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Research Paper

Organic cotton blended yarns for diversified

■ R.D. DHANALAXMI, JYOTI AND KAMLESH PUJARI

See end of the paper for authors' affiliations

Correspondence to :
JYOTI
Department of Social Science, College of Rural Science, University of Agricultural Sciences, DHARWAD (KARNATAKA) INIDIA

■ **ABSTRACT :** Mesta is commonly grown in every farmer's field either as a subsidiary vegetable crop or as a hedge crop or on bunds as wind breakers. Mesta fibre extraction is a routine process practiced in every farm family in Karnataka. Hence, the present study was designed to explore the possibility of spinning pure and blended mesta yarns with different proportions. Results found that mesta fibres have added strength to the cotton yarn simultaneously decreased the elongation and increase in the ratio of mesta fibre for blending reduces the cost of production of cotton yarn.

■ **KEY WORDS :** Mesta fibre, *Hibiscus sabdariffa*, Organic cotton, Dharwad Hirsutum Hybrid-11 (DHH-11), Jute batching oil (JBO), Blending, Physical characteristics

India being a tropical country is blessed with plenty of renewable resources obtained from the plant kingdom. In view of recent global environmental issues and inadequate raw fibre resources, scientists worldwide have begun to show interest in exploiting the full potential of natural fibre and their diverse uses. Synthetic fibres, meanwhile, face ecological and environmental problems in the production stage as well as in their disposability. Therefore, natural fibres and fabrics are gradually gaining importance as consumers are perpetually looking for biodegradable and eco-friendly textiles to preserve their natural environment, flora and fauna. The primary advantage of these natural fibres is that they are less energy consuming locally available and indeed are available in a wide variety.

Apart from cotton, India has a large variety of other cellulosic fibres obtained from different parts of the plant *viz.*, leaf, stem, husk and kernel (seed) etc. Bast fibres are usually stiffer and longer than the fibrils. Generally, on an oven-dry basis, the bast part accounts for about 1/3 of the stem mass and the woody core part for the remainder (Nezamoleslami *et al.*, 1997). Similarly, 'mesta' is the bast fibre obtained from commercially cultivated species such as *Hibiscus cannabinus* Kenaf and *Hibiscus sabdariffa* Roselle, which belong to the family Malvaceae. *H.sabdariffa* is a tall, appears cream to light yellow flower, having a scarlet to magenta throat and green or slightly reddish stem depending on the variety. These species are mainly grown for its fibre purpose. The fibre was discovered in Africa where the fibre was obtained from plants growing in a wild state that were used for twines, bags and matting (Jyothirmai and Jacob, 1997). In India, mesta stands next in importance to jute and it is called as *Patwa* (Hindi), *Lal-mista*, *Chukar* (Bengali), *Lal-ambadi* (Marathi), *Yerra gogu* (Telgu), *Puichchai* (Malayalam) and *Chukiar* (Assam) (Mahadevan *et al.*, 2009).

Hence, mesta species, *Hibiscus sabdariffa* variety AS73, CP 560 grown in the Institute of Organic Farming, University of Agricultural Sciences, Dharwad, Karnataka was selected for the present study to explore better prospects for utilization of mesta fibre for multiple applications.

■ RESEARCH METHODS

Selection of fibre:

Organic cotton DHH-11 (Dharwad Hirsutum Hybrid-11), variety having 28 mm length, fineness 3.8 μ and strength 26.28 μg/inch was procured for blending with mesta fibre having 102.66-(1inch) length,fineness 3.008 tex and strength 131 gf/tex.

Softening of fibre:

Softening was done by using Jute Batching Oil (JBO) emulsion to make mesta fibre pliable and missible with cotton fibres.

Blending:

Fibre was blended by stack method manually with two

different blend proportions *viz*., 60:40 and 80:20 of cotton and mesta, respectively.

Spinning:

Spinning of yarn was carried out in cotton card upto the sliver stage that were later taken to the Draw frame-I (Breaker draw frame) for parallelization of fibres. The rover then passed through Drawframe-II (Finisher draw frame) that performed the correction of variations in diameter of yarn. The rover was then converted to yarn by passing through the speed frame and drafts in the ring frame were set to produce counts between 8_S to 10_S.

Physical characteristics of cotton/mesta blended yarns:

Yarn was finally wound on packages. Thereafter, yarn characters and properties such as yarn count (Ne_c), Lea strength (lb), Count Strength Product (CSP), Single yarn strength (kgf/tex), Yarn elongation (%), Yarn evenness (%), Yarn hairiness (number of hairs/km) were assessed by using the formula :

Yarn count (Ne_c):

$$Ne_c = \frac{L \times w}{l \times W}$$

where,

Ne_c = The yarn number or count

W = The weight of the sample at the official regain in the units of the system

L = The length of the sample

l = The unit of length of the system

w = The unit of weight of the system

Lea strength (lb):

The lea strength was assessed by using instrument 'Auto Wrap reel (capacity 10 bobbin) ISO9001 and Lea strength tester

Count strength product (CSP):

Hank of 120 yards that was wound on the wrap reel and was weighed on an electronic balance and later CSP of blended yarn were calculated by using the formula,

$$CSP = L_1 \times Ne$$

where,

L_1 = Average breaking load, in pounds (kg x 2.2), of the lea.

Ne = English count

Single yarn strength (kgf/tex) and yarn elongation(%):

Single yarn strength (gf/tex) and elongation percentage of the yarns were recorded simultaneously using 'Mesdan Lab 10' equipment.

Yarn evenness (%):

Yarn evenness was measured by instrument 'Star Uster Evenness Tester'

Yarn hairiness (number of hairs/km):

Yarn hairiness (no. of hairs/km) and the length of hair (mm) of the pure and blended yarns were recorded by using instrument Zweigle Hairiness tester.

■ RESEARCH FINDINGS AND DISCUSSION

Results revealed that 60:40, cotton/mesta blended yarn was finer (13.52 Ne_c) than the cent per cent organic cotton yarn (8.9 Ne_c). However, 80:20 cotton/mesta blend exhibited better evenness than the 60:40 blend. Mesta fibres composing of lignocellulosic content tends to be coarse and lacks pliability. Missibility in blended yarns cause problem when there is lack of cohesiveness among the fibres being blended (Fig. 1).

Lea strength of 80:20 cotton/mesta blended yarn was higher than cent per cent organic cotton yarn (155 lb). Higher strength and better structure of mesta fibres improve the yarn

Table 1 : Cost of production per kg of cotton/mesta blended yarn

Particulars	100% cotton (control)			Blended					
				60:40 (cotton/mesta)			80:20 (cotton/mesta)		
	Quantity	Rate (Rs.)	Amount (Rs.)	Quantity	Rate (Rs.)	Amount (Rs.)	Quantity	Rate (Rs.)	Amount (Rs.)
Variable cost									
Cotton	1.15 kg	115.00/kg	132.25	780 g	115.00/kg	89.70	920 g	115.00/kg	105.8
Mesta	-	-	-	520 g	12.00/kg	06.24	380g	12.00/kg	03.96
Jute batching oil (JBO)	-	-	-	80 ml	200/ltr	16.00	40 ml	200/ltr	08.00
Spinning charge	1 kg	1.00/count	15.00	1 kg	1.00/count	15.00	1 kg	1.00/count	15.00
Total variable cost	-	-	147.25	-	-	126.94	-	-	132.76
Miscellaneous									
Overhead expenses @ 1% of total variable cost			1.472			1.27			1.33
Total cost			148.73			128.21			134.09

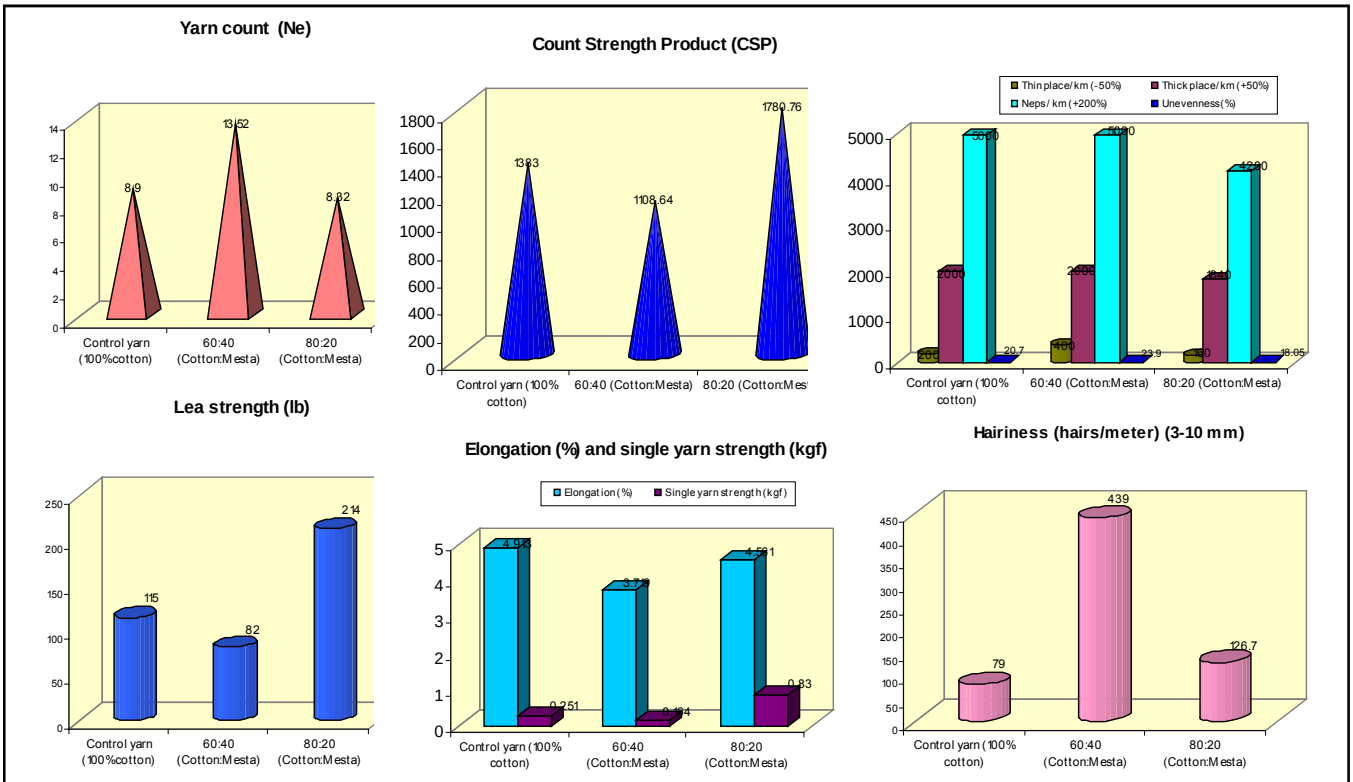

Fig. 1 : Purchasing behaviour of the respondents regarding

strength on blending. On the other hand, they have lower elongation than cotton fibres. Therefore the resultant yarn exhibited lower elongation (4.561%) for 80:20 blend percentage (Fig. 1).

It is evident from the Table 1 that cost of producing one kg of 100 per cent cotton yarn was Rs. 148.72 followed by 80:20 cotton/mesta blended yarn Rs.134.08 and the 60:40 cotton/mesta blended yarn Rs. 128.20. This implies that increase in the ratio of mesta fibre for blending reduces the cost of production of cotton yarn.

Conclusion:

Mesta fibres have added strength to the cotton yarn simultaneously decreased the elongation making the ultimate yarn suitable for knits, curtains and draperies and other household textiles including table and kitchen linen.

Value addition to under utilized minor fibres encourages cultivation of such crops for better returns. Further, helps in conservation and efficient utilization of natural resources for variegated end uses.

Authors' affiliations:
R.K. DHANALAXMI, Department of Textile and Apparel Designing, College of Rural Home Science, University of Agricultural Sciences, DHARWAD (KARNATAKA) INIDIA
Email: dhanalaxmirajkumari@gmail.com
MANISH PUJARI, Department of Spinning, DKTE'S Textile and Engineering Institute, ICHALKARANJI (KARNATAKA) INIDIA

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