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A Review on Effect of Pretreatment of Fibers on Physical and Mechanical Properties of Natural Fiber Reinforced Polymer Composites

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Abstract*—Recently increasing environmental impact linked with production, disposal and recycling of synthetic fiber based polymer composites triggers the growth of ecofriendly composite for various applications such as, marine, sporting goods, chemical, Infrastructure, automotive etc. Among many natural fibers like oil palm, kenaf, jute, flax, cotton, banana and hemp, sisal are ahead attention as they are plentifully available, cheaper, eco-friendly and possess notable and acceptable mechanical properties to hemp, banana and jute. Sisal fiber will play a key role to fabricate a varied range of structural and non-structural industrial products with different polymer matrix. Sisal fiber is one of the most broadly used natural fibers and is very easily cultivated. It is obtain from sisal plant. This review presents a summary of recent developments of sisal fiber and its composites. The quality of sisal fiber based material manufactured by using techniques like Mercerization treatment, or peroxide treatment etc have been discussed in the present paper. Also different mechanical tests such as tensile strength, flexural strength, compression strength are also discussed in the present review.

***Keywords*—Pretreatment,Mechanical properties, sisal fibers, tensile strength, impact strength**

I. INTRODUCTION

Tiesong et al studied the effect of *fiber* content on mechanical properties and fracture behavior of short carbon *fiber* reinforced geo-polymeric matrix composites with different volume fractions [1]. Shao et al studied the effect of length and *fiber* orientation distributions on tensile strength of short *fiber* reinforced polymers using an analytical method for predicting the tensile strength of short-fiber-reinforced polymers (SFRP). The results showed that the strength of SFRP increased rapidly with the increase of the mean fiber length at small mean fiber lengths. The inclined tensile strength of fibers has a great effect on the strength of composites [2]. According to Junzhi Zhang et al. experimental results show that bending resistances of short –chopped basalt fiber concrete is increased. As a result, it is proved that short- chopped basalt fiber is useful in concrete [3]. In the recent years, natural fibers reinforced composites are treated as most promising material in different application due to its attractive properties (Table 1). Natural fibers are now dominate the automotive, construction and sporting industries by its superior mechanical properties. These natural fibers include flax, hemp, jute, sisal, kenaf, coir and many others [4]. The various advantages of natural fibers are low density, low cost, low energy inputs and comparable mechanical properties and also better elasticity of polymer composites reinforced with natural fibers, especially when modified with crushed fibers, embroidered and 3-D weaved fibers[12,27].

Fiber

Long strands of molecules interwoven to form a linear, string-like structure are known as '*fiber*'. *Fibers* are natural or man-made such as cotton, silk, jute, etc.

Types of Fiber

- Natural fiber
- Synthetic fiber

Sisal Fiber

Earlier, Sisal was widely used in ropes, general cordage and twines, but product varieties gradually increased, as companies started using sisal to manufacture paper, buffing cloth, dartboards, handicrafts, Macram, carpets, geo-textiles, wire rope cores and mattresses. Other sisal-inclusive products now range from steel cable yarn to twisted thread, and general yarn to knitted art crafts[12,16,24].

Fig.1 Sisal Tree

Fig.2 Sisal Fiber

Wood fiber	Stalk fiber	Fruit fiber	Seed fiber	Leaf fiber	Bast fiber
Hard wood	Bamboo	Coconut	Cotton	Sisal	Rattan
Soft wood	Wheat	Betel nut	Oil palm seed	Manila	Hemp
Saw dust	Rice		Kapok	Banana	Jute
	Grass		Alfalfa	Palm	Ramic
	Barley			Mengkuang	Bananna
	Corn			Date palm	Flax
				Pineapple	Sugar cane
				Abaka	Kenaf
					Roselle

Table .1*Provides information about natural fibers available in the nature*

Material

Epoxy Material: The epoxy resins are formed by a reaction of epoxies (like epichlorohydrin) with a hardener or polyamine (like triethylenetetramine) that has tremendous cross-linking to create a very tough and yet stiff polymer [13]. The viscosity of epoxies is another step higher than polyesters or vinyl esters. Attributes of epoxy resins include

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extremely low shrinkage, good dimensional stability, high temperature resistance, good fatigue and adherence to reinforcements.

Pretreatment Process Techniques

- Mercerization of Natural Fibers:Alkali treatment of natural fibers, also called mercerization, is the general method to create high-quality fibers. In this process, a 10–30% sodium hydroxide solution formed the best property on natural fiber properties. Flax fibers were soaked into 2.5, 5, 10, 13, 15, 18, 20, 25, or 30% NaOH solutions and it was found that 5, 18 or 10% of sodium hydroxide solution were the suitable concentration for mercerization[9,15].
- Benzoylation of Natural Fibers:In benzoylation treatment, benzoyl chloride is most often used in fiber pretreatment and inclusion of benzoyl ($C_6H_5C=O$) group in the fiber is responsible for the decreased hydrophilic nature of the treated fiber[17]. A known amount of washed fibers are soaked in 18% NaOH solution for 30 min followed by filtration and washing with water. The treated fiber is suspended in 10% NaOH solution and agitated with 50-ml benzoyl chloride.
- Silane treatment of Natural Fibers:Range of coupling agents, silane coupling agents were found to be effective in modifying the natural fiber-matrix interface. Efficiency of silane treatment was high for the alkaline treated fiber than for the untreated fiber because more reactive site can be generated for silane reaction. consequently, fibers were pretreated with NaOH for about half an hour before its coupling with silane[26].
- Acetylation of Natural Fibers:To initiate plasticization to cellulosic fibers, acetylation of natural fibers is a recognized esterificationmethod. Acetylation is formerly useful to wood cellulose to stabilize the cell walls against moisture, improving dimensional stability and environmental humiliation[17].
- Etherification of Natural Fibers: Adaptation of cellulosic fibers by etherification enhances assured latest ranges of properties and makes it more helpful and satisfactory in diversified applications [21]. Sodium hydroxide plays an essential role in forming a charged intermediate species with the fiber, which allows the faster nucleophilic addition of epoxides, alkyl halides, benzyl chloride, acrylonitrile, and formaldehyde (Schemes 3 and 4) [14].
- Peroxide Treatment of Natural Fibers:Peroxide treatment of cellulose fiber has concerned the awareness of various researchers due to simple processability and improvement in mechanical properties. Organic peroxides tend to decompose easily to free radicals (RO), which further react with the hydrogen group of the matrix and cellulose fibers.
- *Graft Copolymerization of Natural Fibers:*Graft copolymerization is an efficient method of surface chemical variation of natural fibers. Graft copolymer of vinyl and allyl ethers of cellulose copolymerized with maleic acid ester appeared in the literature [27]. This idea of was vigorously promoted by announcing new graft copolymers and the field of graft copolymerization research was thoroughly renewed.
- Sodium Chlorite Treatment of Natural Fibers:Treatment of Sodium chlorite focused on the relations of fibers produced between lignin and carbohydrates. The permanence of pluricellular fibers were subjected to mechanical stresses. Subtraction of non-cellulosic compounds by chemical treatments was reflected in the mechanical as well as in the fiber's behavior during dealing out and wearing[22].
- Isocyanate Treatment of Natural Fibers:Isocyanate has functional group, which is very susceptible to reaction with the hydroxyl group of cellulose and lignin in the fibers and forms strong covalent bonds, thereby creating better compatibility with the binder resin in the composites[30].
- Plasma Treatment of Natural Fibers:Treatment is a successful method to transform the surface of natural polymers without changing their bulk properties. The plasma discharge can be generated by either corona treatment or cold plasma treatment. Both methods are considered as a plasma treatment when ionized gas has an equivalent number of positive and negative charged molecules that react with the surface of the present material[27].

Preparation Of Composite Manufacturing process

Sisal fiber is made from the process of decortications. Under this process, leaves of sisal plant are compressed and trampled by a revolving wheel set. The set contains blunt knives, so that only fibers remain. The remaining parts of the leaf are washed away by water. The decorticated fibers are also cleaned by water before drying in the natural heat or by the artificial process of hot air.

Hand layup technique

Hand lay-up technique is the simplest method of composite processing. The infrastructural requirement for this method is also minimal. The processing steps were quite simple. First of all, a release gel has been sprayed on the mold surface to avoid the sticking of polymer to the surface. Thin plastic sheets were used at the top and bottom of the mold plate to get good surface finish of the product. Reinforcement in the form of woven mats or chopped strand mats has been cut as per the mold size and placed at the surface of mold after perspex sheet. Then thermosetting polymer in liquid form was mixed thoroughly in suitable proportion with a prescribed hardner (curing agent) and poured onto the surface of mat which was already placed in the mold. The polymer has been uniformly spread with the help of brush. Second layer of mat was then placed on the polymer surface and a roller has been moved with a mild pressure on the mat-polymer layer for removing any air trapped as well as the excess polymer that were present. The process was repeated for each layer of polymer and mat, till the required layers have been stacked.

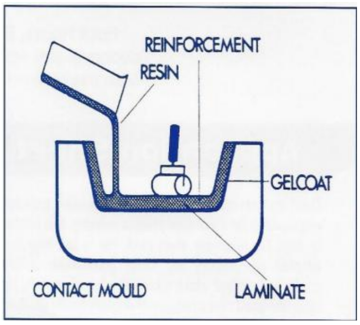

Fig.2 Hand lay-up technique

A composite material is made by combining two or more materials – often ones that have very different properties. The two materials work together to give the composite unique properties. However, within the composite you can easily tell the different materials apart as they do not dissolve or blend into each other.

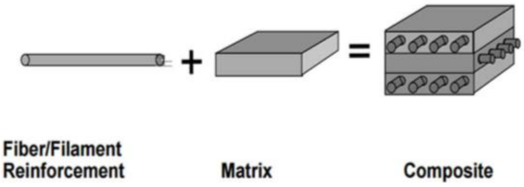

Fig.3 Composite

Fiber Reinforced Composites:

Composites are composed of fibers embedded in matrix material. Such a composite is considered to be a discontinuous fiber or short fiber composite if its properties vary with fiber length. On the other hand, when the length of the fiber is such that any further increase in length does not further increase, the elastic modulus of the composite, the composite is considered to be continuous fiber reinforced. Fibers are small in diameter and when pushed axially, they bend easily although they have very good tensile properties. These fibers must be supported to keep individual fibers from bending and buckling.

Laminar Composites:

Composites are composed of layers of materials held together by matrix. Sandwich structures fall under this category.

*Particulate Composites:*Composites are composed of particles distributed or embedded in a matrix body. The particles may be flakes or in powder form. Concrete and wood particle boards are examples of this category.

Mechanical Properties of Composites

Tensile Properties of Composites: Pretreatment of fibers in natural fiber-reinforced composites regularly showed development in tensile properties due to the increased fiber-matrix adhesion. Tensile properties can be explained on the source of the changes in chemical interactions at the fiber-matrix interface.

Impact Properties of Composites:

Impact strength of the polymeric materials are directly connected to the usually toughness of the materials. Composite fracture toughness is affected by interlaminar and interfacial strength parameters. Natural fibers have a significant effect on the impact resistance through the principle of stress transfer. It has been reported that when an impact load is applied perpendicular to the reinforcing fibers, a good fiber-matrix adhesion is required for even moderate impact strength [18]. The impact properties of the polymeric materials are directly related to the overall toughness of the material [19]. Toughness means the ability of the polymer to absorb applied energy. Impact resistance is the ability of a material to resist breaking under a shock loading or the ability to resist fracture under stress applied at high speed. A lot of work has already been done on the impact resistance of short fiber reinforced composites [10–12] and it depends on fiber rigidity, interfacial stress resistance and fiber aspect ratio. The strength of the matrix, the weakest part of the material, should be related to the failure process. The involvement of fibers in the failure process is due to the separation of fibers the matrix and loss of stress transferring capability. The total energy dissipated in the composite before final failure occurs is a measure of its impact resistance. The total energy absorbed by the composite is the sum of the energy consumed during plastic deformation and the energy needed for creating new surfaces.

Thermal Properties of Composites:

Thermographs provide the information about the thermal stability of a material [189]. Differential scanning calorimetry (DSC) is a thermo-analytical technique in which the heat flow is measured as a function of temperature or time. DSC is used to determine the melting point of the flax-reinforced polypropylene and to collect caloric data. Under controlled atmospheric conditions, the melting range of the polymer matrix was showed an endothermic peak. An increased heating rate leads to a displacement of the melting range to higher temperatures

Types Of Test Universal Testing Machine (UTM):

A Universal Testing Machine (UTM) is used to test both the tensile and compressive strength of materials. Universal Testing Machines are named as such because they can perform many different varieties of tests on an equally diverse range of materials, components, and structures. Most UTM models are modular, and can be adapted to fit the customer's needs.

Universal Testing Machines can accommodate many kinds of materials, ranging from hard samples, such as metals and concrete, to flexible samples, such as rubber and textiles. This diversity makes the Universal Testing Machine equally applicable to virtually any manufacturing industry.

Tensile Test:

Clamp a single piece of anything on each of its ends and pull it apart until it breaks. This measures how strong it is (tensile strength) how stretchy it is (elongation), and how stiff it is (tensile modulus).

Compression Test:

The exact opposite of a tensile test. This is where you compress an object between two level plates until a certain load or distance has been reached or the product breaks. The typical measurements are the maximum force sustained before breakage (compressive force), or load at displacement (i.e. 55 pounds at 1" compression), or displacement at load (i.e. 0.28" of compression at 20 pounds of force).

***3-point bend Test or Flexural test*:**

This is a compression test where you support a length of material by spanning it across two supports on each end. There is nothing supporting the middle portion underneath of it. Then you press down from above directly in the middle of the span of material until the supported material breaks or reaches a specific distance. This test measures how strong the material in flexure (flexural strength) and how stiff it is (flexural modulus).

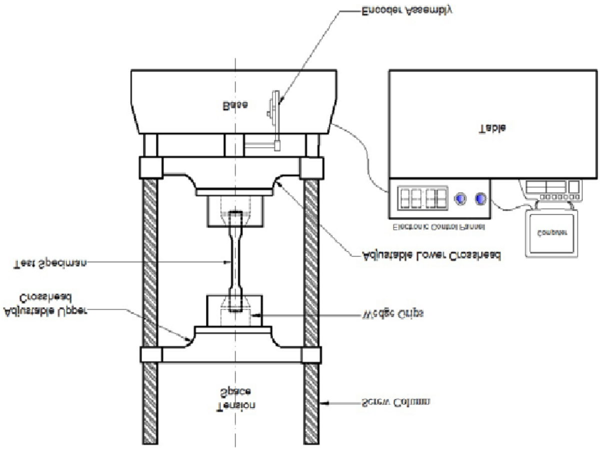

Fig.5 Universal Testing Machine

II. LITERATURE REVIEW

Research has been showed that increasing the sisal fibre weight content in the composites increases the coefficient of friction. The abrasion volume of sisal/glass hybrid composites showed significantly lower than those of sisal/carbon hybrid composite for the same hybrid ratios[1]. the Sisal and hemp fiber surfaces were treated by 10% NaOH solution to enhance the bonding characteristic between fiber and epoxy resin. Hybrid composites were prepared by traditional cold pressing method. A 40 wt. % of sisal/hemp fiber reinforced hybrid composite discloses maximum flexural and compression strength [2].Lima et al said that the influence of the sisal fibers and recycled aggregate on the physical and mechanical properties was assessed experimentally, Flexural tests were carried out on SSFRC blocks, as well as on ceramic and expanded polystyrene (EPS) blocks used commercially. The SSFRC blocks presented higher load and deflection capacity with much more ductile behavior, and with a geometry favorable for the passage of infrastructures[3]. Composite with 4:13 mass ratio of fiber and thermoplastic starch (TPS) exhibit the optimal cushioning property. After biodegradability tests for 28 days, the weight loss of the composites was 62.36%. It's found that the composites are a promising replacement for expandable polystyrene (EPS) as packing material, especially under large compression load (0.7–6 MPa) [4].

Among the various natural fibres, sisal is of particular interest in that its composites have high impact strength besides having moderate tensile and flexural properties compared to other lingo cellulosic fibres. The present work aims is to compare the tensile properties of sisal nano fibre reinforced polymer composites to glass fibre reinforced polymers composites. Initially sisal fibers are chemically treated with sodium hydroxide (NaoH) and hypo chlorite (Naclo) to extract the cellulose content present in the fibers. Chemically treated fibre size is reduced to nano level by using planetary ball milling machine. Ball milling was carried out for 10 hours. Chemically treated fibers are characterized by X-ray powder diffraction to measure their crystallite size. And to find the morphology and inorganic materials of the nano powder, scanning is performed by scanning electron microscope (SEM). Composites were fabricated using Hand Lay-up process. Glass fibre reinforced polymer composites and sisal nano fibre reinforced polymer composites were fabricated. The tensile properties of composites are evaluated experimentally. It is observed the tensile strength of sisal nano fibre reinforced polymer composites have high strength compared to glass fibre reinforced polymer composites [5].The vital play of natural fibre composites are rapidly increasing of application and research purpose. The natural fibres such as bamboo, jute, banana, coir, linen etc have high strength, specific strength, better dimensional stability and mechanical properties, eco-friendly, availability, low cost and biodegradable as compared with synthetic fibres. This paper presents the fabrication and experimental property study on glass-sisal-banana fibres reinforced hybrid composites. The results of the mechanical properties such as tensile strength, impact strength and flexural strength are reported. Three different layers of the hybrid composites are fabricated by hand layup method. The test was carried out using the universal testing machining and Charphy impact machine as per the ASTM standard. It has been observed that the glass-sisal-banana fibres reinforced hybrid composites shows superior properties and used as an alternate material for synthetic fiber reinforced composite materials[7,12].Pantano et al. research a systematic numerical analysis has been carried out by using parametric models properly developed, that let the user to consider the effects of the key main mechanical properties of biocomposites, as the longitudinal Young modulus, in the present study a systematic numerical Abstract analysis has been carried out by using parametric models properly developed, that let the user to consider the effects of the key influence parameters as the fiber concentrations and the fiber curvature. Lima et alsaid that the influence of the sisal fibers and recycled aggregate on the physical and mechanical properties was assessed experimentally, with clear benefits of fiber reinforcement on the post-cracking flexural capacity, while the higher water absorption of recycled aggregates had favorable impact on the compressive strength mainly in the FRC. Flexural tests were carried out on SSFRC blocks, as well as on ceramic and expanded polystyrene (EPS) blocks used commercially. The SSFRC blocks presented higher load and deflection capacity with much more ductile behavior, and with a geometry favor- able for the passage of infrastructures.Rana et alworked on epoxy based sisal composites are prepared by Hand lay-up technique using short sisal fibres of sizes (5, 10, 15 and 20 mm) keeping constant 30 wt.% of total fibres content. The dynamic mechanical properties of short sisal fibre reinforced epoxy composite is determined in terms of storage modulus (E′), loss modulus (E′′) and damping (Tanδ) at different frequencies such as 1, 2 and 5 Hz. The results indicate that storage modulus and loss modulus are found to be high for the composite having 15 mm length of fibres.One of the potential applications of natural fibres composites is to be implemented in insulation components. Thermal behaviour of polymer composites based on natural fibres is recent ongoing research. In this article, thermal characteristics of sisal fibre reinforced epoxy composites are evaluated for treated and untreated fibres considering different volume fractions of 0–30%. The results revealed that the increase in the fibre volume fraction increased the insulation performance of the composites for both treated and untreated fibres. More than 200% insulation rate was achieved at the volume fraction of 20% of treated sisal fibres. Untreated fibres showed about 400%insulation rate; however, it is not recommended to use untreated fibres from mechanical point of view. The results indicated that there is potential of using the developed composites for insulation purposes [18]. G. Prasad et al.studied the influence of sisal fiber content on mechanical (i.e. tensile, flexural, impact, hardness and abrasion resistance) and thermal (i.e. TGA) properties of composites by varying the fiber and epoxy percentage. The composite was prepared by melt-mixing method, followed by compression molding process. The percentage of sisal fiber is varied from 4% to 10% in steps of 2%. Similarly epoxy content is varied from 96% to 90% in steps of 2%. Detailed mechanical Properties of Sisal Fiber Reinforced Polymer Composites have been studied. Themajor mechanical properties viz Tensile, Hardness, Impact, Flexural, Moisture absorption, and Moisture content are studied.Researchersaid that Three types of reinforcement mats were used. Two were handmade while one was machine made. Composites of varying sisal volume fractions were made. Pressure of 15 – 20 bar was applied to the slates for 15 minutes before allowing them to cure at room temperature for 24 hours. Pressure was applied in order to eliminate air bubbles and also to ensure an even and flat resultant surface. Test specimens from the resultant composites were subjected to three-point and four-point bending to determine the Young's modulus [6].

Author name	Methodology details	Results obtained
Betelie et al, 2019	Fabrication of samples used the hand lay-up process with 15, 25, 30, 35, and 40 wt% sisal fibres to epoxy ratio. Tests for the properties indicated were made using the INSTRON material testing system	The samples, that 30 wt% of sisal fiber-reinforced composites have the maximum tensile and flexural strength of 85.5 MPa and 85.79 MPa respectively. The impact strength has been found to be maximum for 40 wt% sisal fiber which is 24.5 kJ/m2
Santos et al. 2019	The mechanical behaviour of polyester resin based natural polymeric composites, made by using experimental planning (granulometry of sisal powder, fiber content and with or without styrene).Thus, combination of analysis of variance (ANOVA), response surface methodology (RSM)and experimental methods allowed evaluated, analyzed and validated the mechanical properties.	High results of mechanical behaviour independent of the addition of styrenewere the particle size and fiber content 1680 _m and 2.5%, respectively. Thebestresults were stress (0.59 MPa), strain (5.68%), tenacity (2.01 E-05 MJ/m3) and energy at break(14 J) for the composite reinforced with sisal powder.
Gerezgiher et al. 2019	Flammability of sisal fiber reinforced Polypropylene (SFRPP) composites material was examined by a horizontal burning test according to ASTM D635 and chemical resistance of the sisal fibre reinforced PP composites was studied using ASTM D543 testing method	SFRPP composite is found to have better resistance to water than NaOH and H2SO4 and treating the fiber has brought considerable improvement on chemical resistance of the composite. Fiber loading and fiber length has positive and negative effect on the flammability of the SFRPP composite respectively
Rao et al, 2018	Composites sisal fibers are subjected to various fiber treatments depending upon on the matrix used. Mechanical properties of these treated composites compared to untreated sisal fiber reinforced composites are studied	An improvement in the mechanical properties such as impact strength, flexural strength, density and various other properties on these treated sisal fiber reinforced composites was observed when compared to the untreated sisal fiber reinforced composites
Uppal et al. 2018	a detailed experimental protocol was conducted for sisal cultivation, fiber extraction, processing and development of composite boards/panels and assessed the impact of incorporation of chopped strand sisal fiber mat on the mechanical behaviour of polyester composites	The results revealed that the diameter of sisal fiber harvested after 5 years of its cultivation varied from 275 to 475μm with a tensile strength of 121–337 MPa; tensile modulus of 2.59–10.47 GPa; elongation at break varied from 3.37 to 10.86%
Sahu et al, 2017	Review article deals a brief description of sisal fiber along with its recent applications and characterization of its polymer-based composites in terms of mechanical properties, thermal properties and tribological and water absorption behaviour	Only fibers of sisal had been used in many applications, whereas its wastes including juice, leaf fragments and fiber's crushes tissues may be utilized in the preparation of biogas, fertilizers, feed for animals, paper products, etc. Sisal fiber is a porous material; due to this, it can be also used in purification and filtration process i.e. water purification, cigarette, tea bags etc
Ali et al. 2017	Reviewpresents a summary of recent developments of sisalfibre and its composites. The properties of sisalfibre itself interface between sisal fibre and matrix,properties of sisal-fibre-reinforcedcomposites andtheir hybrid composites have been reviewed	Recycling characteristics and methods of sisal-fiber reinforcedcomposites are important aspects of thisnew material but there are very few published datato date. Recycling is an attractive future research direction that will provide socio-economic benefits
Mansoor	Sisal fiber based	Sisal fiber reinforced

et al. 2017	epoxy composites were fabricated. Mechanical tests such as tensile, flexural etc were calibrated. Microstructural studies were carried out using SEM.	epoxy composite materials have maximum tensile strength and can hold the strength up to 37.18 Mpa and has flexural strength of 87.073 N. SEM images show the, internal cracks, interfacial properties and internal structure of the fractured surfaces of the composite materials
Madhukiran et al. 2017	Three types (sisal-coir) of hybrid laminate and two pure laminate composites are fabricated using manual layup technique. Epoxy (Ly556 and HY951) resin is used as matrix material in the present work. The specimens are prepared according to ASTM standards and the experiments were conducted on an universal testing machine (UTM	Coir-sisal (20-20) weight fraction hybrid composite samples possess good tensile strength and can with stand the strength up to 17.92Mpa. Short coir-sisal 5mm length fiber hybrid composite having fiber contents of 40 wt% and 60% matrix exhibit the maximum flexural strength.
Sudhir et al. 2014	Reinforcing sisal/ jute fibers with epoxy resin in matrix by using hand layup technique. Hybrid composites were prepared using sisal/jute fibers of 0/40, 10/30, 20/20, 30/10, 40/0 weight fraction ratios while overall fiber weight fraction was fixed as 0.4 weight fraction	The results indicated that addition of sisal fiber in jute/epoxy composites up to 50% weight fraction results increasing the mechanical properties
Dinesh et al, 2013	An attempt has been made to develop 10%, 20% and 30% sisal fibre reinforcement epoxy composite materials according to ASTM D – 3039 and ASTM D-1621 using resin - LY556 as a matrix material and hardener -HY 951 with 10%, 20% and 30%. The Tensile strength and compression strength tests were conducted on the varying percentage standard samples prepared	It is found that appreciable improvements in Tensile strength,compression strength properties of the 30% natural (sisal) fibers reinforced epoxy composites (SFRECM) when compared with 10 % and 20% SFRECM. This study suggests 30% SFRECM can be used for different applications in the human body bonereplacement or orthopaedic implant.
Suryawanshi et al. 2013	The general properties of the composites are described in relation to fiber content, length, strength and stiffness in this work. The development of sisal fiber reinforced, cement based matrices is discussed here and studied of experimental works of different investigator on performance of sisal fiber reinforced cement composites	The influence of sisal fibers on tensile, compressive and bending strength in the hardened state of mortar mixes is discussed. The durability of natural fibers in cement based matrices is of particular interest and is also highlighted

III. METHODOLOGY

- Raw data about sisal fiber and epoxy will be collected.
- Composite of sisal fiber and epoxy will manufactured by suitable technique
- Sisal fiber and epoxy will have been mixed in different length ratio of the sisal fiber.
- The sample will be chemically treated by mercerization, Benzoylation of Natural Fibers and silane treatment.
- Density will determine void content and water absorption with the usage of suitable test technique.
- The result and calculation that is performed will be carried out on universal testing machine and mechanical parameter such as tensile strength, Flexural strength and compressive strength has been calculated.
- A compare all will be done for all the cases of workpieces which are used in the experiment based on the above mechanical parameter.

IV. CONCLUSIONS

Overall present review article was designed to explore, highlights and gathered the previous reported studies directing the mechanical properties of sisal fiber and its polymer composites to provide a perfect source of data and literature for doing future research to reveal it as construction and building materials like synthetic fibers.The mechanical and physical properties ofsisal fiber not only depend on its source, positionand age which will affect the structure andproperties, but also depend on the experimentalconditions, such as fiber diameter, gauge length , strain rate and test temperature. Different matrixsystems have different properties. This paper concludes the introduction of Sisal Fiber, manufacturing process of sisal fiber and treatment process techniques. It also provides different research papers are surveyed in this paper.

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