Properties of oak tasar/viscose blended yarns

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Oak tasar fibres and viscose rayon fibres have been blended in different proportions (65/35, 50/50 and 35/65) to produce a binary mixture of fibres for preparing 16 count yarns. Viscose and blended yarns have been tested for different properties such as yarn strength, elongation, tenacity, count strength product, unevenness and hairiness. It is observed that the yarn strength, elongation and tenacity values decrease with the increase in tasar silk fibre component in blend. Count strength product values are found to increase with the increase in viscose component in the blend and similar trend is also noticed for lea strength values. Maximum unevenness percentage is recorded in 65/35 tasar/viscose blended yarn followed by the yarns of 50/50 and 35/65 tasar/viscose in comparison to pure viscose yarn having minimum unevenness. Hairiness value and index increase with the increase in tasar silk fibre proportion in the blend.

Keywords: Count strength product, Hairiness value, Oak tasar fibre, Unevenness, Viscose rayon fibre

Blending is one of the methods to create novel combinations in many ways. Blends combine the positive attributes of each of its component, minimize the negative characteristics and economize the cost of the material. Blending also provides a fabric which has different aesthetic properties and can be put into different kinds of new uses, thus opening the way for product diversification. Blending of silk with rayon has advantage over blending of silk with cotton and synthetic fibres. Rayon is more versatile and uniform than cotton as it is a manmade fibre. It scores over synthetics, being the biodegradable fibre and thus causes fewer burdens to ecosystem.

Viscose fibre is highly absorbent, soft, comfortable, easy to dye and drapes well. These characteristics make viscose a blend friendly fibre. Rayon in blends is often used to keep cost low, increase absorbency, enhance affinity for dyestuffs and chemicals, improve washability and comfort as well as decrease static electricity accumulation. On the other hand, oak tasar fibre has its natural golden brown colour, dry and knobby look and good strength. Tasar fibre has a rough texture and lacks the sheen associated with silk. It is also not easy to dye. To overcome these problems, it needs innovative blending/processing.

By and large, the customer today does not demand that the fabric should be 100% tasar. Tasar can be blended well with all other natural and synthetic fibres. In fact, it has been felt that the tasar is better blended to neutralize some of its negative attributes without affecting its own characteristics.

Oak tasar silk, not suitable for reeling, could be blended with other fibres, such as cotton, to develop a new yarn with some new functional properties. As tasar silk shows certain warmth, this property can be utilized for the production of garments by blending with wool. The combination of cotton, rayon and ramie with tasar silk will reduce the cost of the tasar fabric.

Unlike mulberry silk, not many efforts have been made to bring this wondrous fibre in the forefront of fashion. Thus, an attempt has been made to use the oak tasar silk waste in blend with viscose fibre to study the effect of blending on blended yarns properties.

Oak tasar fibres and rayon fibres were blended in different proportions (65/35, 50/50 and 35/65) to produce a binary mixture of fibres for preparing 16 Ne yarns. Yarn of pure viscose fibres was also prepared for base reference. Oak tasar fibre could not be processed alone on carding machine owing to its brittle nature.

Viscose and blended yarns were tested for different properties such as yarn unevenness, yarn hairiness, single yarn and lea strength using Uster Tester-3, Laser Spot Tester, Uster Tensorapid and Lea Strength Tester respectively. Prior to the testing, all the samples were conditioned to moisture equilibrium in standard atmosphere at 65±2% relative humidity and 27±2°C temperature.

Table 1 shows the single yarn strength and elongation in terms of mean values. The highest strength is exhibited by 100% viscose yarn followed by blended yarns of 35/65 then 50/50 and 65/35

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Highest CSP (2219.70) is observed for 100% viscose yarn strength values. A similar trend is found in the single blend ratio results in a decline in lea strength of blended yarns. The increase of silk component in 35/65, 50/50 and 65/35 tasar/viscose strength is found to be 117.20 lb, 90 lb, and 84 lb respectively for 35/65, 50/50 and 65/35 tasar/viscose blend. Lea highest (147 lb) for 100% viscose yarn which is evidence of the fact that when two fibres are blended, the resultant strength is not the algebraic sum or average strength of the two component fibres. Low strength of blended yarn is mainly due to the difference in breaking elongation of constituent fibres. Yarn samples with higher values of lea breaking strength show more count strength product. The CSP value increases with the increase in viscose proportion.

Table 1—Single yarn strength and elongation of blended yarns

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Blend ratios (tasar/viscose)</th>
<th>65/35</th>
<th>50/50</th>
<th>35/65</th>
<th>0/100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breaking force, kg</td>
<td></td>
<td>0.2982</td>
<td>0.3721</td>
<td>0.4297</td>
<td>0.5602</td>
</tr>
<tr>
<td>Standard deviation</td>
<td></td>
<td>0.0352</td>
<td>0.0325</td>
<td>0.0493</td>
<td>0.0329</td>
</tr>
<tr>
<td>Coefficient of variation, %</td>
<td></td>
<td>11.80</td>
<td>8.73</td>
<td>11.47</td>
<td>5.87</td>
</tr>
<tr>
<td>Elongation-at-break, mm</td>
<td></td>
<td>49.562</td>
<td>49.789</td>
<td>56.007</td>
<td>71.455</td>
</tr>
<tr>
<td>Standard deviation</td>
<td></td>
<td>6.185</td>
<td>4.392</td>
<td>5.435</td>
<td>6.236</td>
</tr>
<tr>
<td>Coefficient of variation, %</td>
<td></td>
<td>12.47</td>
<td>8.82</td>
<td>9.73</td>
<td>8.72</td>
</tr>
<tr>
<td>Standard deviation</td>
<td></td>
<td>1.236</td>
<td>0.878</td>
<td>1.089</td>
<td>1.247</td>
</tr>
<tr>
<td>Coefficient of variation, %</td>
<td></td>
<td>12.47</td>
<td>8.81</td>
<td>9.72</td>
<td>8.73</td>
</tr>
<tr>
<td>Tenacity, g/tex</td>
<td></td>
<td>8.2373</td>
<td>9.691</td>
<td>11.427</td>
<td>15.517</td>
</tr>
<tr>
<td>Standard deviation</td>
<td></td>
<td>0.9728</td>
<td>0.847</td>
<td>1.310</td>
<td>0.911</td>
</tr>
<tr>
<td>Coefficient of variation, %</td>
<td></td>
<td>11.75</td>
<td>8.49</td>
<td>11.46</td>
<td>5.87</td>
</tr>
</tbody>
</table>

The blended yarn with 65% tasar silk component shows maximum coefficient of variation (11.80%) as compared to lowest coefficient of variation (5.87%) in 100% viscose yarn. Higher per cent of coefficient of variation indicates that the sample is more variable.

It can be observed from Table 1 that maximum elongation of 71.45 mm with 14.27% strain is observed for 100% viscose yarn followed by 56 mm elongation and 11.19% strain in the case of 35/65 tasar/viscose blend. Blended yarns in the proportion of 50/50 and 65/35 tasar/viscose exhibit similar type of values for elongation and strain per cent as 49.789 mm and 9.956% and 9.907% respectively. Highest coefficient of variation (12.47 %) is observed for 65/35 tasar/viscose blended yarn. Similar trend is observed for yarn tenacity. It is found to be maximum (15.517 g/tex) in case of 100% viscose yarn and minimum (8.237 g/tex) in case of 65/35 tasar/viscose with 5.87% and 11.75% coefficient of variation respectively. Blended yarns of 35/65 g/tex and 50/50 tasar/viscose show tenacity of 11.427 g/tex and 9.69 g/tex respectively.

Lea breaking strength is measured in pounds (lb) force. Table 2 shows that the lea breaking strength is highest (147 lb) for 100% viscose yarn which is in accordance with the value of single yarn strength. Lea strength is found to be 117.20 lb, 90 lb, and 84 lb respectively for 35/65, 50/50 and 65/35 tasar/viscose blended yarns. The increase of silk component in blend ratio results in a decline in lea strength of blended yarns. Similar trend is found in the single yarn strength values.

Count strength product (CSP) is a product of the skein strength in pounds and the yarn number (Table 2). Highest CSP (2219.70) is observed for 100% viscose yarn followed by 35/65, 50/50 and 65/35 tasar/viscose yarns respectively.

Table 2 reveals that maximum number of thick and thin places and neps per km are observed in 65/35 tasar/viscose yarn sample in comparison to the 100% viscose yarn which shows minimum number of imperfections. Maximum unevenness (20.82%) is recorded for 65/35 tasar/viscose blended yarn followed by 18.65% and 16.48 % for the yarns of 50/50 and 35/65 tasar/viscose respectively in comparison to 100% viscose yarn having minimum (11.32%) unevenness. Table 2 also shows that maximum hairiness is observed in 65/35 tasar/viscose blended yarn sample with hairiness index 1000.10 and hairiness value 250 while minimum hairiness is observed in 35/65 tasar/viscose with hairiness index 451.90 and hairiness value 113 as compared to hairiness index 481.70 and hairiness value 120.40 in 100% viscose yarn. Maximum coefficient of variation (39.2%) is found in 35/65 tasar/viscose yarn sample.

Yarn strength, elongation and tenacity values decrease with the increase in tasar silk fibre component in blend in spite of the fact that the fibre strength is more in case of tasar silk. This may be attributed to the fact that when two fibres are blended, the resultant strength is not the algebraic sum or average strength of the two component fibres. Low strength of blended yarn is mainly due to the difference in breaking elongation of constituent fibres.

Yarn samples with higher values of lea breaking strength show more count strength product. The CSP values increase with the increase in viscose.
component in the blends and similar trend is noticed for lea strength values also.

Higher percentage of unevenness in the yarn samples having more silk component may be attributed to the higher number of imperfections found in these yarns.

Hairiness value and index increase with the increase in tasar silk proportion in the blend. It may be because of the reason that tasar silk fibres are coarse and in blended yarns coarser fibres migrate toward the periphery and fine fibres remain in the core.

Blending of oak tasar fibre with rayon is an attempt to compensate its shortcomings such as harsh texture, stiffness with the addition of viscose fibre. Besides, this blending also opens up ways to enrich the range of diversified products by offering something new and unique to the market.

References