

**DYEING THE COTTON WITH EXTRACT OF ONION PEELS,
WALNUT SHELL AND (TANACETUM) TANSY**

**КРАШЕНИЕ ХЛОПКА ЭКСТРАКТАМИ ЛУКОВОЙ ШЕЛУХИ,
СКОРЛУПЫ ГРЕЦКОГО ОРЕХА И ПИЖМЫ**

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Natural dyes are attracting increasing attention around the world due to the impact of synthetic dyes on the environment. In this study, 100% cotton fabric was dyed with rich extracts of onion peel, walnut shell and (tanacetum) tansy and combined with some mordants. The coloring of natural dye and the effect of various mordants during simultaneous dyeing with natural dyes were researched. The results showed that natural dyes gave light tones to the fabrics without mordant except onion peel, while the mordanted samples with copper, aluminum-potassium, acetic acids change the colors of the fabric. These extracts, which grow in a large volume in the southern region of Kazakhstan, can be considered as viable alternatives instead of artificial coloring agents. In this study, the experiment was carried out at a temperature of 50-100°C using a minimum amount of mordant with an extract of natural dyes.

Натуральные красители привлекают все большее внимание во всем мире из-за воздействия синтетических красителей на окружающую среду. В этом исследовании 100%-ная хлопчатобумажная ткань была окрашена экстрактами луковой шелухи, скорлупы грецкого ореха и (tanacetum) пижмы, в сочетании с некоторыми протравами. Были исследованы окраски натурального красителя и влияние различных протрав при одновременном крашении с натуральными красителями. Результаты показали, что натуральные красители дали тканям светлые тона без протравы, исключая луковую кожуру, в то время как протравленные образцы с медью, алюмокалиевыми квасцами, уксусными кислотами меняют окраски цвета ткани. Эти растения, произрастающие в большом объеме в южном регионе Казахстана, можно рассматривать как жизнеспособные альтернативные варианты вместо искусственных красящих агентов. В настоящем исследовании окрашивание проводилось при температуре 50...100°C с использованием минимального количества протравы с экстрактом натуральных красителей.

Keywords: textile materials, mordants, natural dyes, tansy extract, cotton fabric, medicinal properties, onion peel, walnut shell, light industry.

Ключевые слова: текстильные материалы, протравы, натуральные красители, экстракт пижмы, хлопчатобумажная ткань, лечебные свойства, луковая шелуха, скорлупа грецкого ореха, легкая промышленность.

Introduction

In modern light industry, synthetic dyes are used to a greater extent to give the fabric color. Today, synthetic dyes were replaced from the practice of dyeing with natural dyes. The production of the use of synthetic dyes creates environmental problems and risks, since synthetic dyes themselves, being mutagenic and allergic, have different levels of toxicity. Due to the deteriorating environmental situation in the world, humanity is forced to return to natural dyes again. Many natural resources that are wasted or thrown away as waste contain useful dyes and pigments [1...4].

Materials of plant origin were used for dyeing the fabric: tree bark, leaves, fruits, flowers, roots. Natural dyes allow us to give an original beautiful color to the textile material. Research on the use of plants as raw materials for dyes and tanning agents continues all over the world [5...8].

In Kazakhstan, which is characterized by a wide variety of soil and climatic conditions and has a rich and unique flora, since many species of dye-bearing plants grow here, many of which are used in medical practice, food and light industry, harmless to humans and nature. Well-known scientists on the use of natural dyes for cotton knitted fabrics, wool and silk fabrics made a contribution [9], [10].

The purpose of this work is to investigate the ecological efficiency of natural dyes obtained from onion waste, tansy plants and walnut shells for textile materials. In this study, a natural dye isolated from the waste of onion peel, walnut shell and tansy flower was successfully applied to cotton fabrics treated and untreated with mordants.

Experimental methods

The experimental work requires a gas burner, an electric oven, manual drying, electronic scales, cotton fabric was woven 3 up 1 down. The fabric was scoured with vanish liquid stain remover and fabric bleach at 40° C for 30 min and then thoroughly rinsed and dried at room temperature. The scoured material was

soaked in clean water for 30 min prior to dyeing or mordanting.

Dyestuff extraction. The walnut shell, (tanacetum) tansy and onion peel extracts had already been dried and powdered. When the coloring material is crushed, it is mixed with water and heated on a gas burner to extract the dye. Dry onion peels, walnut shells and (tanacetum) tansy powders were heated in water at 90-100°C in water bath, liquor ratio 1:10, 1:20 and 1:30 (100 g of dye raw materials is extracted in water with a volume of 1,2,3 liters) for extraction of the colorant about 30, 60, 90 minutes respectively, then were filtered.

Dyeing of fabrics. Per 100 g of fabric, 4 liters of dye broth are usually used, the bath module is 1 :40. Dye the fabric at a slow boil (100°C) for 30 minutes, 60 minutes and 90 minutes in different dye bath modules, respectively. The fabric must be completely immersed. When dyeing, it is necessary to constantly mix the fabric. After dyeing, slightly pressed fabrics are hung out in a place protected from the sun, for "maturing" the dye on the fiber. To intensify the dyeing process, improve the brightness and juiciness of the fabric colors, as well as expand the range of their colors, traditionally used mordants were used - acetic acid, copper sulfate ($\text{CuSO}_4 \cdot 8\text{H}_2\text{O}$), aluminum-potassium alum ($\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$) this salt does not distort the color of the dye, also neutralized with sodium bicarbonate. The bath process, dyeing and mordanting are done together in one bath. Mordanting is carried out from three methods (before, simultaneously and subsequent) and one of them gives the best result. The solution of the mordant is made at the rate of 10 g per 1 liter of water (1%). The solution of aluminum-potassium alum requires neutralization with soda Na_2CO_3 . To do this, a 10% solution of sodium bicarbonate soda is poured into a 1% solution of alum while stirring a little.

Results and discussion.

The samples processed with the use of an aqueous extract of plant raw materials and

mordants were dyed and compared for color. With natural dyes, the selected cotton fabric was dyed at home at a temperature of 50,70 and 100°C, with different durations of 30, 60, and 90 minutes, as well as in three dye baths 1:10, 1:20 and 1:30. The samples were compared without the use of mordants. Dyeing with onion peel gives different shades of

brown, as well as a rich brown color will turn out with an increase in the dyeing time in the bath of 1:20. The dye treated with various solutions leads to the appearance of various shades of orange color at different intervals of time. The obtained samples are shown in Tables 1, 2.

Table 1

Bath module	Time 30 minutes		
	Temperature 50°C	Temperature 70°C	Temperature 100°C
1:30			
1:20	Time 60 minutes		
	Temperature 50°C	Temperature 70°C	Temperature 100°C
1:10	Time 60 minutes		
	Temperature 50°C	Temperature 70°C	Temperature 100°C

Table 2

Types of mordants	Temperature 100°C	
	Bath module 1:20	
	30 minutes	60 minutes
Copper sulfate 1%		
Aluminum-potassium alum		
Aluminum-potassium alum neutralized with sodium bicarbonate		

An experiment conducted using a tansy flower showed different shades of yellow. To obtain a rich yellow, we were also treated with traditional mordants, as a result we will see a

new color. The same natural dye can give different colors when treated with different mordants at different time intervals. The most optimal module of the dyeing bath is 1:20 when

dyeing cotton fabric with mordants in the in-

terval of 30 minutes. The results of the experiment are shown in Table 3, 4.

Table 3

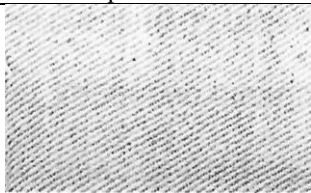


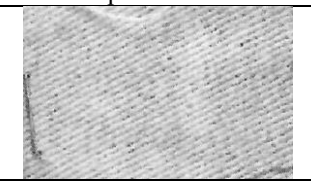
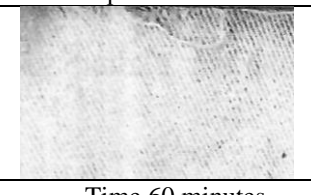
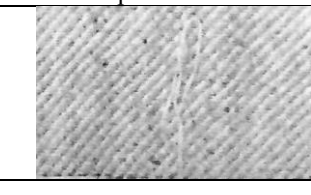
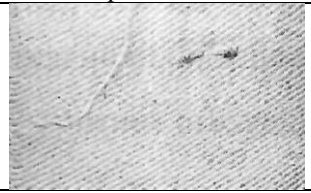
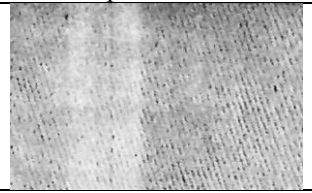
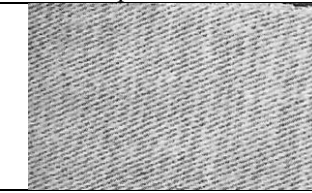
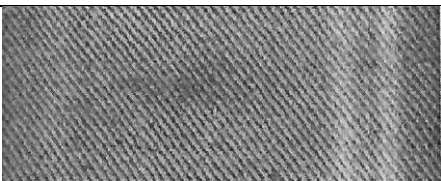
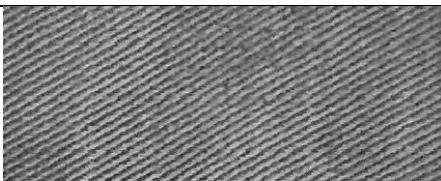
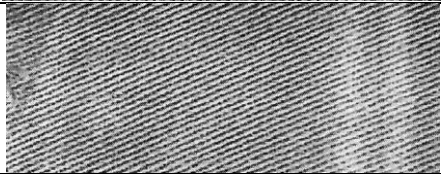
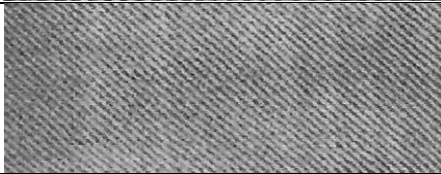
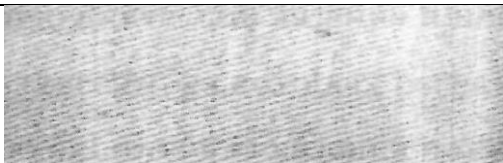
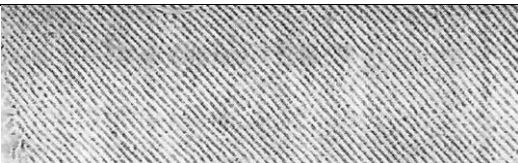
Bath module	Time 30 minutes		
	Temperature 50°C	Temperature 70°C	Temperature 100°C
1:30			
1:20	Time 60 minutes		
	Temperature 50°C	Temperature 70°C	Temperature 100°C
			
1:10	Time 60 minutes		
	Temperature 50°C	Temperature 70°C	Temperature 100°C
			

Table 4

Types of mordants	Temperature 100°C	
	Bath module 1:20	
	30 minutes	60 minutes
Copper sulfate 1%		
Copper sulfate 2%		
Aluminum-potassium alum		Aluminum-potassium alum neutralized with sodium bicarbonate
		

For the practical consolidation of the studied theoretical material on dyeing fabric with natural waste, a number of experiments were carried out with and without mordants in different time intervals in three modules of the

bath. As part of the experiment, an experiment was obtained that at 90 minutes, the dye will turn the fabric gray in the 1:10 bath module. With the use of mordants, shades of beige and gray appeared on the fabric. The results of the

study show that the waste from the walnut can be used as an effective dye for cotton materials

Table 5, 6.

Table 5

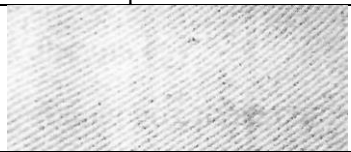

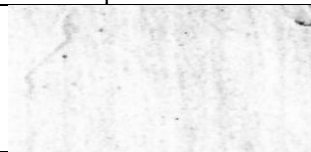









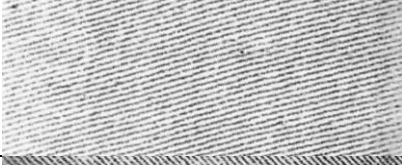
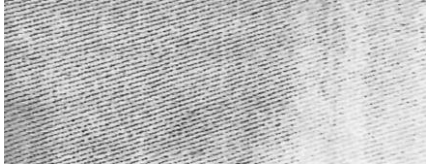

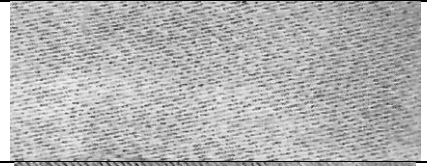
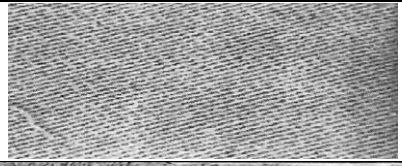
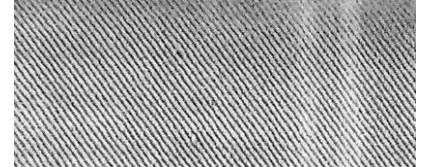
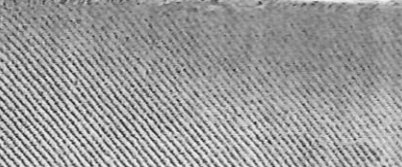
Bath module	Time 30 minutes		
	Temperature 50°C	Temperature 70°C	Temperature 100°C
1:30			
1:20	Time 60 minutes		
	Temperature 50°C	Temperature 70°C	Temperature 100°C
			
1:10	Time 60 minutes		
	Temperature 50°C	Temperature 70°C	Temperature 100°C
			

Table 6

Types of mordants	Temperature 100°C	
	Bath module 1:20	
	30 minutes	60 minutes
Acetic acid 70%		
Acetic acid 9%		
Copper sulfate 1%		
Copper sulfate 1%	Bath module 1:30	
	30 minutes	60 minutes
		
Aluminum-potassium alum		

CONCLUSION

The use of available material for dyeing by conventional dyeing reduces the cost of natural dyeing and increases the productivity of resources and reduces the amount of waste. This makes onion waste, nut waste and wild flower waste one of the easily accessible materials for the natural dyeing industry. These dyes are safe for humans, are not environmentally harmful also have some medicinal properties for health. This article demonstrates new possibilities for obtaining shades of natural dye, and opens up good prospects for alternatives to synthetic dyes for the textile industry.

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