International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 02 Pages: 24-32
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

Journal Website: http://sciencebring.com/index.php/ijasr

Research Article

EFFECT OF THREAD ON YARN QUALITY OF COTTON/POLYESTER 80/20% BLEND YARN

Submission Date: February 05, 2023, **Accepted Date:** February 10, 2023,
Published Date: February 15, 2023
Crossref doi: https://doi.org/10.37547/ijasr-03-02-04

Fayzullaev Sh.R.
Tashkent Institute of Textile and Light Industry, Uzbekistan

Rajapov O.O.
Tashkent Institute of Textile and Light Industry, Uzbekistan

Kojametov B.T.
Karakalpak State University, Uzbekistan

Kolondorov M.J.
Karakalpak State University, Uzbekistan

ABSTRACT

The mechanical properties, thickness and uniformity of the yarn, deformations of its components and the ability of the yarn to withstand repeated forces, as well as different degrees of breakage of yarns in spinning machines, depend on the twist of the yarn. The productivity of spinning machines also depends on the twist of the thread, because at a constant speed of rotation of their components, their productivity is inversely proportional to the twist of the thread. Therefore, it is important to choose the optimal twist of the thread .

The scientific article presents the results of the study of the effect of the number of twists given to the cotton/polyester 80/20% mixed yarn on the quality parameters of the yarn. P wax/polyester 80/20% mixed yarn 14.7 tex (Ne 40 /1) in 850, 918 and 988 twists on ring spinning machines prepared. The quality indicators of the finished yarns were determined using USTER test equipment

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 02 Pages: 24-32
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

The unevenness and mechanical properties of mixed yarns and their coefficients of variation were analyzed. As a result, it was determined that the coefficients of variation of the cotton/polyester 80 / 20% mixed yarn between twist 850 and 918 in terms of unevenness indicators decrease, the tensile strength, breaking strength and breaking work indicators of the yarns increase.

KEYWORDS

Yarn quality, mixed yarn, unevenness, polyester fiber, coefficient of variation.

INTRODUCTION

According to the end of January-April 2022 of the textile and sewing knitting industry, more than 438,000 tons of cotton fibers were used by the companies in the industry. The volume of production of industrial products amounted to 29 trillion sums (growth rate - 112 percent). Including; cotton yarn - 354,000 tons (104 percent), yarn gauze - 315 million square meters (103 percent), knitwear - 91,000 tons (130 percent), sewing and knitwear - 998 million pieces (151 percent) [1].

The strength, unevenness, hairiness of the blended yarn depends on the fiber properties, the ratio in the blend, the spindle speed of the spinning machine [2], the yarn count, the high roller pressure and the twist coefficient of the drafting pairs [3-4]. When spinning high quality yarns, the influence of the diameter of the draw rolls, the initial elongation and the twist coefficient imparted to the web on the tensile force in the draw zone has been studied [5-6]. The decrease in the titer of the yarn is also caused by the increase in the elongation properties of blended yarns [7]. Filament breakage occurs due to breakage or displacement of the fibers in the filament. The breakage of the fiber in the thread is determined by the core strength of the fiber and the correct distribution of the fibers along the length of the thread. On the other hand, the twist applied to the yarn causes fiber shifts and breaks [8]. The quality parameters of ring, rotor and pneumo-mechanical blended yarns made of cotton/viscose/polyester/elastane depend on the parameters entered into the system and the ratio of blend and twist factor [9-10].

Dr Madan Lal Regar, assistant Professor, National Institute of Fashion Technology, Jodhpur, India and Prof. (Dr.) S.K.Sinha pointed out that the presence of long fibers in the thread section increases the strength of the thread and mentioned that the strength of the thread decreases with increasing number of rotations up to a certain limit to [11]. Given the number of twists, the elasticity, unevenness, hairiness and hardness of the blended yarns are good, and the number of twists is more than necessary. If more is given, the properties of the blended yarn deteriorate [12-14]. As we increased the number

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 02 Pages: 24-32
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

of twists of the yarn spun from 100% cotton fibers, it was observed that the friction and slip properties of the fabric woven from it decreased. With an increasing number of windings, the dust holding capacity also decreases and the water permeability improves [15-17].

Test methods. The experimental work was carried out in the scientific laboratory of the "Spinning Department" of TITLI, and 14,7-tex cotton/polyester 80/20% blend yarns were spun by the ring spinning process with 850, 918 and 988 twists in three different samples manufactured.

Quality parameters of mixed yarns Unevenness indicators of mixed yarns in the conditions of the quality laboratory near the company "BAKAN TEX" Tests for 3000 m of yarns at a speed of 400 m/min on Uster® Tester 6 and mechanical indicators of Uster® Tensojet 4 devices are made 3 times repeated, the results are averaged.

The purpose of the research work. The aim was to develop new ranges of raw materials and increase the quality level of the ranges in the manufacture of outerwear products for weaving from a mixture of cotton and polyester fibers. For this purpose, the influence of the twists given when spinning cotton/polyester 80/20% blend yarn on the quality parameters of the finished yarn was studied.

Cotton fibers of the "Sultan" selection variety and polyester fibers were used to produce mixed yarn samples. Cotton fiber samples were taken in accordance with the UzDSt 614-2018 standard and quality indicators were determined using the USTER AFIS PRO 2 device.

The properties of the fibers used in the research are given in Table 1 and a summary of the spinning schedule is given in Table 2.

Table 1

Properties of fibers in the mixture

No	Samples	Mic	Linear density of fiber text	Fiber length (mm)	Short Fiber Index (SFI)	Comparison ring power (g/tex)	Elongation at break (%)
1	Cotton fiber	3.6	0.186	32.1	8.4	33.9	7.1
2	Polyester fiber		0.164	38			

Table 2

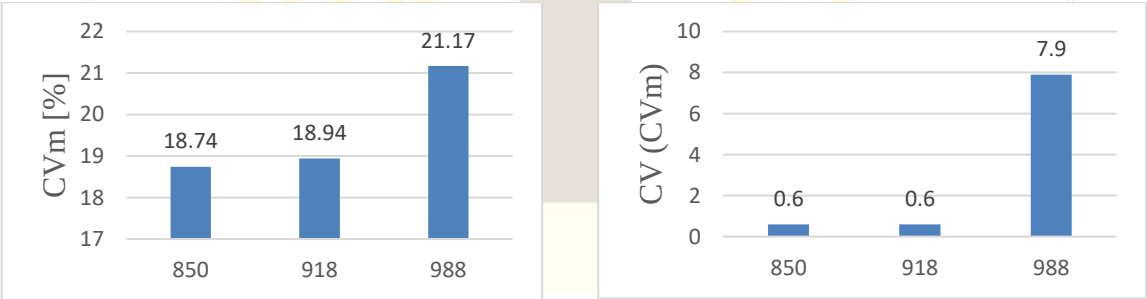
15.4 tex cotton/polyester (80/20) blend yarn spinning plan

by TTYeSI science laboratory

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 02 Pages: 24-32
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

No	The name of the machines and brand	Output product linear density, tex	Number of additions, d	Stretching quantity, E	Bad tooth		Issuer worker organ speed		Theoretical productivity, kg/h
					α_{pr}	K, tw/m	V, m/min	n, min $^{-1}$	
1	Card DK-903	5100					320		100
2	Draw HSR-1000	5100	6	6			850		150
3	Roving Zinser-668	530	1	9.62	6.7	29	15,65		
4	Spinning Zinser-350	14.7	1	34.4	53.7	850	12,43	11000	0.022
		14.7	1	34.4	58	918	12,72	11000	0.022
		14.7	1	34.4	62.4	988	13,05	11000	0.022

The result analysis. when we increased the twist of the 80/20% cotton/polyester blend yarn intended for weaving from 850 to 918, the unevenness of the mass of the yarn, the number of thin and thick areas, the number of tufts and the coefficients of variation and the Hairiness decreased. It was found that when the hardness of the blended yarn was given the 918 twist, the relative tenacity, tenacity and breaking performance indicators of the yarns increased. When we gave 988 twists to the mixed thread, the thinnest areas of the thread a) and their variation coefficients b) recorded the highest index. When spinning 80/20% cotton/polyester blend yarn intended for weaving, it can be concluded that the optimal twist option is 918 twists/meter.

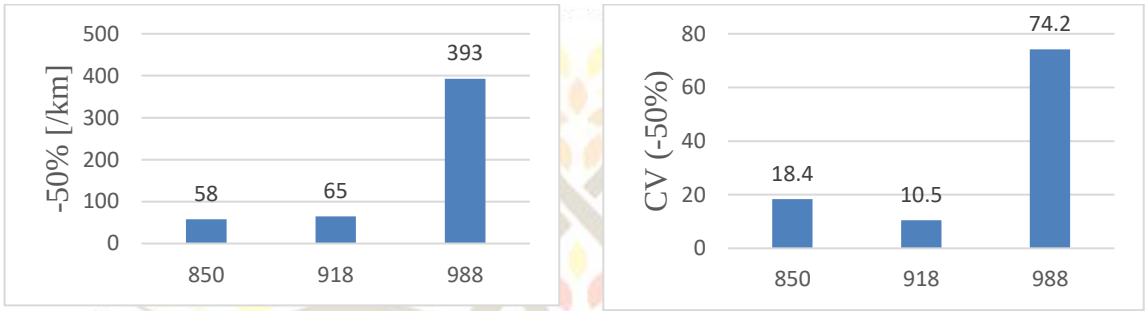


a) b)

Figure 1. By mass of cotton/polyester blend yarns roughness values a) and their coefficients of variation i b)

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 02 Pages: 24-32
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

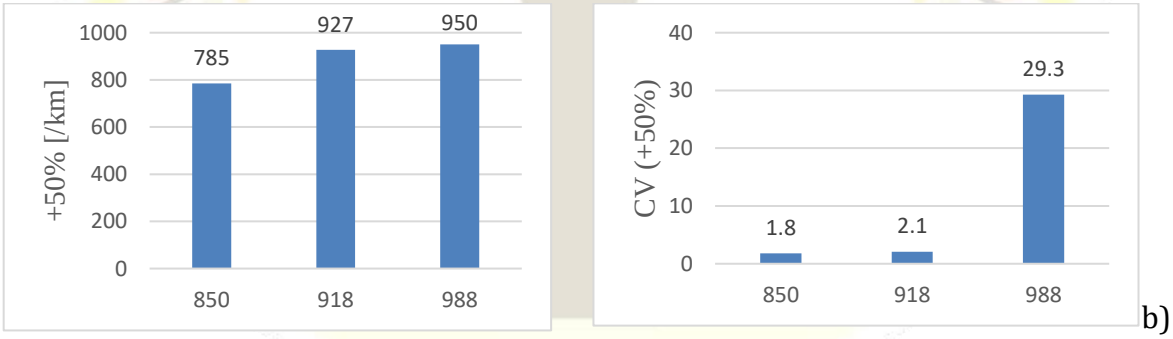
Figure 2, when 850 twists were given to the yarn spun from 80/20% polyester/polyester mixture , the thin areas of the yarn (Figure 2 a) recorded an index of 58 [/km] . When 918 twists are given, the thin areas of the thread increase by 12%, and we can see that the coefficient of variation according to b) decreases by 42.93%. When we gave 988 twists to the mixed yarn , the thinnest areas of the yarn a) and their coefficients of variation b) recorded the highest index.



a) b)

Figure 2. Thin areas of cotton/polyester blend yarns i a) and their coefficients of variation i b)

Figure 3, a) with the increase in the twist of yarns spun from a cotton/polyester mixture, the number of thick areas of the yarns decreased , and the highest figure corresponded to the yarn with 988 twists. Mixed of threads thick places according to v is the coefficient of variation the most less indicators are 1.8 and 2.1 respectively 850 and 918 turns respectively given mixed to the threads right came.

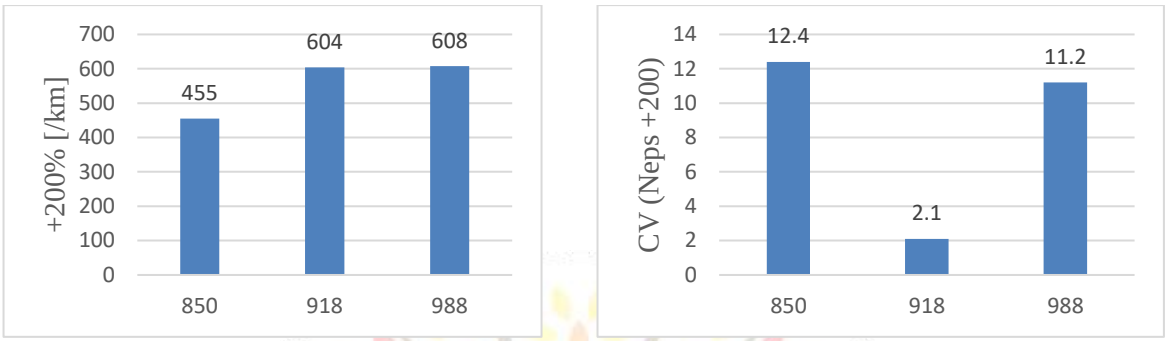


a) b)

Figure 3. Thick areas of cotton/polyester blend yarns i the number a) and their coefficients of variation i b)

Cotton/polyester mixed yarns, Fig. 4 a) the lowest indicator of the number of neps and the highest indicator of their coefficient of variation corresponded to the 850 twisted yarn. When we increased the twist of the mixed thread from 850 to 918, the number of neps increased, but their variation coefficient decreased by 16.93% according to b).

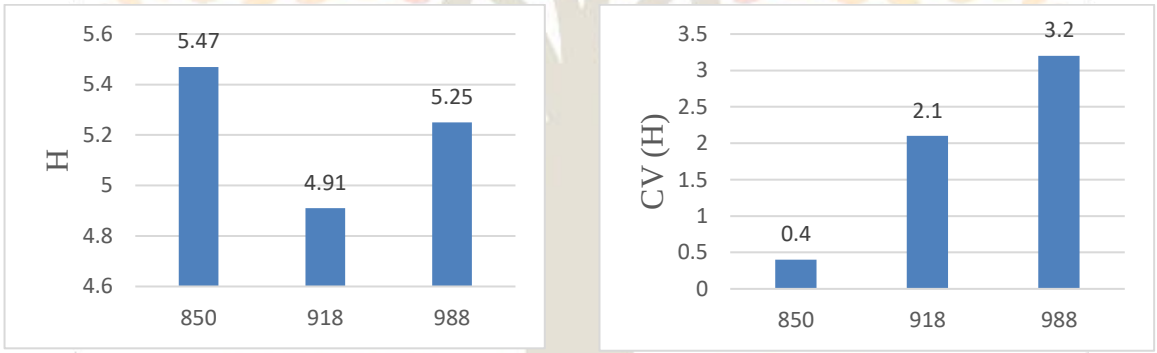
International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 02 Pages: 24-32
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135



a) b)

Figure 4. In yarns made from a cotton/polyester blend number of neps a) and their coefficient of variation b)

In the process of spinning cotton/polyester 80/20% mixed yarn, when we give 850 and 918 twist to yarns, we can see in Figure 5 a) hairiness index decreased from 5.47 to 4.91 or 10.23%. As the twist of the mixed yarns increased, the coefficients of variation in hairiness of the yarns b) increased.



a) b)

Figure 5 . Fluffiness of cotton/polyester blend yarns a) and their coefficient of variation b)

In Figure 6, when we twist the cotton/polyester mixed yarn from 850 to 918, it was observed that the yarn's a) specific breaking strength is improved by 11.36% and variation coefficient b) by 12.27%. Burami 988 mixed yarn recorded the lowest relative breaking strength and the highest result in terms of their coefficient of variation.

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 02 Pages: 24-32
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

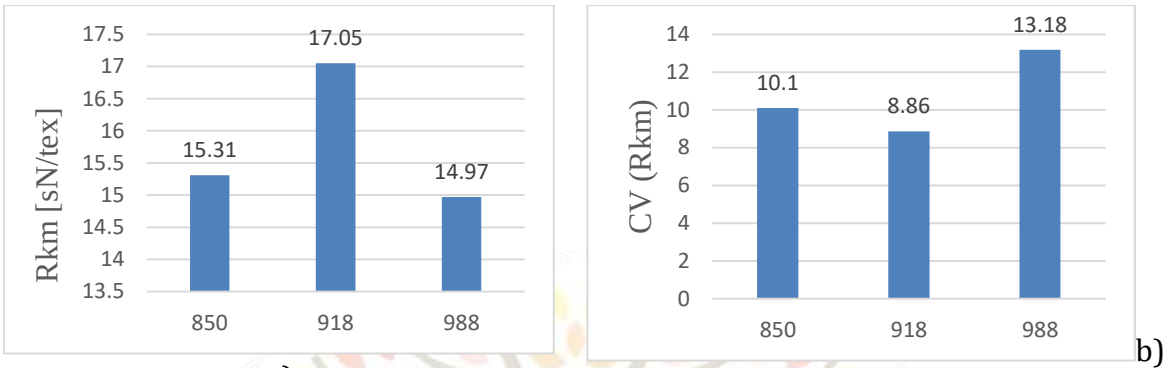


Figure 6 . Cotton/polyester blend yarn a) comparison cut off power and b) coefficient of variation

Fig. 7 a) the work at break of yarn increased from 324.9 [sNcm] to 330.2 [sNcm] when the twist was increased from 850 to 918 in cotton/polyester 80/20% mixed yarn spinning and recorded the highest value b) the coefficient of variation decreased by 15.48 indicators. When we gave 988 turns to cotton/polyester blend yarn, a) work at break decreased by 12.55% and b) coefficient of variation increased by 11.49%.

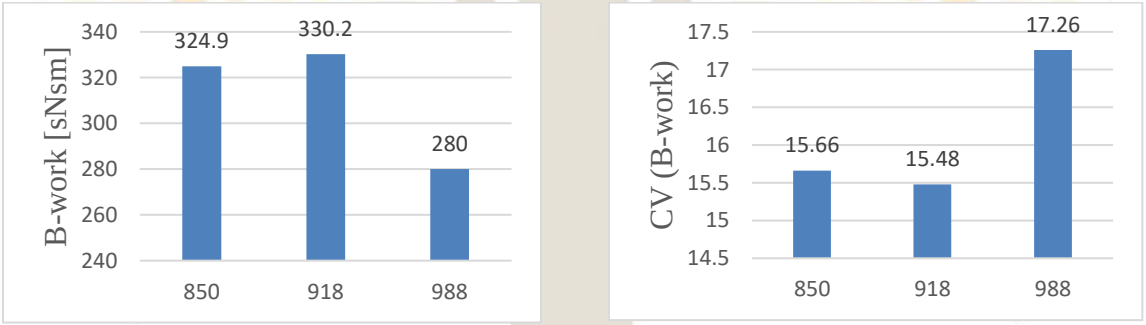
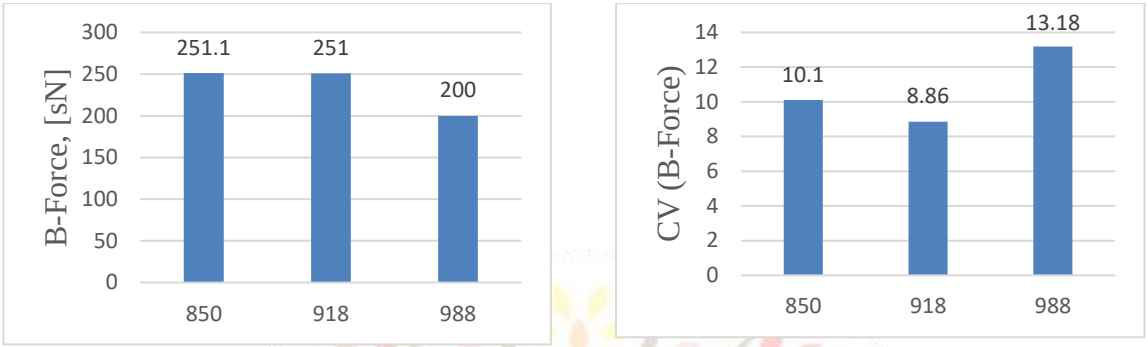


Figure 7 . Cotton/polyester blend yarn a) in interruption work and b) coefficient of variation

Figure 8 is a cotton/polyester 850 and 918 twist blend a) of threads breaking force recorded the same indicator of 251 [sN], the increase of the twist by 918 resulted in a decrease of the breaking force b) coefficient of variation by 12.27%. When we increase the twist of the mixed thread to 988, the threads a) breaking strength decreases by 20.31% and b) coefficient of variation increases by 48.74% was determined.

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 02 Pages: 24-32
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135



a) **b)**

Figure 8 . Cotton/polyester blend yarn a) cut off power and b) coefficient of variation

CONCLUSION

When we increased the twist of the cotton/polyester 80/20% mixed yarn intended for weaving from 850 to 918, the unevenness of the mass of the yarn, the number of thin and thick areas, the number of naps increased, and the coefficients of variation and the degree of hairiness decreased. It was found that when the twist 918 was given to the hardness of the mixed yarn, the relative breaking strength, breaking strength and breaking performance indicators of the yarns increased. When 988 twist was given, the unevenness of the mixed yarn increased, the hardness decreased, and the quality of the yarn deteriorated. In spinning cotton/polyester 80/20% mixed yarn intended for weaving, it can be concluded that the optimal twist option is 918 twists/meter.

REFERENCES

1. Economic indicators of the textile and sewing-knitting industry for the end of January-May 2022. Acces: https://uzts.uz/toqimachilik-va-tikuv-trikotaj-sanoatining-2022-yil-janvar-may-yakuni-bayycha-iktisodi-koyyakhari/
2. Assoc. Skobova N.V., St. Prep. Zamostotsky E.G. Pererabotka Himicheskikh Volokon V Smesi S Naturalnymi Vitebsk 2010
3. Subrata Kumar Saha and Jamal Hossen "Impact of Blend Ratio on Cotton-modal Blended Ring-spun Yarn Quality with Varying Modal Fiber Percentage" /JOURNAL/ SciRange /Year : 2020 | Volume : 2 | Issue : 1 | Page no. : 22-27
4. Sheikh Muhammad Nawaz, Asad Farooq & Sajjad Ahmad Baig "Studies on Cottonized Jute Composite Structures Spun on Ring, Rotor and Air Jet Spinning Systems" 2008 International Conference on Flax and Other Bast Plants

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 02 Pages: 24-32
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

5. Su, CI and Jiang, JY (2004). Fine Count Yarn Spun with a High Draft Ratio, Textile Research Journal, 74(2), 123–126.
6. Su, CI and Lai, WC (2005). Optimum Drafting Conditions of Polypropylene Spun Yarns, Textile Research Journal, 75(1), 6–8.
7. Vadicherla T, Saravanan D. Effect of Blend Ratio on the Quality Characteristics of Recycled Polyester/Cotton Blended Ring Spun Yarn. FIBERS & TEXTILES in Eastern Europe 2017; 25, 2(122):48-52. DOI: 10.5604/12303666.1227875
8. KA Ramasamy, G Nalankilli & OL Shanmugasundaram, Properties of cotton, tencel and cotton/ tencel blended ring-spun yarns Indian Journal of Fiber & Textile Research Vol. 39, September 2014, pp. 322-325
9. KARamasamy, G. Nalankilli, OLShanmugasundaram Properties of cotton, tencel and cotton/ tencel blended ring-spun yarns Indian Journal of Fiber & Textile Research Vol. 39, September 2014, pp. 322-325
10. Namiranian R, Etrati SM, Najar SS. Investigation of the Physical and Mechanical Properties of Fine Polyester/Viscose-Elastic Composite Rotor-Spun Yarn. Fibers & Textiles in Eastern Europe 2011; 19, 6: 28-33.
11. Madan Lal Regar, SK Sinha & R Chattopadhyay "Comparative assessment of Eli-Twist and Siro yarn made from polyester and its blend with cotton" Indian Journal of Fiber & Textile Research Vol. 44, September 2019, pp. 299-305
12. Tyagi, GK , Goyal, Ashwani , Chattopadhyay, R " Influence of twist and blend ratio on characteristics of ring-spun tencel blended yarns" Indian Journal of Fiber & Textile Research Vol. 38, June 2013, pp. 138-143
13. Ahmed, F. "Study of the Impact of Low Twist Rotor Yarn Characteristics on the Quality of Knitted Fabric Produced", Ph.D. Thesis, Mehran University of Engineering and Technology, Jamshoro 21-22 (2013).
14. Rajapov, O., Fayzullaev, S., Makhkamova, S. Transportation of chemical fibers and investigation of the process of chemical fiber carding in the unit of the licker-in carding machine. Transportation Research Procedia, Volume 63, 2022
15. Das, AP and Ishtique, MS "End breakage in rotor spinning: effect of different variables on cotton yarn end breakage" Autex Research Journal, 4 (2), 52-59 (2004).
16. Arabov Dj. i saavt. "ZARYADKA SYNTETIChESKIX VOLOKN I ULUCHSHENIE EMULSII".húnándàxuéxuébào (zìránkēxuébǎn) 49.12 (2022).
17. Desalegn Atalie1, Addisu Ferede and Gideon Kipchirchir Rotich, " Effect of weft yarn twist level on mechanical and sensorial comfort of 100% woven cotton fabrics" Atalie et al. Fashion and Textile (2019) 6:3