Dyeing Cotton Fabric by using Henna and Copper Sulphate

Leila Mahmoud Mobark Mokhtar[1], Einas Ibrahim Ali Mousa[2]
[1]*Assistant professor, University of Kordofan –Sudan –-Now at Shagra University ,KSA.*
[2] *Assistant professor, Shagra University, KSA.*

Abstract

The purpose of this study is to observe colour grading on cotton fabric from mixing henna with copper sulphated. To achieve the aim of the study was mixing the henna with copper sulphate (1:1, 3:1, 5:1, 7:1, 1:3, 1:5, 1:7) respectively, and add 0.5 grams of sodium chloride salt as the installer, and have also been instances henna ratio to copper sulphate with used sodium chloride salt percentage change (1.0, 1.5, 2.0, 2.5). The result was getting different grades of Brown and greenish-Brown. And the results were compared with the resulting colour of henna and copper sulphate without mixing. Depending on the results of the study concluded that To obtain different grades of Brown and greenish-Brown by mixing different ratios of henna copper sulphate with sodium chloride salt.

Keyword: *Copper Sulphate, Cotton Fabric, Henna, Natural Dyes, Sodium Chloride.*

I. INTRODUCTION

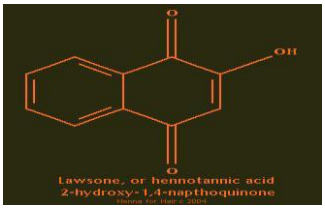
Textile materials (natural and synthetic) used to be coloured for value addition, the look and desire of the customers. Anciently, this purpose of colouring textile was initiated using colours of natural source [(14)].

Interest in natural dyes has increased considerably because of their non-hazardous nature. The study of naturalcolourants is an extensive and active area of investigation dueto the growing interest of substituting synthetic colourants withtoxic effects in humans[(15), (16)] as well as the availability of various natural coloring resources such as from plants, insects, minerals and fungi.Use of natural dyes in coloration of textile materials and other purpose is just one of the consequences of increased environmental awareness [(17)] , and some natural dyes can not only dye fabrics in unique and elegant colors but also impart antibacterial and ultraviolet protective functions [(13)].

The history and origin of *Henna* are hard to trace with centuries of migration and cultural interaction it is difficult to determine where particular traditions began. There is very persuasive evidence that the Neolithic people in Catal Huyuk, in the 7th millennium BC, used henna to ornament their hands in connection with their fertility goddess [(4),]

Henna, Lawsonia *inermis*, ((2-hydroxy-1,4-naphthoquinone, also known as hennotannic acid), is a red-orange dye present in the leaves of the henna plant). It is a large bush, or small tree in (2–6 m high, family Lythraceae,) [(10),] that grows in hot, dry climates. Henna used to keep hair healthy and to colour grey hair. Henna leaves are harvested, dried, and powdered. When mixed with a mildly acidic liquid, henna will stain skin, hair, and fingernails reddish-orange.Henna's leaves have a red-orange dye molecule, *lawsone*. You can see it in young leaves in the centre vein of the leaf. Henna leaves have 1% to 4% lawsone content, depending on climate and soil conditions **[(1)].** Black Henna is a mixture of blue and orange pigments. Red Henna has only orange colour. [(9)]

The natural constituents of *Lawsonia inermis* are essential oils, 1,4-naphthoquinone, tannins, Gallic acid, flavonoids, lipids, sugars, triacontyl tridecanoate, mannitol, xanthones, coumarins (5-alkyloxy 7-hydroxycoumarin), 2-3% resins, 5-10% tannic ingredients and up to 2% Lawsone (2-hydroxy-1,4-naphthoquinone). A major portion of Lawsone is glycosidic bond, and that is cleaved by enzymatic hydrolysis of the glycosidic hennosids and autooxidation of aglucons **[(6), (8)]**. The metals (Na, K, Cd, Mn, Cr, Fe, Cu, Ni, Zn and Pb) present in the Lawsonia inermis **[(11)].**The pH of Henna paste is below 4 in aseptically sealed cones [(7)].



Fastness properties such as wash, light, etc. are often very low when use Henna with cellulosic textiles. This may be due to the polar features of

3.1.2 Preparation of Henna Sample

Henna sample (Lawsonia inermis) was collected from Henna plants which grown in an ALdamar city in north Sudan, dried at room temperature (about 30℃), then cleaned by hand from dusts and plant parts and were ground using a grinder and kept in polyethylene sacks for experiments. .

B. Methods

3.2.1 Experiences

Accurately weighed of Henna, accurately weighed of copper sulphate, and accurately weighed of sodium chloride were taken, each one was dissolved in 100 ml of distilled water after that put 0,4 g pieces of cotton knitting fabric and were mixed, then heated at 100℃ for 30 Minutes. Sample preparation were as shown in tables (1) ,(2),(3),(4).

both cellulose and Lawson (hydroxyl groups are active sites[13].

II. OBJECTIVES

Accordingly, the main objective of the present work is to dye cotton fabrics with Henna and copper sulphate addition of sodium chloride salt, dye cotton fabrics with the Henna addition of sodium chloride and dye cotton fabrics with and copper sulphate addition of sodium chloride salt too observes the colour of the dyed fabrics.

III. MATERIALS AND METHODS

A. Materials

3.1.1 Sample Materials

Copper Sulphate, Henna, Sodium Chloride, Knitting cotton fabric (126 g/m2) , made from yarn number 105 Tex .

Table (1) Samples of experiment when Henna were variable.

No of experiment	Time of Boiling min	Water /ml	NaCl /g	Copper Sulphate ($CuSO_4$) /g	Henna/g
1	30	100	0.5	1	1
2	30	100	0.5	1	3
3	3o	100	0.5	1	5
4	30	100	0.5	1	7

Table (2) Samples of experiment when copper sulphate were variable.

No of experiment	Time of Boiling min	Water /ml	NaCl /g	Copper Sulphate ($CuSO_4$) /g	Henna/g
1	30	100	0.5	1	1
2	30	100	0.5	3	1
3	3o	100	0.5	5	1
4	30	100	0.5	7	1

Table (3) Samples of experiment when sodium chloride was variable.

No of experiment	Time of Boiling min	Water /ml	NaCl /g	Copper Sulphate ($CuSO_4$) /g	Henna/g
1	30	100	1	3	3
2	30	100	1.5	3	3
3	3o	100	2	3	3
4	30	100	2.5	3	3

Table (4) Samples of experiment when Henna were variable and without added copper sulphate.

No experiment	Time of Boiling min	Water /ml	NaCl /g	Copper Sulphate ($CuSO_4$)/g	Henna/g
1	30	100	0.5	0	1
2	30	100	0.5	0	3
3	30	100	0.5	0	5
4	30	100	0.5	0	7

Table (5) Samples of experiment when sodium chloride was variable.

No experiment	Time of Boiling min	Water /ml	NaCl /g	Copper Sulphate (CuSO4) /g	Henna/g
1	30	100	0.5	1	0
2	30	100	0.5	3	0
3	30	100	0.5	5	0
4	30	100	0.5	7	0

IV Results

Figure (1) show that 1 ,3,5,7 g of Hennarespectively, mixed with 1 g of copper sulphate, and 0.5 g of sodium chloride.

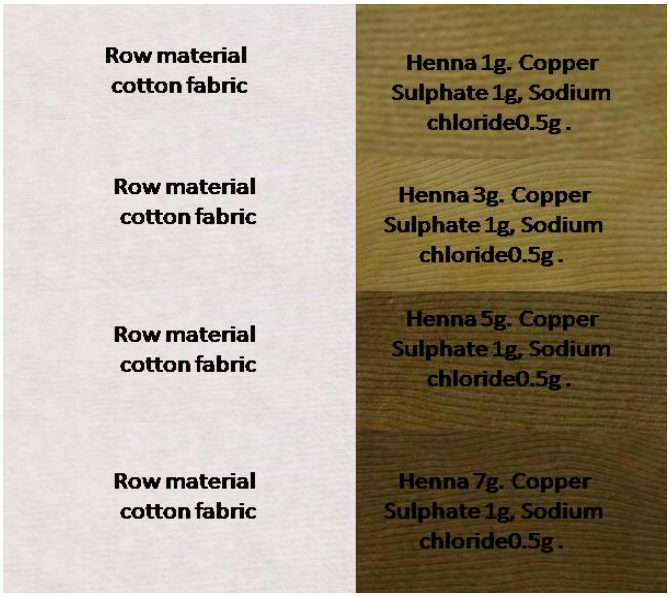


Figure (1) the result of experiments when Henna were variable

Figure (2) shows that 1,3 ,5,7 g of copper sulphaterespectivel, mixed with 1 g of Henna , and 0.5 g of sodium chloride .

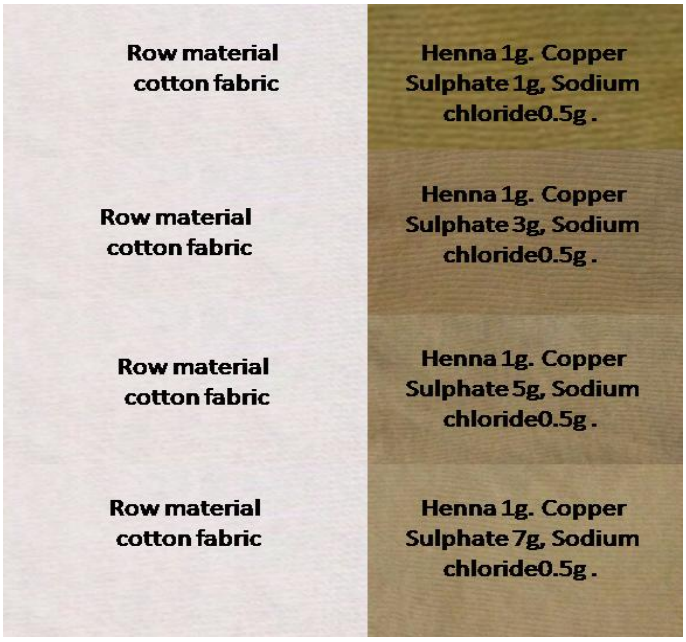


Figure (2) the result of experiments when Copper sulphate were variable

Figure (3) show that 1 ,1.5 ,2 ,2.5 g of sodium chloride respectively,mixed with 3 g of Henna , and 3 g of copper sulphate.

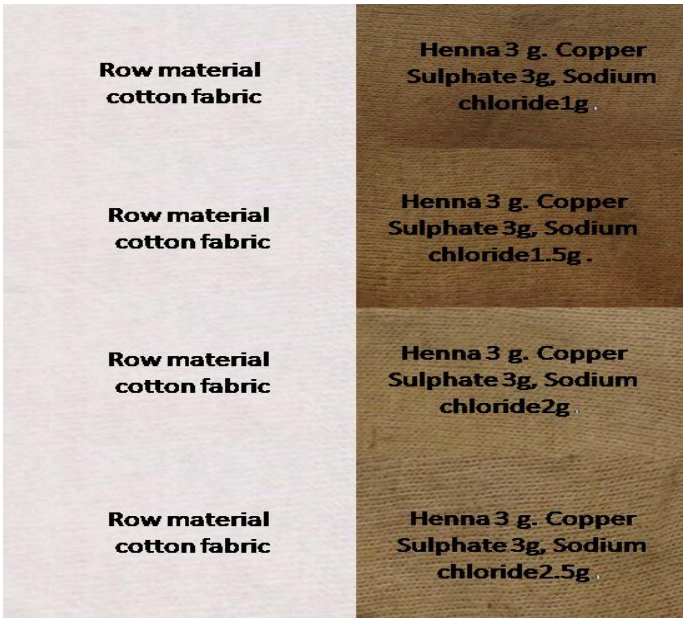


Figure (3) the result of experiments when sodium chloride were variable

Figure (4) shows that 1 ,3 ,5,7 g of Hennarespectively,mixed with 0.5 g of sodium chloride , without added copper sulphate

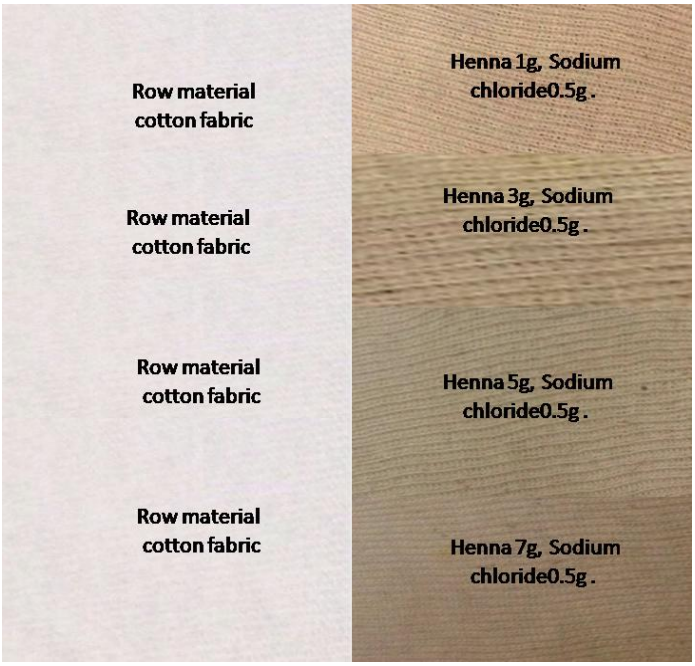


Figure (4) the result of experiments when Henna were variable and without added copper sulphate

Figure (5) shows that 1 ,3 ,5,7 g of copper sulphate respectively,mixed 0.5 g of sodium chloride , without added Henna.

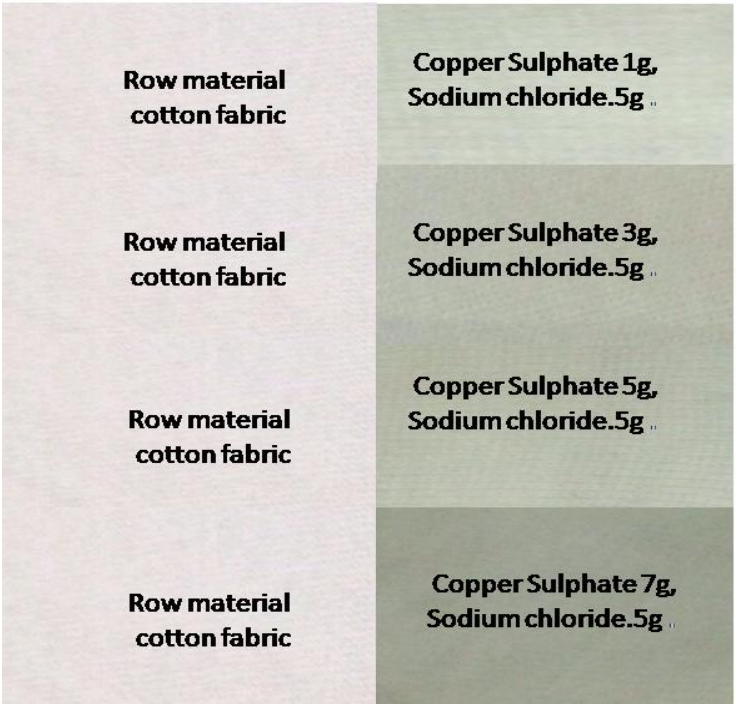


Figure (5) the result of experiments when Copper sulphate were variable and without added Henna.

Figure (6) comparison of the result of experiments

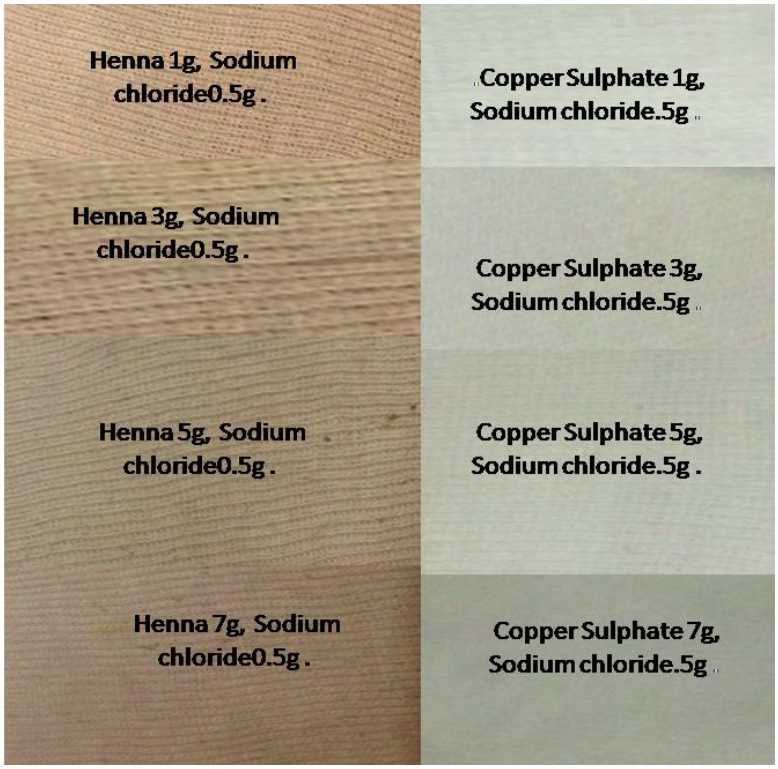


Figure (7) compare of the experiments results between henna and copper sulphate without mixing with each other

of copper sulphate (1,3,5.7 g) dissolved in 100 ml of distilled water with 0.5 grams of sodium chloride was given the cheesecloth degrees of light green colour increases with major copper concentrate.

Figure (6) shows the different degrees of brown and green colour on the cheesecloth when mixing copper sulphate with henna presence of sodium chloride.

Figure (7) note that when using copper sulphate is added Henna, and the use of henna is adding copper sulphate is obtained by two different colours with a high degree (light green and light brown) on cheesecloth.

VI CONCLUSIONS AND RECOMMENDATIONS:

Research it was noted that when mixing copper sulphate with henna presence of sodium chloride as an installed, we get different degrees on the cheesecloth of brown and brownish green. It was also noted that when using henna is copper sulphate, as well as when using copper sulphate is Henna we get the degrees of light brown and green light, which was the result of the colours of the non-mixing is completely different from the result of colour mixing in terms of the type of colour and intensity. It was also noted that a change in the concentration of copper sulphate and install the concentration of sodium chloride henna we get the degrees of brown, and change the ratio of the concentration of henna and install

V. DISCUSSION

From Figure (1) we conclude that when mixing henna in different proportions with copper sulphate (1: 1.3: 1.5: 1.7: 1), respectively, the presence of 0.5 grams of sodium chloride, it was observed that the intensity of the colour on the cheesecloth increase from green to dark brown greater the concentration of henna (1, 3, 5, 7 grams).

Figure (2) We note that when mixing henna with a copper sulphate ratio of 1: 1 in the presence of sodium chloride 0.5) g) given the cheesecloth dark green, but when copper sulphate ratio increased for Henna (3: 1,5: 1.7: 1) in the presence of 0.5 grams of sodium chloride was given the cheesecloth-brown colour with varying degrees less than the greater proportion of copper sulphate.

Figure (3) notes that when using equal proportions of henna and copper sulphate (3: 3) grams with the changing proportions of sodium chloride salt (1,1.5,2,2.5 gram) given the cheesecloth-brown colour intensity increases, the lower the concentration of chloride salt sodium.

(Figure 4) shows that when using different concentrations of henna presence of 0.5 grams of sodium chloride was given the cheesecloth degrees of light brown increases slightly increased rate of increase of henna.

Figure (5) and the method described in the table (5) note that when using different concentrations

[14] Gumrukcu, Gulsah; 0zgur, Mahmure ustun, 2015 "Application of Purified lawsone as natural dye on cotton and silk fabric." Journal of Textiles 2015 (2015).

[15] Alam, M. M., M. L. Rahman, and M. Z. Haque, 2007. "Extraction of henna leaf dye and its dyeing effects on textile fibre." Bangladesh Journal of Scientific and Industrial Research 42.2 (2007): 217-222.

copper sulphate, sodium chloride ratio we get the degrees of greenish brown colour.

The researchers recommend reference to the figure(6) to obtain the degrees of brown cotton fabric must henna mixed with copper sulphate by (1: 1) with the change ratios and concentrations of sodium chloride. For a greenish brown colour on the cotton fabric must use 0.5 grams of sodium chloride with a change ratios and concentrations of henna and copper sulphate.

REFERENCES

[1] Morgan, Alex, 2010. Henna for Hair “How-To” Henna . Catherine Cartwright-Jones 2010 , Published by TapDancing Lizard™ LLC 4237 Klein Ave. Stow, Ohio 44224 USA .

[2] Morgan, Alex, 2008.The Henna Page “how-to” North African Henna: History and Technique, Catherine Cartwright-Jones, Published by Henna Page Publications, a division of TapDancing Lizard LLC 4237 Klein Ave. Stow, Ohio 44224 USA

[3] Martin E. Hanke , 1961. The Biochemistry And Physiology Of Henna (Lawsonia Alba) : Its Use As A Remedy For Intestinal amoebiasis . MARTIN E. HANKE, PH.D. Chicago University, Illinois. Transactions Of The Royal Society Of Tropical Medicine And Hygiene. Vol. 55. No. I. January, 1961.

[4] Morgan, Alex , 2005. The Henna Page “how-to” Mix Henna. Catherine Cartwright-Jones 2010 , Published by Henna Page Publications, a division of TapDancing Lizard 4237 Klein Ave. Stow, Ohio 44224 USA.

[5] Habbal OA, Aljabri AA, El-Hug AH, Al-Mahroopi ZH, Al-Hashmi NA, 2005. In vitro antimicrobial activity of Lawsonia inermis Linn. (Henna). A pilot study on the Omani henna. Saudi Med. J. 26(1)

[6] Neeraj V, Mehra DS, Niyogi UK, Khandal RK , 2008. Retention of colour intensity in Henna paste during storage. Natural Product Radiance 7: 117-121.

[7] Singh , Nitu, Kumari, Praveen, 2015. Research Article Synergistic anti-inflammatory Activity of Lawsonia Inermis linn. And Chlorophytum Brovilianum Sant.International Journal of Pharma Research & Review, Feb 2015; 4(2):21-25 ISSN: 2278-6074 Nitu Singh et.al, IJPRR 2015; 4(2) 21

[8] Zumrutdal, Emin, and Mehmet Ozaslan, 2012. "A Miracle Plant for the Herbal Pharmacy; Henna (Lawsonia inermis)." International Journal of Pharmacology8.6 (2012): 483-489.

[9] Singh M1, Kaur M2, Dangi CBS, Singh H, 2014. Phytochemical & TLC Profile of Lawsonia Inermis (Heena) . International Journal for Pharmaceutical Research Scholars (IJPRS) V-3, I-1, 2014 ISSN No: 2277 - 7873 RESEARCH ARTICLE

[10] Mamoona Nigha, Maryam Nazeer, 2015. Determination of Metal Content in Lawsonia Inermis Linn by Flame Atomic Absorption Spectroscopy . International Journal of Healthcare Sciences ISSN 2348-5728 (Online) Vol. 3, Issue 2, pp: (54-58),

[11] Omer, K. A., Zhao Tao, and A. I. Seedahmed, 2015. "New Approach for Dyeing and UV Protection Properties of Cotton Fabric Using Natural Dye Extracted from Henna Leaves." Fibres & Textiles in Eastern Europe (2015).

[12] Samanta, Ashis Kumar, and Adwaita Konar, 2011. Dyeing of textiles with natural dyes. INTECH Open Access Publisher, 2011.

[13] Gumrukcu, Gulsah, 2011. "Effect of Tannic Acid and Metal Salts on Dyeing of Woolen Fabrics with Red Onion (Alliumcepa L.)." Asian Journal of Chemistry23.4 (2011): 1459.