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GRADING OF TASAR RAW SILK YARN – DEVELOPMENT OF METHOD AND PROCEDURES

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ABSTRACT

This paper envisages the need of quality assessment for the purpose of quality improvement. If tasting the tasar yarn as per the test method used for mulberry raw silk yarn, it is found almost all falls in grade-less category which hinders the passage for improvement. As the physical and chemical property of tasar raw silk differs to that of mulberry raw silk, the method of test has to be modified suitably so that the tasar silk can be tested and graded in a better way. In the absence of testing and grading method to accommodate all the Tasar silk produced in the industry, the buyer and seller will not have any reference for improvement as well as for fair transaction. In the age of competitive market of apparel textiles, testing of different parameters of yarn to determine its quality and its grouping in different varieties has become very important for a particular end use. All the textile yarns are tested by one or more methods for its quality characteristics. In the present study effort has been made to evaluate different characteristics of tasar silk from different origin and use the results to develop a suitable classification table for the purpose of grading. The quality characteristics that are being used for quality evaluation are Size uniformity in terms of cv%, tenacity, elongation along with size of tasar silk. Cohesion character is considered for warp verity only. From the study suitable testing and grading method for Indian tasar silk yarn has been developed which has been adopted by BIS as national standard.

Keywords : Tasar silk, classification, variation, tenacity, elongation, cohesion.

Introduction

There is no testing method as well as grading method specifically meant for tasar raw silk yarn. Presently the yarn is tested as per the test method for mulberry raw silk yarn. It is found that almost all tasar raw silk falls in grade-less category, if we test the tasar silk as per mulberry raw silk. As the physical and chemical property of tasar raw silk differs to that of mulberry raw silk, the method of test has to be modified suitably so that the tasar silk can be tested and graded in a better way. In the absence of testing and grading method to accommodate all the Tasar silk produced in the industry, the buyer and seller will not have any reference for fair transaction. There is also no reference standard for improvement of quality of tasar raw silk yarn.

In the age of competitive market of apparel textiles, testing of different parameters of yarn to determine its quality and its grouping in different varieties has become very important for a particular end use. All the textile yarns are tested by one or more methods for its quality characteristics. With introduction of new machineries by CSTRI, Bangalore and CTR&TI, Ranchi, new phase of tasar silk yarn with enhanced quality have begun. With many types of tasar silk yarns available for consumers, it becomes imperative to assess the quality of the yarn and grade them to signify its use for particular application and fix the price accordingly. In order to assist the weaving industry in selection of

required quality tasar raw silk, the industry demands well defined standards, which can only be achieved by adopting proper testing and grading method in tasar sector.

In fact there has never been an urge for testing and grading as marketing and consumption of yarn face no problem due to its limited production. Also there was no separate reeling/spinning and weaving production line in tasar like exists in mulberry as female members of the tasar weavers use to produce yarn to be consumed in own weaving work. Gradual popularization of mechanized yarn production has been creating a separate yarn production line. It had encouraged making attempt in some section in the field to grade the tasar silk based on its proximity to target denier, colour uniformity, type of lacing done as well as presence of flosses and knots. Now with the thrust given on the increased productivity, it is time to assess the quality of yarn being produced like mulberry raw silk and grade it to facilitate fair transaction. Due to wide variability in all the cocoon parameters, low NBFL and reliability the quality of tropical tasar raw silk never rise to the level of quality of mulberry raw silk and therefore testing and grading under set procedures and norms applicable for mulberry do not reflect the true picture of the grade of silk for tasar.

In order to address these issues, this study has been taken up to develop standard test procedure for testing and grading of Tasar raw silk. The present study developed set

parameters and norms that can be used for tasar raw silk as reference for grading and develop suitable method and procedures for testing such parameters. Converting the developed method into BIS standard has been done. By introduction of testing & grading in the tasar sector it not only help for the fair trade but also help the reelers to improve the quality of Tasar silk produced.

Material and Methods

The 460 lots tasar raw silk produced in the country and 14 lots of imported variety has been procured and processed for quality parameters. Out of 474 lots, 299 lots are from commercial production units. The sample selection is based on the quality information available with the local weavers in the cluster and fair distribution for all qualities from superior to inferior grades. Also 116 lots of tasar silk yarn has been produced at DCTSC, Cuttack by dry reeling method (Charkha reeling machine) and wet reeling method (Wet Reeling machine). CTR&TI has supplied 59 lots with the existing facility available at the institute.

For the purpose of selection of test parameters, preliminary studies has been conducted for 20 samples and analysed. Preliminary studies in winding test will be conducted on samples selected on random basis for modification in winding speed (speed between 30 to 100 rpm), yarn tension etc., in-comparison with the mulberry raw silk testing methods besides the no. of yarn samples and its length to be taken into consideration for size test.

The remaining tasar yarn samples will be tested to generate following data and results will be used to develop suitable tasar yarn testing methods for grading of tasar raw silk.

- Winding and size results.
- Tenacity and elongation results.
- Cohesion results
- Yarn defects.

The test results are compiled, analysed and extrapolated to form a flexible scale grading method. Statistical methods employed to prioritize the test parameters and accordingly weightage given to arrive at the final yarn grades.

Results and Discussions

Winding performance during winding test

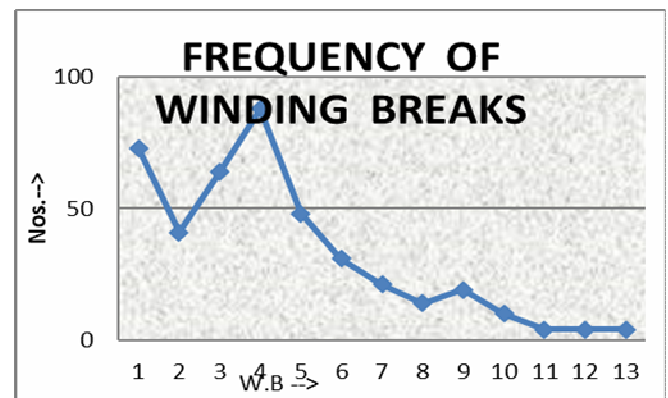
Both dry reeled and wet reeled Tasar silk yarn showed very poor winding performance even at lower speeds mainly due to unevenness, entanglements in the yarn and poor cohesion among the filaments. Buniyad reeled yarn have shown higher breaks mainly due to fibrillation of individual filaments. Due to very poor winding performance, winding speed of 30 mpm was proposed for winding test and the duration is 30 minutes or till the skein exhaust which ever is early.

474 tasar yarn samples were subjected to winding performance test and the results show that the winding breaks per 5 skeins varied from 0 to 22 & Average winding breaks is 3 per 5 skeins per 30 minutes of winding. The result of the winding breaks is expressed as number of breaks per 5 skeins per half hour winding duration and expressed as whole number. As winding breaks mainly depend upon the denier of the yarn, for the preparation of classification table three categories of size was considered i.e. yarn size upto 80 denier

and above 80 denier. The whole data was divided into two based on above category. Each data set is analysed and bifurcated into 5 classes. The frequency distribution of 461 samples if winding breaks is as given in table 1 and graphical presentation is as given in graph 1.

Table 1 : Frequency of winding breaks.

Winding breaks	Frequency	%
0	73	17
1	41	10
2	64	15
3	88	21
4	48	11
5	31	7
6	21	5
7	14	3
8	19	5
9	10	2
10	4	1
11	4	1
12	4	1



Graph 1 : Frequency of winding breaks

Size and Size uniformity test

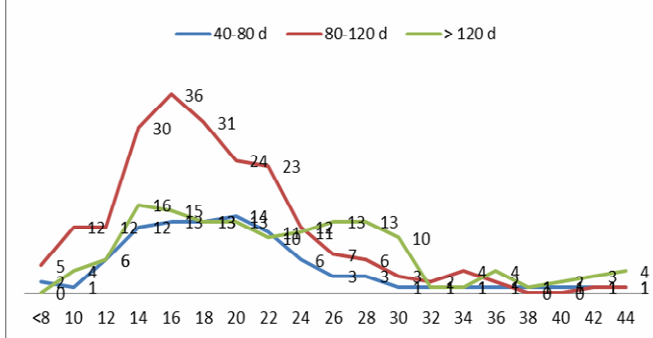
The size and its uniformity is very important parameter which is directly affecting both economics of manufacture and quality but also on the type of product to be manufactured. In this context, emphasis was given to this parameter and highest weight-age given in classification.

The length of 22.5 meters per kilcha and 45 meters per kilcha was tried for consideration. For the purpose of selection of test length to be considered for size test, it is observed that the length of 45 meters per each test sample (kilcha) is good enough to give required level of precision.

Data results of all Tasar samples tested showed wide range of size of yarn, varying from 32 denier to 216 denier. The details of size and its uniformity expressed as Coefficient of Variation (CV%) is as given table 2. Graphical frequency distribution of 40-80d, 80-120d and above 120d is given in graph 2. As the total lots available below 40 d is minimal it is not being considered for frequency distribution graph.

Table 2 : Size and its uniformity expressed as Coefficient of Variation (CV%)

	Size	CV%
Minimum	32	4.8
Maximum	216	45
Average	106	19

Fig-2: Groupwise Distribution of lots

As the size is varying to a large extent and based on the application & its utility, four groups of size was proposed for classification. The four groups are as shown in table 3.

Table 3 : Denier range of four groups.

Denier Range
40 d (4.49 tex) and finer
41 to 80 d (5 to 8.94 tex)
81 to 120 d (8.95 to 13.39 tex)
121 d (13.4 tex) and coarser

Data in each group is analysed and bifurcated into 6 preliminary grades (from A to E, A being the highest and E being the lowest). The details of norms classification are given in Grading procedure.

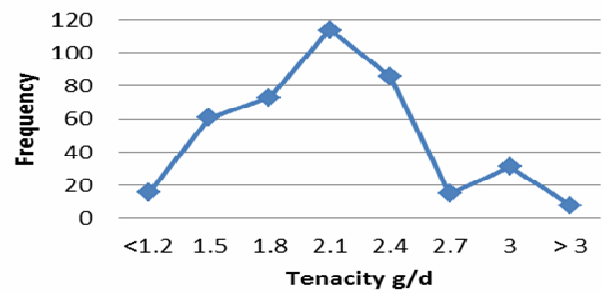
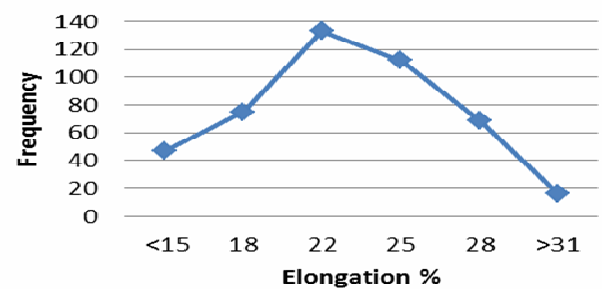
Tenacity and Elongation test:

Tenacity (strength) and Elongation (stretch-ability) are the two parameters which are very much essential for any textile yarn. The importance is felt only if the values falls below certain limit.

As temperature and RH are affecting the test results, it is essential to test in standard atmospheric conditions i.e. 27 C and 65% RH. 454 samples out of 474 samples were taken for analysis and the remaining data is not considered as the results are deviating to a large extent due to environmental factors. The samples were analysed and found that tenacity is varying for a large extent from as low as 1.1 g/d and high of 3.6 g/d. The average tenacity is 2.1 g/d. In order to facilitate improvement in yarn quality three classifications are proposed. Graphical representation of frequency distribution of tenacity and elongation is as given in graph 3&4.

Table 4 : Classification norms.

Characteristic	Grade	A	B	C	D	E	F
CV of Size	40 d (4.49 tex) & below.	(= <)	(= <)	(= <)	(= <)	(= <)	(>)
(Tex	41 to 80 d (4.5 to 8.94 tex)	8	12	18	25	30	30
Or	81 to 120 d (8.95 to 13.39 tex)	9	13	20	30	36	36
Denier)	121 d (13.4 tex) & above	10	16	24	32	38	38
		12	18	26	34	40	40
	Class	(1)	(2)	(3)	(4)	(5)	
Winding breaks	80 d (8.94 tex) & below.	(= <)	(= <)	(= <)	(= <)	(= <)	(>)
(Breaks/5skeins/30 min.)	above 80 d (8.95 tex)	4	5	7	10	10	10
		3	4	6	8	8	8
			(1)	(2)	(3)	(4)	(5)
			(>=)	(>=)	(>=)	(>=)	(<)
Tenacity (g/denier)			2.5	1.8	1.8	1.8	1.8
Elongation (%)			22	18	18	18	18
		(1)	(2)	(3)	(4)	(5)	
		(>=)	(>=)	(>=)	(>=)	(>=)	(<)
Cohesion (No. of strokes)		20	15	10	10	10	10

F distribution of Tenacity g/d**Fig. 3 : Distribution of Tenacity****F distribution of Elongation (%)****Fig. 4 : Distribution of elongation**

Cohesion test for warp variety of Tasar silk yarn.

Cohesion plays an important role in warp variety of tasar yarn. The yarn is being tested as per testing of mulberry silk yarn. As the cohesion in tasar yarn is very low, in the beginning of tasar silk industrial growth, cohesion is considered only for warp variety. The testing method is as per mulberry silk testing procedure.

32 samples of warp variety of the samples tested for cohesion and found that the result varied from as low as 1 stroke to 15 stroke. The average result is 8 stokes.

Grading table / Classification table:

The grading/classification table is a reference table indicating level of quality of both individual parameter as well as overall quality of the yarn. The data generated from the test results were further bifurcated into sub groups based on the groups / category. The bifurcated data is analysed and grouped to form classification norms which is as given in table 4.

Conclusion

It is concluded that the tasar silk yarn as on date is very inferior in many of the quality parameters and extremely good in some parameters viz. Elongation. As a matter of fact that tasar silk yarn quality has to improve a lot in order to make it's demand to grow further. In order to facilitate the improvement of tasar silk yarn quality national standards were published by BIS which is the outcome of this study. The national standards when implemented in the field will facilitate both reelers and weavers to get better quality yarn at a better price. With continuous monitoring of tasar yarn quality, the reelers can improve their product i.e. tasar silk yarn as well as it facilitate the weaver to choose the right raw material.

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