USE OF NATURAL EXTRACTS FROM *PRUNUS SEROTINA* IN TEXTILES AS DYES

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Abstract

Since ancient times the humans developed and used various products for improving the appearane of textiles materials for different purphoses.
The aim of this paper was related to find a suitable natural products that have no alergenic properties, reduced carbon footprint and resilience due to source and properties. The reason was related with reviewing the ancient handcrafts as an option for comercial agressive chemical products.

In this way it was a challange to find proper dosage, way of production and way of use of natural extracts but keeping the desired apearance. Also it was important to asses the quality obtained in comparison with products obtained in clasical aproach and resilience in environment.
It was used an natural alchoolic extract from Prunus serotina specie that have intense red color and is provided from natural spontan flora near Săcuieni village.

Key words: *Prunus serotina*, natural colorant, textiles, dyes, chemical compounds substitution.

INTRODUCTION

Color was during history one of the main goal of the human mankind in order to creeate an pleasent environment, answering to the increasing demands about beauty but also for technical reasons. Colorants for textiles known as dyes were in this way one of the most important concerns of the textile industry.

Many times colors were used as symbols or have special meanings like mooring, joy or in latest time abstract meanings like red color for comunism and socialism.

From the begining coloring was used in caves or walls and later for coloring textile materials for various use.

Is well known the purple color specific for phenicians and this information is coming from over 3000 years. This is a fact that lead to the importance of textiles materials coloring in the past and even nowodays.

The colors used in the past were conbinations of natural ingredients from plants, soil, animals, etc.

Unfortunatelly this kind of colorants is very unstable from different reasons. Chemical composition of them is a key factor but also because the organic compounds are an excellent support for growth of many types of

micro-organisms and due to composition rich in sugars and having high water content.

Due to this aspects the technology of coloring textile materials was turned in one of the most polution one. In this way there were developed products fosil combustible based, sintetic substances and the use of high quantities of energy for obtaining and using in the textile coloration.

The stability of the colors obtained is influenced by several factors. In our study we compared the color of the *Prunus serotina* natural extract with two comercial chemical products from the begining and after exposure at U.V. as degrading factor.

MATERIAL AND METHOD

Aims of the study were the following:

• Producing the colorant,

• Testing the resiliance of the colorant in comparison with chemical products,

For fullfiling this there were established following objectives:

• Producing the natural extract,

• Finding the proper dosage in textile coloring,

• Assesing the resiliance of the colored textiles by using U.V. exposure.

Producing the natural extract was done following the production flow from below.

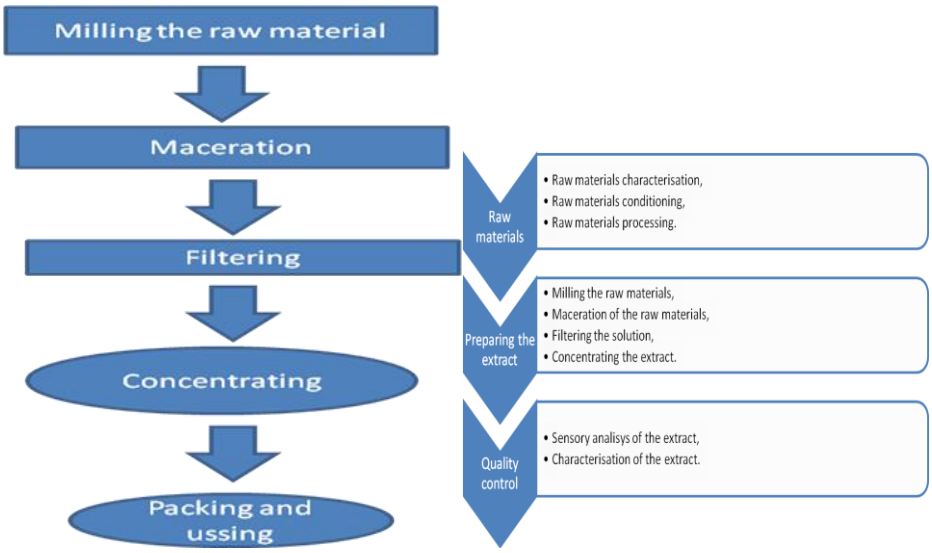

Fig. 1. Producing the natural extract and quality conttrol (Timar, 2020)

The main issues was raw materials management. In this way raw materials were characterized, conditioned and mechanical procesed.

Preparation of the extract was the second issue because it was important to maintain specific appearance of raw materials.

Preparation of extract from *Prunus serotina* was done by maceration in alchoolic solution in 1:1 ratio for 48 hours and then under vacuum extraction the alchool was evaporated.

We pay atention for yield of production due high price of *Prunus serotina* fruits, short shelf life of them and in this way the fruits were ultrafrezeed at -80 ℃ and later 24 hours imersed for maceration in ethilic alchool.

The assesment of the extract quality was done by optic method – coloring scale.

Before using the extract it was stored at 0 ℃ to avoid alteration.

The textile material taken in to study was linen based.

The properties of the material are the following:

- Unmelted pure canvas
- 15/15 threads per cm
- width 215 cm

Appearance:

- smooth,
- semi-transparent

Color: Ivory

Print: Folk

Width: 215 cm

Weight: 190 gr/sqm

Composition: 100% linen

The chemical products used for coloring are the following:

Product A: Galus red, 10 g per unit.

Product B: La Nave No: 8 Rojo, 20 g per unit.

The textile material was cuted in pices of 10x10 cm for coloring.

Finding the proper dosage

It was done by assesing the global quality of the colored samples in comparison with two well known comercial chemical products.

There were conducted trials with following concentration of extract:

- 0 % (blank sample), Sample 1
- 2 %, Sample 2
- 5 %, Sample 3
- Product A, Sample 4
- Product B, Sample 5

The coloring was done in the following way according with the producers recomandation:

Step 1: Weight the textiles to determine the required amount of paint. Use rubber gloves.

Step 2: Fill a container with enough water to completely cover the clothes and heat until it reaches the boiling point. Cool the water (30-40°C).

Step 3: Empty the contents of one or more sachets of paint into the amount of water and mix well, for example using a wooden spoon, until it dissolves.

Step 4: Put the clean and damp clothes in the container, keep the water temperature for 30 minutes, and then remove the clothes.

Step 5: Add 6 tablespoons of vinegar. Maintain the temperature for another 30 minutes. Shut down the fire and keep the product in solution, gently removing the clothes from time to time, until the water cools. Rinse with plenty of water until no more color comes out. Do not squeeze the clothes. Dry in the shade.

Step 6: To clean the utensils, put hot water in the container in which you painted, dissolve the contents of the cleaning product and insert the rest of the utensils used. Let them soak for an hour, after which you can easily clean them. If this box does not contain the envelope with the cleaning product, use lye and a measure of your usual detergent. Never use the cleaning product with your clothes as it will damage them.

For *Prunus serotina* natural extract the coloring is done in similar way without preparation of coloring solution that is natural extract themselves.

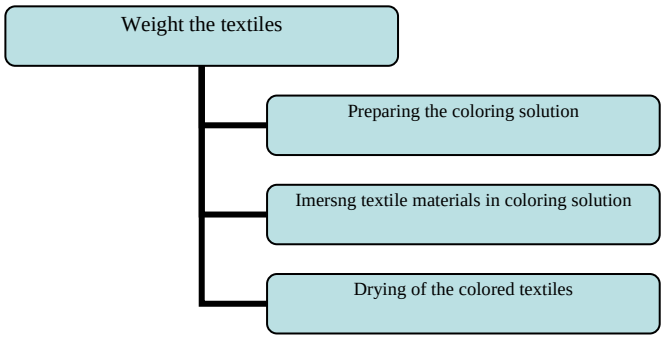

Fig. 2. Production flow for coloring

After drying the samples were exposed at an U.V. source with the following properties:

- LAMP OSAGA 2G 11
- Power - 18W
- Wave lenght - 253.7 nm.

Fig. 3. Experimental device for U.V. exposure

The Figure 3. Is presenting the experimental device. The exposure was done for 24, 48 and 72 hours. Afer each increment was done the color assesment.

The red color assessment was done according color codification as is presented in figure 4.

Fig. 4. Color codes for red

RESULTS AND DISCUSSION

The first set of results was obtained after coloring and drying. The results are presented in table 1.

There was record that colors were intens and the samples colored with natural extract are almost in the same range of color like the chemical compounds based dyes.

Table 1.

Comparison of color after coloring and drying

No. Crt.	Sample	Color code
1	Sample 1	withe
2	Sample 2	PMS 1805
3	Sample 3	PMS 1807
4	Sample 4	PMS 1817
5	Sample 5	PMS 1815

The second set of data are reffering to the color assesment after 24 hours of U.V. exposure. The results are presented in table 2.

Table 2.

Comparison of color after 24 hours of U.V. exposure

No. Crt.	Sample	Color code	
		At the begining of the experience	After 24 hours of U.V. exposure
1	Sample 1	withe	withe
2	Sample 2	PMS 1805	PMS 1795
3	Sample 3	PMS 1807	PMS 1797
4	Sample 4	PMS 1817	PMS 1805
5	Sample 5	PMS 1815	PMS 1807

There was recorded that color of the natural extract based textiles become lighter than chemical based products samples.

The third set of data are reffering to the color assesment after 48 hours of U.V. exposure. The results are presented in table 3.

Table 3.

Comparison of color after 48 hours of U.V. exposure

No. Crt.	Sample	Color code		
		At the begining of the experience	After 24 hours of U.V. exposure	After 48 hours of U.V. exposure
1	Sample 1	withe	withe	withe
2	Sample 2	PMS 1805	PMS 1795	PMS 1788
3	Sample 3	PMS 1807	PMS 1797	PMS 1788
4	Sample 4	PMS 1817	PMS 1805	Warm Red
5	Sample 5	PMS 1815	PMS 1807	PMS 179

There was recorded that color of the natural extract based textiles recover and was in similar range like chemical based products samples.

The forth set of data are reffering to the color assesment after 72 hours of U.V. exposure. The results are presented in table 4.

There color of the natural extract based textiles become once again lighter than chemical based products samples. Howewer the color of natural extract based textiles was brighter.

Table 4.

Comparison of color aft
er 72 hours of U.V. exposure

No. Crt.	Sample	Color code			
		At the begining of the experience	After 24 hours of U.V. exposure	After 48 hours of U.V. exposure	After 72 hours of U.V. exposure
1	Sample 1	withe	withe	withe	withe
2	Sample 2	PMS 1805	PMS 1795	PMS 1788	Red 032
3	Sample 3	PMS 1807	PMS 1797	PMS 1788	PMS 185
4	Sample 4	PMS 1817	PMS 1805	Warm Red	PMS 185
5	Sample 5	PMS 1815	PMS 1807	PMS 179	PMS 185

CONCLUSIONS

Natural compounds enjoy positive consumer image and have application in obtaining of traditional products. The natural compounds used shown properties comparable with chemical based products but the resilience was not so strong.

This aspect despite reduce the efficiency was compensated by reduced carbon footprint do to use of fruits that are growing spontaneous in the forests and preparation of coloring solution demand small energy quantities and produce no pollutants.

RECOMANDATIONS

The most importnt recomandation that we are propose is related with the extraction time that we are proposed to be extended in the future.

Another recomandation that was drawn was the comparison of natural coloring compounds from extract and the antioxidant activity in order to predict the paint quality.

Also there are different other plants from spontaneous flora that we propose to be take in to study and compared with current results like *Viscum*

nigra, Atropa beladona, Ribes nigrum, Vaccinium myrtillus and blue varieties of *Vitis vinifera.*

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