

ECO-FRIENDLY DYEING OF COTTON WITH CHANTERELLE NATURAL DYES BY MICROWAVE IRRADIATION

Ayşe USLUOĞLU¹, Murat TEKER², Hicret Didar ŞAHİN³

¹ Sakarya University, Sakarya, TURKEY

¹ ayseusluoglu@gmail.com, <http://orcid.org/0000-0002-7523-4210>

² teker@sakarya.edu.tr, <http://orcid.org/0000-0001-7699-0504>

³ <http://orcid.org/000-0001-9556-5327>

ABSTRACT

Application of natural dyes is becoming increasingly popular in textile industry. In this study, we were used wild mushroom as a natural dyes. Chantarelle, (*Cantharellus Cibarius*), mushrooms were collected from Istanbul city, washed and then dried. The dyestuff extraction from Chantarelle mushroom was performed in microwave media with in ten minutes. Different mordant materials were used to see the effects of different mordants. The cotton fabrics were dyed with mordant in ten minutes in low level microwave media.

We measured color strength of dyed fabrics with Macbeth Color Eye 7000 A. We evaluated wet fastness of dyed fabrics according to ISO standards. Cotton fabric dyed with chanterelle natural dyes showed good fastness properties.

Keywords: Mushroom, *Cantharellus Cibarius*, Microwave, Mordant.

Introduction

People have always admired the colors of nature. Various paintings, patterns and drawings, especially on the cave walls in Europe, are the most important indicators of these. The first traces of painting in the world are found during the archaeological excavations in India and in the Mohenjoraro (3rd millennium BC) region [1]

Natural dye is defined as any dye, pigment, or any other substance derived from natural sources such as plants, animals and minerals [2]. Synthetic dyes are used widely for their colour variety, good colour fastness properties, standard usage and low prices. But, synthetic dyes are hazardous, non-biodegradable and carcinogenic. The increased awareness about the environment and the growing demand to the organic, sustainable, natural products brings natural dyes and dye resources to prominent. Along with these reasons, recently the use of natural dyes has increased interest [3-4].

Fungi are a kingdom of organisms that are as complex and diverse as plants and animals, but not as much attention as other living groups, with a small percentage of them discovered and named [5]. Some experts have suggested that there may be ten times more fungal species than plant species. Studies on the use of mushrooms as natural dyes are very few in the literature [6-10].

In this study, the natural dyes are extracted from Chantarelle mushroom (*Cantharellus Cibarius*) in microwave media [11]. We dyed cotton fabrics with different mordants separately in microwave media [12-13]. The dyed fabric tested and evaluated for water fastness, washing fastness, perspiration fastness.

Materials and Methods

In experimental studies, 100% bleached cotton knitted fabric ready for dyeing was used. Chantarelle, (*Cantharellus Cibarius*), mushrooms were collected from Istanbul city. We used copper sulphate, potassium aluminum sulphate, zinc chloride, iron(II)chloride as a mordant. It used in the Kumtel brand KUM-1225 (1150 W) model with the trade name as a microwave oven. The reflectance values of all dyed fabrics were measured using a Gretag Macbeth Color Eye 7000 color spectrophotometer. For fastness tests, ECE phosphate test detergent B, Sodium perborate tetra hydrate, multifiber were used. Laborteks brand light cabinet and grey scale were used in the fastness tests evaluations.



Fig. 1. Chantarelle (*Cantharellus Cibarius*), mushrooms

Extraction and Dyeing Process of Natural Dyes in Microwave Media

Chantarelle, (*Cantharellus Cibarius*), mushrooms were collected from Istanbul city, washed and then dried 2 minutes in microwave media. 100 g. mushrooms were mixed with 1000 g of water. The dyestuff extraction from Chantarelle mushroom was performed in microwave media with in ten minutes. Different mordant materials were used to see the effects of different mordants. 1,5 g of the fabric, 50 g. the natural dyestuff and used 5% salt (copper sulphate, potassium aluminum sulphate, zinc chloride, iron(II)chloride) as a mordant. The cotton fabrics were dyed with mordant in ten minutes in low level microwave media. After, all dyed fabrics washed with fresh water in one minutes.

Fastness Properties






For all dyed fabrics, washing fastness was made according to ISO 105 C06 B1S method, acidic and alkaline perspiration fastness were made according to ISO 105 E04 method, water fastness was made according to ISO 105 E01. Fastness evaluations were made according to ISO 105 A02 and ISO 105 A03 method with grey scale in light cabinet.

Results

Photos of natural dyed fabrics in microwave environment are shown in Table 1. The all dyed

fabrics were dyed uniform.

Table 1. Natural dyed fabrics in microwave media

Without Mordant	FeCl ₂	KAl(SO ₄) ₂	ZnCl ₂	CuSO ₄
				

Different colors were obtained by using different mordants. The fabric dyed without mordant had the lightest color depth. The different and deepest color was reached by using FeCl₂ mordant. Yellow color was obtained by using FeCl₂ mordant.

Table 2. Fastnesses Values

Natural Dye from Chantarelle	Washing Fastness [ISO105C06 B1S]	Acidic Persp. [ISO 105 E04]	Alkaline Persp. [ISO 105 E04]	Water Fastness [ISO 105 E01]
Without Mordant	3/4	4	4	4
FeCl ₂	3/4	4	4	4
KAl(SO ₄) ₂	4	4	4	4
ZnCl ₂	4	4	4	4
CuSO ₄	3/4	3	3	3

The dyeing process was carried out using different mordants with the dyestuff, we obtained from wild mushrooms, and it was observed that their fastness was good. The fabric dyed with CuSO₄ was obtained the lowest wet fastness values [14].

The dye extraction takes 10 minutes, the dyeing process takes 10 minutes by using microwave heating system. The extraction takes 90 minutes and the dyeing process takes 90 minutes by using traditional heating method. The process was completed in a very short time with the microwave heating system [15-16].

Conclusion

As a result of our studies, it has been seen that mushrooms can be used as a good natural dyestuff source. Our country, which is very rich in biodiversity, has more than enough raw materials for the production of natural dyestuffs. The process was completed in a very short time with the microwave heating system. It has been seen that dyeing in microwave media is sustainable,

energy and time save is much more advantageous.

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CHANTERELLE GÖBƏLLƏYİNDƏN TƏBİİ YOLLA ALINMIŞ EKOLOJİ TƏMİZ BOYADAN PAMBIĞIN MİKRODALQALĞALI ŞÜALARLA BOYANMASI

Ayşe USLUOĞLU¹, Murat TEKER², Hicret Didar ŞAHİN³

¹ Sakarya Universiteti, Sakarya, TÜRKİYƏ

¹ ayseusluoglu@gmail.com, <http://orcid.org/0000-0002-7523-4210>

² teker@sakarya.edu.tr, <http://orcid.org/0000-0001-7699-0504>

³ <http://orcid.org/000-0001-9556-5327>

XÜLASƏ

Toxuculuq sənayesində təbii boyaların tətbiqi getdikcə populyarlaşır. Bu araşdırmada təbii boya kimi yabanı göbələkdən istifadə etdik. Chantarelle, (*Cantharellus Cibarius*), göbələklər İstanbul şəhərindən toplanmış, yuyulmuş və sonra qurudulmuşdur. Chantelle göbələkindən boyanın çıxarılması mikrodalğalı mühitdə on dəqiqə ərzində həyata keçirildi. Fərqli mordanların təsirini görmək üçün müxtəlif mordan materiallarından istifadə edilmişdir. Pambıq parçalar aşağı səviyyəli mikrodalğalı mühitdə on dəqiqə ərzində mordanla boyandı.

Macbeth Color Eye 7000 A ilə boyanmış parçaların rəng gücünü ölçdük. Boyanmış parçaların nəmə davamlılığını ISO standartlarına uyğun olaraq qiymətləndirdik. Chanterelle təbii boyalarla boyanmış pambıq parça yaxşı möhkəmlilik xüsusiyyətlərini göstərdi.

Açar sözlər: göbələk, *Cantharellus Cibarius*, mikrodalğa şüa, soba.

ЭКОЛОГИЧЕСКОЕ КРАСЕНИЕ ХЛОПКА НАТУРАЛЬНЫМИ КРАСИТЕЛЯМИ «ЛИСИЧКА» ПУТЕМ СВЧ-ОБЛУЧЕНИЯ

Айше УСЛУОГЛУ¹, Мурат ТЕКЕР², Хикрет Дидар ШАХИН³

¹ Университет Сакарья, Сакарья, ТУРЦИЯ

¹ ayseusluoglu@gmail.com, <http://orcid.org/0000-0002-7523-4210>

² teker@sakarya.edu.tr, <http://orcid.org/0000-0001-7699-0504>

³ <http://orcid.org/000-0001-9556-5327>

АБСТРАКТ

Применение натуральных красителей становится все более популярным в текстильной промышленности. В этом исследовании мы использовали лесные грибы в качестве натуральных красителей. Шантарелла (*Cantharellus Cibarius*), грибы были собраны в городе Стамбул, промыты, а затем высушены. Экстракцию красителя из гриба Шантель проводили в микроволновой среде в течение десяти минут. Чтобы увидеть эффект от разных протрав, использовались разные протравочные материалы. Хлопчатобумажные ткани окрашивали протравой за десять минут в микроволновой среде низкой интенсивности.

Мы измерили интенсивность цвета окрашенных тканей с помощью Macbeth Color Eye 7000 А. Мы оценили стойкость окрашенных тканей к влаге в соответствии со стандартами ISO. Хлопчатобумажная ткань, окрашенная натуральными красителями лисички, показала хорошие свойства стойкости.

Ключевые слова: гриб, *Cantharellus cibarius*, облучение.