

Dyeing with Tannins from Plants, Used as Mordant Dyes

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Abstract

From the three types of tannins naturally occurring in plants (gallic tannins, ellagitannins and catechines), the ellagitannins offer to the dyer the largest range of shades for creative purpose on cotton fabric. Some ellagitannins from *Terminalia* sp fruits (myrobolam), and *Punica granatum* fruit (pomegranate rind) can be used as mordant dyes to obtain patterns of various shades on cotton, by printing mordants first, then by dyeing the so printed piece in a tannin bath: Using this method, different colors will be obtained in only one dye bath. The four mordants used in this workshop are: ferrous acetate, aluminum acetate, a mix of the latter, and potassium titanyl oxalate. The mordants are thickened with tragacanth gum and printed with polystyrene blocks, then the fabric is dried, and the mordants are fixed in a chalk bath (or a wheat bran bath, as an alternative). Then, the fabric is dyed in a tannin bath: The obtained shades, in the myrobolan bath as well as in the pomegranate bath are: black, dull yellow, khaki, and orange. Sampling with various proportions of each mordant and mix of mordant will help to find the right proportion according to the dyestuff which is used.

submitted to the xenotest, some of these colors have been found fairly fast to light, while some other have not been analyzed yet. The harmony of these shades altogether can be appreciated for creative purpose.

1. Introduction

Plants containing Tannins are very common all over the world. The most remarkable tannin plants, according to their composition ratio, are traditionally used for the preparation of leather and to dye textiles. By reaction with the traditional aluminous and ferrous mordants, they give attractive shades.

Generally speaking, for the dyer, there are three kinds of tannins:

Gallic tannins, or colorless tannins are mainly used to fix some metallic salts on the fabric in order to give to the fibers a good affinity for most of coloring matters from plants. When associated with ferrous salts, the gallic tannins are converted onto grey to black dyes, very popular in numerous traditions of the world

Ellagic tannins, or "yellow tannins, are used for the same purpose (example: tannins from myrobolam are used in India to print the mordants on the cotton fiber), but they also react strongly with ferrous salts to give brownish black shades, or grays. With Al and Fe mixed mordants, the ellagitannins may give some khaki shades

Catechic tannins, or "red tannins" doesn't react strongly with metallic salts, but fix by themselves on cellulose fibers, and give brownish shades when correctly oxidized (by exposure of the dyed piece to the sun, or by chemical means)

Some other metallic salts, as potassium titanyl oxalate give also attractive shades with gallic and ellagic tannins: Effectively, some interesting orange colors can be done by the association of these tannins with titanium salts. During this course, some experiments will be proposed to the students with ellagitannins from myrobolam and from pomegranate rind, In order to

obtain various shades in one piece of fabric, using only one dye bath.

By printing ferrous, aluminous and titanium salts on a piece of cotton, some brownish yellows, some khaki, some black or gray and orange shades will be obtained simultaneously on the piece by a subsequent dye in a tannin decoction.

2. Methodology

Material and ingredients

Myrobolan extract is obtained from SVRD company (Le Havre, France), while pomegranate rind comes from local market and will probably be available in Hong Kong. Ferrous sulphate, alum, and potassium titanyl oxalate, sodium acetate, tragacanth gum, clay (Kaolinite), calcium carbonate (chalk) and wheat bran comes from French suppliers.

The blocks for printing mordants are made from polystyrene covered with velvet plastic adhesive (from the French company Venilia)

3 Techniques and Processes

preparation of the mordents

Prepare 4 glass pots containing 200ml of cold water

In pot A, add 10g of ferrous sulphate + 10g of sodium acetate + 3 grams of tragacanth gum.

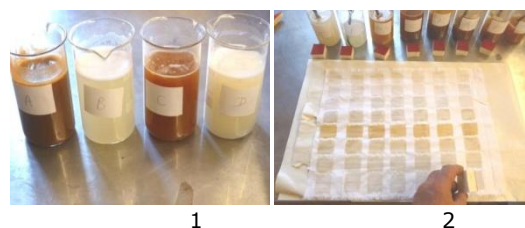
In pot B, add 10g of alum + 10g of sodium acetate + 3grams of tragacanth gum.

In pot C, add 5g of ferrous sulphate + 10g of alum + 15g of sodium acetate, + 3grams of tragacanth gum

In pot D, add 10g of potassium titanyl oxalate, + 3grams of tragacanth gum.

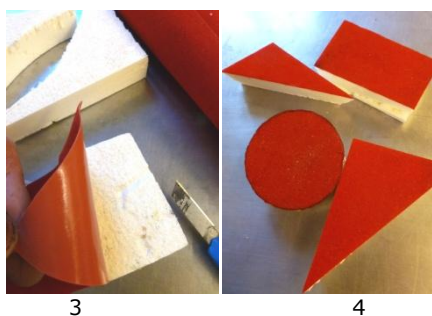
Stir well to avoid lumps in the preparation.

In order to facilitate the study of possibilities with various tannin plants, these four generic mordents (1) are diluted as follow: The concentrated ferrous mordent A is diluted with half part of a tragacanth gum preparation (3grams for 200ml of water): this first dilution is A1, then a dilution of A1 will give A2, then diluting again A2, we obtain a third dilution called here A3. In order to test an other mix of Al and Fe mordent, I suggest also to mix half mordant B (concentrated al mordent) and half ferrous mordent A3. We obtain then 8 mordents which will give 8 different shades with any kind of mordant dyestuff, including ellagitannins (2), by printing them first with polystyrene blocks, then by dipping the piece in a tannin bath. In order to test various plants, We can prepare several lines of 8 mordents, then cut the piece.



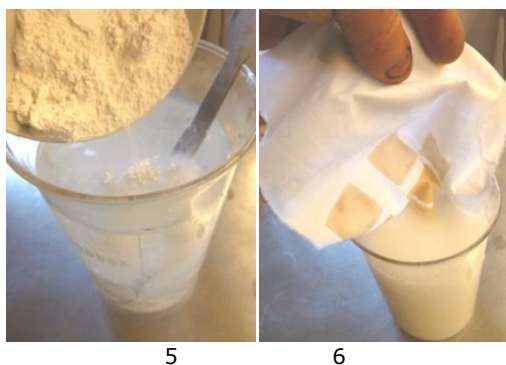
1
2
About the preparation of polystyrene blocks. Some Polystyrene sheet of 2cm thickness is covered with

velvet adhesive (3), then cut with a blade, in order to do some simple and easy made blocks (4).



4 Cautions for printing the mordants and subsequent treatment (drying and fixing process)

Apply each mordant on a polystyrene block with a brush and press the block on the fabric, then, when all the mordants are applied, dry carefully, and soak the printed fabric in a preparation of chalk (CaCO₃), prepared with 20gr of chalk per litre), then rinse (5 and 6)



5 Preparation of the dye

Bath Nr1: the myrobolam extract is diluted in warm water (about 20% of the weight of the fabric), and the pieces are soaked in this bath, during 1/2hour, increasing gently the temperature until 80°. Then the fabric is rinsed and washed .

Bath Nr2: the pomegranate rind is boiled during 1/2hour, then, the solution is filtered, some cold water is added in order to get a 40°celsius solution and the pieces are soaked in this bath, during 1/2hour, increasing gently the temperature until 80°. Then the fabric is rinsed and washed (7)

6 results



7

From left to right: Titanium mordent; Aluminum mordent; mix of Al mordent and diluted ferrous mordent; Mix of concentrated Al and concentrated Fe mordent; Concentrated Fe mordent; First dilution of Fe mordent; second dilution of Fe mordent; Third dilution of Fe mordent.

Observation: the myrobolam dyed sample (above) and the pomegranate rind sample (below), give similar shades, characteristic of ellagitannins.

In order to create a printed pattern with tannins, these samples may help to choose which mordent will be use. For the next example, four mordents have been selected, and printed on a piece of cotton, then the piece have been dyed as previously in the myrobolam bath (Ti mordent, Al mordent, Mix of Al and diluted Fe (Third dilution), and diluted Fe.(8) The same shades are obtained



7 Discussion

This method doesn't need a big amount of mordants, and the pollution is minuted by the use and fixation of the mordants until the last drop. During the fixing process, just a tiny part of these mordants is wasted and thrown away.

Overall, the exploration of the resources of your environment may help you to discover some other attractive tannin plants for your art: Some wastes from the forest and from any wood transformation (barks, saw dust.) will give some attractive results as well.

Acknowledgements

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Author



Michel Garcia created his own company, "Plantes et Couleurs" in 1993. His work is focused on the research and teaching of sustainable developments and ecological processes using natural dyes from plants. In 1998 He founded the association Couleur Garance, and In 2002, the dye plants botanical garden of Lauris (France).