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Dyeing of Silk with Marigold Flower

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Abstract

Flowers are one of the most delicate and beautiful gifts of nature. Marigold flower is one of them. The present study focused on extraction of natural dye from the petals of marigold flower. The natural colour obtained from marigold was evaluated by dyeing mulberry silk fabric. The results revealed that the dyed samples have beautiful natural colour and has good fastness properties to light, washing, crocking, rubbing and perspiration.

Keywords: Natural dyes, mordants, silk

Introduction

Nature is full of beautiful colours that captivate the human eye. From ancient times, natural colours were used to paint walls, food, dyeing of textiles, leather and other useful objects. Apart from these natural colours were used by the tribal people to decorate their body. Basically, natural colourants are derived from plants, invertebrates or minerals. The majority of natural dyestuff is obtained from plants sources: roots, berries, barks, leaves, flowers, wood and other organic sources such as fungi and lichens.

Besides this, natural dyes are eco-friendly dyes and does not affects the human health. These colourants are biodegradable and non-toxic in nature. Natural dyes are antioxidant and antimicrobial in nature. The antioxidant has a major role to play in neutralizing the free radical. Hence it acts as preventive against deadly carcinogenic diseases like cancer. It's antimicrobial properties also helps in prevention of skin inflammation, toxicity and other fungal infections. Even some of them have therapeutic values for which the raw material finds use in medicine. Apart from this these dyes cooling sensation to the wearer and also revitalizes our body.

In the current scenario, organic awareness and environmental consciousness have revived the interest of consumers towards natural dyes and naturally dyed products. In comparison to natural dyes, synthetic dyes are cheaper and are toxic in nature. Researchers have proved that synthetic dyes are more suspected to release harmful chemicals that cause skin allergies and are carcinogenic in nature which results in deterioration of human health.

In the present study, an attempt is has made to dye mulberry silk fabric with natural dye extracted from the floral parts of marigold flower (*Tagetes erect*) and also focuses to analyse the fastness properties of the dyed samples. These flowers not only used for decoration purpose but also have many medicinal properties and used to treat severe infections.

Materials and methods

Selection and pre-treatment of fabric

Mulberry silk was selected for the study. Before dyeing, the fabric is subjected to degumming process. The degummed fabric is free from sericin which hinders the penetration of dyestuff into the fibre polymer system and also affects the lustre of the fabric. Removal of natural gum from silk fabric is known as degumming (Sargunamani and Selvakumar, 2002) [5]. For degumming, the solution was prepared by addition of mild detergent. The samples were soaked in the solution and the degumming process was carried out at 50 °C for 30 minutes. After that the samples were washed in cold water and dried in shade

Selection and extraction of dye

Fresh petals of marigold flower are selected for the study. For extraction process, acidic medium was selected for the study. For this 2% HCL was poured in 200 mL of distilled water. Fresh petals of marigold (50 gms) was immersed in the solution. The solution was kept for half an hour. Further the extraction process was carried out at 80 °C for 60 minutes.

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During the dye extraction process, the solution was stirred continuously. On completion, the solution was allowed to cool. The extracted dye solution was filtered and used for dyeing of silk.

Selection of mordant

For mordanting, alum was selected for the study. Chemically alum is known as Aluminium potassium sulphate dodecahydrate. Mordant increases affinity of the dyes. These are metallic salts which forms complexes with the fibre and the dye.

Mordanting and dyeing of samples

Dyeing was carried out by using all the methods of mordanting. In pre-mordanting method the samples were first mordanted and then dyeing was carried out. For mordanting, the solution was prepared by dissolving 20grms of alum in 100mL of luke warm distill water. The samples were dipped in the mordant solution for half an hour and further the solution was boiled for half an hour. The mordanted samples were subjected to dyeing process for 60minutes. In simultaneous mordanting both dyeing and mordanting are done simultaneously. In post mordanting, the samples are dyed and then mordanting is carried out for 30 minutes.

Colourfastness

Fastness properties of all the dyed samples were tested and subjected to fastness parameters such as light, rubbing, crocking, washing and perspiration.

Results and Discussions

Table 1: Natural colours obtained on silk by using mordant (alum)

Mordanting method	Colour obtained
Pre-mordanting	Bright yellow
Simultaneous mordanting	Light yellow
Post mordanting	Yellow

Rubbing fastness

Based on Table 2, the rubbing fastness of dry state of silk in all the three mordanting methods was found to be excellent as compared with wet state. In wet state minimum change in colour was noticed. Slight staining was also observed.

Wash fastness

The table indicates the result of dyed samples with all the mordanting methods. The wash fastness of samples ranged between 3 to 5 that is good to excellent. Slight staining was found. In case of colour change it was negligible.

Light fastness

The dyed samples was subjected to light fastness. The data clearly showed that all the dyed samples have good fastness.

Perspiration

To determine perspiration fastness, the samples was tested against both medium (acidic and alkaline). The result showed good fastness property. On comparison between acidic and alkaline mediums, acidic medium showed good fastness.

Table 2: Colour fastness of the dyed samples

Mordanting methods	Rubbing fastness				Washing fastness		Light fastness	Perspiration fastness			
	Dry		Wet					Acidic		Alkaline	
	CC*	CS**	CC*	CS**	CC*	CS**	CC*	CS**	CC*	CS**	
Pre-mordanting	5	4	4	4	5	3	5	3	4	3	3
Simultaneous mordanting	5	4	3	3	4	4	3	4	4	4	3
Post mordanting	5	3	4	4	3	3	4	2	3	4	4

*CC = Colour change **CS= Colour stain

While comparing the results of fastness for all the mordanting methods, it was found that pre-mordanted samples showed excellent results followed by simultaneous method and then post mordanting method. Apart from this dyed samples showed different shades of colour using mordant and the fastness properties was found to be satisfactory.

Conclusion

The present study showed that natural dye can be successfully extracted from the petals of marigold flower. A variety a shades can be achieved by addition of different mordants. This is an initial step to safe guard our environment by using ecofriendly dye on the textile materials.

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