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Natural Staining Patterns by Dried Skins of *Vitas coignetiae Pulliat*

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Abstract

Vitis coignetiae Pulliat is well known as meoru in South Korea. The term, natural dye, covers all the dyes derived from natural resources such as plants, insects and animals. To change and obtain other colors, mordants have been used. In this study, using various mordants above, color changes to fabric silk by the skin of *Vitis coignetiae Pulliat* were compared with the dye of its original dried skins. Sodium tartrate plus citric acid did not induce the color changes of the silk as compared with original skin dye, that is, the silk fabric showed pink close to purple. Copper acetate and potassium dichromate were supposed to induce different color but showed the differences between lightness and darkness. This study would be useful to obtain color changes by the skins of *Vitis coignetiae Pulliat.* Further study will be processed to evaluate them as a biological usage.

Keywords: *Vitis coignetiae Pulliat*, Natural dye, Mordant, Fabric silk, Color.

INTRODUCTION

Vitis coignetiae Pulliat is well known as meoru in South Korea, and its fruits can be eaten [1]. Although *Vitis coignetiae Pulliat* do not show huge differences with typical grape, the sugar content of the fruit and the extent to which the fruit forms are different. The skin of *Vitis coignetiae Pulliat* is dark blue and it does not get wiped off when the clothes are succulent. It suggests that the skin of *Vitis coignetiae Pulliat* would be applied for natural staining and other chemical usages.

The term, natural dye, covers all the dyes derived from natural resources such as plants, insects and animals [2]. Moreover, if applicable, the materials would be applied for biological staining to cells and tissues such as haematoxylin [3]. Pathologist looks at a biopsy of a suspected disease by the haematoxylin staining with a counterpart of eosin. As mentioned above, raw skins of showed dark blue. To change and obtain other colors, mordants have been used, e.g., copper acetate, aluminum potassium sulfate, sodium tartrate plus citric acid, iron (II) sulfate and potassium dichromate [4,5]. For example, dried *P. amurense* Ruprecht was dark brown in its outer peel but a distinct yellow inside the peel. Copper acetate induced very different colors of khaki to silk fiber [5]. Therefore, it implied that mordants could produce unexpected colors. In this study, using various mordants above, color changes to fabric silk by the skin of *Vitis coignetiae Pulliat* were compared with the dye of its original dried skins.

MATERIALS AND METHODS

Preparation of dried skins of *Vitis coignetiae Pulliat* and extraction of dye

Vitis coignetiae Pulliat was purchased from a traditional market and washed three times with distilled water (DW). Five hundred gram of its skins were completely dried on air for the next extraction of dye. Briefly, about 500 gram of the skins was dissolved into 9 liter of distilled water by boiling with strong flame. pH 5.5 was continuously maintained and boiling to completely extract the natural dye was performed for 50 min. When vapor was come up, the solution was boiled with medium flame for 30 min. When the skins were sufficiently wet in the water, they were filtered to obtain the pure dye.

Application of dye to silk fiber

Our research targeted the staining of silk, using the dried skins of *Vitis coignetiae Pulliat* and changes of silk colors using a variety of mordants. Mordants of copper acetate, aluminum potassium sulfate, sodium tartrate plus citric acid, iron (II) sulfate or potassium dichromate were pre-mordanted with the fabric silk as shown in Table 1 and then the dye was added. The dyeing time was about 40 minutes. After the dyeing was finished, the silk fabric was washed with water and dried without squeezing.

Table 1. Treatment of Mordants to Silk Fabric

Mordants	Volume of mordants (gram)	Volume of distilled water (ml)	Treatment time (min)
copper acetate	15	900	15
aluminum potassium sulfate	15	900	15
sodium tartrate plus citric acid	40 + 120	800	15
iron (II) sulfate	150	900	5
potassium dichromate	15	900	15

RESULTS

3.1 Staining of silk fabric by dried skins

Original skins of *Vitis coignetiae Pulliat* express dark purple. The color of silk fabric was not dark like dried skin but was soft and weak (Figure 1).

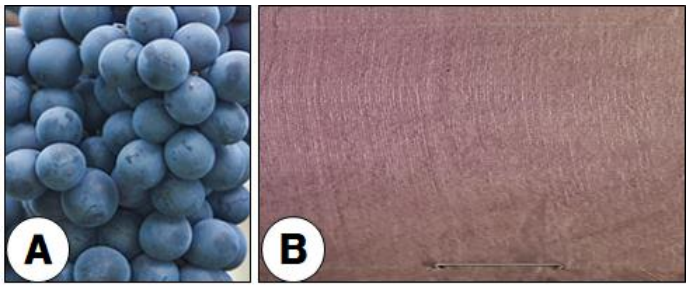

Figure 1. Fruits of *Vitis coignetiae* (A) and silk fabric stained by the dye of their skins. Its fruits show dark blue (referred by http://evenif1.tistory.com/53).

Mordants application to silk fabric staining with dried skins of Vitis coignetiae

Mordants are used to set dyes on fabrics or tissue sections by forming a coordination complex with the dye which then attaches to the fabric or tissue [6]. It may be used for dyeing fabrics, or for intensifying stains in cell or tissue preparations [6]. Here, it was precluded that various mordants, e.g., copper acetate, aluminum potassium sulfate, sodium tartrate plus citric acid, iron (II) sulfate and potassium dichromate would change the color of silk stained of the dried skins of *Vitis coignetiae Pulliat*. Acidic condition of pH 5.5 was maintained during the staining due to the absorbance of the dye to silk fabric. Sodium tartrate plus citric acid did not induce the color changes of the silk as compared with original skin dye in figure 1B (Figure 2), that is, the silk fabric showed pink close to purple. And, aluminum potassium sulfate induced dark blue very close to the fruit skin of *Vitis coignetiae Pulliat*. On the other hand, iron (II) sulfate induced color close to black. Compared with other color changes by mordants, iron (II) sulfate could be used to obtain darker color. Copper acetate and potassium dichromate were supposed to induce different color but showed the differences between lightness and darkness (Figure 2).

Figure 2. Staining of silk fabric by the skins of Vitis coignetiae with various mordants. Five different mordants were applied to stain the silk fabric prior to the treatment of the dye from the the skins of *Vitis coignetiae*.

DISCUSSION

Vitis coignetiae Pulliat is generally used to produce wine and to freshly eat. It is not well reported that the skins of *Vitis coignetiae Pulliat* can be used to stain fabrics even if it looks easy. In our results, the skins of *Vitis coignetiae Pulliat* induced pink close to purple, black, green, etc. Its skins would be applied to induce darker color from pink to black.

With regard of biomedical approaches, the inhibitory effect of *Vitis coignetiae Pulliat* was shown at the stages of multi-step carcinogenesis [7]. However, its fruits were reported to have those effects rather than its skins. *Vitis coignetiae Pulliat* also had the effect of angiogenesis in a cancer cell [8].

Among mordants, aluminum potassium sulfate induced dark blue very close to the fruit skin of *Vitis coignetiae Pulliat*. As mentioned in Introduction, haematoxylin is widely used to stain tissues with a counterpart of eosin. Compared with colors by the skin of *Vitis coignetiae Pulliat* plus of the mordant of aluminum potassium sulfate and haematoxylin, the skin of *Vitis coignetiae Pulliat* would be a good candidate alternative to haematoxyin.

This study would be useful to obtain color changes by the skins of *Vitis coignetiae Pulliat.* Further study will be processed to evaluate them as a biological usage.

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