Semiconductor Optoelectronics
ISSN: 1001-5868

OVERVIEW OF ECO FRIENDLY TEXTILE FIBER

[1]M. Sindhu, & [2]Dr.J.Banu Priya
[1]Ph.D Research Scholar, Department of Costume Design & Fashion, PSG College of Arts & Science, Coimbatore
[2]Assistant Professor, Department of Costume Design & Fashion, PSG College of Arts & Science, Coimbatore

Abstract
Nature in its abundance offers us a lot of materials that can be called fibrous. Plant fibres are obtained from various parts of plants, such as the seeds (cotton, kapok, milkweed), stems (flax, jute, hemp, ramie, kenaf, nettle, bamboo), and leaves (sisal, manila, abaca), fruit (coir) and other grass fibres. Fibres from these plants can be considered to be totally renewable and biodegradable. At present, fibrous materials are being utilized in applications such as apparel industry, automotive industry, aircraft industry, aero space industry, marine applications, sporting goods, roofing structures, chemical industries, transportation, logistics industries, interior design, wind energy and electronics. Recently, there has been a rapid growth in research and innovation in the natural fiber area. The advantages of natural fibers include low environmental impact, low cost and wide range of applications. In this paper that narrated as natural fibres and its chemical composition influenced in various applications. The purpose of this study is to determine the extent to which plant fibers can be identified and processed into woven weaving method.
Keywords: Eco friendly fibres, plant fibres, natural fibres, lingo cellulosic, biodegradable

Kaivun

Kaivun fibre is perhaps the most important soft fibre available naturally in Travancore, S. India. It is derived from Helicteres isora L., an arborescent perennial shrub indigenous to the region. In the local language, Malayalam, the plant is known as "kaivun" and "edampiri-valampiri" in Tamil as "kaiva". The Indian Screw tree (Helicteres isora L., Malvaceae) is a shrub occurring in dry deciduous woodlands through tropical and sub-tropical. In the 19th century, H. isora bark was used for making rope and sacks, but was outcompeted by jute (from Corchorus species) as a fibre source. Helicteres isora L. is a large perennial arborescent shrub with cylindrical branches. It grows generally to a height of five to 15 feet with a stem diameter of one to two inches. The chemical compound helicteres isora is 74.8%,cellulose 23%,lignin 0.92%,ash 1.09%,fat and moisture content 5-6%.the fiber physical properties moisture content 5-6%,tensile strength 500-600 mpa, Density 1.35 g/cm qube, Diameter 10-20 µm, fiber medical and textile usages of fiber. The fibre is botanically regarded as a bast fibre. The length of the staple varies from four to seven feet. Each filamentous strand of fibre is composed of cells with overlapping ends. The size of these cells varies considerably, the length from 1700-2200 / with a mean of 1920 μ and the width from 11-22 μ, , with a mean of 17 μ. Recently authors filed a patent on extraction method of kaivun fibre for textile yarn manufacturing.

Pineapple Leaf Fibres (PALF):

The fibre extracted from leaves of pineapple plant is called pineapple PALF. PALF is also known as pina-fibre. PALF-blended yarns are potentially used in various textile applications such as apparels, curtains, footwear, along with different industrial textiles, medical textiles, fashion textiles, automotive textile industry. In manual process, the initial step is mixing of layered fibres in water for about 20 days to become saturated. The manual procedure begins with shredding through beating, scraping and husking the leaves. During this step, microorganisms play a significant role in removing the unwanted material, gummy substance and separating the fibres. After this procedure, fibres are cleaned. Then the fibres are naturally dried. The mechanical method is administrated by the leaves area unit fed through the feed rollers. That is passed through a series of scratching rollers. The pineapple leaves sides are scraped by scratching roller skates to dispose of the waxy layer. Then, it gone through the toothed roller. There it closely fitted cutting edges of roller macerates.

Corn fiber

Corn fiber is a comparatively new innovation in the textile industry. Corn Fibre is also called Ingeo fibre. Corn is an agricultural product with large quantities of starch, which manufacturers extract from the plant fibers and break down into sugars that are then fermented and separated into polymers. At this point in the process, the corn fibers are paste-like substances which are then extruded into delicate strands that are cut, carded, combed, and spun into yarn. Aside from the chemical processes, the rest of the process is similar to what is done with wool. Corn fibre is composed of lactic acid, which is produced by converting corn starch into sugar & then fermenting it to get lactic acid. The process for manufacturing the polymer used to make corn fiber on an industrial scale centers on the fermentation, distillation and polymerization of a simple plant sugar, maize dextrose. The production and use of corn fiber means less greenhouse gases are added to the atmosphere. Greenhouse gases are the chief contributor to global climate change. Compostability and chemical recyclability mean that under the right conditions and with the right handling, the complete life cycle of production, consumption, disposal and re-use is neatly closed.

Date Palm Fiber:

This particular fiber has certain properties such as- 100% biodegradable and compostable, structurally tensile strength is 5 times higher than steel and same as flax & sisal, thermal insulation properties are higher than carbon fiber. Physical properties of the natural fibers are crucial in determining their quality for various industrial applications as well as natural fiber composites. Mechanical properties of natural fibers are powerfully affected and determined by many necessary variables like structure, micro-fibrillar angle, chemical composition, cell dimensions and defects. The primary cell-wall and other secondary walls of date palm fibers consist of a series of helically wound cellular micro-fibrils formed from long chain cellulose molecules can determine the mechanical properties of fiber. Every cell-walls are formed from three main components which are cellulose, hemicelluloses and lignin.

Cellulose and lignin are the vital structural components in maximum natural fibers. Although celluloses are resistant to hydrolysis, strong alkali and oxidizing agents, also cellulose is degradable to some extent when exposed to chemical treatments. On the other-hand lignin is a complex hydrocarbon polymer and it usually gives rigidity to plant and assists in water transportation. the byproducts of date palms, and then converted it into fiber tow, chopped fibers, yarn, non-woven mats, woven fabric etc. Date palm fibers can be easily mixed with other long fibers like agave, sisal, flax or abaca. It is also possible to make yarn by mixing it with hemp or jute. These fibers derived from date palms are not only durable but also economical in production and compatible with textile & composite processing.

Milkweed stem

Milkweed stems are natural cellulose fiber milk weed floss between cotton and linen have been obtained from stems of common milkweed stems for common milkweed plants. its low-density low elongation and short length of fiber make fiber milkweed floss unsuitable for production industry. The fiber combined the cotton and line fiber mixed and used for textile industry. Milkweed stems easily grown dry and aired climates. Milkweed stems harvested per year twice. Milkweed stems fiber also used in medicine industry. Plant milkweed stems blended with cotton and process develop to the textile and yarn. The plant seeds also used in oil and Biodeseal. the fiber properties similar and better then cotton and linen. Single cells are too small for use high value fiber applications. For paper and plup industry its commonly called as ultimate's fibers. Natural cellulose fibers from natural milkweed stems with in milkweed floss. Milkweed wood fiber cellulose 74.5%, lignin 4.1%,ash 2.2% the milkweed floss fibers cellulose 85-90%, lignin 18% milkweed stem fiber much lower lignin content compare to milkweed floss fiber. The fiber milkweed stem fiber single cells diameter 17 plus or minus 104, length 11.5 plus or minus 3.8 cm,strength 2.0 plus or minus 3.5 g/den,elongation 3.5 plus or minus 4.5%, moisture region 0.1 plus or minus 9.6%. The fiber milkweed floss fiber single cells length 2.9 plus or minus 3.0 cm,strength 2.3 plus or minus 2.7 g/den, elongation1.2 plus or minus 2%, moisture region 11.1 %, stems of milkweed plants have been used to obtained natural cellulose fibers better then strength and elongations milkweed floss.

Lotus fiber

Many new fiber introduced the textile world. And eco friendly fiber further of next generations lotus (nelumbo nocifera) is sacred lotus, origin of overall India and Egyptian bean of simple lotus. Central and northern India and south Himalayas lotus fiber cultivated in edible oil usages. Its commonly cultivated in under water gardens. The fiber extraction methods used in trational method for handmade process. This method more time consuming process. lotus fiber lake of usage of this method. Fiber all parts of leaves, seeds, stem used in multiple usage of human life. Lotus stem required for 120,000 stems to make 1.09 yards of fabric. initial moduls is 146.81cn/dtex, breaking density is 3.44 cn/dtex, elongations at break 2.75% the close to ramie and smaller than cotton. It can be blend silk, banana, kapok the fiber enhances the property of resulting fabric, because the luxurious and eco friendly fabric. Lighter weight of fabric, comfortable easy to wear, lotus fiber eco-friendly and many applications used in textile industry.

Banana fiber

Banana fiber is a lingo cellulosic fiber, obtained from the pseudo-stem of banana plant (Musa sepientum), is a bast fiber with relatively good mechanical properties. Banana plant is a large perennial herb with leaf sheaths that form pseudo stem. Appearance of banana fiber is similar to that of bamboo fiber and ramie fiber, but its fineness and spinnability is better than the two. Banana fiber also called as sweet banana, the various nutrsion such as protein, fat, carbo hydrate, ferrous, calcium, potassium, magnesium, vitamin A, vitamin C, and commonly it takes approximately 12-16 moth fiber yield. The chemical composition of banana fiber is cellulose, hemicellulose, and lignin. The banana fiber properties of tenacity 29.98g/denier, finesse denier 17.15%, moisture region 13.00%, gongation-6.54%, alco-ben-extractive-1.70%,total cellulose 81.80%,alpha cellulose-61.50%,residual gum-41.90%, lignin-15.0%, banana fiber also good mechanical properties. The extraction of the natural fiber from the plant required certain care to avoid damage. In the present experiments, initially the banana plant sections were cut from the main stem of the plant and then rolled lightly to remove the excess moisture. Impurities in the rolled fibers such as pigments, broken fibers, coating of cellulose etc. were removed manually by means of comb, and then the fibers were cleaned and dried. This mechanical and manual extraction of banana fibers was tedious, time consuming, and caused damage to the fiber. Consequently, this type of technique cannot be recommended for industrial application. A banana fiber had a very limited application and was primarily used for making items like ropes, mats, and some other composite materials. With the increasing environmental awareness and growing importance of eco-friendly fabrics, banana fiber has also been recognized for all its good qualities and now its application is increasing in other fields too such as apparel garments and home furnishings.

Ramie Fiber:

Ramie is one of the oldest vegetables fiber and has been used for thousands of years. It is also known as China-grass, rhea and grass cloth. The fibres are found in the bark of the stalk. The fibre is very fine and silk-like, naturally white in colour and has a high lustre. Ramie is classified chemically as a cellulose fiber, just as cotton, linen and rayon. Chemical composition of ramie fibres is: cellulose (91-93%), hemicelluloses (2.5%), pectin (0.63%) and lignin (0.65%). Ramie fibres exhibit excellent mechanical properties, i.e. the best in the group of bast fibres (45-88 cN/tex) and, as most of the natural cellulose fibres the strength increases by 25% when fibres are wet. The ultimate fibre length is between 120-150mm and fibre diameter is 40-60 µm. Fibres are durable and they have good resistance to bacteria, mildew and insect attack. The main disadvantage of ramie is its low elasticity (elongation at break is 3-7%), which means that it is stiff and brittle [Mather 2011]. Fibres are oval to cylindrical in shape and their colour is white and high lustrous. Fibres surface is rough and characterized by small ridges, striations, and deep fissures. Ramie fibre can be easily identified by its coarse, thick cell wall, lack of twist, and surface characteristics [Hearle 1963]. The process of transforming ramie fiber into fabric is similar to manufacturing linen from flax. Ramie is most often blended with other fibers for its unique strength, absorbency, luster and dye-affinity. When blended with high-quality cotton it offers increased lustre, strength and color. When mixed with wool, ramie adds lightness and minimizes shrinkage. When blended with rayon, it offsets the low wet strength. Ramie is used in fabrics resembling linen, such as apparel fabrics for shirts and shorts, tablecloths, napkins and handkerchiefs. It is often found as a blend with cotton in knit sweaters. Ramie is also used in fishnets, canvas, upholstery fabrics, straw hats and fire hose.

Kapok

Kapok *(Ceiba pentandra)* is a highly lignified organic seed fibre, containing 35-50% of cellulose,22–45% of hemicelluloses, 15–22% of lignin and 2–3% of waxes. It also contains smaller quantities of starch, about 2.1% of proteins, and inorganic substances, notably iron (1.3–2.5%). Kapok contains 70–80% of air and provides excellent thermal and acoustic insulation. The absolute density of a kapok cell wall is 1.474 g/cm3, whilst the density of fibres by considering about 74% of lumen is only 0.384 g/cm3 [Cook 2006]. Kapok is a smooth, unicellular, cylindrically shaped, twist less fibre. Its cell wall is thin and covered with a thick layer of wax. A wide lumen is filled with air and does not collapse like cotton. By the microscope observation kapok fibres are transparent with characteristic air bubbles in the lumen. The cross section of fibres (Figure 3) is oval to round. The kapok cell wall structure differs from other natural cellulosic fibres. A primary cell wall, which is directly related to the superficial properties of fibres, consists of short microfibrils, which are oriented rectangular to the surface of fibres. In the secondary cell wall microfibrils run almost parallel to the fibre axis.[Hearle 1963, Rijavec 2008, Fengel 1986, Khalili 2000, Fengel 1986/2].

Kapok fibres are 10–35 mm long, with a diameter of 20–43 µm. The cell wall thickness is about 1–3 µm. The tensile strength is 0.84 cN/dtex (93.3 MPa), Young's module 4 GPa, and breaking elongation 1.2% [Mwaikamno 2001].

Due to its wide lumen, kapok has an exceptional capability of liquids retention. Its excellent thermal and acoustic insulating properties, high buoyancy, and good oil and other non-polar liquids absorbency distinguish kapok from other cellulosic fibres. Kapok is mainly used in the form of stuffing and nonwovens; it is rarely used in yarns, mostly due to low cohesivity of its fibres and their resilience, brittleness, and low strength. New potentials of kapok are in the field of technical textiles, yachts and boats furnishing, insulating materials in refrigeration systems, acoustic insulation, industrial wastewaters filtration, removal of spilled oil from water surfaces, and reinforcement components in polymer composites [Rijavec 2008].

Flax

Flax fibres are obtained from the stems of the plant *Linum usitatissimum*. Fibres are running at the surface of the plant stem, which is about 1 m height and 2 – 3 mm thick in the diameter [Blackburn 2005]. Like cotton, flax fibre is a cellulose fibre, however its structure is more crystalline, making it stronger, and stiffer to handle, and more easily wrinkled. Flax fibre properties are controlled by the molecular fine structure, which is affected by the plant growing conditions and the retting procedure that is applied. The process of retting tends to separate the bundles of flax fibres into individual fibres, althoughmany fibres remaining together in bundles [Hearle 1963]. Flax fibres are not as pure as cotton in terms cellulose content; indeed they contain only about 60 - 70% of cellulose. In addition they contain other substances such as hemicelluloses 17% and lignin 2-3%, as well as waxes 2%, pectins 10% and natural colouring matters [Mather 2011, Mohanty 2005]. Flax fibres have a soft handle and have fairly lustrous appearance. The length of fibres varies between 6 – 65 mm, but on average they are about 20 mm long. Their diameter is about 20 µm.

Flax fibres are not as twisted as cotton fibres, but both have a lumen in the centre. Several dislocations that are areas of the cell wall in natural fibres where the direction of the microfibrils (the microfibril angle) differs from the microfibril angle of the surrounding cell wall, are observed on longitudinal images of fibres (Figure 4). These deformations are due to extraction procedures [Thygesen 2006]. The shape of fibres varies from polygonal to oval and irregular. Fibres cross-section form depends on variety, plant growth conditions and maturity. Flax fibres are amongst the strongest in the group of naturally occurring fibres (55 cN/tex and about 20% stronger in wet state), but they do not stretch much. Flax fibres elongation at break is only 1.8% and their moisture regain is 12% [Lewin 1998, Cook 1993].

Hemp

Hemp is the bast fibre obtained from stems of *Cannabis sativa* L plants. It grows easily to a height of 4 m without agrochemicals and captures large quantities of carbon. The most important components of fibres are cellulose (77%), pectin (1.4%) and waxes (1.4%). Pectin is found in the middle lamellae and glues the elementary fibres to form bundles. The lignin (1.7%) is an incrusting component of the fibre. It is incrusting cellulose and contributes to the hardness and strength of fibres. It is located in the middle lamellae and fibre primary cell wall. Other components of hemp fibres are tannin, resins, fats, proteins etc. The content of these components is much higher in hemp than in cotton.

Therefore the processing of those fibres requires different technology [Blackburn 2005]. The diameter of the cell varies considerably from 16 to 50 μm, with broad flat lumen. The length of the individual or elementary fibres is ranging from 2 to 90 mm (average length is 15 mm). Elementary fibres are thick walled and the cross-section of fibres is polygonal with rounded Edges. In longitudinal view, the fibre is roughly cylindrical, with surface irregularities and lengthwise deformations caused by dislocations. The ends of fibres are slightly tapered and blunt [Hearle 1963]. Hemp fibres are coarser when compared to flax and rather difficult to bleach. The fibres have an excellent moisture resistance and rot only very slowly in water. Hemp fibres have high tenacity (53-62 cN/tex); about 20% higher than flax, but low elongation at break (only 1.5%) [Mohanty 2005].

Kenaf

Kenaf fibres are obtained from *Hibiscus cannabinus*. Kenaf contains two fibre types: long fibre bundles situated in the cortical layer and short fibres located in the ligneous zone. Elementary fibres are short; their fibre length ranges from 3 to 7 mm, with average diameter of 21 μm. The cross-sections are polygonal with rounded edges and the lumens are predominantly large and oval to round in shape [Hearle 1963]. The lumen varies greatly in thickness along the cell length and it is several times interrupted. Kenaf fibres contain about 45-57% of cellulose, 21.5% hemicelluloses, 8-13% lignin and 3-5% pectin. Kenaf fibres are coarse, brittle and difficult to process. Their breaking strength is similar to that of low-grade jute and is weakened only slightly when wet. There are many potential specific utilization possibilities for kenaf whole stalk and outer bast fibres, including paper products, textiles, composites, building materials, absorbents, etc. [Mohanty 2005].

Abaca

Abaca or Manila hemp is extracted from the leaf sheath around the trunk of the abaca plant (*Musa textilis*). The commercial fibres are utilized in the form of strands, and the strands in turn are composed of bundles of individual fibres. Individual fibres, when removed from the strands by boiling in an alkali solution, are smooth and fairly uniform in diameter. Thelumens are large in relation to wall thickness. Cross-marking is rare, and fibre tips pointed and often flat and ribbon –like. The technical fibres are 2 to 4 m long. The single fibres are relatively smooth and straight and have narrow pointed ends. Individual fibre diameters range from 14 to 50 μm and the lengths from 2.5 to 13 mm [Hearle 1963]. Chemically, abaca comprises 76.6% cellulose, 14.6% hemicelluloses, 8.4% lignin, 0.3% pectin and 0.1% wax and fat. Abaca is considered as one of the strongest of all natural fibres, being three times stronger than cotton

and twice that of sisal, and is far more resistant to saltwater decomposition than most of the vegetable fibres. Abaca is a lustrous fibre and yellowish white in colour.
Abaca fibres are used manly to manufacture ropes and handicraft goods [Blackburn 2005].

Bamboo

The natural pant fiber bamboo fast growing methods of plant. the bamboo fiber compares to other fiber due to eco-friendly fibers. bamboo growth rate and fixing the carbon dioxide of atmosphere, it makes important of plant fiber Organic bamboo fabric is left unbleached by the manufacturers. The fiber mechanical properties and re- usable reinforced polymer matrix composite on construction industries. Fiber parts are cellulose and hemicellulose, lignin, pectin parts of fiber. bamboo plants are mostly founded in All world expected places having extreme cold climates for Europe some species can be successful introduce mild temperature of Europe. More than 1000 types of bamboo mostly around 70 bamboo plant developed different atmospheres. bamboo largest plant of grass family poaceae. These long- fleshy plant but appearance never like grass fiber. Therefore, bamboo fiber after that called natural grass fiber plant. The 87 genera about 1500 species of bamboo distributed in world the bamboo fast growing plant with 3-4 years of age used for any purpose. the plant reached height 15-30m the period of two to three months. The growth of 20cm -100cm.the diameter of fiber 5-15 cm. bamboo mechanical properties very excellent. The culm consists of about 50% parenchyma cells, 40% fibers, 10 % vascular tubes. The amount about that 40% of mass and 60-70% of weight of Culm. The main chemical constituents of culm tissue are cellulose 73.83%, hemi cellulose 12.49%, lignin 10.16%, the density of fiber about 0.4 to 0.9g/cm3 the depend on anatomical structure such quantity and fiber around the vascular bundles. Density increase from inner lawyer to the outer part of culm from the bottom on top. The mechanical bamboo generally increases thick fiber wall increased approximately three years.the processed we used NAOH solution for soaking the bamboo stiped duration 3 hours and 5%mass per value, after u take that bundle wash out of HCL solutions neutralized solutions of fibers. Mechanical process of water retting the scarping the fiber surface the long fibers were damage and strong effect and quality of fiber. Bamboo fiber used reinforcement in polymeric material used,light weight product,low cost,higher strength,and stiffness.bamboo used in textile apparel industryes,making houses,bridges,traditional boats,ect. the textile product used sanitary towel and table napkin, cushion decoration fabric.

Jute

Jute is one of the plants basted bast fiber. fiber mallow family malvaceae. Jute is fast growing plant compared to cotton most important of the plant. natural fiber jute ecological balance also provide rural development people countries. Jute also used rain forced compounds. jute fiber producing from flowering plant in genus Corchorus, jute fiber long, soft and shiny vegetables, the color of off -white fiber have low pesticide and fertilizer needs. Fiber collection called phloem of plant called as skin, industry used for raw jute fiber used .and jute fiber called as golden fiber, and also biodegrable fiber. The climate is hot and humid weather the plant growing about that 2.5-3 m height within 6 months. The fiber high tensile strength, jute, and soft water is important for jute production. The best affordable nature fiber, jute fibers are composed primarily of the plant materials cellulose and lignin. Fiber collection of phloem of the plant it called as skin, industrial used for raw jute fiber used. jute fiber 1-4 meters long, used for re generate fiber. Lingo cellulose fiber have low density and sometimes process stiffness equal to glass fiber. it reinforcement polymeric composites is growing day by day increase. Fiber density1.3 g/cm, Elongation 3.5-4.5%,tensile strength 393-723 mpa, young modules 26.5 gpa. this low coast, and high density of fiber. Jute is the mostly widely procedure mesh work for fiber inner layer. the single cells of jute fiber cellulose content 58-63%, hemi cellulose 21-24%, lignin 12-14%, pectin 0.2-0.5%, wax 0.4-0.8%,protein 0.8-2.5%,and mineral matters 0.6-1.2%. this are chemical compound of jute fiber. jute carbon di oxide potential of natural jute fiber. the product procedure from sheet/board, door, window, furniture, etc. advantage of jute fiber maintained free, durable, biodegrable, less costly, low thermal conductivity, Eco-friendly fiber.

Nettle

Nettle fiber is a common plant(urtica dioica) the plants are mostly growing in ruderalsites, and road side plant and home gardens. The first nettle fiber cultivated in Germany and Australia for textile production usage of fiber. nettle plant used in all parts of stem, seeds, and leaves for different usages. nettle fiber similar to flex. Second year fiber harvested in mid of July and august. Fiber harvesting per years only one time. Retting process stalk composition microorganisms, reduced fiber yield and poor quality. The fiber upper part of stalk higher percentages of fiber sed textile production.lower parts of stalk other alternative purpose used. Flower light green color leaves 2-4 cm long, it cores shapes leaves. nettle fibers India and nether land some country used in medical purpose used. The nettle chemical compounds cellulose 81%,hemicellulose 6%,lignin 2%,ash 7%,the middle part of stem fiber better stencil strength, the fiber content stem 3.5-13.2% on dry and wet stage. Nettle diameter 23-37mm,tensile strength 38-81 cn tex, length 38-62 mm, elongations 4-7%.the plant root and leaf used to textile application for tissues and fabrics,ropes and finishing nets,silky fabric,cloth, paper for manufacturing.

Sisal fiber

Natural fiber are bio based fibers vegetable animal origin. natural fiber generally elongated substance on filament. Sisal fiber extracted from sisal leaves. Natural fiber especially plant fibers due to low cost and biodegrability. Sisal fiber agave sisal Ana extracted from sisal leaves. Each of contains approximately length about 0.5-1.0m,sisal leaf consists of a structure composed of approximately 4% fiber,1% cuticle,8% dry matter 87%of water. alkali treatment mostly improves fiber quality. Fiber extraction method and retting process to be used in traditional methods. sisal fiber cellulose content 55-65%, hemi-cellulose 10-15%, pectin 2-4%, lignin 10-20%, water soluble materials 1-4%, fat and wax 10.3-10.15%, ash 0.7-1.5%.retting process take 7-21 days cycle of fiber extraction and lower quality of fiber. The retting cause removal of gummy materials. Are pectin substance, because extraction of fiber become difficult. The physical propriety of fiber density 40-45 g/tex, tensile strength 0.4-0.7 mpa, young modules gpa 2.0-9.0, elongation break 2.5-4.5%.mositure region 11%,density 1.45 g/cc, porosity 17%, fiber Dia meter 100-300~ m. the sisal fiber many usage in textile products rope, bags, carpet, the rubber cement products also used in sisal fibers.

Hemp

Hemp is a fast-growing plant. Used in textile industry, many purposes used. The fiber is not considered for production soft and easy care textile. The hemp fiber (cannabis sativa) is annual plant bast fiber yield and considered the main product. Hemp fiber produced outer layer of stem. The primary fibers cell compares to secondary cell much longer and higher lignin content primary cells. The primary and secondary fiber developed undependably, although both are always related to the hemp fiber height and diameter. The chemical compounds are cellulose 70-74%,lignin 3.5-5.7%,hemi cellulose 15-20%,pectin 0.8%,wax 1.2-6.2%,ash 0.8% the fiber hemp most available and widely used in bast fiber its high cellulose content. Fiber length specific strength and fiber stiffness. The physical properties of hemp length 5-55%,density g/cm 3 1.4%,moisture content 8% of the hemp plant. natural fiber uses 60% less energy compare to grass fiber production. and result in lower air emissions. It wastage of fiber 100% organic and biodegradable. The hemp used in various applications used in textile industry.

Coir

Coir fiber mostly grown to costal area and the yield commercially imported product manufacturing like oil, nuts, and fiber. coir is also know s kokos or coco natural seeds fiber. the fruit of cocos nucifera is a tropical plant of the arecaceae (palmae) family. the fiber yield depending up on the season .and fiber extraction the quality of fiber produced. The retting period normally 6-12 months, the three types of retting for stake retting, net retting, pit retting method of similar and differ in the method of steeping husk. The fiber from rotated husk is also extracted mechanically. The machine to remove the last traces of pith on the fiber. Softer and process fiber comes to paroled. after the spinning the good quality of coir is a golden yellow and unbroken individual fibers. Its biodegrable, high water resistance. the chemical compounds are cellulose 36-43%, lignin 41-45%,pectin 3-4%,hemi cellulose 0.15-0.25%,moisture content 8.0%,the physical properties of coir fiber length 15-20 cm, Día meter 100-450 mm, density 1.5 g/cm qube, tensile strength 131-175 mpa, young modules 4-6 gpa, elongation break 15-40%,swelling in water 6-8%,coir is used to geo textile, fiber spun in to yarn and woven mats, matting, rugs, carpets, coir and rope and verity of materials manufacture.

Flax

Flax is a commonly used fiber, used for woven and non woven products. it also called common plant botanical name (linum usitatissimum) originally cultivated in Mesopotamia. The fiber extracted from bast or skin of stem flax plant. Fiber soft lustrous and flexible bundles of the fiber. appearance of fiber blonder hair. Strong then cotton and less then elastic of flex. And short staple fiber used in lower value of products. flex is annual plant, temperature climates, especially of northern Europe. Plant grows up to 60 cm. The plant harvesting high quality of fiber, and second poor quality of oil. Traditional method of harvesting from required special made. The two type of harvested in flex plant, mechanized equipment. And manual method. the mature plant is pulled up with the roots maximize the fiber length. The flex dry seeds are removed after then retted. The retting process is depending up on the climate. First retting inner stalk, leaving the outer fiber intact. Retting separate bast fibers for core tissues is permeant fiber processing.to be affected the fiber quality and fiber yield. Various enzymes formula used in retting you can modify the fiber properties. the cellulose75%, hemicellulose 5%, lignin 4%, fat/wax 3%, ash 0.5%, water 12.5% the chemical different compounds. Physical properties of fiber length 90-125 cm, average Día meter 0.02mm,tensile strength 6.5-8 gm/denier, Elongations 1.8-2.2%,specific gravity 1.54%,moisture 12%. The natural flex fiber ivory green, and grey more eco friendly fiber. The flex fiber used in textile industry, and food products used.

Kenaf

Kenaf (hibiscus cannabin us) is plant family malvaceae, its new green material, kenaf fiber extracted from kenaf plants. Kenaf fiber used in all part of the fiber to be used in (stalk, leaves, seeds) multipurpose used. These plants are cultivated in years ago. Kenaf fiber have a, it also biodegrable fiber. kenaf fiber is one of the good mechanical property. It's annual plant for sub-tropical and united states India and Bangladesh, kenaf cellulose 45%-57%, hemi cellulose 21.5%, lignin 8% -13%, pectin 3%- 5%. fiber medical plant also called as medical herbs it also used traditional prehistoric times.it is an annual plant, naturally grown 1.5-3.5 for woody bast. the stem 1-3 cm, the flowers are 8-15cm diameter the flower color, white, yellow, or purple, the flower center part of flower dark purple color. they plant originally southern Asia. The baste constitutes 40% of plant. the hole stem produces paper plum. the knife stem produces two types of fiber: coarser fiber in outer layer (baste fiber) and fine fiber in the core. the knife fiber used in textile and other parts of engineered wood, insulation, animal bedding, packing material, rope, twine, paper made from similar to jute. kenaf mostly used in animal bedding and feed.

Agave

The natural fiber good alternative for textile industry. The plant Agave Americana is a monocots plants belongs to Agavaceae family. agave America fibers have quite important textile potential. Agave Americana fibers are low density, high tenacity and high moisture absorbency in similarity with other leaf fibers. This plant multiple uses and has great potential of employment creation, provision of food securing and sustainable development. These fibers are long and bio degradable. *Agave americana L.* was introduced in Canary Islands in the sixteen century, and belongs to the *Agavaceae* family (also sisal belongs to this family), originally coming from Central America.].*Agave americana L.* belongs to the same family as *Agave sisalana*, Mechanical extraction method are not reliably in the removal of cementing compounds (mostly waxes, hemicelluloses, lignin and hydrocarbons)agave totally dietary fiber 38.40%,protein 35.33%,ash 5.94%,lipid 2.03%,the fiber exhibited with potential food application al so used. The fiber used in textile industry and other applications.

Conclusion

In this modern era, textile products that use natural fibers are more in demand because they offer various benefits such as renewable properties, excellent biodegradability and ease of manufacture that do not have a negative effect on the environment. Based on the explanation above, it can be estimated that the use of plant fiber as raw material for various industrial applications. Currently products that use natural fibers are more in demand because they offer various benefits such as renewable properties, excellent biodegradability and ease of manufacture that do not have a negative effect on the environment. For this reason, a further study is needed to determine the physical properties of above mentioned raw material of plant fiber.

REFERENCE

Correspondence Vipul Chaudhary Department of Agricultural Engineering, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut Uttar Pradesh, India

yashas gowda thyavihalli girijappa, sanjaymavinkere rangappa,27 September 2019, natural fiber sustainable renewable resources for development of ecofriendly composites review. vol 6, pag 3.

Pineapple, India horticulture data base, htpp//nhb.gov.in/area-pro/database-2011.pdf,26.4.11(2006)

kannojiya R,kumar Gaurav, Ravi Ranjan, Tiyer N.K and Pandey K.M 2013,Extraction of pineapple fibers for making commercial products, vol 7,no 4.

Bamboo Fibre Extraction and Its Reinforced Polymer Composite MaterialP. Zakikhani, R. Zahari, M. T. H. Sultan, D. L. MajidP

A Review on Bamboo Fiber Composites and its ApplicationsN. Kaur1, S. Saxena2, H. Gaur3, P. Goyal41,2,3,4Amity Institute of Aerospace Engineering, Amity UniversityAmity University, Sector-125, Noida, Uttar Pradesh1navpreebajwabj@gmail.com, 2shreysaxena1@gmail.com3himalayagaur007@gmail.com, 4priyankagoel03@gmail.com

Jiajia Fu, Gibson S. Nyanhongo, Carla Silva, Massimiliano Cardinale, Endry Nugroho Prasetyo, Chongwen Yu , Artur Cavaco-Paulo & Georg M. G Ü Bitz Bamboo fiber processing: insights into hemicellulase and cellulose substrate accessibility, Biocatalysis and Biotransformation, January–February 2012; 30(1): 27–37.

Comparison of Jute and Banana Fiber Composites: A Review Article in International Journal of Current Engineering and Technology · January 2013 DOI: 10.14741/ijcet/spl.2.2014.22

Asheesh Kumar, and Anshuman Srivastava,octomber 8 2017, Preparation and Mechanical Properties of Jute Fiber Reinforced Epoxy Composites,vol 6.pag 4.

Shubham S. More1, Kuldeep D. Gayke2, Paresh G. Lokhande3, Snehal S. Gardade4, Nilesha U. Patil,2020, A Review on Feasibility of Using Jute Fiber Composite for Industrial Pallets and Trays, Vol. 13,pag 718.

C.R. Vogal and Hartl,November 3,2013, production and processing of organically grown fiber nettle and use in the natural textile industry, review vol 18,pag 121.

I G P Agus Suryawan1, N P G Suardana, I N Suprapta Winaya, I W Budiarsa Suyasa, T G Tirta Nindhia, 201 (2017) 012001, doi:10.1088/1757-899X/201/1/012001, Study of stinging nettle (urtica dioica l.) Fibers reinforced green composite materials : a review,pag 2.

Flavio de Andrade Silva, Nikhilesh Chawla, Romildo Dias de Toledo Filho, 1 October 2008Tensile behavior of high performance natural (sisal) fibers,pag 3438.

Lucian,Lucian, ayoup ali,2018 polysaccharide-based fibers and composites,chemical and engineering fundamentals and industrial applications,spinger book.

Yogesh Ravindra Suryawanshi, march 3 2013, Study Of Sisal Fibre As Concrete Reinforcement Material In Cement Based Composites,vol 3.pag 1-4.

Arancha Hernandez,win westerhuis,jan E.G van dam, august 2006,microscopic study on hem bast fiber formation,vol 3.pag 1-4.

João P. Manaia 1, Ana T. Manaia 1 and Lúcia Rodriges 2,2 december ,2019,Industrial Hemp Fibers: An Overview pag 2-16.

Narendra reddy and yiqi yang,2009,extraction and characterization of natural cellulose fibers from common milkweed stems, pag 2212-2216

Akhila Rajan T. Emilia Abraham, 25 Sep 2008, Coir Fiber–Process and Opportunities PART 1,PAG 35-36.

Narmatha dhirhi,rajashree Shukla,Nirmala patel,Hemant sahu and nandan Mehta,2015,extraction method of flex fiber and its uses,vol.15,pag 712-716.

Kenaf fiber reinforced composites: A review H.M. Akil ⇑, M.F. Omar, A.A.M. Mazuki, Safiee, Z.A.M. Ishak, A. Abu Bakar School of Materials and Mineral Resources Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 Nibong Tebal, Penang, Malaysia

Ashish Hulle, Pradyumkumar Kadole and Pooja Katkar, 5 February 2015, Agave Americana Leaf Fibers, 64-75; doi:10.3390/fib3010064.PAG 34-65.

Charlotte Facho, Dr. Anshu Sharma,2018, Documenting Extraction Process of Helicteres isora Fibre,pag 868-869.

Date palm fibers

Table: Chemical Composition (%) of Date Palm Fibers

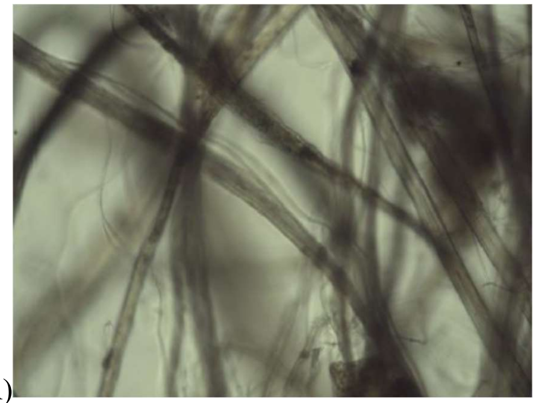
Constituents	Cellulose	Hemicelluloses	Lignin	Ash	Extractive
Leaflet	40.21	12.80	32.2	10.54	4.25
Leaf	54.75	20.00	15.30	1.75	8.20
Rachis	38.26	28.17	22.53	5.96	5.08

PINEAPPLE FIBER

Table: Chemical Composition (%) of Pineapple Leaf Fibres (PALF)

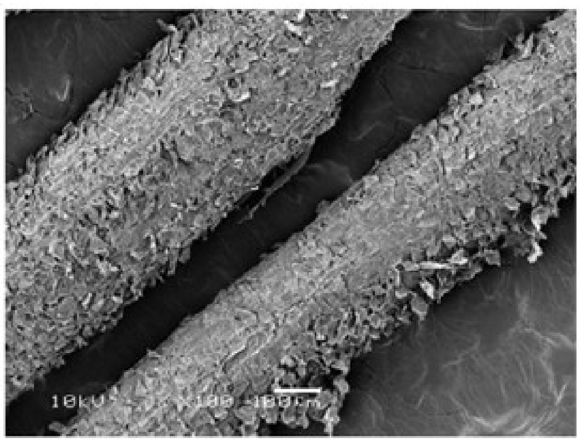
Constituents	**%**
Cellulose (wt%):	70–82
Lignin (wt%):	5–12
Hemicellulose(wt%):	–
Pectin (wt%):	–
Microfibrillar-spiral angle (°):	14
Moisture content (wt%):	11.8

1.Pineapple Leaf Fibres (PALF):

(A) 

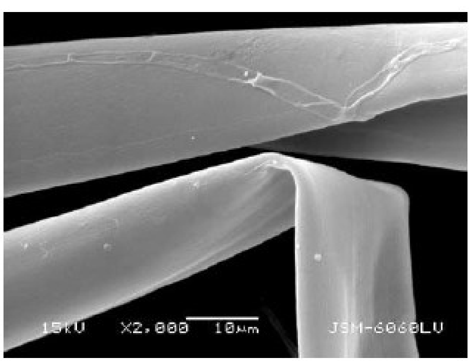
(B) 

2. Date Palm Fiber:



(A)

3. Kapok

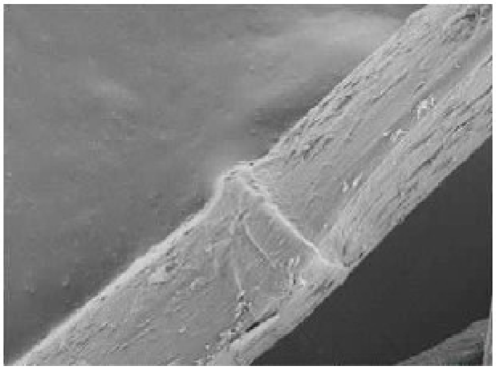
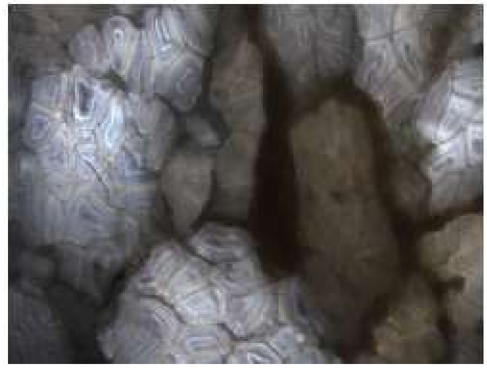


(A)

(B)

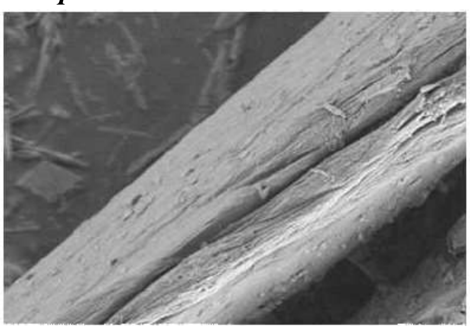
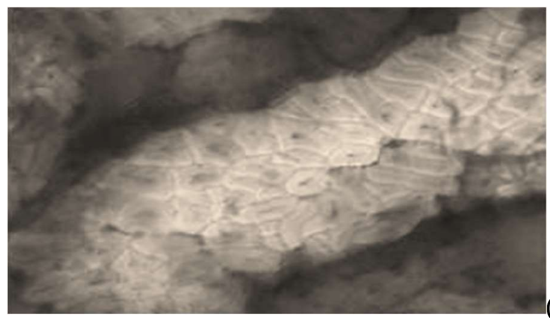
SEM image of longitudinal view (a) and cross section (b) of kapok

4. Flax


(A)

(B)

a) Longitudinal view (10000× magnification) and b) cross-section (30× magnification) of flax fiber

5.Hemp


(A)

(B)

a) Longitudinal view (10000× magnification) and b) cross-section (200× magnification) of hemp fibre