



Potential Uses of Aloe Vera extraction in Finishing and Textile Wet Process

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TEXTILES were an important part of both old and social economies. They were vital to many life facets, including clothes and many other applications. Recently, the use of natural materials in textile manufacturing processes was of great importance. Among the natural materials that received great importance was the Aloe Vera plant, as it enters into all stages of textile manufacturing from the first stage to the end because of its very important and beneficial impact on this type of industry. Where it is used as UV protection, Anti-oxidant, Anti-microbial, and also in the dyeing and printing process. Add to that Aloe Vera is one of the oldest medicinal plants in human history.

Keywords: Aloe Vera; Textile; Antimicrobial; UV protection; Antioxidant .

Introduction

Textiles were an important part of both old and social economies. They were vital to many life facets, including clothes and many other applications.[1]. The textile industry strives constantly for new manufacturing techniques to increase product quality and the environmental development of these products is also significant. Apart from the conventional dressing feature. Textiles now provide safety and warmth in hazardous conditions. Barrier efficiency and thermophysiological comfort are the most critical conditions for protective wear.[2]. Textile finishing is applied for the conversion into a technically useful textile of a textile fiber. Finishing is typically done in the textile industry in the final phase of textile production and the textiles acquire some useful properties. It is widely conceived that the final uses of technical textiles will continue to increase every year, as there are two types of finishing namely (a) using chemical materials and (b) using natural

materials, but chemical finishing results in a lot of damage and waste harmful to the environment, so bio-finishing has been reported.

Aloe Vera is known as a perennial plant that adapts to water-scarce areas, as it is distinguished by its ability to store large amounts of water in its tissues, and many types of Aloe Vera, have green leaves covered with a thick peel and yellow tubular flowers, and the transparent inner core is covered with a thin layer of the vessels, the length of the Aloe Vera leaves ranges from 30 to 50 centimeters and its width is up to 10 centimeters. The Aloe Vera plant also contains two main types of liquids; The first liquid is known as latex and is bitter in taste and yellow in color. The second liquid is a transparent mucous gel. It should be noted that the uses of the Aloe Vera plant have recently spread.

Aloe Vera Gel has become a biotechnology potential in the textile industry in the latest trend. [3] Aloe Vera is essentially an African wild plant.

It is also known as the lily of the desert and plant of immortality due to its medicinal effects. The plant's leaves include Aloe Vera leaves comprise three distinct substances chemically and physically: the outer leaves including the vascular bundles, the middle layer of latex which is the bitter yellow sap, and inner leaves, colorless gel.[4]. The aloe plant, which is a cactus plant is about 95% water, with an average pH of 4.5.[5]. This plant contains more than 75 nutrients and 200 active substances, 20 minerals (calcium, manganese, sodium, copper, magnesium, potassium, zinc, chromium, and iron), 18 amino acids, and 12 vitamins. The glycoprotein, barbaloin, aloe-emodin, emodin, mannose-6-phosphate, acemannan, aloesine, and several others are the principal components of these components. Anti-hydration, anti-inflammatory, antibacterial, antifungal, antiviral, etc., are active elements of Aloe Vera gel.[6]. They also have protection against UV, anti-protozoal, and injury. [7] The wound-healing property of Aloe Vera has been extensively studied. Aloe Vera presents good wound healing effects with glycoprotein and mannose-6 phosphate.[8] The primary cause of their antimicrobial function is polysaccharides and barbaloin in aloe gel.[9, 10]. These polysaccharides also known as mucosaccharides, since they are plant-derived, and also have anti-inflammatory, anti-carcinogenic, anti-allergic, and anti-microbial properties, as well as retarding the progression of tumors.[11] The antifungal

and antibacterial properties of Aloe Vera can be exploited for medical textile applications, such as wound dressing, sutures, and other bioactive textiles.[12].

Despite the many benefits of Aloe Vera, it has side effects. While considered safe in topical form when used as directed, you may consider steering clear of Aloe Vera if you have a severe burn or other significant wounds. There is even some evidence that aloe might reduce the natural ability of your skin to cure serious surgical wounds. Some users may be itchy or slightly burnt when the Aloe Vera works on your skin. However, if you experience a rash or hives, you could have a sensitivity to the gel and should stop using it immediately. On infected skin, you should not use Aloe Vera gel. The protection of the gel may interrupt the healing process and aggravate the illness, even when it contains microbiological qualities.

Extraction of Aloe Vera gel

Manual Extraction

First, wash the leaves of Aloe Vera for the removal of soil, Second cut the plant's Aloe Vera leaves, Then Remove the top layer of Aloe Vera leaves with a knife. And the end extraction of Aloe Vera gel using a spoon from inner parts of the leaves (see **Fig. 1**).

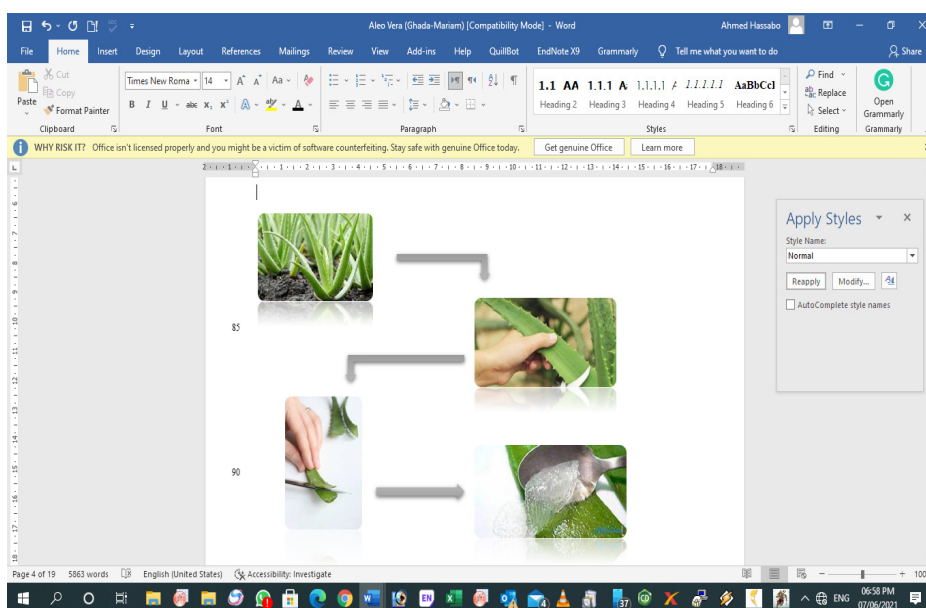


Fig. 1. Manual extraction of Aloe Vera gel from plant leaves.

Mechanical Extraction

First Cut the plant's aloe leaves first. Second, washing the Vera aloe leaves for dirt removal, Third Aloe leaves feeding between the rollers and Strengthen the handle for optimum extraction by decrease the distance between rollers. Then this extracts the gel by rotating the handle to fill the sheets between the rollers. And the end the extracted gel is collected in the pot and the gel drops through the outlet into the container.[13, 14]

Methods of treating fabric using aloe vera

Direct technique

The technique of direct application applies natural substances to textiles. The pad-dry-cure technique is a typical technique of direct application by which textiles are immersed for a certain period in soluble finishing agents. Once immersed, the tissue is pressed between the roller nip with a specific pressure limit. In addition, during a certain period at a specific temperature, the cloth is dried and cured to fix the finish of the material. While this is an accessible technique but it is hard to obtain acceptable stability if a chemical affinity among the finishing compound and the cloth does not happen. This process might be used to apply several finishes to textiles, the impact being the same irrespective of the number of finishing compounds. For all other applications, this method is essential.[15].

Nanotechnology

The use of herbal agents is consequently also increasing for textile applications since they are seen as less risky to humans and the environment.

However, stability is the fundamental concern with all these plant-based agents. There have been several approaches used to keep them stable, such as nanotechnology. Various nanoparticles were produced for medicinal use and drug release utilizing plant components [16, 17]. However textile usage is quite narrow and there is a field for their application to concentrate them In a nanoscale, the adherence of fibers to natural agents can be strengthened without affecting the textile's texture, function, and feel [18] for example, Herbal nanoparticles on cellulosic fabric have given higher antibacterial softness with increased stability without altering the physical features[15].

Microencapsulation method

The functioning of fabrics by placing nanoparticles is a micro-packaging method to

increase the qualities and to give new features to textile production[19]. The small particles of solid, liquid, or gas materials are embedded as the core substance within a protective material in encapsulation. In nano-balloons or nano-capsules manufactured using a range of polymer and non-polymeric compounds, several active compounds such as medicines, enzymes, vitamins, pesticides, odors, skin softeners, PCM, and catalysts are effectively encapsulated. One substance is packaged in a second substance in this approach. Stability is a concern since the placement of microspheres on the textiles and microencapsulation is a costly technology and thus the treatment of microcapsules by various cross-linkers or binders may impact the textile handling. The use of microencapsulated PCMs and the influence of plasma-surface modifications on adhesion to fabric was examined to some part fix this problem [15].

Crosslinking Method

The chemical Linkage among polymeric chains and utilized finish is generally occurred by using a cross-linker for firm application. The placement of chemical bridges connecting polymer chains takes place in the situation of chemical cross-linking systems. No heating, as well as various catalysts, are necessary for irradiation crosslinkers, However, for physical, ecological cross-linking, strength is lower because the ionic connection among polymer chains is produced with effective antibacterial function and great thermal characteristics. The physical cross linking technique is the greatest common approach employed for applying herbal or oil extraction to textiles with traditional methods of pad-dry cure plus cross-linking in the existence of several catalysts[15].

Application of Aloe Vera in Textile Wet Processing

Aloe Vera is used in the initial operations of preparing textiles and that's because Aloe Vera is suited for this form of pretreatment as it contains a variety of enzymes, sodium, and gum that are important to the processing of textile wet.[11]. As when Desizing process using Aloe Vera gel instead of inorganic chemicals. Aloe gel contains many important enzymes and organic components like peroxidase, carboxypeptidase, amylase, and alkaline phosphatase. The aloe gel showed excellent results for desizing with controlled temperature and pH.[20]. First of all, Aloe Vera's active enzyme joins the substrate and forms

chemical bonds to the substratum. The enzyme acts as a catalyst and constitutes an unstable medium compound with the substrate, known by the 'lock and key' mechanism as an enzyme-substrates complex. The catalyst subsequently weakened the relations between the substrate and the materials of size. As a consequence, the layer was isolated from the sizing ingredients (see **Fig. 2**).[21]

Dyeing

In addition to the use of Aloe Vera in the textiles pretreatment process, it is also used in the textile dyeing process. Aloe Vera consists of salt, acid, enzymes, and all of the necessary ingredients for the operation of dyeing. Aloe Vera gel was used in a reactive dyeing process instead of salt. Depending on the various amounts of aloe gel used, the cloth produced different shade depths. In the dyeing wash, 100% Aloe gel was treated to provide an outstanding shade depth. However, lower Aloe Vera gel concentrations showed more dull colors. The fabric had a medium and dull shade depth at 80% and 60% concentrations of Aloe Vera during dyeing. These outcomes are clarified by the fact that a high Aloe Vera concentration produces more salt than dye. This higher content of salt increases color depth. The use of Aloe gel, however, did not harm the fabric wash pace, the strength of tearing, or drapability. Aloe Vera leaves is also a natural coloring agent and mordant agent. The leaves can be easily applied to protein-cationic fibers like silk and wool, due to their functional amino group in an acidic medium. Aloe Vera leaves are not suitable

for dyeing cotton fiber, however, because cotton contains an anionic group.[22].

Printing

In the printing process, Aloe Vera gel is used as a thickener in reactive and pigment printing. The water-soluble Aloe Vera gel includes polysaccharide and polymerase and is one of the cheapest forms of a natural thickener. Aloe Vera gel was recently used as a thickener because of the thickening quality of the polysaccharide. The gel showed positive results in the 30%-40% Aloe Gel and 2% binder Concentration used in printing as a thickener. When Aloe gel and synthetic thickener were applied to fabric for printing, the gel showed similar results to the synthetic in wash fastness and colorfastness. Aloe Vera gel can be easily prepared and preserved as a printing paste. Aloe gel is environmentally sustainable, economically affordable (anywhere it is found), and easy to cultivate.[20].

The textiles were of low viscosity and poor sharpness when Aloe Vera was applied to the textile. The processed textile, however, exhibited high viscosity and high sharpness when mixed with sodium alginate, which contained 50% gel and chemical concentrations.[23].

Pradhan et al. tested the use of Aloe Vera gel as the thickener for prints on cotton cloth with reactive dye. They spread Aloe gel on cotton fabric as a thickener and got excellent washability and light-weight.[24].

Finishing

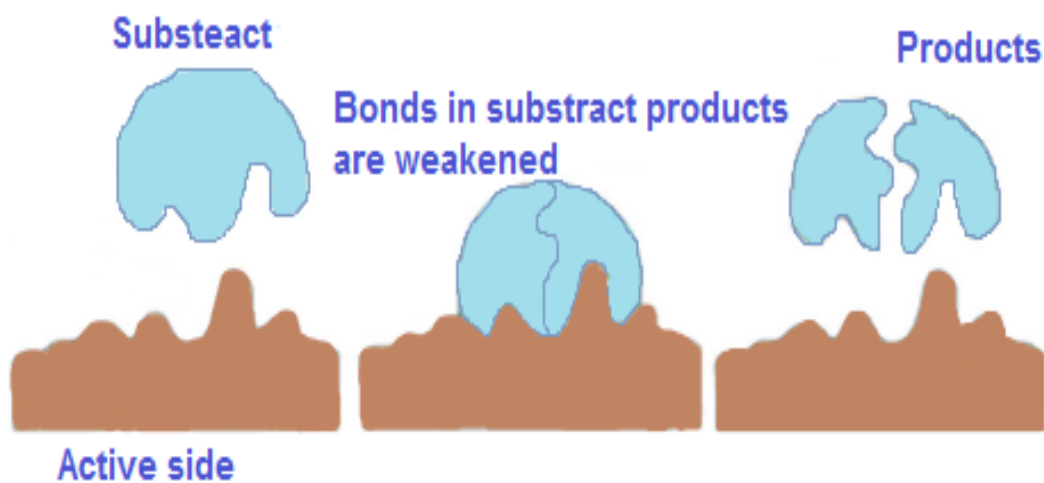


Fig. 2. Desizing process with Aloe Vera gel containing enzyme.

Antimicrobial properties

Lately, there was strong attention in scientific research on the antimicrobial finish of textile materials. Most material transfer of micro-organism infections is generally occurring [15].

The deterioration of bacteria typically leads to the damage of several beneficial characteristics of textiles. Antimicrobial coatings that can be used with microencapsulation can solve this issue. This effect is particularly useful for medical and technical fabrics [25].

Microorganisms can be realized “nearly all over the environment and speedily expand once essential needs like humidity, nutrients, and temp are found [26].

Microorganisms are generated by diseased ones throughout hospitals. Microorganisms can also be transported and pathogen expanded in hospitals, surgical robes and masks, operational head ware and footwear, operating clothes, bedsheets, towels and the garments of all people in the hospital. Fabrics of anti-microbial characteristics are necessary for all these conditions [11].

Due to its large hydrophobicity, most synthetic fibers are more resistant than natural fibers to threats by microorganisms. Keratinous fiber and cotton carbohydrates proteins may, under certain situations, behave as nutrients and energy sources. Soils, dust, sweat solutes, and certain textile finishes can also provide microorganisms with nutrient sources [26].

These micro-organisms are the cause of discoloration, fiber destroys, annoying smell, and the quietly slimy feel. These are also problems in textile. If the fabric is used next to the skin, a microbial infestation causes pathogens and developmental odor cross-infection. As a side effect of a microbial attack, the performance characteristics of cotton are destroyed. A huge range of people can benefit from antimicrobial material. The growth and negative influence of microorganisms such as odor, stain, and deterioration, is destroyed by an antimicrobial agent. Antimicrobial agents for the control of bacteria, fungi, mold, mildew, and algae are also used for fabrics [27].

The textile can be given antibacterial compounds by various chemical, physical or physiological methods during the phase of fiber formation or attractive finishing point, based on

the composition, fiber nature, chemistry, fiber composition, and surface of the fiber.

There are two types of antimicrobial textiles [15]:

- Leaching Antimicrobial Textiles: The antibacterial textiles that function with the regulated releasing technique are named antibacterial leaching textiles that gently leak biocides to their surroundings to destroy the microorganisms.
- Non-leaching or Bounded Antimicrobial Textiles: Antibacterial textiles that do not leach or contact kill, can kill the microorganisms only when they have contacted a material since these fabrics have organic polycationic chemically bound materials via covalent linkage directly or via cross-linking and do not release biocides into their outer environment.

Direct pad-dry-and-cure, spraying, coating, and foaming are used for many antimicrobial agents. Herbal antibacterial compounds are mostly used to obtain more apparent results during textile production and at the final level. [15].

The rising market of herbal products has resulted in the development of textile healthcare materials in latest years. Many plants have been known for their antibacterial behaviors, selection, and screening [28]. In medical and healthcare uses, textiles (woven, nonwoven, knitted, and composites) are used differently. Various items must fulfill requirements for individual end-use performance according to the individual end-user application [27].

Aloe Vera is an organic herb whose anti-microbial behavior affects different microorganisms [27]. Anti-bacterial and antifungal characteristics of Aloe Vera extract can depend on the ace-man, anthraquinones, and salicylic acid ingredients. [11] Furthermore, textiles covered with Aloe Vera infused nanoparticles with increased washing durability and antibacterial activity were made [29]. The treated tissue demonstrated antibacterial activity, with gram-positive (*S. aureus*) and gram-negative (*E. coli*) behavior. [30]. The bacterial reductions in the finished cloth of Aloe Vera differed at Aloe Vera concentrations [11].

Ultraviolet protection

In recently, the necessity of sunlight protection has been widely known to users, there is connected to skin harm caused by sunlight and its association with higher UV radiation exposures. UV light can cause rapid and urgent responses and harm, including skin wrinkling and sunburn. The skin color relies on the combined amounts of melanin, carotene, and hemoglobin. This amount of melanin in the skin affects its beauty or blackness, between several characteristics, and impacts human color, Melanin also acts a significant part in the reduction of harm caused by UV radiation mostly in the skin [31].

Massive quantities of sunlight can cause several issues including aging, skin burning, pigmentation, harm to the eye, Damage to DNA, tumor of the skin, etcetera. The sun's energy consists of around 10 percent as UV radiation. Regarding adverse impacts on plants and people; In sections of UV-A (320–400 nm), UV-B (280–320 nm), and UV-C (<280 nm), ultra-violet light less than 400 nm has been categorized [32]; UVC has 100% absorption of ozone and atmosphere; The ozone layer absorbs UVB; while the ozone layer does not absorb UVA. UVC radiation in comparison with UVB and UVA is the most potent. The least potent radiation is UVA [31].

Sun protection items like sunscreen, sun protection materials, etc., and ultraviolet protection factor (UPF) that is added to textile items are used to avoid these sorts of damages via Ultraviolet radiation [31]. The efficiency of the ultraviolet protection element of textile is defined (UPF values). Higher values of UPF show better degrees of safety. UPF relies on several elements such as textile color that is strongly attached to the finishing agent quantity [33, 34]. Almost everyone wants to gain textile materials that can guard us against UV radiation. [31].

A largely recent aim of textile finishing is to guard the skin against the effects of sun radiation, as cloth does not always provide effective protection. Special protection qualities of textiles versus various impacts are more attractive [35].

The usage of Aloe Vera gel for different purposes has achieved importance in recent decades. This gel is an antibacterial, laxative, and UV radiation protective ingredient antioxidant, anti-inflammatory, and immunological stimulant [8, 36, 37].

The modified cotton textiles Aloe-*J. Text. Color. Polym. Sci.* **Vol. 18**, No. 2 (2021)

anthraquinone-treated have proven to be effective protective against the ultraviolet and the quantity of the UV transmission of the modified material is extremely low in comparison to the untreated material. Bonded onto the surface of the cloth, the Aloe-anthraquinone may capture UV light fully. Aloe-anthraquinone-modified material had a UV protection factor (UPF) of around 57, but the untreated fabric had a UPF value of around 14.

The highest transmission effect was obtained for bleached tissue. Realize: the higher the value of UV transmission the bigger the risk for health. This shows that Aloe Vera-treated material has a better UV-protection ability than bleached material [11]. Aloe Vera polyphenols can aid secure and absorb UV rays [38, 39].

The fundamental UV absorption components were polyphenols in Aloe extracts. It has been thought that Aloe gel modulates the skin by avoiding UVB sunlight sensitization, particularly within the first 24 hours after exposure [40].

Antioxidant properties

Oxidation is a chemical activity capable of generating reactive oxygen compounds or liberated radicals that may result in chain events that harm genetics, speed up aging and increase the risk of carcinoma in people [11].

A free radical is an atom with at least one electron which has no pairs. Throughout regular metabolic, free radicals are generated as a by-product [41]. Besides by pollution, smoking, radiation, air pollution, alcohol intake, toxins, high blood sugar standard [11].

Antioxidant substances are efficient oxidative harm protectors versus liberated radicals and are suitable for usage in textile, packaging, cosmetic, and preservation fields [39].

Several antioxidant compounds are found in nature to prevent the consequences of ROS (reactive oxygen species). Phenol substances can positively capture or scavenge liberated radiometals through several combined interactions using antioxidant enzymes [40]. The plenty of the whole phenolic OH in Aloe Vera extract subscribes to its antioxidant activity [41]. Aqueous debrief, of Aloe Vera includes many antioxidant ingredients: phenols, flavonoids, ascorbic acid, β -carotene, and α -tocopherol. [12]. The bioactivity in Aloe Vera gel in terms of the anti-oxidant ability is validated. The free radical

reducing abilities are provided by the phenolic component and acetylated polysaccharides found in the gel [41].

Wound activity

Wound healing is a manner dermis and skin rejuvenate after skin damage and different body cells. The creation of skin allows the existence and stimulation of collagen [12].

Wound-healing fabric, bandages, and dressing materials are utilized generally for hygienic and medically useful functions. Suitable wound curative fabrics not only create a protective surface to microbial infections and preserve the injury, but enhance curative treatment and pain reduction [29].

Aloe Vera is a plant item that has been utilized for over two centuries as a skincare treatment. There are 350 A. vera types of the Aloe family, which may be found all over the world. Aloe Vera types are Aloe Aristata, Aloe dichotoma, Aloe Ngobitensis, Aloe Variegata, Wild Aloe, Aloe Barbadosensis Miller, etcetera. Many of the significant types are often utilized for their strong curative characteristics [42].

Using Aloe Vera on the fabrics is a favored strategy to obtaining beneficial wound treatment. Aloe Vera's wound healing effects are linked to its vitamins, enzymes, polysaccharides, and phenolic substances [42]. Aloe Vera involves a lot of several compounds, such as cytokines, that cause the wound healing phase that breaks the cell wall borders. Fibroblasts moved to the site after the application of Aloe Vera gel and caused fresh cell formation. [12].

The big amount of aloe polysaccharides existing in Aloe Vera is essential to reinforcement wound healing due to their anti-inflammatory and immunomodulatory action [43].

The most important efficient element of Aloe Vera is the aloe polysaccharides includes glucomannan, acetylates, and acemannan. The acetyl group in acemannan is one of the main essential cell growth activity compounds [12].

Aloe Vera includes mannose, causing an increasing macrophagic function and speeding up wound healing. Macrophages cause the speed formation of fibroblasts, which increases tissue development [12].

Aloe Vera mannose-6 phosphate is affected

in the activation of collagen formation which is wholly responsible for the cure for wounds.

Collagen production is caused by skin cells (fibroblasts). Collagen holds a particular function in the production of fibers in the wound site and remedies the wound through protein creation and related enzyme action. The action of Aloe just on the other hand enhances oxygen in the wound region, which causes an increased blood circulation and accelerated epithelial cell reproduction and transition and is linked to wound heals. [12].

Cosmetic Textiles

Textiles may have skincare characteristics; they are known as cosmetics. [11]. The most important cosmetic elements for cosmetics come from inorganic, synthetic, and animal chemicals, animal derivatives like, plant products.

Cosmetic textiles are divided into three main groups according to their effects on the human body the grafting technique of the fabrics and the type of textiles utilized. These are split into cosmetic products that minimize, moisturize, energize, perfume, refresh and relax, revitalize, prevent UV and improve skin firmness and elasticity different extracts from different natural sources are encapsulated inside the polymer walls, which, owing to friction, pressure, and temperature, breaks into touch with the human skin, effectively liberating the active ingredients into the skin, giving the desired effect. [43]. One method is to use the process of microencapsulation to create cosmetic textiles. A large series of microencapsulated elements including Aloe Vera, vitamin E, retinol, and caffeine presently have been reported to give moisturizing, firming, or slimming advantages. [11]. The Aloe Vera oil, a common skincare component in almost all cosmetics applications makes the material biofunctional, Merging the energetic ingredient's pharmacological qualities with textiles, offering advantages for the consumer's body. [44].

On communication with such form of Cosmo textile, moisturizing chemicals can be transmitted from the materials moisturize the stratum corneum of skins. Mostly in the United States and Europe for moisturizing advantages, for instance, socks and legwear carrying vitamin C or Aloe Vera gelatin sacs were applied [29].

Dogi Global Fabrics has started a range of
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smart fabrics using Aloe Vera nanoparticles for cosmetic textiles that offer moistures, calms, antioxidants, and anti-aging effects. for cosmetic-textile usage.[29]

Curative textiles

Lately, much focus has been paid to curative clothing, since it has no side effects and is not harmful or environmentally safe. All oral medicinal products and ointments have an adverse impact but on the other hand. Various natural herbal extracts are now employed for developing curative clothing. Used as healing clothes is a successful therapy for several skin conditions such as bacteria, inflammatory illness of the skin, seasonal skin disease, hives, and eczema. Scientists worked on the treating of atopic dermatitis by Aloe Vera with enhanced curative clothing. A T-shirt and pajamas were produced to heal erythematous skin diseases by 20% and 40% Aloe Vera gel. The healing apparel was utilized once a week while sleeping for ten hours [11]. Researchers have been working on the microcapsulation of therapeutic finished provided by Aloe Vera. Aloe Vera herb Extraction was used as the inner substance and acacia gum being the capsular's shell material for the production of microcapsules.

The microencapsulated extracts of Aloe Vera showed a high level of antimicrobial agents. An individual jersey-cut fabric with a pad-dry-curing method was used for the microencapsulation of Aloe Vera. The clothing was constructed of this fabric encapsulated. Tests from field trials demonstrated that the treatment of inflammatory skin conditions supplemented with Aloe Vera was excellent [45].

Physical properties of treated fabrics

When Aloe Vera is used to developing its physical properties, such as the crease recovery angle, length of the bending, the coefficient of the drape, and the change in strength. In comparison with untreated fabric, the Aloe Vera finished cloth showed a higher crease recovery angle, a greater bending length, and a poor whiteness index. The bending of the tissue treated with Aloe Vera diminishes as stiffness but softness increases. The static and dynamic fusion coefficient also increases despite the minor drop in the whiteness index.[12, 46].

The modified textiles of the aloe anthraquinone showed a better recovery angle, but the breaking

strength was reduced significantly. Compared to the control sample, the moisture adsorption remained nearly unaltered.[47].

when evaluating the physical properties of Aloe Vera treated textiles, the whiteness index, air permeability, and tensile strength dropped whereas the permeability of water vapor and the crease recovery angle. Meanwhile, the Aloe Vera treatment has had no damaging effect on the abrasion resistance of finished cloth but somewhat less heat conductivity. [48].

After the treatment of cotton by Aloe Vera, crease recovery and abrasion resistance increased, but moisture recovery reduced in comparison to the control fabric, breaking strength, and flexural stiffness.[49]. The coefficient of the drape of printed material processed by Aloe Vera reduced and softer the fabric.[50]. Compared to control cotton, the air strength of the Aloe Vera-treated textile was increased. The decrease in air permeability was possibly due to the impregnation of cotton fabric with microcapsules. Closing the space between strands would be coated microcapsules. Airflow, therefore, didn't travel through the tissue readily. In addition, the treatment reduced the whiteness of the cloth by 4%. [51].

Conclusion

Aloe gel has been used in many different ways over the years. Aloe gel proves necessary in current civilization by its natural, biodegradable and ecologically secure goods for our safety. Aloe gel has over 200 bioactive compounds. The polysaccharides and acemannan are recognized for their antibacterial, antioxidant, wound cure, and hygiene products also as the major components of Aloe Vera. However, for several applications, the method of action of other compounds, like anthraquinones, vitamins, enzymes, and salt, is also highly beneficial.

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الاستخدامات المحتملة لمستخلص الصبار في عملية التجهيز وعمليات النسيج الرطبة

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كانت المنسوجات جزءاً مهماً من الاقتصادات القديمة والاجتماعية. كانت حيوية للعديد من جوانب الحياة ، بما في ذلك الملابس والعديد من التطبيقات الأخرى. في الآونة الأخيرة ، كان لاستخدام المواد الطبيعية في عمليات تصنيع المنسوجات أهمية كبيرة. من المواد الطبيعية التي حظيت بأهمية كبيرة كان نبات الصبار ، حيث يدخل في جميع مراحل تصنيع المنسوجات من المرحلة الأولى حتى النهاية لما له من تأثير مهم للغاية ومفيد على هذا النوع من الصناعة. حيث يتم استخدامه كحماية من الأشعة فوق البنفسجية ومضاد للأكسدة ومضاد للميكروبات وأيضاً في عملية الصباغة والطباعة. أضف إلى ذلك نبات الصبار من أقدم النباتات الطبية في تاريخ البشرية.

الكلمات الرئيسية: الصبار ، الغزل والنسيج ، مضادات الميكروبات ، حماية للأشعة فوق بنفسجية ، مضادات الأكسدة