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Physical properties of Himalayan nettle cotton union fabrics

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ABSTRACT : The present investigation concerns with the potential utilization of underutilized non conventional fibres for weaving of union fabrics. The focus of the study was on the utilization of Himalayan nettle (*Girardinia diversifolia*) fibres. Himalayan nettle cotton union fabric was woven on both handloom as well as power loom in which cotton yarn was used as warp and Himalayan nettle yarn as weft. Himalayan nettle cotton union fabrics were tested for physical properties *i.e*, thickness, bending length, drape coefficient, pilling test, fabric strength and elongation. On the basis of physical properties, the developed Himalayan nettle cotton union fabrics were used for the development of the products.

Key words: Cotton, Himalayan nettle, non conventional fibres, union fabric

Non conventional fibre yielding plants are one of the largely ignored and underutilized resources of the hilly regions. Unfortunately advanced knowledge about processing of fibres is lacking as rural people are still using these non conventional fibres for mats, ropes, cordages and twines (Das *et al.*, 2010). These non cultivated fibrous plants such as *bhimal*, *rambans*, Himalayan nettle etc. are wildly grown in hilly region of Uttarakhand. These are of local importance and have potential value as source of income generation. Thus these can fulfill an important role for the economic upliftment of poor people in the developing countries. Natural fibre plants can be economically exploited in an eco friendly manner. Even marginal consumption of these fibre yielding plant resources could prove a landmark beginning and can bring in significant benefits for the society.

Uttarakhand has been recognized as one of Indian states which has potential for nettle fibre development. Nettle is herbaceous perennial flowering plant found in abundance in the Himalayas. The plant has hollow stinging hair on its leaves and stems which act like hypodermic needle hence it is also called *bichchhoo* grass locally. Stems of nettle plant contain fibres that are extracted through retting process. Local people have now realized the importance and potential use of Himalayan nettle after looking at significant developments in nettle fibre production and its trade at a small and medium enterprise level in the neighbouring country Nepal (Garg and Saggu, 2017).

Himalayan nettle (*Girardinia diversifolia*) is found in Uttarakhand and several species of these plants are endemic to this region. The fibres extracted from these plants are being utilized by local people for small handicraft products, ropes and sacks. By keeping all these points in mind an attempt was made to utilize hand spun yarns of Himalayan nettle fibres to weave union fabrics on handloom and power

loom and assess their physical properties to determine their intended use for particular purpose.

The study was conducted in the year 2015-2016 in the department of Clothing and Textiles, College of Home Science, G.B.P.U.A.T., Pantnagar.

Collection of raw material : Himalayan nettle yarns were procured from Kraftloom Overseas P. Ltd., Dehradun. Cotton yarn was procured from Kashipur. The yarn count of Himalayan nettle and cotton yarns was 81.78 tex and 69.06 tex, respectively.

Development of union fabrics : Himalayan nettle cotton union fabrics were woven on handloom (2/2 twill weave) and on power loom (plain weave). Fabric 1 and 2 designate Himalayan nettle cotton fabrics woven on handloom and power loom, respectively. Cotton yarn was used as warp and Himalayan nettle yarn was used as weft in both the fabrics.

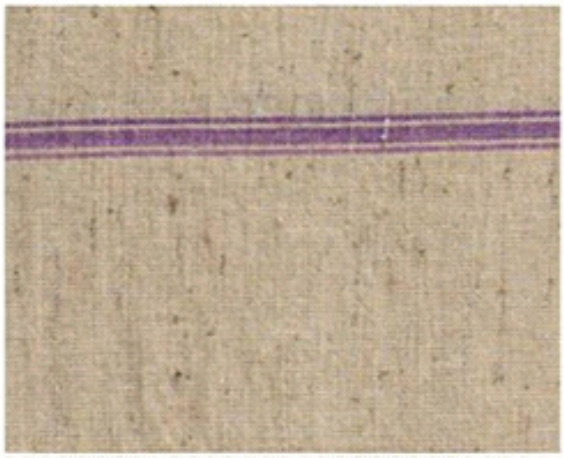
Testing of physical properties of woven fabrics : Woven Himalayan nettle cotton union fabrics were tested for fabric thickness (IS: 7702-1975), fabric count, bending length (IS: 6490-1971), crease recovery (IS: 4681-1968), Breaking strength and elongation (IS: 1969-1968), drape coefficient (IS: 8357-1977) and pilling test (ASTM D 4970) by using standard test methods (ISI and ASTM).

Physical properties of Himalayan nettle cotton union fabrics are as follows.

Fabric thickness : Results in Table 1 show that thickness values of Himalayan nettle cotton union Fabric 1 and 2 were found to be 0.87mm and 0.85mm, respectively. Slight difference can be observed in the thickness of Himalayan nettle- cotton union Fabric 1 and 2.

Fabric count : Fabric count of Himalayan nettle-cotton union Fabric 1 and 2 was observed as 30 x 32 and 34 x 36, respectively (Table 1).

Fabric 1 : Twilt weavefabric woven on hand loom



Fabric 2 : Plain weave fabric woven on power loom

Plate 1. Himalayan nettle cotton union fabrics

Table 1. Properties of woven Himalayan nettle cotton union fabrics

S.No.	Properties		Fabric 1(Twill weave fabric woven on hand loom)	Fabric 2 (Plain weave fabric woven on power loom)
1.	Thickness (mm)		0.87 mm	0.85 mm
2.	Fabric count	Warp	30	34
		Weft	32	36
3.	Bending length (cm)	Warp	2.08 cm	2.00 cm
		Weft	5.46 cm	4.16 cm
4.	Crease recovery angle	Warp	116	98
		Weft	124	115
5.	Tensile strength (Kgf)	Warp	36 kg	38 kg
		Weft	54.9 kg	56.2 kg
6.	Elongation (%)	Warp	28	32
		Weft	55	59
7.	Drape coefficient (%)		36 per cent	38 per cent
8.	Pilling		5 (No pilling)	5 (No pilling)

Slight difference in count of Fabric 1 (twill weave) and Fabric 2 (plain weave) may be due to the difference in weave structures which resulted in difference of number of ends and picks per inch.

Bending length : It is apparent from Table 1 that bending length of Himalayan nettle-cotton union Fabric 1 was found to be 2.08 cm (warp way) and 5.46 cm (weft way) whereas bending length values of Himalayan nettle-cotton union Fabric 2 were 2.00 cm (warp way) and 4.16 cm (weft way).

High bending length in weft direction of both types of union fabrics may be due to the more stiffness of hand spun Himalayan nettle yarns which were used in weft direction.

Crease recovery : It is clear from the data presented in Table 1 that crease recovery angle of Fabric 1 was found to be 116^0 (warp direction) and 124^0 (weft direction) whereas crease recovery angle of Fabric 2 was found to be 98^0 (warp direction) and 115^0 (weft direction). High value of angle shows more crease recovery whereas low value of angle shows less crease recovery.

Breaking strength and elongation : Tensile strength was measured in terms of breaking force in kg. Table 1 shows that tensile strength values of Fabric 1 were 36 kg (warp) and 54.9 kg (weft) whereas Fabric 2 exhibited tensile strength of 38 kg (warp) and 56.2 kg (weft). Percentage elongation of Fabric 1 and Fabric 2 in warp direction was found to be 28 per cent and 32 per cent respectively whereas percentage elongation of Fabric 1 and Fabric 2 in weft direction was observed as 55% and 59% respectively. It can be deduced from the results that both the woven samples had more tensile strength in weft direction. This may be attributed to the use of yarns fine spun yarn from Himalayan nettle fibres in weft direction which had higher tenacity than cotton yarns used in warp direction. Himalayan nettle fibres are bast

Plate 2. Products developed from Himalayan nettle cotton union fabrics

fibres having more staple length than cotton fibres. Spun yarns of nettle fibres are thus stronger than cotton yarns.

Drape coefficient : Himalayan nettle-cotton union Fabric 1 and Fabric 2 exhibited 36 per cent and 38 per cent drape coefficient respectively (Table 1). The drape coefficient values of both the fabrics are in close proximity which exhibited low drapability. Draping qualities of fabric are affected by the stiffness of fibres and yarns. Nettle yarn used in weft direction of woven fabric was stiffer and due to which fabric exhibited stiffness and low drapability.

Pilling test : Himalayan nettle- cotton union Fabric 1 and 2 exhibited no pilling. Himalayan nettle yarn, spun from longer staple length fibre used in warp direction whereas fine cotton yarn was used in warp direction in both the Himalayan nettle cotton union fabrics. Therefore there is less chance of migration of loose fibres on the fabric surface which was responsible for no pilling.

Product development : Woven union fabrics of Himalayan nettle cotton were utilized for the development of products like jackets, stoles and accessories. Himalayan nettle cotton union fabric woven on handloom was used for construction of fashion accessories such as purse, belt and mobile cover whereas upper garments such as waist coat and stole were

prepared from the fabric woven on power loom. Both type of fabrics had stable structure and showed low drapability hence their utilization for upper garments and handicrafts was justified.

Practical and scientific utility : Now days, consumers are getting aware of more hygienic lifestyle and pollution free environment hence, there is need to develop novel eco friendly and bio degradable textiles to save tomorrow. Introduction of cost effective processing techniques, spinning, and weaving methods for non- conventional fibres are required for maximizing their utilization. An initiative has been taken towards value addition of Himalayan nettle fibres so that their scope can be enhanced in textile market through product diversification. Proper utilization of these non conventional fibres in form of attractive handloom and power loom products will add to their commercial value. An attempt was made to utilize Himalayan nettle fibres for production of green products that will provide additional income to the farm families.

CONCLUSION

The use of plant sources for various textile applications has opened up new avenues in the field of textiles. Production of fabrics from natural fibres has always been the mainstay of the global textile industry as it contains all the elements that are good for the consumer. Fashion apparels and accessories of natural origin are making their way into global market. The research was intended to use yarns spun from non conventional fibres in handloom and power loom industry to add new dimensions in terms of innovative raw material to finished products.

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