The Pharma Innovation Journal 2020; 9(3): 350-352

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2020; 9(3): 350-352

www.thepharmajournal.com
Received: 25-01-2020
Accepted: 26-02-2020

Tausi Honorata Alexander
University of Dar es Salaam, College of Engineering and Technology, Department of Mechanical and Industrial Engineering, P. O. BOX 35131, Dar Essalaam, Tanzania

Sakshi
Department of Clothing and Textiles, College of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India

Goel Alka
Department of Clothing and Textiles, College of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India

Gahlot Manisha
Department of Clothing and Textiles, College of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India

Corresponding Author:
Tausi Honorata Alexander
University of Dar es Salaam, College of Engineering and Technology, Department of Mechanical and Industrial Engineering, P. O. BOX 35131, Dar Essalaam, Tanzania

Quality charaterstics of recycled handloom fabrics

Tausi Honorata Alexander, Sakshi, Goel Alka and Gahlot Manisha

Abstract
Textile production is not something can be limited in this lifestyle, this suggest that there will be continuous increase in fiber consumption, which leads to a higher amount of post industrial and post consumer fiber waste. Recycling is the most beneficial way of dealing with waste both environmentally and economically. As one of the reason this study joined the ecological movement toward material sustainable through recycling. In this study, recycled cotton yarns of count 7,8 and 9 Nec, recycled polyester yarns of 18 Nec and recycled polyester-cotton blended yarns of 20 Nec were used to preparation of recycled fabric on handloom and assess their physical properties.

Keywords: Recycled cotton, recycled polyester, recycled fabric, handloom fabric

Introduction
With clothing as one of the basic needs alongside food and housing, textile is necessity for human. Textiles materials serve different purposes such as apparel, home and industrial textiles. Increase in world population and rapid industrialization are reasons to quick exhaustion of natural resources. Improvement in living standard of the people, escalating in fast fashion, contemporary lifestyles, over consumption, cheap and easy availability of textiles and poor consumer awareness about environment friendliness are some of the causes of increasing demand for textiles and clothing. As the demand increases the amount of waste generated due to production and uses of textiles also increases.

Waste disposal is one of the most serious environmental problems the society has is facing. Both waste incineration and waste dumping in landfills have negative environmental impact. Natural fibers such as cotton, jute, wool and silk are biodegradable. However, decomposition of biodegradable materials in landfills is a principal cause of methane, an important greenhouse gas, making landfills one of the largest human related sources of methane. Even if the textile waste can be used as an efficient fuel in the waste-to-energy facilities, burning waste can cause emissions of CO2 and remaining ashes may contain toxic substances. Therefore, incinerating waste may be appropriate only if there is no better alternative. The best solution to avoid waste disposal is revolves around the 4R's of environmental management i.e. reduce, reuse, recycle and recover to keep end of lifecycle textile products out of landfills. Material that cannot be reused, repaired or recycled, incineration can be used to recover energy from the waste combustion heat. Recycling of textile waste brings both economical and environmental benefits.

Nowadays, sustainability of material and eco-friendly product concepts has begun to be a priority among the producers and consumers of textiles products. Because of known economic and environment benefits in recycling. Textile reuse and recycling status in the world has been surveyed by J. Lu and coworkers (J Lu and Hamouda, 2014) [2], data showed that China reuse/recycle only 10% of all fiber waste, Japan 12-13% and 15% of the fiber waste in the US is reused or recycled. Europe, Germany been one of the pioneer countries where as much as 66% of the projected textile fiber turnover is collected and recycled or reused as reported in the German federal organization for secondary raw materials and disposals. At present, recycled yarns are mostly used in manufacturing of knitted fabrics and there is lacking in literature on recycled woven fabrics prepared on handloom that was another reason this study was aimed to prepare handloom fabrics from recycled cotton and polyester yarns and asses quality characterstics.

Materials and Methods
In this study recycled polyester (18 Nec), recycled cotton (7, 8 and 9 Nec) and blended (20 Nec) yarns were procured from Ganesha Ecosphere Ltd, Uttarakhand, Kabra Agencies,

Panipat, Haryana and Shreeji Cotfab Ltd, Rajastha, India Procured yarns were assessed for properties i.e. yarn count, yarn strength and yarn weight where assessed. Five recycled fabrics were developed in 2/ 2 twill weave structure. The recycled polyester was used in warp for all five woven samples i.e. doubled polyester yarn was used in warp in order to withstand the mechanical action of handloom.

The properties of prepared fabric samples were tested includes thickness, drape, wettability and air permeability were also determined. Tests were done 5 times and the average values were taken. The instruments used for thickness was fabric thickness tester, for drape was drapemeter, for wettability spray tester and air permeability tester was used to test air permeability.

Results and Discussion

Table 1 shows the results of yarn properties From Table 1 it shows that (100% recycled polyester yarn) had higher tensile strength compared to the rest of the yarns tested. As polyester is synthetic fibre it had better strength compared to rest of the yarn samples. Yarn 5(Y5 Blended polyester cotton yarn) which had tenacity of671.8 gf. These results correlate with the results obtained in a study by Telli and Babaarslan, (2017) [5], which showed that recycled polyester had higher tensile strength at break when compared to recycled cotton, and it was suggested that lower tensile strength of recycled cotton was related to bad yarns length uniformity. It can also be deduced from the table that 100% recycled cotton yarns used in the present were having more weight compared to 100% recycled polyester and recycled blended yarn

Table 1: Physical properties of yarns

Physical properties	Yarns				
	Y1	Y2	Y3	Y4	Y5
Yarn count (Nec)	7	8	9	18	20
Yarn strength (gf)	416.2	367.1	316.1	886.6	671.4
Yarn weight (g/m)	0.07	0.07	0.07	0.04	0.03

Y1 = 100% recycled cotton (7 Nec)
Y2 = 100% recycled cotton (8 Nec)
Y3 = 100% recycled cotton (9 Nec)
Y4 = 100% recycled polyester (18Nec)
Y5 = 40:60 recycled polyester-cotton blend (20Nec)

Table 2 gives information regarding physical properties of manufactured woven fabrics.

Table 2: Physical properties of woven fabrics

Fabric sample	Drape coefficient (F%)	Fabric thickness (mm)	Wettability (Rating)	Air permeability ($m^3/m^2/min$)
F1	28.76	0.63	80	156.698
F2	28.68	0.63	80	175.035
F3	24.52	0.60	80	165.033
F4	20.59	0.39	0	211.709
F5	21.34	0.45	50	208.375

F1 = 100% recycled polyester (9 Nec) × 100% recycled cotton (7 Nec)
F2 = 100% recycled polyester (9 Nec) × 100% recycled cotton (8 Nec)
F3 = 100% recycled polyester (9 Nec) × 100% recycled cotton (9 Nec)
F4 = 100% recycled polyester (9 Nec) × 100% recycled polyester (18Nec)
F5= 100% recycled polyester (9 Nec) × 40:60 recycled polyester-cotton blend (20Nec)

It is evident from the Table 2 that F1 [100% recycled polyester (9 Nec) × 100% recycled cotton (7 Nec)] had maximum drape coefficient, followed by F2[100% recycled polyester (9 Nec) × 100% recycled cotton (8 Nec)] and minimum drape coefficient was in F4[100% recycled polyester (9 Nec) ×100% recycled polyester (18Nec)]. Minimum value of drape coefficient (F) was found in fabric sample 100% recycled polyester (9 Nec) × 100% recycled polyester (18 Nec) fabric sample, which means it has better drapability in comparison to the remaining woven fabric samples. Good drapability in 100% recycled polyester (9 Nec) × 100% recycled polyester (18Nec) fabric sample might be for the reason that polyester yarns of 9 Nec in warp and 18 Nec in weft were used. Polyester spun yarns are flexible and softer, than cotton thereby their draping quality was found to be improved and non significant difference in drape coefficient between F1 and F2 also between F2 and F3 and between F4 and F5 woven samples at 5% level of significance.

Table 2 also shows two fabric samples, F1 and F2 had same value of thickness followed F3. Recycled fabric samples F1, F2 and F3 having the highest thickness value might be due to reason that the yarns used in weft were recycled cotton whose count were 7,8 and 9 Nec. These fabrics were made of coarse weft yarns compared to the other two, coarse yarns made of more number of fibres in the their cross-section, hence more thickness values. In general the lower the count the coarser the yarn. There was non significant difference between F1, F2 and F3 and between F4 and F5 woven sample at 5% level of significance.

It can be envisaged from Table 2 that F4 [100% recycled polyester (9 Nec) × 100% recycled polyester (18Nec)] fabric sample showed complete wetting of the whole upper surface and lower surface. Followed by F5 sample, which showed complete wetting of the whole upper surface, while wetting of the upper surface at spray point was observed in F1, F2 and F3 fabric samples. Maximum wettability in F4, this might be due to the reason that the fabric had more open weave structure and this study found no significant difference between 100% recycled polyester (9 Nec) × 100% recycled cotton F1,F2 and F3 fabric samples with respect to wettability.

It can be inferred from the Table 2 that maximum air permeability was observed in fabric sample F4[100% recycled polyester (9 Nec) × 100% recycled polyester (18Nec)] followed by F5 and minimum air permeability was observed in F1. Maximum air permeability was in F4, which might be attributed by the reason that the fabric was having open weave structure which easily permitted the passage of air and its thickness was less compared to rest of the fabrics. Result of the present study are in line with study conducted by Telli & Özdil (2015) [6] where, it was noticed that 100% polyester fabrics displayed the highest air permeability result among the nine different fabrics. The reason for high air permeability was attributed to the lower cover factor of the polyester fabrics, which is caused, by lower hairiness and yarn diameter values of the 100% polyester yarns. The result found highly significant difference in air permeability at 5% level of significance.

Conclusion

This study was focused on recycled polyester and recycled cotton yarns, the important data obtained prove that 100% recycled polyester (9 Nec) × 100% recycled cotton (7 Nec),

and 100% recycled polyester (9 Nec) × 100% recycled cotton (8 Nec), fabrics were stiff with poor drape, had less permeable to air compared to the rest of the fabric samples and it had low rate of wettability.100% recycled polyester (9 Nec) × 100% recycled cotton (9 Nec), fabric had medium drapability less permeable to air and it had low rate of wettability.100% recycled polyester (9 Nec) × 100% recycled polyester (18 Nec), and 100% recycled polyester (9 Nec) × 40:60 recycled polyester-cotton blend (20 Nec), fabrics were flexible with good drape, and highest permeable to air. The present study is aiming to be helpful for handloom weavers to increase their income through producing of ecofriendly fabric from recycled yarns, which are in demands now days. The fabric samples are suggested for various applications such as stoles making, draperies, interlining and it can be used in carpet backing. These fabrics can also be used in apparel material such as dress material, apron, shopping bags etc. It can also be used as household textiles for making pillow and cushion cover, tablecloth, and in vibrant colours it can be used for upholstered furniture.

References

1. Abbasi M, Mojtahedi MRM, Khosroshahi A. Effect of spinning speed on the structure and physical properties of filament yarns produced from used PET bottles. Journal of Applied Polymer Science. 2007; 103:3972-3975.
2. Lu JJ, Hamouda H. Current status of fiber waste recycling and its future. Advanced Materials Research. 2014; 878:122-131.
3. Samanta AK. Effect of blend ratio on yarn evenness and imperfections characteristics of wool/polyester ring-spun yarn. Indian Journal of Fibre Textile Research. 2014; 39:89-92.
4. Saville BP. Physical testing of textiles. Cambridge, England, Wood Head Publications Limited, 2000, 307 p.
5. Telli A, Babaarslan O. Usage of recycled cotton and polyester fibers for sustainable staple yarn technology. Tekstilve Konfeksiyon. 2017; 27(3):224-233.
6. Telli A, Ozdil N. Effect of recycled PET fibers on the performance properties of knitted fabrics. Journal of Engineered Fibers and Fabrics. 2015; 10(2):47-60.