

DEVELOPMENT OF NETTLE FABRICS AND ITS PROPERTIES

¹T. Vijayalakshmi, ²Dr. G. Manonmani

¹Research Scholar, ²Assistant Professor

¹PSG College of Arts and Science

²Mother Theresa Women's University

INTRODUCTION

The Textile Industry uses many different kinds of fibers as its raw materials. Some of these fibers were known and used in the earlier civilization as well as in modern times. Other fibers have acquired varied degree of importance in recent years. The factors, influencing the development and utilization of all these fibers including their ability to spin, and the availability in sufficient quantity, the cost of economy of production and the desirability of their properties to the customers.

Nettle is described as the only efficient cotton substitute. This is a much despised plant in the hills of North India due to its virulent stinging hairs. The plant grows to heights of 3 or 4 feet and is often used as fencing to keep out cattle. The popular Hindi name is Bichuaa means scorpion.

The length of the Nettle fibre varies from 3/4 inch to 2 1/2 inches. It can be dyed and bleached in the same way as cotton, and when mercerized is but slightly inferior to silk. It has been considered much superior to cotton for velvet and plush. Cotton is ideal for blending with natural and manmade fibers.

METHODOLOGY

The sequential steps to create the nettle fabric

- Harvesting the Nettle plant
- Extraction of Nettle Fibre
- Blending, Opening and Cleaning
- Carding Process
- Drawing Process
- Spinning Process
- Warping and Sizing Process
- Reeling Process
- Weaving Process

HARVESTING THE NETTLE PLANT

Nettle is found in the tropical regions like Nilgiris, Anamalai Hills and Himalayas. Stinging Nettle (*Girardinia Diversifolia*) is a perennial plant found in temperate and tropical wasteland areas. The plant is characterized by pointed leaves and white to yellowish flowers. The plant for the study was collected from the forest of Kotagiri. The stem of the plants are cut 10 cm above the ground.

EXTRACTION OF NETTLE FIBRE

Nettle Fibers were extracted using water retting method. Water retting process employs the action of bacteria and moisture on plants to dissolve or rot away much of the cellular tissues and gummy substances surrounding the bast-fibre bundles. Retting process was continued for about 15 days. The retted bark was taken out and beaten with wooden hammer and washed thoroughly to remove the impurities. The fiber is taken and boiled with ash for smoothening of the fibers after which the clean fiber is taken and dried thoroughly.

OPENING, BLENDING AND CLEANING

Opening was done in order to loose the hard lumps of fiber and disentangle them. The fibers were fed into opening machine which passes through rollers with metal hooks which opens the clusters of fibers and separates the fibers. Cleaning was done to remove the trash such as dirt and burrs. Since the natural fiber has a lot of impurities, it is necessary to clean them. After cleaning nettle fiber is blended with cotton in three different ratios NC01, NC02, NC03, and with polyester in three different ratio NP01, NP02, NP03.

CARDING PROCESS

The initial process of arranging the fibers in parallel is known as carding.

**Carding Web****Carding Sliver**

The remaining impurities were removed and the fibers were disentangled and straightened using the carding machine. The blended fibers were placed on the in-feed table or conveyor is moved to the nippers which restrain and meter the fiber onto the swift. As they are transferred to the swift, many of the fibers are straightened and are rotated into a drum to form a thin sheet. Then the sheet is cut in one end and removed which is called web. The web fed into the conveyor passes through an orifice which compacts them slightly and produces an even strip of fibers called carded sliver.

DRAWING PROCESS

The drawing machine makes slivers obtained from the carding engine by uniting or doubling a number of them and then drawing them to about a many times their original length as the number of doubled slivers amount to. The evenness would be perfect in each cross section of the entire length of the sliver.

**Drawing Machine**

The carding sliver fed to the drawing frame where the sliver passes through three set of rollers. It is then collected in a can kept underneath the machine. This process was repeated for three times to create evenness in the yarn.

SPINNING PROCESS

The spinning process is an ancient textile art in which plant, animal or synthetic fibers are twisted together to form yarn briefs Toshinari (1994). Characteristics of spun yarn vary according to the material used, fiber length and alignment, quantity of fiber used, and degree of twist.

**Spinning Machine**

The carding sliver was converted into yarn by using computerized Open-End Rotor spinning machine. The drawing sliver was fed into the spinning machine. The twist, count and speed of rotation are fed into the computer and the machine was operated. Then the sliver was twisted and wound on the bobbin. Three blended combinations of nettle cotton and nettle polyester yarn is produced NC01, NC02, NC03, NP01, NP02 and NP03 yarn.

WARPING AND SIZING PROCESS

The large spools of yarn are wound into a beam which is used for weaving, a process known as warping. The warp yarns are wound onto the beam from packages mounted on creels. The warp yarns normally pass through sizing solution. Sizing protects the yarn against snagging that occurs during weaving.

REELING PROCESS

The spinning processes the thread is wound upon bobbins. The cone is fitted to the reeling machine and then the thread from the cone is transferred into small bobbin to be inserted in to the shuttle for weaving.

WEAVING

The yarns are converted into fabric by weaving process. The interlacing of two sets of threads crossing each other at right angles is called weaving. Six different combinations of fabrics are produced NC01, NC02, NC03, NP01, NP02 and NP03 fabric.

EVALUATION OF NETTLE BLENDED YARN

PROPERTIES OF NETTLE BLENDED YARNS						
	NC01	NC02	NC03	NP01	NP02	NP03
Actual Strength (g)	290.3	309.2	303.8	384.6	390	461.9
CV% of strength	26.17	21.52	24.62	17.23	14.73	13.51
% Elongation	9.95	11.96	9.78	11.76	12.97	15.8
CV% of Elongation	24.97	22.38	23.43	18.19	13.96	10.81
Yarn Count(Ne)	9.8	9.7	10	9.8	9.7	10

The Nettle blended yarns were evaluated for mechanical properties like strength and elongation of the yarn. NC02 was found to be strong in Nettle/ Cotton Combinations and in NP03 was found to be strong IN Nettle /polyester combinations. The yarn count was found to be at the average of 9.8 Ne for all the combinations.

EVALUATION OF NETTLE BLENDED YARN

PROPERTIES OF NETTLE BLENDED FABRICS						
	NC01	NC02	NC03	NP01	NP02	NP03
Warp Strength (kg)	19.88	18.65	20.27	23.34	22.71	30.67
Weft Strength (kg)	16.03	13.36	19.22	17.07	20.96	23.52
Fabric thickness (mm)	0.85	0.86	0.85	0.91	0.91	0.78
Fabric Weight (g/sq.mtr)	180.46	178.76	156.85	179.23	169.46	172.38
Weight Loss in %	4.94	7.53	7.12	1.32	1.01	0.071

The fabric with NC03 was found to strong in warp and weft direction out of the cotton nettle blended fabrics. The fabric with NP03 was found to be strong in warp and weft direction out of the nettle polyester blended fabrics. The average thickness of the blended fabrics was found to be 0.86mm. The average GSM of the Nettle/Cotton fabric was 172g/sq.mtr. The average GSM of Nettle/Polyester fabric was 173 g/sq.mtr.

CONCLUSION

The properties of the blended nettle fabrics were analyzed by evaluating the nettle blended yarn and nettle blended fabric. The properties of the different nettle blended yarn and fabrics shows that the nettle blended fabrics can be used as textile material for clothing. The study states that Nettle cotton fabric is eco friendly which is useful for the society.

BIBLIOGRAPHY

1. A Shwini K. Agarwal - Introduction to natural fibers, Elsevier Publishers, 1959, Pg. 13.
2. A.N.Galathi - The physical Properties of Cotton, Asia Publishing house Bombay, 1957 Pg.122.
3. Albert Easton Lewis - Introduction To Textiles Sir I. Pitman, 1928, Pg. 6
4. Barrett Hazeltine - Field Guide to Appropriate Technology, Academic press, 2003, Pg. 125.
5. B. P.Saville - Physical testing of textiles, Woodhead Publishing Ltd. 1999 Pg. 145.
6. Bhuvnesh Chandra Goswami - Textile sizing, Taylor & Francis Library, 2005, Pg. 69.
7. Cheryl Mendelson Laundry, Published by Philadelphia printers.1848, Pg. 55.

WEBSITE ADDRESSES

1. www.allfiberarts.com/library/.../aa052502.htm - United States
2. www.selfsufficientish.com/forum/viewtopic.php
3. www.botanical.com/botanical/mgmh/n/nettle03.html
4. www.rosenlake.net/er/Grieves_Nettle_Common.html
5. www.suite101.com/content/ethnobotany---useful-nettles-a222495