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Effect of mordants with the application of natural dye extracted from *Allium cepa* on natural fabric

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Abstract

The major development in textile manufacture is fabric coloration. Such as natural colorants are mostly known for practice in dyeing for fibers like wool, cotton and silk even for leather coloring meanwhile pre-historic times. The natural bases are eco-friendly, obtainable at low cost, non-allergic, at liberty of azo-compounds and biodegradable. In this research, dye stuff was extracted from (*Allium cepa*) Onion skin and used for dyeing natural fabric with natural and synthetic mordants application. As onion is a remedial root plant and onion skin is deliberated as waste material from kitchen, which is used for fabric and food coloration. Natural mordants give pale colors, whereas synthetic mordants give yellow color. Shade depth with spectrometer was determined to check the K/S value. Washing test was applied to evaluate the fastness of color and tensile strength was applied on samples to measure the strength after dyeing. While rubbing test in dry as well as wet condition was applied to check the color fastness to abrasion. There was assessment of physical assets of fabric once using extracted dye of natural source.

Keywords: Natural dye, natural fabric, *Allium cepa*, mordants, pre, meta and post treatments

Introduction

The textile sources used to pattern for collecting worth, objective and on the way to fulfill the mandate of consumers. Basically, this strong point of mind was invented, using natural ingredients for dyeing or coloration the textile, able to synthetic and artificial colors. Almost the synthetic pigments being factory-made through petrochemical bases and done over risky chemical measures which posture risk heading towards eco-friendly environment. By means of natural fiber strands and threads have the capability to absorb dyestuff, as cotton and linen have ability to dye, for the reason of cellulosic nature, even though silk and wool have strong fibre, protein nature, hypo-allergenic, flame retardant and easy to wash (Samanta and Konar, 2011) [1].

The use of natural integral for coloration natural fabrics may add the returns of eco-friendly environments. The onion count up the world's prehistoric cultivated item, using root vegetable. This one covers level with flavonoids that stand in countless absorption in the onion outer skin rather than plump bulb. Specific result of studies shows that purposes of flavonoid are resolute by their arrangements and structures, for this reason, the flavonoids with different constructions expression alteration of biological activities (Shi *et al.* 2016) [2].

Wangatia *et al.* (2015) [5] explained that the as mordants consumption of metal salts for naturally dyed fabric products make textile not just fully eco-friendly environment. The natural colorant used was extraction of dye from mango bark for pre and post mordanting techniques. Some amount of dyestuff for the sample dyeing and after dyeing, washing was experienced using specific washing equipment. The washing fastness test and ultra violet absorption test with spectroscopy was compiled. Relating the control samples with mango bark mordant sample which comprised, un-mordanted sample and those samples which were treated with mordant like copper sulphate, confirmed significant mordanting result which was smoothly better than conventional mordant. Additional investigation exposed that with mango bark extract during post mordanting gives superior wash fastness act than the pre mordanting.

Mordants is the material which is used to fix color on fabrics through forming a complex between dye stuff and fabric substrate. Mordants support to tie and binding dyes stuff on fabric

through developing chemical bond. A bridge between dye and fiber, resulting the stain ability of dyeing and this coloring ability can increase the property of dye fastness. The performance of mordants formed several color shadows with different mordant. The mordant techniques instead of some visible improvement in wet and dry rubbing test alternatively, with washing tests all shades will changed (Janani *et al.* 2014) [3].

There is water contributed and organic diluters as a part in growth, onion's external skin extract is completely soluble. For silk coloration, used acidic dye material and essential at higher boiling temperature, bring about the use of more energy and fibre mutilation. This is rest on natural elements through using organic solvents and water. In this process, some mordants e.g., Alum, Potassium dichromate and Copper Sulphate. The endings shows that onion's skin gives stable shades and deeper color in contrast of organic extracts for dyeing on silk material (Miah *et al.* 2017) [4].

In this presented work, basically there is the awareness about the usage of natural resources to protect environment from ecological unevenness and pollution. With the use of kitchen wastage, dyeing will be done.

Methodology

Extraction of dry

The dye extraction was supported out at pH 7, in neutral medium. 5 g of dried onion peel was mixed with 100 ml of water in beaker. The mixture was reserved for 60 Min, at 100° C for extraction on heating mantle. To maintain the volume of solution, particular amount of water was added into the beaker. The dye was filtered. Obtained extracted dye had dark brown color and ready for dyeing fabric.

Dyeing of fabric

The extraction dye stuff was supported to dye the fabric. 3 g of fabric was added with 60 ml of dye in beaker. A salt sodium sulphate was used as a dye fixer. The mixture was reserved at 100 °C for 60 minutes, for dyeing on heating

mantle. To keep the solution volume into beaker, specific water amount was added. After the completion of time, the dyeing of fabric sample was pulled out, soaked and dried.

Pre-mordanting

In pre-mordanting, 3 g of fabric was treated in beaker with the natural and synthetic mordants one by one while M: L ratio was 1:20 for 30 minutes at 100 °C on heating mantle. The mordant solution was 60 ml for each sample. After 30 minutes, without washing with water fabric was dried. Then mordanted fabric was used for the dyeing.

Post-mordanting

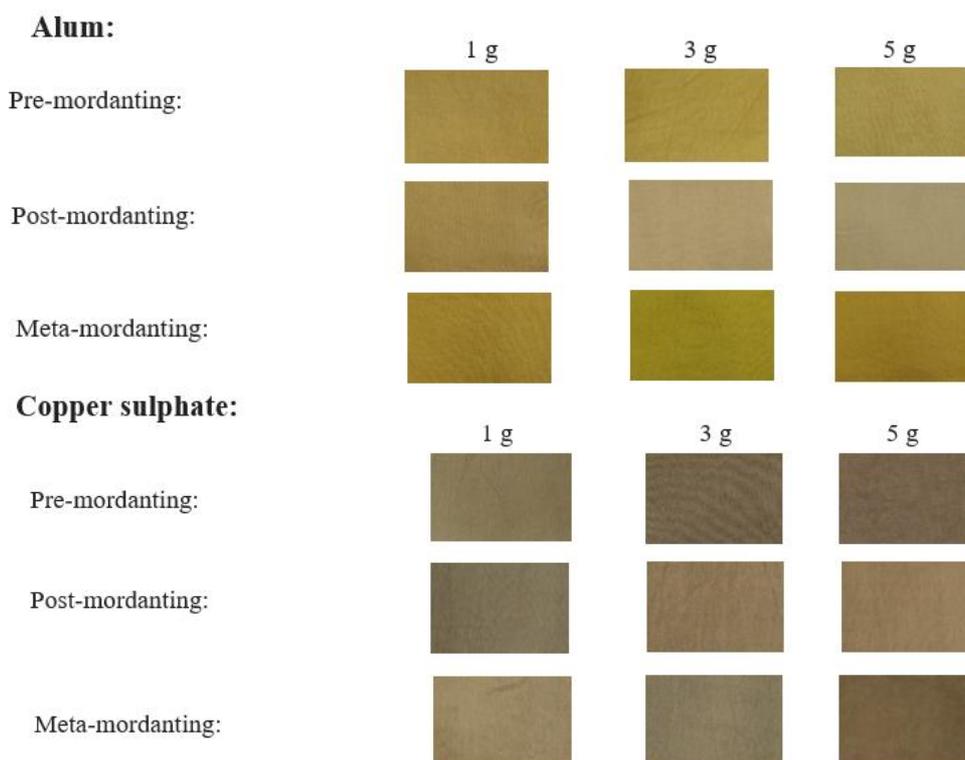
In post-mordanting, the fabric was dyed firstly and then the synthetic and natural mordants was treated one by one on dyed fabric in beaker. For each sample the mordant solution was 60 ml. The fabric weight was 3 g however M: L ratio was 1:20 at 100 °C for 30 minutes on heating mantle.

Meta-mordanting

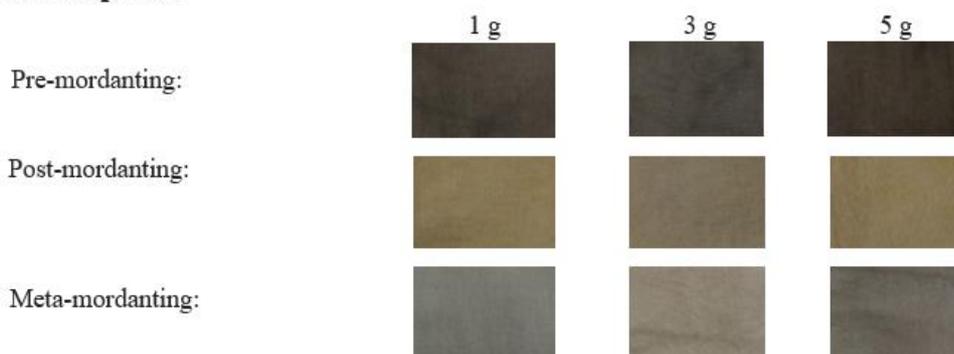
In meta-mordanting, the fabric was added with dye liquid and mordant in a beaker. Both types of mordant was treated one by one on fabric in dye bath. For each sample the mordant solution was 60 ml. The fabric weight was 3 g however M: L ratio was 1:20 at 100 °C for 60 minutes on heating mantle.

Results

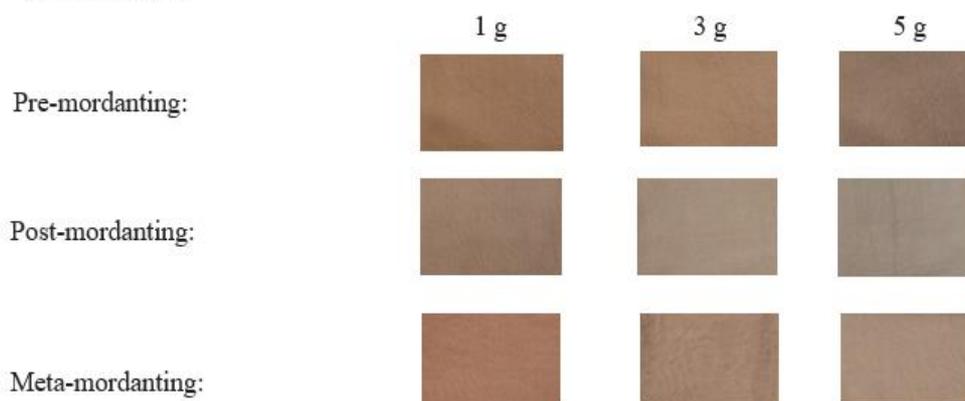
Samples treated with onion peel dye extract and mordants
Simple dyeing with onion peel extract without mordant:



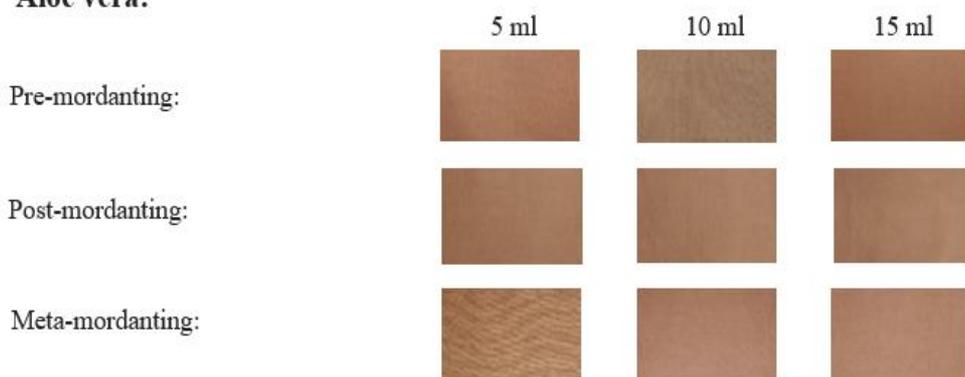
Iron sulphate:



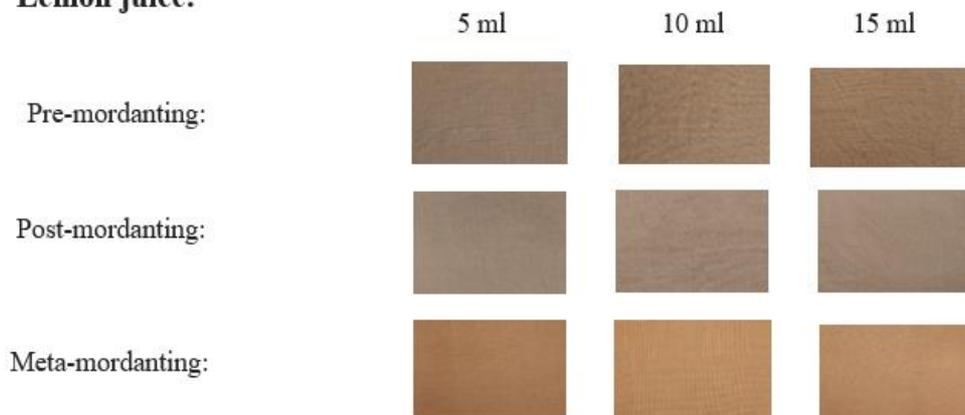
Tannin acid:



Aloe vera:



Lemon juice:



Conclusion

The natural dye extracted from peel on onion, applied on the cotton fabric with the help of synthetic and natural mordants have features as: Natural dyes give the wide range of color shade with the variation of dye concentration. The natural sources are environmental friendly and non-toxic. These are

biodegradable and ecological material. Use on onion peel for dyeing purpose is just a usage of kitchen wastage. Treated fabric present the excellent absorbency of dyestuff, fabric in dry condition give the lower color fastness to rubbing. There is requirement to transmit more work to improve the natural dye fastness properties.

Interpretation of findings

Physical test

(i) Shade test

After dyeing and mordanting, test for quality insurance was done. Shade depth (K/S) value to evaluate the dye absorbance in the fabric with light spectrometer machine. Result shows that the 5g of iron sulphate in pre-mordanting method had higher K/S value of 16.762. While 10ml of aloe vera in meta-mordanting had lower K/S value of 3.0724.

(ii) Tensile strength

This was done to check the strength of fabric. Pre mordanting with 1 gram of copper sulphate shows the best result of tensile strength.

(iii) Rubbing test

This test was applied on fabric so that to judge the color bleeding from rubbing or color fastness to rubbing. The result shows that the color fastness greater in wet condition.

(iv) Washing test

This test was done for checked out the color fastness to washing. The standard detergent was used for the purpose of washing trial, which named as ECE Non-Phosphate Reference Detergent (A). The color fastness to washing tests shows that sample in meta mordanting with 3 gram of alum has greater shade difference after washing.

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