

CARISSA CARANDAS AS A NATURAL COLOURANT AND ITS EFFECT ON PHYSICAL AND FASTNESS PROPERTIES OF SILK

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ABSTRACT

The present work was focussed to determine the effect of degumming on physical and fastness properties of silk. Study was also aimed to determine the effect of *Termenalia bellerica* Roxb. and *Punica granatum* Linn. as a natural mordant and Stannous chloride, Potash alum as metal mordants. *Carissa carandas* Linn. has imparted range of brown colour on silk. *Termenalia bellerica* Roxb. and *Punica granatum* Linn. as natural mordants showed increase in physical properties with good to very good sunlight and wash fastness properties.

Key words : *Carissa carandas* Linn., *Termenalia bellerica* Roxb., *Pomgranate rind*, Potash alum, Stannous chloride, Tearing Strength, Sunlight and Wash fastness.

INTRODUCTION

Manufacturing of synthetic dyes involve many carcinogenic chemicals and the effluents which are discharged in the river or emitted into the atmosphere result in ecological imbalance, pollution problem and disturbed environment due to the ample usage of harardous chemical, particularly synthetic dyes. As a result, attention shifts towards the scope of natural dyes, (Shivankar et.al. 2011).

The present research paper is aimed at developing an eco – friendly natural dye from *Carissa carandas* Linn. leaves extract.

Carissa carandas Linn. its local name is Carandas. The caranda, is a shrub which produces berry-sized fruits. The caranda has attracted more interest as a source of fuit and as a medicinal plant. It is a fruit of dry area and

flourishes well on land with high temperature, (Jayalakshmi et.al.2009).

Punica granatum Linn. is native to Iran; now cultivated throughout India. The fruit rind contains total tannins 32.8% hydrolysable tannin 22.1% prepared by aqueous extraction of rind, (Kharbade and Mishra, 1999).

Terminalia belerica Roxb. belongs to family Combretaceace, locally known as Bahera in India. Bahada fruit is also a part of triphal. It is a large deciduous tree with a buttressed trunk, a thick brownish gray bark with shallow longitudinal fissures, attaining a height of between 20 to 30 meters. Phytoconstituents of bahera are tannins, ellagic acid, ethyl gallate, galloyl, glucose and chebulanginic acid. Saraswathi Motamarri N .et.al. (2012).

Extraction of *Terminalia bellerica* Roxb fruits under different conditions occurred optimal

dyeing when using extracts obtained via boiling 5gm of water for 90 min, adjusting the dye bath to pH7 and dyeing the wool for 60 min at the boiling point. EI- (Zawahry and Kamel 1999).

Silk has a unique combination of properties not possessed by any other fiber. “Dry” tactile hand, natural lusture, good moisture absorption, lively suppleness and draping qualities and high strength. Very few studies have been found on physical properties of textile substract dyed with natural dye.

MATERIALS AND METHOD

Materials:

Grey tussar silk was used as a textile substrate . *Carissa carandas* leaves were used as a source of natural dye. Two natural mordants *Terminalia bellerica* Roxb. and *Punica granatum* Linn. were used. Potash alum and Stannous chloride were used as metal mordents.

Experimental Methods:

Degumming Of Silk :

The grey silk material was degummed in a bath caintaining 10% Ezee , 2% NaOH (owf) for 2 hours at boiling temperature keeping M:L as 1:20. After processing it was washed thoroughly in hot water and then in cold water. The degummed silk was dried in air for 48 hours.

Aqueous Extraction Of *Carissa carandas* Linn leaves:

Dye extract was prepared with 50% dye material concentration (owf) keeping M:L as 1:50. Extraction was carried out for 3 hours at 90⁰C maintaining the level of solution in the container throughout. The dye extract was allowed to cool at room temperature. The solution was then filtered and transferred into dyebath.

Mordanting:

The mordanting bath was set for 10% Potash alum , 3% Stannous chloride, 10% *Terminalia bellerica* Roxb., 10% *Punica granatum* Linn. mordant concentration (owf) keeping M:L as 1:50. The initial temperature of the dye bath was 40⁰C and it was slowly raised upto 90⁰C.

Mordanting was carried out for 45 mins. Mordanting bath was allowed to cool for 15 mins at room temperature. Mordanting was carried out separately for each experimented silk sample.

Dyeing:

Mordanted sample was dyed in previously prepared dye bath The initial temperature of the dye bath was 40⁰C and it was slowly raised upto 90⁰C. Dyeing was carried out for 60 mins. The dye was allowed to cool at room temperature for 15 mins at room temperature. Dyeing was carried out seperately for each mordanted silk sample. The dyed samples was removed squeezed gently and rinsed thoroughly in cold water. The sample was shade dried.

Assessment Of Physical Properties:

Controlled, scoured and dyed cotton samples were assessed against . Ends and Pics per inch, lengthwise shrinkage, thickness and tearing strength (ASTM stds).

Assessment of Fastness Properties:

Wash fastness (ISO2) Sunlight fastness (IS-686-1985).

RESULTS AND DISCUSSION

It is evident from the table-1 that degumming has showed significant rise in ends and picks / inch.

Degumming has resulted in higher thickness value of silk. Slight lengthwise shrinkage has observed after degumming. Decrease in tearing strength of silk was observed in both warpwise and weftwise direction after degumming.

Remarkable increase has been observed in terms of ends and picks/inch after mordanting. Where, *Terminallia bellerica* Roxb. was used as natural mordant. Significant increase in thickness of silk was observed. Surprisingly higher thickness was noted when silk was mordanted with *Terminallia bellerica* Roxb.. No significant difference was observed for shrinkage. Data from table reveals that silk mordanted with metal mordants has showed reduced tearing strength in both warp

and weft direction over the control and degummed silk. Significantly higher tearing strength was noted in both warp and weft direction when silk was degummed with *Terminalia bellerica* Roxb. and *Punica granatum* Linn. as natural mordant.

Siddiqui et. al. (2009) studied the effect of mordants on durability of cotton and silk fabrics dyed with Parijataka flower pigment where physical properties were found to be increased due to utilization of different mordants.

Stannous chloride as a mordant imparted pink brown colour with *Carissa carandas* Linn. leaf extract as a natural colourant. Ratings towards Sunlight and Wash fastness are represented in table-2. Dyed silk mordanted with Stannous chloride when subjected for washing and exposed to sunlight showed good fastness, Potash alum as mordant imparted red brown colour. Very good sunlight fastness was noted with 4/5 rating. Wash fastness was observed fairly good towards dyed silk, where slight staining was observed on adjacent fabric.

Table-1. Effect Of Degumming And Mordanting On Physical Properties Of *Carissa carandas* Dyed Silk.

Samples	Count		Thickness	Shrinkage inch/yard	Tearing Strength	
	Ends/inch	Picks/inch			warp	Weft
Grey Silk	70	83	11.99	100	44.33	44.66
Degummed Silk	71	120	16.16	98	40	30.33
Mordanted Silk						
Stannous Chloride	116	90	15.93	98	37.33	36.66
Potash alum	104	100	16.49	98	30	46.33
<i>Terminalia bellerica</i> Roxb.	120	100	19.33	98	58	52.66
<i>Punica granatum</i> Linn.	110	85	17.49	98	55.66	45.66

Figure-1. Effect Of Degumming And Mordanting On Physical Properties Of *Carissa carandas* Linn Dyed Silk.

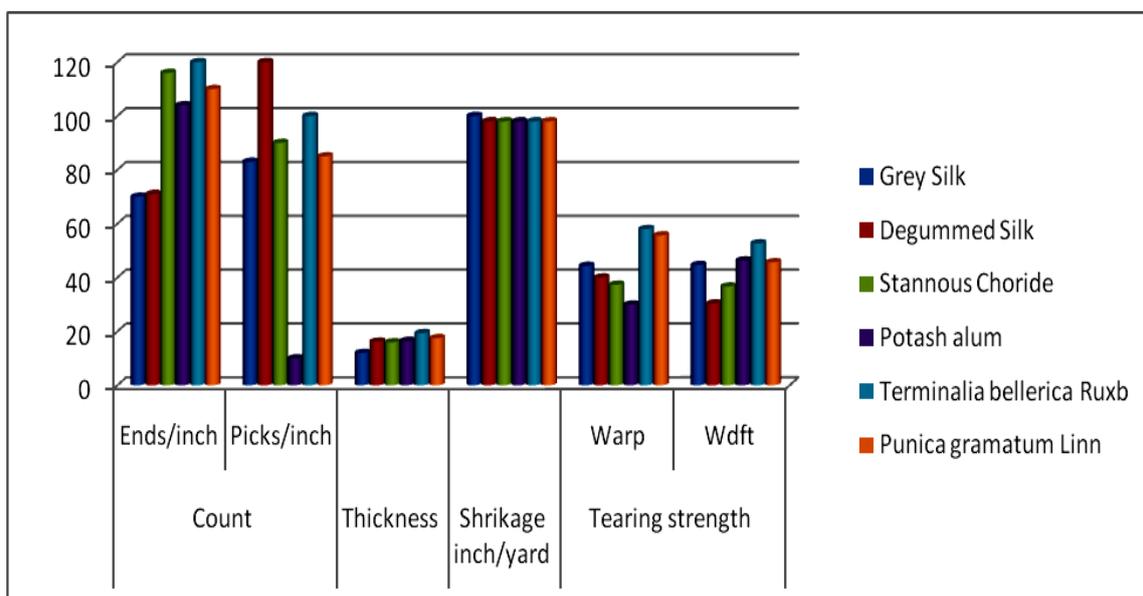
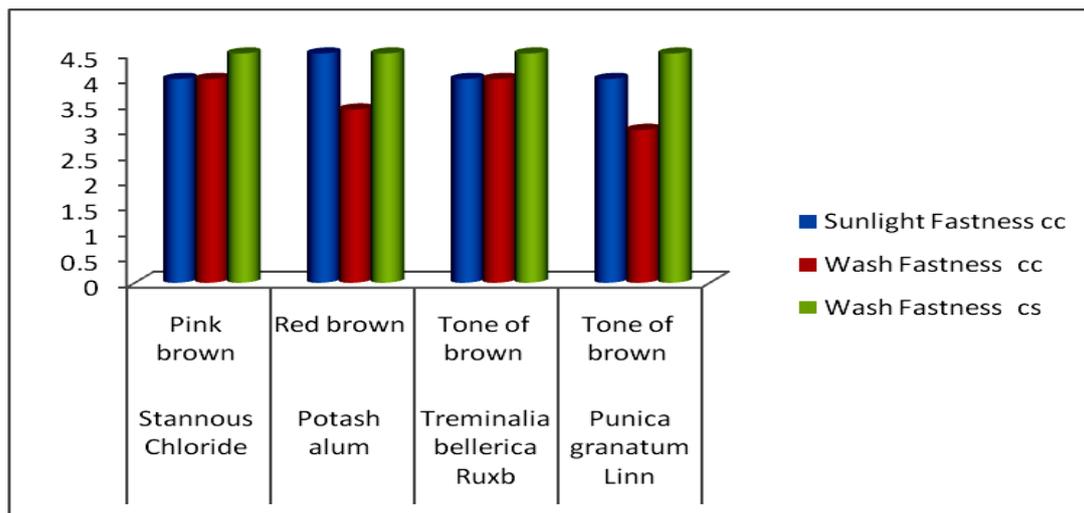


Table 2. Effect Of Mordants On Fastness Properties Of Dyed Silk.

Mordant	Colour	Sunlight Fastness	Wash Fastness	
		cc	cc	Cs
Stannous chloride	Pink brown	4	4	4/5
Potash alum	Red brown	4/5	3/4	4/5
<i>Terminalia bellerica</i> Roxb	Tone of brown	4	4	4/5
<i>Punica granatum</i> Linn	Tone of brown	4	3	4/5

Graph- 2. Effect Of Mordants On Fastness Properties Of Dyed Silk.



Terminalia bellerica Roxb. obtained tone of brown colour with good sunlight and wash fastness rated 4.

Punica granatum Linn. as a natural mordant imparted tone of brown colour on silk which when exposed to sunlight rated 4 with good sunlight fastness. Moderate colour change was noted when assessed towards wash fastness which rated 3 on gray scale.

A study of dyeing silk with walnut bark revealed improved colorfastness. When the silk samples were mordanted with Stannous chloride and Alum, improved light fastness was noted when the samples were mordanted with Potassium dichromate and Copper sulphate, (Singh et.al.1993) and Bhuvaneshwar et al, 2013).

Kumar and Bharti (1998), stated that metal salts or tannic acid improved the fastness properties using metals salts or mordants provided the widest range of shades.

Ela Dedhia (1998), stated those natural dyes with organic and inorganic mordant in various combination; identifying natural dyes on fabrics; and sequestering agents that improve the fastness properties of natural dyes.

Geeta mahale et.al (1999), conducted a study, on marigold as a natural colouring Agent and Assessment of its colorfastness. The mordanted silk skeins samples had excellent wash fastness. Non- mordanted samples had good wash fastness in light shades and fair wash fastness in darker shades. Mordanted and non-mordanted samples had excellent dry and wet rub fastness. Non-mordanted samples and sample mordanted with Potash alum and Potassium dichromate had poor light fastness in darker shades..Copper sulphate mordanting conferred good to excellent light fastness.

CONCLUSION

It can be concluded from the present work that no significant effect of degumming was found

on physical properties of *Carrisa carandas* Linn. dye silk. Degumming has increased the number of ends and pick/inch and thickness of silk. Degumming has reduced the tearing strength of the silk mordanted with metal mordants. *Terminalia bellerica* Roxb. and *Punica granatum* Linn. as natural mordants helps to improve physical properties more specifically the tearing strength. *Carissa carandas* dyed silk imparted range of brown colour with acceptable range of fastness properties.

REFERENCES

1. **Bhuvanewari E, Madhavi R, Thulasi N And Sivaprasad S.** 2013. Impact Of Photoperiod On The Circadian Cellulose And Cellulase Rhythms In The Digestive System Of Silkworm, Bombyx Mori. *Biolife*. 1(2):-17-29.
2. **EI-Zawahry,M.M. and M.M.Kamal,**1999. Dyeing Of Wool Cloth With Terminalia Bellerica Fruit Extract. *Indian J. Of Fiber and Textile Research* 24[2]:126-131.
3. **Ela Dedhia** 1998.Natural Dyes . *Colourage* 45[3]:45-50.
4. **Geeta Mahale, R.K. sunanda,K. Bhavani, P.Pratibha,**1999.Natural Dyeing-Silk with Arecanut Extract. *Textile Industry Of India*.38 [6-7]:20-22.
5. **Jayalakshmi and S.Amsamani,**"Eco-Dyeing of animal fiber"*Asian Dyer*, April 2009. pp-55.
6. **Kharbade B.V. and V.K. Mishra** 1999, Extraction Purification Characterisation Of Some Indian Natural Dyes. Book of paper convention on Natural Dyes. Dept of textiles technology, IIT, Delhi 9th -11th Dec, p-3-4.
7. Kumar V and B.V. Bharti, 1998. Studies on Natural Dyes, mangifera Indica Bark. *American Dyestuff Reporter*.87[9]:18-21.
8. **MS. Irfana Siddiqui,, M. Gous and Ukalkar M.B,** 2009,"Rffect Of Mordants On Durability Of Cotton and Silk Fabrics Dyed With Parijatka (*Nyctanthes arbor-tristis* Linn) flower pigment."*Colourage*.Vol LVII No.4p-74-79, April-2009.
9. **Saraswathi Motamarri N, Karthikeyan M,Kannan M and Rajasekar S,** 2012. *Terminalia belerica* Roxb-A Phytopharmacological Review. *International journal of Research in Pharmaceutical and Biomedical Sciences*, Vol.3(1), Jan-March, Vol-3(1), pp-96-99
10. **Shivankar. V.S,S.K. Vyas, R. Ojha and V.Kedar,** 2011, Extraction Of NaturalDye Pomegranate Rind And Its Fastness Properties, *Asian Dyer*, Feb-March,57-60.
11. **Singh N.S. Jahan and K.C. Gupta,** 1993. *Indian Textile J*.103.(5). Feb.1993:72-74.

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