

CHEMICAL EFFECT OF PHYSICO-MECHANICAL PROPERTIES OF JUTE & JUTE-SYNTHETIC BLENDED (80/20) YARNS

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ABSTRACT

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The study was conducted at BJRI laboratory Dhaka, Bangladesh during the period of 2008-2009 under pilot plant and processing division. Two plied of 8 lbs/spy of jute-acrylic blended (80:20) yarns were treated successively with chemicals for woolenization, bleaching, dyeing and softening. Physico-mechanical properties -tensile strength, quality ratio, twist per inch etc of gray yarn and treated yarn with different chemicals in different stages were determined.

Keywords: Blended yarn, woolenization, bleaching and dyeing.

INTRODUCTION

Jute plant is hard and non-smooth and containing about 60% cellulosic fibrils. The rest are non-fibrous ground constituents like lignin, hemi cellulose and pectin substances which are encrusted with the fibrils making them coarse and non-flexible (Azad, 1995). Jute is the cheapest natural fiber used for manufacture of different goods which were highly in demand both in the domestic as well as foreign markets. But with the invention of synthetics, it has lost its traditional market considerably. Therefore, the idea to have excessive reliance on the production of conventional products like Hessian, Sacking and Carpet Backings etc. should be reviewed in the present crisis of jute industry and more in the face of the challenge from newly developed rival synthetic products (Kassem, 1992). Some significant research works had been successfully carried out in different regions of the globe dealing with the trade and manufacture of jute and its products and the similar efforts should be made now in the countries especially where this cheap natural jute fiber is growing abundantly (Kassem, 1992).

Jute fiber and its products for sophisticated textile uses have to undergo some chemical processing in wet stage. On chemical processing of jute, there is slight loss of strength occurred and a stage comes when the constituents are disintegrated with complete loss of fiber quality. So in the chemical processing of jute fiber materials, this aspect is to be taken care of some methods have been developed in the chemical process for jute materials such as woollenising, bleaching, dyeing, softening etc.

In this experiment studies on variation of physico-mechanical properties of jute and jute-synthetic blended yarns after chemical treatment in different stages of wet processing have been performed.

MATERIALS AND METHODS

Two plied jute-acrylic blended (80:20) yarn of 9 lbs/spy (309.15tex) nominal count was spun. The yarns were spun by using conventional jute spinning machinery in mechanical processing division. Blending offers ways of reaching new and better products in which the good features of one fiber argument and complement those of another.

The plied yarns were treated chemically successively by maintaining the following recipes in different stages of wet processing:

1) Woollenising	:	Caustic Soda (flakes) solution	20% (o.w.m) * *
	:	Sulphuric acid	3% (o.w.m)
2) Bleaching	:	Hydrogen peroxide (35%)	10% (o.w.m)
	:	Sodium silicate (stabilizer)	6% (o.w.m)
	:	Soda ash	2% (o.w.m)
	:	Lisapol (wetting agent)	0.2% (o.w.m)
3) Dyeing	:	Procion Yellow R	2% (o.w.m)
	:	Common salt (NaCl)	40 g/l
	:	Soda ash	5 g/l
	:	M.L.R	1:20
4) Softening	:	Basosoft	4% (o.w.m)
	:	Acetic acid	0.5% (o.w.m)

** o.w.m - on the weight of the material

Woollenization: An important wet process to improve severely the appearance and handle of jute fibers & its blended. By this process, jute fiber is treated with strong alkali and remarkable changes occurs in its physical structure - lateral swelling occurs, together with considerable shrinkage in length, as a result the fiber is softened to touch and develops a high degree of crimp or waviness. The crimp gives a "wool like" appearance to the fiber & the resultant fiber is termed as modified jute (Rowell and Stout 1998).

Bleaching: It is done for removing the natural coloring matters of jute fibers and a preparation of jute materials in uniform manner prior to dyeing. Hydrogen peroxide is used as a bleaching agent very extensively for this purpose. (Trot man 1984)

Dyeing: It is a process of jute materials coloration. Jute yarns are generally dyed in open vat or in hank dyeing machine & fabrics in jigger dyeing machine. Dyeing is done by using suitable selected dyestuffs based on the end uses of the products. Some standard and economic dyeing methods have been developed for jute materials in order to obtain desired washing, rubbing and light fastness.

Softening: The final stage of the finished products to improve the hand feel /touch of jute materials by using fatty acid based softener.

RESULTS AND DISCUSSION

Standard test method was followed to determine the textile properties say tensile strength, count, quality ratio, loss of quality ratio, twist per inch (TPI) of single and ply yarns of blended gray and chemical treated yarn.

It is found from the resultant table that the value of “quality ratio” of yarn was decreased gradually in different stages of wet processing due to chemical reaction on yarns. It is also observed from the results that the values of twist per inch (TPI) of single yarns were increased gradually except the dyed yarn. Same phenomena also followed except the dyed & softened yarn stage in case of TPI of two ply yarns.

Table 1. Physico-mechanical properties of gray (untreated with any chemical) and successively treated using different chemical in different stage of wet processing of jute acrylic (80:20) blended yarns

Tested Sample	Tensile Strength			Count (lbs/spy)	Quality Ratio (%)	Loss of Quality Ratio (%)	Single Yarn Twist (TPI)	Two ply Yarn Twist (TPI)
	Mean	S.D	C.V%					
Grey Yarn	12.50	1.80	14.40	18.52	67.50	0	4.45	2.37
Woollenized Yarn	11.00	1.20	10.90	19.0	57.90	14.75	4.75	2.84
Bleached Yarn	8.30	0.60	7.47	20.53	40.78	39.6	5.39	3.19
Dyed yarn	8.00	0.69	8.62	19.62	40.43	40.10	5.16	3.05
Softened yarn	7.90	0.67	8.48	18.45	38.05	38.05	5.55	2.95

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