International Journal of Research in Engineering and Applied Sciences(IJREAS)
Available online at http://euroasiapub.org/journals.php
Vol. 7 Issue 4, April-2017,
ISSN (O): 2249-3905, ISSN(P): 2349-6525 | Impact Factor: 7.196 | Thomson Reuters Researcher ID: L-5236-2015

CHARACTERIZATION OF NATURAL COLORANTSWITH APPROACHING CLEANER PRODUCTION AND SUSTAINABILITY IMPACT: A STUDY

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Abstract

This research generates economic growth, but it is associated with side effects of health hazards of pollution. That is necessary to take care of such pollution by introducing clean innovation, and the regulatory measures and awareness creation. Eco requirements would be continuing to dominate the trade and the processor needs to understand in detail the changes that need to be done to satisfy these requirements. Society, Economy and Environment, and there are three important components of real sustainable development, balancing all the three simultaneously with the existing level of technology is a herculean task. Although to be global means an increased cultural intertwining or a higher flow of data and a social tolerance as well as the existence of a world market that enables productivity and accessibility, they are also disadvantages related to the loss of cultural identity of certain cultures or sustainable issues that must be addressed.

1. OVERVIEW

Today, the uses of 100 million people living in mechanically created areas compare to the consumption of more than one billion people living in immature locales of the world, just to meet major necessities. This case is risky because it has two conflicting appearances and them two put extraordinary pressure on the global environment. People who can't go through adequate to supply their principal prerequisites are constrained to make short-go decisions that regularly have unfriendly since quite a while ago dated consequences for the environment to address their issues. Instances of environmental issues caused by low consumption and destitution incorporate cyanide fisheries which compromising the reef ecosystem of poor anglers in Southeast Asia, ranchers in Africa consuming trees for rice bread, decimating woods and expanding neediness and hardship by accelerating disintegration and desertification.

Advanced production technologies, which are utilized to meet expanded consumption demands, have additionally made production exercises imperative to the global environment. The creating innovation achieved the issues like pollution of the environment, air, and water, thinning of the ozone layer, a decline of green zones. Accordingly, be that as it may, a popular feeling has risen, particularly in created nations, which are delicate to these issues. New safety measures have started to be viewed as both to keep up industrialization and to secure the environment. It has been demonstrated that tidying up after the pollution is more expensive than tidying up before the pollution and it is beyond the realm of imagination to expect to re-

establish the debased environmental parity after pollution.

Its motivation is to make science available to the necessities of regular day to day existence, considered as highly successful to conquer environmental issues and handle pollution. Bio resourced advances' expansion is quickly changing the world with its endless number of applications and conceivable outcomes; biotechnological processes assume a key job in expanding and advancing economical production. In the Design or Textiles handle, biotechnologies' practices are ordinarily connected with supportable development and green assembling processes - pollution control and counteractive action, resources preservation, cost decrease.

This methodology empowers for a new extreme method for rethinking materials as it comprises in building new biological capacities or systems or re-planning existing natural ones (Synthetic science organization). The production of biomaterials is a huge effect of this innovation. Textile and form designers are looking to science as part of the innovative process, creating novel and regularly astounding outcomes. Cut edge and complex advances serve better clothing industry as far as quality, imaginative pieces of clothing. Albeit most innovation is considered underexplored, the recent pattern of broad utilization of biomaterials in item and design pieces of clothing is developing exponentially, given their potential outcomes.

Nature has constantly overwhelmed over synthetic or artificial, from the earliest starting point of this world as nature was the main alternative for a human being at that point, and now with advantageous qualities of naturally inferred materials over synthetics giving them need. Shading has constantly assumed an imperative job in the arrangement of various societies of a human being everywhere throughout the world. It influences each snapshot of our lives, unequivocally impacting the clothes we wear, the decorations in our homes. Before, painters had utilized natural dyes separated from plants, bugs, molluscs, and minerals for their artistic creations.

The interesting character of their works was the aftereffect of using diverse blends of dyes and mordants, as varnishes and enamels in charge of attachment of the shades and assurance of the layers wrecked by environmental impacts. Natural dyes were likewise utilized in clothing, and in the restorative industry (Henna, Catechu), the pharmaceutical industry (Saffron, Rhubarb) and in the food industry (Annatto, Curcumin, and Cochineal). As now open's mindfulness for eco-conservation, eco-wellbeing and wellbeing concerns, environmentally kind and non-harmful sustainability in bioresource colorants, have transformed textile innovative work. Additionally, environmental and amphibian conservation viewpoints constrained Western nations to abuse their high technical abilities in the headways of textile materials for high quality, technical performances, and

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one next to the other development of cleaner production strategies for financially savvy esteem included textile products.

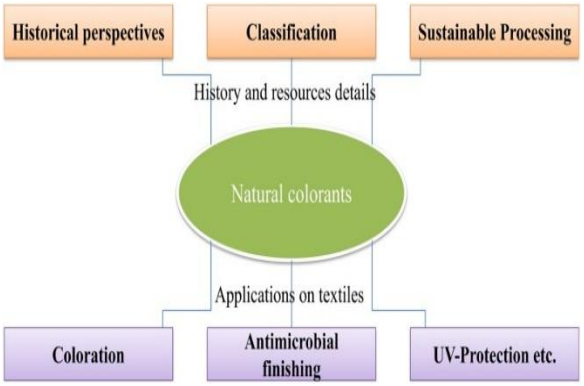

Figure 1: Natural Colorants

2. BIO-COOPERATION BIOTECHNOLOGY IMPACT ON THE WORLD

Biotechnology application in textiles dates back more than two thousand years - from strands to natural dyes. The jump from great to present day biotechnology included just the perfect inventive apparatuses to find distinctive uses and elements of bioresources, in this manner taking into consideration the improvement of this new field. These complex innovations' development is accentuated through huge advances in hereditary engineering and synthetic science, where the utilization of living beings is viewed as a biological process that may supplant modern or mechanical systems. Synthetic Biology is, in more extensive terms, the engineering of science.

3. CONVENTIONAL AND NON-CONVENTIONAL METHODS OF NATURAL DYEING

- **Conventional dying**

Dyeing can be done in a basic bath, acidic bath or in an unbiased bath, contingent upon the chemical idea of natural dyes. There are different reports available on various methods of mordanting and additionally extraordinary methods of dyeing of various filaments, for example, cellulosics, dialect cellulosics, protenic and synthetics. Different sorts of shades, similar to dark to darker and green to yellow to orange, can be gotten by the application of various mordants. Be that as it may, before dyeing, the clothes should be scoured, dyed or treated chemically by various methods. In this manner, source-wise and state-wise, distinctive craftsman dyers are performing natural dyeing of silk, cotton, and wool from a long time and have inferred some unique techniques and processes for individual color fiber blend to get a specific shade.

- **Non-conventional dying**

Customer's interest for eco-friendly textiles and eco-friendly dyes prompted the recovery of natural dyes for textiles, with the more up to date vitality productive dyeing process and increasingly reproducible shade creating processes. It is accounted for that the ultrasonic invigorated dyeing conditions for neem leaves give better color take-up, uniform dyeing, and better light and wash fastness on cotton texture. Dyeing under ultrasonic conditions is beneficial because it devours less warmth than ordinary dyeing for a similar shade dyed nylon with three diverse natural dyes utilizing different mordants by two unique techniques [open

bath and high-temperature high pressure (HTHP dyeing methods)], of which HTHP dyeing was observed to be better when contrasted with open bath.

The archaeological textile research involves the investigation through scientific technologies to detect the chemical composition and, to identify the sources of the dyestuffs used in old textiles. These studies of the colorants used by ancient peoples incorporate a multidisciplinary look into, consolidates small scale scientific chemistry, spectroscopic methods, history, prehistoric studies, organic science and so on. The dyestuffs connected onto textile materials past human advancements have been analyzed to examine the development and mechanical headways in textile dyeing through different archeological periods. In the previous decades, analysts are especially profited by the instrumental investigations of old artifacts and colorants were broke down with small scale chemical tests, for example, TLC, HPLC, switched stage HPLC, FT-IR spectroscopy, UV– Visible spectroscopy, X-ray fluorescence, and vitality dispersive X-ray (EDX) spectroscopic techniques.

4. EXTRACTION AND PURIFICATION OF COLORANTS FROM NATURAL DYES

The extraction efficiency of colourant components present in natural plant/ animal/ mineral sources depends on the media type (aqueous/ organic solvent or acids/ alkali), pH of the media and conditions of extraction, such as temperature, time, material-toliquor ratio and particle size of the substrate.

- **Aqueous Extraction**

Dayal and Dobhal [1] separated colorants from the leaves of Eucalyptus hybrid, seeds of Cassia tora and Grewia optiva by utilizing watery medium under shifting condition. These dyes confer quick shades of silk, cotton and jute fabrics. Khan et al. [2] contemplated natural dyes removed from biomass items, to be specific cutch, ratanjot, and madder. The shading extent of wool tests colored with these dyes demonstrates red, yellow zone. Maulik et al. [3] likewise examined the extraction of hinjal and jujube bark having pH 4-5 for coloring wool and silk.

The color take-up has all the earmarks of being higher if there should arise an occurrence of wool than in the event of silk. Dish et al. [4] colored the dim jute texture with concentrates from deodar leaf, jackfruit wood, and eucalyptus leaf by absorbing it delicate water and bubbling for four h independently. Color take-up expanded with the expansion in severe concentration. Saxena et al. [5] at first extricated marigold and chrysanthemum blooms by heating their dry petals with fermented water and announced it to be the best. Watery extraction of saffron yields a yellow color with medium wash fastness on wool and poor wash fastness on cotton. The wash fastness can be enhanced by treatment with metal salts previously kicking the bucket.

- **Different Mordants and Mordanting Methods**

Mordanting is the treatment of textile texture with metallic salts or other complex shaping operators which tie the natural mordantable dyes onto the textile strands. Mordanting can be accomplished by either premordanting, at the same time mordanting or postmordanting. Diverse sorts and particular mordants or their mix can be connected on the textile fabrics to acquire shifting shading/shade, to expand the color take-up and to enhance the shading fastness conduct of any natural color. Broad work has been accounted for around there of study. Dayal et al. [6] examined the impact of copper sulfate and potassium dichromate on shading fastness properties of silk, wool and cotton filaments.

5. ADVANTAGES AND DISADVANTAGES OF NATURAL DYES/ COLORANTS

In the recent years, there has been a trend to revive the art of natural dyeing. This is mainly because in some aspects natural colourants are advantageous against synthetic dyes. Some of these advantages along with some limitations (disadvantages) are listed below:

Advantages of natural dyes/ colorants

1. The shades produced by natural dyes/colorants are usually soft, lustrous and soothing to the human eye
2. Natural dyestuff can produce a wide range of colours by mix and match system. A small variation in the dyeing technique or the use of different mordants with the same dye (polygenetic type natural dye) can shift the colours to a wide range or create totally new colours, which are not easily possible with synthetic dyestuffs.
3. Natural dyestuffs produce rare colour ideas and are automatically harmonizing.
4. Unlike non-renewable basic raw materials for synthetic dyes, the natural dyes are usually renewable, being agro-renewable/vegetable based and at the same time biodegradable
5. In some cases, like hard, indigo etc., the waste in the process becomes an ideal fertilizer for use in agricultural fields. Therefore, no disposal problem of this natural waste.
6. Many plants thrive on wastelands. Thus, wasteland utilization is an added merit of the natural dyes. Dyes like madder grow as host in tea gardens. So, there is no additional cost or effort required to grow it.
7. This is a labor-intensive industry, thereby providing job opportunities for all those engaged in cultivation, extraction and application of these dyes on textile/food/leather etc.
8. Application of natural dyes has potential to earn carbon credit by reducing consumption of fossil fuel (petroleum) based synthetic dyes.
9. Some of its constituents are anti-allergens, hence prove safe for skin contact and are mostly non-hazardous to human health.
10. Some of the natural dyes are enhanced with age, while synthetic dyes fade with time.

11. Natural dyes bleed but do not stain other fabrics, turmeric being an exception.
12. Natural dyes are usually moth proof and can replace synthetic dyes in kids garments and food-stuffs for safety.

Despite these advantages, natural dyes do carry some inherent disadvantages, which are responsible for the decline of this ancient art of dyeing textiles.

Limitation/ disadvantages of natural dyes/ colorants

1. It is difficult to reproduce shades by using natural dyes/colourants, as these agroproducts vary from one crop season to another crop season, place to place and species to species, maturity period etc.
2. It is difficult to standardize a recipe for the use of natural dyes, as the natural dyeing process and its color development depends not only on color component but also on materials.
3. Natural dyeing requires skilled workmanship and is therefore expensive. Low color yield of source natural dyes thus necessitates the use of more dyestuffs, larger dyeing time and excess cost for mordants and mordanting.
4. Scientific backup of a large part of the science involved in natural dyeing is still needing to be explored.
5. Lack of availability of precise technical knowledge on extraction and dyeing techniques.
6. The dyed textile may change color when exposed to the sun, sweat and air.
7. Nearly all-natural dyes with a few exceptions require the use of mordants to fix them on to the textile substrate. While dyeing, a substantial portion of the mordant remains unexhausted in the residual dye bath and may pose serious effluent disposal problem.

6. TEXTILE INDUSTRY'S ENVIRONMENTAL EFFECTS AND APPROACHING CLEANER PRODUCTION AND SUSTAINABILITY

The remarkable development of the global economy in recent years has additionally caused the blast in consumption. While a portion of this development in consumption is important for people to proceed with their lives, the rest isn't. Like lavishness, consumption is additionally indicating uneven conveyance. Despite the fact that consumption of per person has ascended in large territories of the world, these increments are not the equivalent for everyone, and the contrasts between the increments are colossal. 86% of personal consumption costs are completed by the most extravagant associations of the world, while the poor are devouring 1.3 %. A person in North America is assessed to average around multiple times in excess of a person in China or India and around multiple times more than somebody in Bangladesh.

7. CONCLUSION

Natural bioactive compounds (natural dyes/shades) have been accounted for as noteworthy antimicrobial operators for textile completing in eco-accommodating dyeing. Indian textile sector has been getting a charge out of rich customary notoriety on the planet showcase for some decades. The development of this industry in term of its yield and fare tends substantiates this. In recent years it has been the casualty of numerous difficulties that have come up with regards to industrialization. A standout amongst the most difficulties issues for humans today is the environmental issue. Subsequently, people, business associations, the legal executive and the administration everywhere throughout the world have perceived the need for eco-friendly textiles to maintain a strategic distance from or lessen environmental issues.

REFERENCES

[1]. Dayal R & Dobhal P C, Colourage, 48 (8) (2001) 33
[2]. Khan M A, Khan M, Srivastav P K & Mohammad F, Colourage, 56 (1) (2006) 61.
[3]. Maulik S Ray & Pradhan S C, Man-made Text India, 48 (10) (2005) 396.
[4]. Pan N C, Chattopadhyay S N & Day A, Indian J Fibre Text Res, 28 (9) (2003) 339
[5]. Saxena S, Varadarajan P V & Nachane N D, Proceedings, Convention of Natural Dyes, edited by Deepti Gupta and M L Gulrajani (Department of Textile Technology, IIT Delhi), 2001, 185.
[6]. Dayal R, Dhobal P C, Kumar R, Onial P & Rawat R D, Colourage, 53(12) (2006) 53.