

Use of indigenous herbal medicine- purple lady/iron leaf (*Telanthera ficoidea*) as a natural dye source for dyeing of mulberry silk fabric

■ POMIMA DUARAH AND SATVINDER KAUR

Received: 27.02.2014; Revised: 19.09.2014; Accepted: 30.09.2014

See end of the paper for authors' affiliations

POMIMA DUARAH
Department of Textiles and
Apparel Designing, College of
Home Science, Assam Agriculture
University, JORHAT (ASSAM)
INDIA
Email : pomimaduarah@
rediffmail.com

■ **ABSTRACT** : Naturally occurring materials are non-toxic, biodegradable and non-carcinogenic. Environmental considerations are now becoming an additional important factor during the selection of consumer goods including textiles all over the world. So, interest in natural product is gaining importance throughout the world and people are becoming aware of the need for eco-friendly materials. For the research, mulberry silk fabric was dyed with purple lady (*Telanthera ficoidea*) and mordant selected were alum and tea. All the three mordanting method viz., pre, simultaneous and post mordanting method were used. The dye materials were collected and extracted from the leaves and stems of purple lady with method. The silk fabric samples were degummed, ironed and dyed. The O.D. value before and after dyeing were recorded. Purple lady (*Telanthera ficoidea*) natural dye could be used effectively for colouring of mulberry silk fabric.

■ **KEY WORDS**: Mulberry silk, Purple lady, *Telanthera ficoidea*, Fastness, Properties

■ **HOW TO CITE THIS PAPER** : Duarah, Pomima and Kaur, Satvinder (2014). Use of indigenous herbal medicine- purple lady/iron leaf (*Telanthera ficoidea*) as a natural dye source for dyeing of mulberry silk fabric. *Asian J. Home Sci.*, 9 (2) : 409-412.

Natural dyes are being considered as a possible substitute to synthetic dyes. As a result of increased environmental awareness, natural dyes are being preferred over the synthetic dyes because they exhibit better biodegradability and compatibility with the environment. In addition, the dyes obtained from natural sources do not possess the danger of allergic reactions and are non-toxic in nature.

Awareness and concern for environmental issues has lead to extensive research for use of natural dyes for silk yarn/fabric. A great deal of emphasis on the screening of newer natural colouring materials for the industrial application has gained impetus. Dyes from natural sources are in great demand because current global trends indicate consumer preferences for products from natural sources as well as processes that are safe and eco-friendly. Natural dyes make an important contribution to fabric decoration by producing various shades

by the use of mordants and different dyeing methods.

Assam is rich in flora and fauna, and also the home of silk. The sub-Himalayan region of North-Eastern India particularly Assam and Arunachal Pradesh are the treasure house of wide varieties of plant species. Due to the varied topographic and climatic conditions, various types of flora with their own distinctive characteristic are available in this part of the country. Many of the plant species have medicinal and aromatic value, while some plant species contain natural colouring matters in their leaves, fruits, roots, flowers, seeds or barks. The practice of extraction of colouring matters from plant sources is in vogue in this part of the country from very ancient time. Conventionally, some rural people of NE region extract dyes either from leaves, roots, flowers, seeds or barks of some selected plant species adopting their own methods of extractions. These methods mostly involve boiling, scraping, powdering and mixing with other materials to get

desired colours. Sometimes fermentation processes are also involved in extraction of dyes. In most cases, the dyes are extracted and used fresh for colouring textile materials.

Therefore, an investigation was carried out on use of Indigenous herbal medicine- purple lady/iron leaf (*Telanthera ficoidea*) as a natural dye source for dyeing of mulberry silk fabric and study of its fastness properties.

The study was taken up to explore a new dye source and various shades of colour and fastness properties with the following objectives :

- To identify and select the dye bearing parts (leaf and stem) of purple lady –*Telanthera / Alternanthera ficoidea*.
- To extract the dye, find out the effect of dye in alkaline and acidic medium and study the shades in presence of mordant on mulberry silk.

■ RESEARCH METHODS

Use of dye bearing material (parts) :

The specific dye-bearing parts (leaf and stem) of *Telanthera ficoidea*, locally known as-purple lady/ bishlayakoroni/iron leaf plant were dried and powdered. The powdered material was used as dye for dyeing of silk yarn / fabric.

For this study, leaves and stems of *Telanthera ficoidea* were used to dye mulberry silk fabric. *Telanthera ficoidea* plant is a semi-erect herb of deep purple colour. It is cultivated as a hedge for lawn decoration and can be propagated easily.

This particular plant was used traditionally to overcome from pain, wound healing purpose but not for dyeing.

Research procedure :

Selection of fabric :

Mulberry silk fabric of plain weave, degummed silk fabric were used for the research.

Selection of natural dyes :

The leaf and stem of *Telanthera ficoidea* plant were dried and powdered. The powdered material was used as dye for dyeing.

Extraction of dye :

The dye was extracted in alkaline and acidic medium.

Alkaline media :

In order to select the amount of alkali for dye extraction, tests were carried out and the concentration of Na_2CO_3 selected was 0.5 g/100 ml. The alkalinity of the liquor was maintained at pH 9-10. The concentration selected was based on the optical density value and per cent dye absorption.

Acidic media :

In order to select the amount of acid for dye extraction,

tests were carried out and the concentration of HCl selected was 1.0 %/100 ml. The pH of the acidic liquor was maintained at pH 2-3. The concentration selected was based on the optical value and per cent dye absorption.

Use of mordant (mordanting method) :

The mordants selected and used in the research work were alum (metallic mordant) and tea (natural mordants). Tests were carried out to select the concentration of the mordants for dyeing based on the optical density and per cent dye absorption. The concentration of alum selected was 15 g per 100 g of fabric and the concentration of tea selected was 10 g per 100 g of fabric. and mordanting method viz., pre-mordanting, simultaneous mordanting, post mordanting were used for the investigation along with dyeing for fixing the colour to the fabric.

Dyeing method :

The calculated amount of extracted dye liquor was taken as per the material to liquor ratio. The material to liquor ratio (M : L) was finalized at 1 : 40 for dyeing. The dyeing time selected was 45 minutes, maintaining a temperature of 90°C. The percentage of dye absorption by the fabric sample at a particular wave length (580 nm) was estimated as :

$$\text{Per cent dye adsorption} = \frac{\text{O.D. before dyeing} - \text{O.D. after dyeing}}{\text{O.D. before dyeing}} \times 100$$

■ RESEARCH FINDINGS AND DISCUSSION

During the investigation, samples were given different treatments and their effect was recorded. The optical density of the liquor before and after dyeing showed the amount of the dye absorption by the fabric.

The abbreviations used in the nomenclature of the sample are – A₁-Alkaline, A₂-Acidic, M₁-Alum, M₂-Tea, P₁-Pre mordanting, P₂-Post mordanting, S-Simultaneous mordanting.

The different shades obtained by mulberry silk fabric samples dyed with *Telanthera ficoidea* with mordant alum and tea were cream, mid cream, dark brown, stone brown, golden brown and copper brown Table 1 and Fig. 1.

After dyeing, it was found that mordant alum produced pale shades whereas tea produced a variety of brilliant shades. All the samples showed good absorbency. The per cent absorption of dye was better when the dye was extracted in acidic medium.

Conclusion :

On the basis of experimental results, it can be concluded that the leaves and stems of *Telanthera ficoidea* can be successfully used for dyeing of mulberry silk fabric in the presence of mordants, alum and tea. The shades obtained ranged from cream to dark brown each having good colour fastness to sunlight, washing, pressing (dry and wet), crocking

Table 1 : Different shades obtained by mulberry silk sample dyed with natural dye *Telanthera/ Alternanthera ficoidea* with mordant alum and tea

Sr. No.	Sample	Mordant	Shade
1.	'O'		Off white
2.	A ₁	-	Cream
3.	A ₂	-	Mid cream
4.	A ₁ M ₁ P ₁	Alum	Mid cream
5.	A ₁ M ₁ S	Alum	Mid cream
6.	A ₁ M ₁ P ₂	Alum	Mid cream
7.	A ₁ M ₂ P ₁	Tea	Dark brown
8.	A ₁ M ₂ S	Tea	Stone brown
9.	A ₁ M ₂ P ₂	Tea	Golden brown
10.	A ₂ M ₁ P ₁	Alum	Mid cream
11.	A ₂ M ₁ S	Alum	Mid cream
12.	A ₂ M ₁ P ₂	Alum	Mid cream
13.	A ₂ M ₂ P ₁	Tea	Copper brown
14.	A ₂ M ₂ S	Tea	Copper brown
15.	A ₂ M ₂ P ₂	Tea	Copper brown

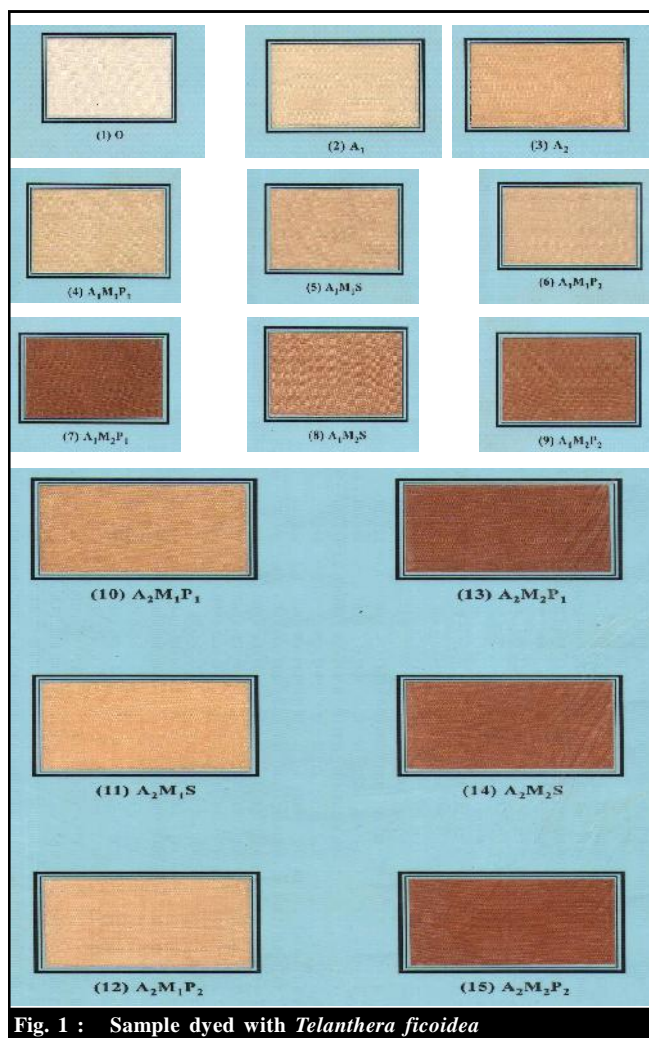


Fig. 1 : Sample dyed with *Telanthera ficoidea*

(dry and wet) and perspiration (alkalial and acidic).

Authors' affiliations:

SATVINDER KAUR, Department of Textiles and Apparel Designing, College of Home Science, Assam Agriculture University, JORHAT (ASSAM) INDIA

■ REFERENCES

Agarwal, S. and Gupta, K.C. (2004). Colour and fastness characteristics of natural dye from red sandal wood (*Pterocarpus sastalinus*). *Tex. Trends*, **47**(7) : 29-30.

Agarwal, S. and Gupta, K.C. (2005). Optimization of dyeing conditions for natural dye – Madder roots (*Rubia corifolia*). *Tex. Trends*, **48** : 24-27.

Bains, S., Kaur, K. and Kang, S. (2006). Comparative study of colour fastness properties of dyed cotton with Arjuna (*Arjuna jermineia*) dye using mordants and their. *Tex. Trends*, **45**(2) : 41-42.

Bhal, D. and Gupta, K.C. (1988). Development of dyeing process of silk with natural dye cutch. *Colourage*, **33**(22) : 22-24.

Bhuyan, R., Saikia, D.C. and Saikia, C.N. (2002). Isolation of colour component from the roots of *Moriunda augustifolia* Roxb. and evaluation of its dyeing characteristics. *Indian J. Fibre Tex. Res.*, **27** : 429-433.

Bisht, B.G, Remi, G. and Goel, A. (1999). Dyeing of natural fibre – Bhimal with natural dye. *Kilmora. Tex. Trends.*, **42**(5): 33-35.

Chowdhury, S.N. (1982). Eri Silk Industry. Directorate of Sericulture and Weaving, Assam, Guwahati, pp. 29-44.

Chowdhury, S.N. (1992). Silk and sericultural. Directorate of Sericulture, Guwahati, pp. 1-5, 16-24.

Chowdhury, S.N. (2001). Sericulture and weaving (An overview) Textbook. 1st Edn., P. 1-3.

Daniely, M., Bhattacharyya, S.D., Arya, A. and Roale, V.M. (2006). Natural Dyes : Scope and Challenges. Scientific Publ., Jodhpur, India P.3

Das, S. (1992). Application of natural dyes on Silk. *Colourage*, **39**(9): 52-54.

Gohl, E.P.G. and Vilensky, L.D. (1983). Textile science : An Explanation of Fibre Properties. Longman Cheshire, Oty, Ltd., Melbourne, pp. 79-86, 152-156.

Gulrajani, M.L. and Maulik, S.R. (2002). Evaluation of fastness characteristics and colour value of selected natural dyes on synthetic fibres. *Tex. Trends*, **45**(2) : 31-34.

Kar, A. and Borthakur, S.K. (2008). Dye yielding plants of Assam for dyeing handloom textile products. *Indian J. Traditional Knowledge*, **7**(1) : 166-171.

Mukhopadhyay, M. and Bhattacharyya, N. (2001). A pragmatic approach to super critical fluid dyeing of textile fibres with natural dyes. *Colourage*, **48**(4): 21-22.

Phukan, R., Phukan, A. and Ahmed, G. (2004). Dyeing of silk yarn with the heartwood of jackfruit. *Tex. Trends*, **47** : 29-31.

- Paul, R.M.D. and Pardesh, P.D. (2000).** Natural Dyes, Classification, Chemistry and Extraction methods. *Colourage*, **1** (12): 43-46.
- Paul, R.M.D. and Pardesh, P.D. (2001).** Natural Dyes, Classification, Chemistry and Extraction methods. *Colourage*, **2** (4) : 51-55.
- Sengupta, S. (2001).** Application of tea liqueur for colouration of cotton fabric. *Tex. Trends*, **44**(3) : 23-24.
- Singh, K. and Parmar, S.S. (2005).** Are natural dyes safer than synthetic dyes. *Tex. Trends*, **40**(11) : 23-25.
- Singh, O.P. (2000).** Natural Dyes: The Pros and Cons. *Indian Tex.*, 42-46.
- Subhashini, S., Rajalakshmi, R. and Venikeertheeswari, N. (2009).** A systematic and scientific approach to the extraction and dyeing with a natural dye on silk-annatto seeds dye. *Oriental J. Chem.*, **25**(1) : 77-84.
- Suneeta, M.B. and Mahale, G. (2003).** Colour fastness of Parthenium dyed silk. *Tex. Indus. Trade J.*, **49**(1-2) : 49-50.
- Swetti, S. (2002).** Natural dyes in contemporary pictorial tapestry. Proceedings- Colour Congress 2002: The Art, History and Use of Natural Dyes. 19-21st May, Ames, IOWA, USA, P. 103.

★ ★ ★ ★ ★ 9th Year of Excellence ★ ★ ★ ★ ★