduction of aloe vera fibers slightly decreased the tensile strength, while the elastic modulus remained constant.

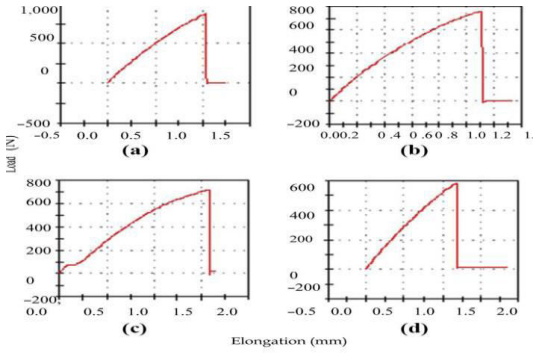

Figure 5

5. Conclusions

The introduction of aloe vera fibers, within the standard deviations, did not change the tensile strength of epoxy matrix composite and slightly decreased the tensile strength of polyester matrix composite. The introduction of aloe vera fibers increased the elastic modulus in both composites, despite the relatively highdispersion of values. SEM fractography revealed a poor adhesion between both the epoxy and polyester matrices with the aloe vera fiber, which contributes to a small decrease in the composites tensile strength. An alternative to overcome this problem is to apply a pre-treatment to the fibers. Although, it implies in higher costs and chemical waste disposal to the environment.

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