Journal of Textiles, Coloration and Polymer Science
https://jtcps.journals.ekb.eg/

Green Dyeing is All-Natural, Fabric, Dye and Mordent

Shaimaa Ali Kamel

Higher Institute of Applied Arts, Fifth Settlement, Egypt

Abstract

IN THIS STUDY cotton fabric is dyed with natural dye extracted from turmeric in the absence and presence of two kinds of mordents Alum as a synthetic mordent and Albumin as a natural mordent with three different techniques pre-mordanting, meta-mordanting and post- mordanting process. The dyed fabrics were evaluated the colour properties and assessed in terms of depth of shade and fastness properties It was founded that Albumin achieved good results as an alternative to metallic or metal salts in mordanting dye

Keywords: Natural fabric, Natural dye, Natural mordent.

Introduction

With the increasing awareness of environment by replacing synthetic materials or chemicals with natural ones due to the damage caused by these materials to the environment such as water and air pollution[1]. In the textile industry, Synthetic dyes offer a large scale of colors and shades are obtained easily, are not expensive, and have good fastness properties[2]. On the other hand, most synthetic dyes are not biodegradable, may cause allergies, toxic and carcinogenic [3] . So natural dye is considered a topic of international interest as it is biodegradable, non toxic, easily available, have lots of medical properties and also have wide range of shades of various hues [4].
It was one of the oldest techniques which recorded the civilization of the ancient people[5] .these records were found in many countries such as Egypt, India and, Chain which had been exclusively done with natural colourants.[6], [7], [8]

Where does the importance of natural dyes come from these days? [1]

The textile dyeing industry using synthetic dyes is producing an enormous amount of remnants in the wastewater[9]. On the other hand, by dyeing with natural dyes water can be saved and water pollution avoided. Scientific evidence has proven allergic and toxic effects reactions may be caused when using synthetic dyes allergic of some synthetic. While natural dyes are skin friendly due to their non - toxicity and non-allergic as some of these dyes have medicinal effects on the skin. In natural dyes, a wide broad spectrum of colours can be reached when changing any of the dye techniques that may turn colours to another wide range or produce new colours such as using different mordants with the same dye. The plant-based natural dyes are usually agro-renewable and biodegradable. Many plants of these dyes grow on poor lands, so natural dyes can add a new feature to the poor land and the wastes can increase fertilizing for use in agricultural lands. This also increases job opportunities and sustainable employment in both the cultivation and textile industries. Using natural dyes decreases the consumption of fossil fuel (petroleum) which is used to produce synthetic dyes, which will lead to reduced carbon emissions. [10]
One of the most important uses of natural dyes is being used by archaeology to protect and preserve the ancient museum coloured textiles heritage.

Classification of natural dyes Natural dyes:

Natural dyes have been classified in many types First they were classified according to alphabetical order or according to the botanic source. Then they are classified into groups as below:

Corresponding author: Shaimaa Ali Kamel, e-mail: shaimaaalikamel@yahoo.com, Tel.: 01005703115
(Received 05/05/2023, accepted 28/05/2023)
DOI: 10.21608/JTCPS.2023.209058.1181

1- Substantive Dyes: (such as indigo, turmeric etc.)which dye the fibers directly
2- Adjective Dyes: (such as logwood, madder etc.) which need mordant with a metallic salt.
3- Monogenetic Dyes: those produce only one colour irrespective of the mordant applied along with the dye

4- Polygenetic Dyes :(such as alizarin) those produce different shades according to mordant applied in dying process

Classification of natural dyes according to the basis of hues:

A) **Red dyes**: most of them come from roots or barks of plants or hidden in the bodies' insects. They mostly are based on anthraquinone and its derivatives. These dyes have fastness to light and washing.

B) **Yellow dyes**: most of the yellow dyes are flavonoids. Generally, those shades are pale with fading but turmeric produce dull deep shade, have fastness to light due to emit fluorescence. natural yellow dyes give Wash fastness rating ranges from fair to excellent

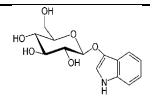
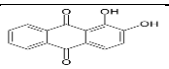
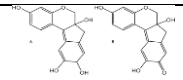
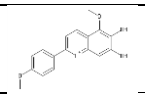
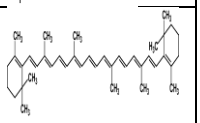
C) **Blue dyes**: impart excellent fastness to washing and light such as indigo and woad

D) **Black dyes**: comes mostly from tannin plant and substantive to protein and cellulosic fiber, they produce good fastness properties.

Classification of natural dyes according to the basis of origin:

Natural dyes are classified into three categories: vegetable, animal and mineral origin. Most of vegetable origin dyes come from root, branch, leaf, flower, seeds or fruit of plants. Animal origin mostly derived from insects. Those yielding are cochineal and kermes. Mineral dyes are derived from mineral natural source .they are produced from inorganic compounds such as chrome-yellow, manganese brown, iron-buff, narkin-yellow, and Prussian-blue.

Classification of natural dyes according to their chemical structure [11- 12]

Dye	Source	specification	Chemical structure
Indigoid dyes	Indigo and Tyrian purple, woad	the main dyeing component indigo	 INDICAN
Anthraquinone dyes	Madder, lacs, kermes, cochineal	mordant dyes, plant and mineral	 Alizarin
Alphanaphthoquinones	is lawsone (henna), juglone, obtained from the shells of unripe walnuts	Disperse dyes and give shades of orange.	 Juglone
Flavonoids	isoflavones, aurones and chalcones	Giving brilliant and fast colours on both wool and silk.	
Di-hydropyrans	sappan-wood	dark shades on silk wool and cotton	
Anthocyanidins	carajurin	orange dye for wool and cotton	
Carotenoids	carrots	The colour is due to the presence of long conjugated double bonds.	

Classification of natural dyes according to the application method:

1- **Mordant dyes:** dyestuffs which need a mordant because they have no affinity for the fibers. It should have electron donating groups to form a bond with the metal salt, such as (madder, fustic, kermes, berries, persian, and cochineal etc.)
2- **Vat dyes**: they are insoluble dyes which should be converted to their water soluble form leuco by reduction with sodium hydrosulphite and then applied to the fabrics, then followed by oxidation to appear the true colour then followed by soaping treatment such as indigo.
3- **Direct dyes:** those dyes have high affinity for the cellulosic fabrics. They are applied at boiling dye bath such as Turmeric, harda, pomegranate rind etc.
4- **Acid dyes**: those dyes are applied in an acidic medium. The dye structure forms an

electrovalent bond by either sulphonic or carboxylic group (s) and also forms an electrovalent bond with amino groups of wool and silk. The fastness can be improved with tannic acid (black tanning) treatment such as saffron.

5- **Disperse dyes**: they have not solubilizing groups so their low solubility is low. They applied on to synthetic fabrics in neutral to mildly acidic pH. They can also be applied to protein fabrics. Then treated with within chromium, copper and tin salts to post mordanted, such as lawsone and many other flavone and anthroquinone dyes.

6- **Basic or cationic dyes**: those dyes give coloured cations when ionized and bond with the –COOH group of protein fabrics by an electrovalent bond. These dyes are applied in neutral to mildly acidic pH, and have poor light fastness, such as berberine.

One of these interests is using natural dyes with natural mordent as alternative of synthetic dyes or natural dyes with synthetic mordent [12]

Mordents

A mordant is a chemical which can be fixed on the fabrics and also forms a complex with the natural dyes. According to the limited substantively of natural colorants for the fibres, dyeing process requires use of the mordant to strengthen the fixation of the natural colorant on the fibres. As it helps increasing absorbance, enhance dye take-up by the fabric, and fixation of natural dyes which also improves the fastness properties of the dyed fabrics which led to prevent fading and bleeding of colours by forming chemical coordinate bonds and promote good bonding of dyes with textiles

Mordent can be applied by different techniques to form complex between natural dye and fabrics.

First: by applying the mordant to the fabrics and then dyeing with natural dye (pre-mordanting process).

Second: by applying the mordant in the dyeing bath-simultaneous application of the dye and the mordant (meta- mordanting process)

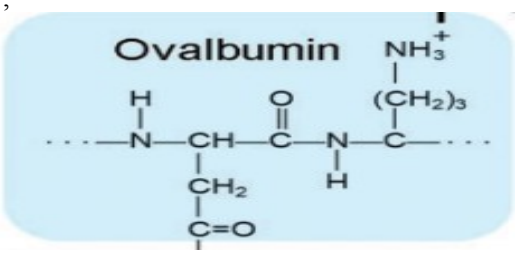
Third: by applying the mordant to the fabrics after the dyeing process (post-mordanting process).

Some of metallic or metal salts are used in dyeing of natural dyes as mordants like alum, tannin, potassium dichromate, ferrous sulphate, zinc sulphate, copper sulphate, and tannic acid [13] are used to develop wide range of shades after complexing with the natural dyes compounds, However, Most of metallic salts can harm public health by using only small amount of them due to its toxicity, also they are lead to diseases when occur union between these non-degradable and toxic ions with living organisms in the food chain as result of wastewater pollutants which consequently harms the environment. [14]

For protecting the environment of these impacts, some trails are investigated by using a natural mordent as alternative of metal salts or synthetic mordent to increase the dyeing fastness properties of natural dyes.

In this study, ovalbumin is used as a natural mordant to improve the affinity of cotton fabrics to natural dye. It is a kind of proteins found in avian egg white ,[15] and it is not only used in food products but also in biological and pharmaceutical systems too. [16]

Cotton has only hydroxylic groups in its chemical structure that may obstacle of fibre–dye bonding mostly with natural dye. Many studies have done to improve dye adsorption and bonding on cotton by using a variety of functional compounds as secondary, tertiary and quaternary amines[17], in this work ovalbumin used to bind fabric and the dye through the hydrogen-bonding interactions occurring between the amino and carbonyl groups present in ovalbumin and the hydroxyl groups present in cotton. [15, 18]



Experimental

Materials

Cotton fabric

Raw plain Woven cotton fabric (130 g/m^2) was obtained from Misr Helwan spinning and weaving Co. (Egypt)

Chemical used:

Sodium hydroxide (NaOH)

Triton X-100 (wetting agent)

Alum [hydrated aluminium potassium sulphate ($KAl(SO_4)_2.12H2O$]

Ovalbumin

Natural dye: Turmeric - Curcuma Longa. (CI Natural Yellow 3), Powder was supplied by a local market in Egypt.

Methods

Scouring

The fabric was scoured by sodium hydroxide (4.0 %) and wetting agent using liquor ratio (1:50 w/v). at boiling for 90 minute, after which time it was thoroughly rinsed and dried at room temperature.

Natural dyes extraction from Turmeric Powder

About 100g of Turmeric dry Powder that contains the pigment components was added to 1000 ml of distilled water subjected to boiling for 30 min, and

concentrated to 500ml.the liquor was left to cool at room temperature and then filtrated off

Turmeric consists of up to 3% curcumin, a polyphenol is the active substance of turmeric which was represented in the following Fig. (1).

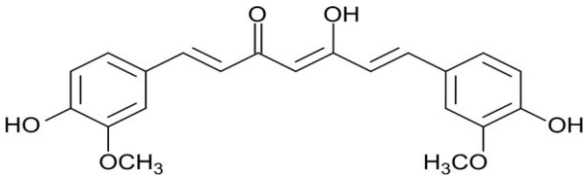


Fig. 1: Curcumin chemical structure

Dyeing of cotton Fabrics using the Natural Dyes

1) In absence of mordant

Scoured cotton fabrics were dyed using extracted Turmeric dye in absence of metal salts or mordent at a boiling for 45 minutes using liquor ratio of 1:30.

After dyeing, soaping of the dyed fabrics were performed in a bath containing 1 g/l non-ionic detergent 10% at 60^{o}C for 15 minutes to remove the unfixed dyes present on the fabric surface. Then, subsequently rinsed with water and dried at room temperature.

2) In presence of mordant

Dyeing of scoured cotton fabrics were conducted using three different techniques:

- pre-mordanting
- simultaneous
- post mordanting method

A) Pre-mordanting: in the presence of mordent Alum, and different concentration of ovalbumin(1%, 2%, 3%), the samples were separately immersed in a bath containing the above mentioned mordent and the temperature was kept at 100^{o}C for 60 minutes at a fabric-to-liquor ratio of 1:20. Then the samples were cooled and finally squeezed and dried without washing.

The pre-mordanting samples were dyed using the aforementioned extracted curcuma natural colour at L.R. 1:50 and the dyeing was carried out for 60 minutes at boiling.

After dyeing process, the samples were rinsed with water, and then washed with soaping bath at 60 ◦C for 15 minute, finally rinsed with cold water and air dried.

B) Simultaneous mordanting (one-pot method): The samples were mordanted in the same dyeing bath with different mordents (Alum, and different concentration of albumin). Dyeing process was carried out using the aforementioned extracted curcuma natural colour with L.R. 1:50 for 60 minutes at boiling.

Then samples were washed with soaping bath at 60 ◦C for 15 minute, finally rinsed with cold water and air dried.

C) Post-mordanting: Firstly, the samples were dyed using the mentioned extracted curcuma natural dye at L.R. 1:50 and the dyeing was carried out for 60 minutes at boiling. Then washed with water, then the dyed samples were treated in the presence of Alum, and different concentration of ovalbumin, the samples were separately immersed in a bath containing the above mentioned mordent and the temperature was kept at 100^{o}C for 60 minutes at a fabric-to-liquor ratio of 1:20. Then samples were washed with soaping bath at 60 ◦C for 15 minute, finally rinsed with cold water and air dried.

Tests and Measurements

1- Color properties:

Colour properties of dyed samples as colour strength (K/S) was evaluated using Shimadzu UV/Visible spectrophotometer by reflection of light technique. The K/S value was assessed by the Kubelka equation. The measurement was done in accordance to ASTM E313-96 using CIE color system coordinates

2 -Fastness properties: [19, 20]

The colour fastness properties: washing or rubbing fastness were assessed according to standard methods

2.1. Color fastness to rubbing: The colour fastness to rubbing Include dry and wet rubbing of the dyed samples was determined according the AATCC test method 8-1996, (ISO) 105X12. test.

2.2. Color fastness to washing: The colour fastness to washing was measured according to the (ISO) 105-C06 A2S: 1994 standards (AATCC test method 36-1972).

Results and Discussion

The detailed results for the turmeric natural dye applied to cotton fabric samples using different mordants and mordanting techniques are presented in the next extension. The results indicate that different K/S values obtained of dyed cotton samples when

using different mordants and mordanting techniques. Generally, natural mordant and synthetic mordant gave different colours values.

Table (1): K/S values of cotton samples

Mordent	Mordent method	K/S
	No mordent	2.51
Alum	Pre- Mordanting	1.87
	Sim- Mordanting	2.53
	Post - Mordanting	1.69
Albumin 1%	Pre- Mordanting	2.98
	Sim- Mordanting	2.88
	Post - Mordanting	1.37
Albumin 2%	Pre- Mordanting	3.60
	Sim- Mordanting	3.00
	Post - Mordanting	1.39
Albumin 3%	Pre- Mordanting	2.50
	Sim- Mordanting	1.45
	Post - Mordanting	1.31

Effect of mordanting technique on K/S

Pre-mordanting method:

From Figure 2, turmeric dye for cotton fabrics without mordent and with pre-mordanting both Alum and Albumin (1,2,3% conc.) indicates that the K/S values without mordant samples had higher K/S than samples with Alum mordant, on the other hand, Albumin mordent (conc.2%) gives higher values of K/S.

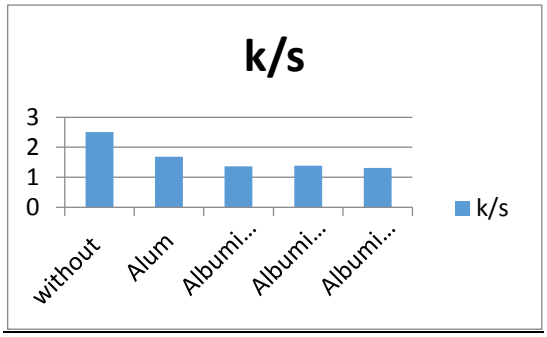


Figure (2): Effect of mordent type on colour strength (k/s) using (pre-mordanting method).

Simultaneous method:

Albumin natural mordant exhibits satisfactory colour strength with simultaneous-mordanting as can be seen from Table 3 and Figure 3. Alum mordent shows higher K/S than without mordent while K/S increases by albumin mordent for both concentrations 1, 2 % then decreases by conc.3%.

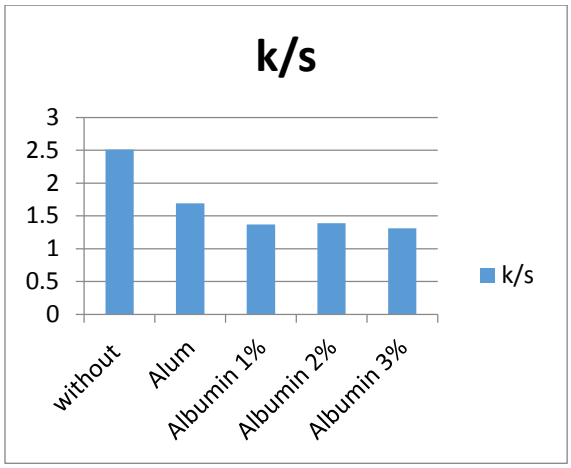


Figure (3): Effect of mordent type on colour strength (k/s) using (simultaneous mordanting method)

Post mordanting method:

From Figure (4) it could be seen that post-mordanting with Alum gave highest colour strength value of about 1.69 while on the other hand, albumin 3% has the least colour strength value of 1.31.

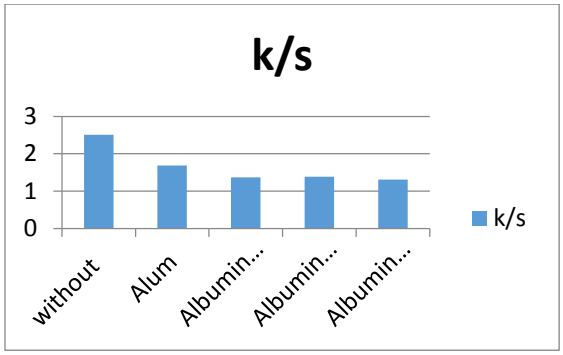


Figure (4): Effect of mordent type on colour strength (k/s) using (post mordanting method)

Results with respect to colour strength K/S values of cotton fabric dyed of with natural dyes (turmeric) obtained using no mordent, natural and synthetic mordants are given in Tables 2–4, figures 2-4

The results indicate that the K/S values of the cotton fabrics pre-mordanted cotton samples showed that Albumin natural mordent had higher K/S than samples with Alum mordent while Albumin mordent (conc.2%) gives the highest K/S values of all dyed samples.

Also, it can be observed that the K/S values of dyed fabrics with Albumin 1,2 % (simultaneous mordanting method) higher than Alum while Albumin 3% is the least K/S value in this technique.

On the other hand (post mordanting method**)** gave the least K/S values when comparing with the two other methods also Alum gave K/S values of dyed samples more than Albumin

Overall, the order of the three highest colour strength (K/S value) of mordanted and dyed fabrics was in the following sequence ‘‘Albumin 2% pre -method > Albumin 2% simultaneous- method > Albumin 1% pre- method ’’.

This may be attributed to that Albumin is having cationic group with positive charge dyeing sites in place of existing hydroxyl sites subsequently improving the affinity of cotton for anionic dye by the attraction between the positive charge on the fibre and the negative charge on the anionic dyes.

This may be attributed to that when cotton fibres immersed into water, it gives a negative charges because of ionization of hydroxyl groups in the cellulose chain. These charges repulse the negative charges of anionic dyes during the dyeing operation, which lack the fiber–dye bonding especially with natural dyes. On the other hand Albumin is having cationic group with positive charges which may replace existing hydroxyl sites in dyeing, subsequently improving the affinity of cotton for anionic dye by the attraction between the positive charge on the fibre and the negative charge on the anionic dyes.[21]

Effect of using different mordents on color components

Table (2): Effect of mordent type on colour components

mordent	Tech.	Conc.	L*	a*	b*	C*	h	K/S
Stand. without	Nil	--	78.32	4.91	52.82	53.05	84.69	2.51
Alum	pre	1%	77.47	6.28	44.88	45.32	82.03	1.87
	Sim.	1%	78.45	6.68	53.26	53.67	82.86	2.53
	post	1%	73.59	5.68	36.18	36.63	81.08	1.69
Albumin	pre	1 %	77.14	5.95	54.49	54.81	83.77	2.98
		2 %	77.12	6.72	59.68	60.06	83.57	3.60
		3 %	79.78	3.12	54.40	54.48	86.71	2.50
	Sim.	1 %	71.96	6.13	34.98	**60.57**	**83.96**	2.88
		2 %	71.08	5.86	36.02	**60.06**	**83.57**	3.00
		3 %	81.85	0.27	47.25	47.25	89.67	1.45
	post	1 %	81.96	0.44	40.96	40.96	89.39	1.37
		2 %	74.54	2.38	30.47	**40.92**	**89.29**	1.39
		3 %	82.38	-0.43	42.48	42.48	90.67	1.31

Table 2 shows the effect of mordent technique and concentration on the colour coordinates L* , a* ,b* ,C* and h values, results obtained for cotton fabric without and with mordent by different technique (pre, sim., post- mordanted with Alum and Albumin mordant and dyed with natural Where Colour components expressed as '**L**' brightness, '**a**' red-green, and **'b**' yellow-blue parameters.

It was noted that the highest '**L**' brightness value was for the cotton sample treated with 3% conc. of albumin post mordanting method) coinciding with being the lowest sample in the K/S value, while the lowest was for sample treated with 2% (simultaneous mordanting method) which has high value of K/S .

From a* and b* values, the highest values went to sample 2 % conc. of albumin (pre-mordanting method) and also had the highest values of K/S, while the lowest was for 3 % and 2 % conc. of albumin post mordanting method) which have also the minimum K/S vales.

By comparing the Alum mordent by Albumin mordent, we can say that all high results were for samples treated with Albumin regardless its conc. and technique and it also characterized by clean and ecofriendly energy

Effect of mordents on fastness properties

Table (3) : Effect of mordents type and technique on fastness properties.

mordent	Technique	Conc.	washing		rubbing	
			Alt.	St.	wet	dry
Stand. without	Nil	---	2/3	2	3	3
Alum	pre	1%	3/4	3/4	4	4
	Sim.	1%	4/5	4	4	4-5
	post	1%	5	5	4	4-5
Albumin	pre	1 %	3	3	¾	3-4
		2 %	3	3	4	4
		3 %	3/4	3/4	4	4
	Sim.	1 %	3	3	4	4
		2 %	3	3	4	4-5
		3 %	4	3/4	¾	4-5
	post	1 %	3/4	3/4	4/5	4
		2 %	4	4	4	4
		3 %	4/5	4	4/5	4

Alternation (Alt), Staining (St), Wash & Rubbing on gray scale: 1, poor; 2, fair; 3, good; 4, very good; 5, excellent

Conclusions

From the work conducted it was demonstrated that Complete green dyeing of cotton fabrics with curcumin can be done successfully using albumin as a natural mordent ; it is shown a range of colours could be derived by using different mordanting techniques.

Conflicts of interest:

There are no conflicts to declare

References

1. Srivastava , R., Importance of natural dye over synthetic dye: a critical review, *Int J Home Sci*. , 5**(2)**:148-15., (2019)

2. Kamel ,M.M, and Abo El Amaim, Y.M, Eco-friendly process for dyeing banana fabrics with curcuma natural dyes, *Journal of Architecture, Arts and Humanistic sciences*, 36 **(7)**527-585 (2022).

3. Bhatti IA, A. S, Jamal MA, M., and Abbas, M. Influence of gamma radiation on the colour strength and fastness properties of fabric using turmeric (Curcuma longa L.) as natural dye, *Radiat Phys Chem*. ,79(**5**):622-625, (2010).

4. Haddar, W., Ben , M., and Guesmi, A., A novel approach for a natural dyeing process of cotton fabric with Hibiscus mutabilis (Gulzuba): process development and optimization using statistical analysis, . *J Clean Prod*. , (**68**) ,114-120, (2014)

5. Nazir, F. , Siddique, A., Nazir, A ., Javed, S., Hussain, T. and Abid, S. , Eco-friendly dyeing of cotton using waste-derived natural dyes and mordants*, Coloration Technology*, 692, 138-684, (2022)

6. Kumar, A., and Konar, A. , Dyeing of Textiles with Natural Dyes , *In Natural Dyes. InTech*. January, (2011).

7. Gupta ,V. K., Fundamentals of Natural Dyes and Its Application on Textile Substrates , intechopen, 1- 33, (2019)

8. Hosen, M. D., Rabbi, M. F., Raihan, M. A., and Al Mamun, M. A. , Effect of turmeric dye and biomordants on knitted cotton fabric coloration: A promising alternative to metallic mordanting, *Cleaner Engineering and Technology*,(**3**), (2021).

9. Hosen, M. D., Rabbi, M. F., Raihan, M. A., and Al Mamun, M. A. , Effect of turmeric dye and biomordants on knitted cotton fabric coloration: A promising alternative to metallic mordanting, *Cleaner Engineering and Technology*,(**3**), (2021).

10. Gregory, P., Toxicology of textile dyes , . In Environmental Aspects of Textile Dyeing , Elsevier Inc., 44–73, (2007).

11. Jyoti , A., Prerna, A., and Gunjan, G., Rainbow of Natural Dyes on Textiles Using Plants Extracts: Sustainable and Eco-Friendly Processes , Green and Sustainable Chemistry, (**7**) , 35-47, (2017)

12. Hassabo, A. G., & Osman, H. A., Sara, A., and , Mohamed, M., Valuable Observation of Eco-friendly Natural Dyes for Valuable Utilisation in the Textile Industry, *Journal of Textiles, Coloration and Polymer Science*, 18(**1**), 55–64(2021)..

13. Prabhu, K. H., and Aniket S., B., Plant based natural dyes and mordnats: A Review, *J. Nat. Prod. Plant Resour.,* 2 (**6**):649-664,(2012)

14. Baseri, S., Eco-friendly production of anti-UV and antibacterial cotton fabrics via waste products , *Cellulose* , 27(**17**), 10407–10423. (2020).

15. Giacomini, F., de Souza, A. A. U., and de Barros, M. A. S. D., Cationization of cotton with ovalbumin to improve dyeing of modified cotton with cochineal natural dye, *Textile Research Journal*, 90 (**15–16**), 1805–1822, (2020).

16. Janhom, S., Watanesk, R., Watanesk, S., Griffiths, P., Arquero, O. A., and Naksata, W. , Comparative study of lac dye adsorption on cotton fibre surface modified by synthetic and natural polymers, *Dyes and Pigments*, 71(**3**), 188–193, (2006).

17. Choudhury, A. R. , Coloration of cationized cellulosic fibers— a review. *AATCC Journal of Research. American Association of Textile Chemists and Colorists* , (**1**), 3 , 11-19, (2014)

18. Zhou, L., Shao, J., Chai, L., and Fu, G. , Adsorption behavior of annatto dye on cotton fabrics modified by Sericin , *Advanced Materials Research* , (**441)** , 111–115, (2012).

19. AATC. , Aatcc Technical Manual, Aatcc, 85, 465. , www.aatcc.org., (2010).

20. AATCC., Committee RA38Partly equivalent to ISO 105-X12., (2007).

21. Sharma R. , and Sayed, U. , Surface Modification of Cellulosic Fabric, *Int'l Journal of Advances in Chemical Engg., & Biological Sciences (IJACEBS),* (**3**), 1, 90-96, (2016).

الصباغة الخضراء طبيعية بالكامل خامة ، صبغة و مثبت

شيماء على كامل
[1] المعهد العالى للفنون التطبيقية - التجمع الخامس - قسم طباعة المنسوجات والصباغة والتجهيز- مصر.

المستخلص. استهدفت الدراسة استخدام الصبغات الطبيعية كبديل للصبغات الصناعية كأتجاه حديث لتقليل الاضرار البيئية الناتجة عن استخدام الصبغات الصناعية مثل تلوث المياه، امراض الحساسية .. الخ ولكن تواجه استخدام الصبغات العديد من المشكلات مثل انخفاض درجة ثباتها على الاقمشة وللتغلب علي هذه المشكلة يجب استخدام مثبتات و هى فى الغالب عبارة عن املاح مثل املاح الامونيا او النحاس ، ومعروف عن هذه الاملاح انها تسبب اضرار بيئية و تقلل من الهدف من استخدام الصبغات الطبيعية لذلك كان الهدف من البحث ايجاد بديل عن المثبتات المعدنية ،تم استخدم الالبومين كمثبت فى عملية الصباغة وهو عبارة عن بروتين حيوانى وتمت هذه العملية بثلاث تقنيات مختلفة هى المعالجة بالمثبت قبل – اثناء – بعد عملية الصباغة و تمت مقارنة النتائج (قياس شدة اللون – مكونات اللون – ثبات للغسيل والاحتكاك) لكلا من الالبومين كمثبت طبيعى و الشبة كمثبت صناعى وقد حقق الالبومين نتائج جيدة .

الكلمات المفتاحية : الخامة الطبيعية ، الصبغة الطبيعية ، المثبت الطبيعى