International Journal of Recent Advances in Multidisciplinary Topics
Volume 3, Issue 10, October 2022
https://www.ijramt.com | ISSN (Online): 2582-7839

A Study on Natural Materials for Warp Yarn Sizing

S. Varshani[1*], K. Kanishka[2], S. Rajesh Kumar[3]
[1,2]Student, Department of Textile Technology, Bannari Amman Institute of Technology, Erode, India
[3]Assistant Professor, Department of Textile Technology, Bannari Amman Institute of Technology, Erode, India

***Abstract*: The sizing is a preparatory process of weaving that comes after warping. It is a very important and critical preparatory process. "The process of application of a thin film of adhesive and binder on the yarn surface to improve the weavability of yarn is called sizing process". The quality of the sizing process directly influences the performance of the loom and the quality of the fabric to be woven. The ultimate aim of the project is to give good strength and abrasion resistance properties using natural materials like Tamarind, Aloe vera, Garlic and Wood gum also with combinations of different ratios. As the synthetic materials are harmful for the environment, the natural materials are used as a replacement. It is environmental friendly processing that is sustainable using the earth's resources without causing damage to the environment. As a result, it gives good weaving efficiency with minimum effluent load.**

***Keywords*: Natural materials, Abrasion resistance, Weaving efficiency, Environmental friendly, Binders.**

1. Introduction

Sizing is the technique of giving a defensive coating at the warp yarn to decrease yarn breakage all through weaving. Sizing is the most essential operation in preparing warp yarn for weaving particularly with cotton yarn. The smallest blunders in sizing technique can be very harmful. This may also boom warp breakage rate at the looms and therefore reduce weaving manufacturing and quality. Therefore, sizing is termed as the "Heart of Weaving".

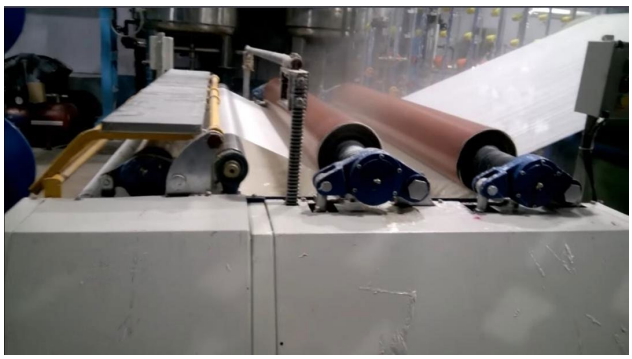

Fig. 1.

Sizing is implemented into the yarn especially to enhance the weave ability of warp yarn with the aid of using making it greater proof against motion of weaving i.e. absorption, friction, tension & flexing. Sizing is implemented directly to the fiber floor with the aid of using numerous technique and numerous recipes consistent with the requirements. The most commonly used sizing machine is Slasher sizing machine.

2. Objectives

- To improve the weave-ability of warp yarns in weaving by applying a uniform size paste coating on the yarn surface.
- To size the warp yarn by using natural materials to increase strength and abrasion resistance for the weavability of the fabrics.
- It also maintains good fabric quality by reducing hairiness, weakness & by increasing smoothness, absorbency of yarn.

3. Methodology

The weaving technique is a main mechanical challenge for the yarns. Especially threads made from cotton, viscose, linen, wool and their blends with artificial fibers, can get broken through the intense, abrasive stress. This can cause thread breakage and abrasions to the yarns. The application of a protective sizing reduces abrasion and strengthens the warp yarns.

- By using Tamarind flesh, Aloe Vera, Garlic, Wood gum, as a film forming agents for the warp yarn sizing is done.
- Strength and abrasion resistance properties are getting increased.
- It is cost effective and natural sources.
- No side effects compared to synthetic sizing paste.
- Biocompatible and bio-degradable. It is quality of not having toxic or injurious effects on biological systems.
- Environmental friendly processing that is sustainable using the earth's resources without causing damage to the environment.
- Local availability that is existing in or belonging to the area where we live.

Effects of warp yarn sizing:

In this process, the warp sheet gets immersed in the paste of adhesive and binder, and then the warp is squeezed properly to eliminate the excess amount of adhesive. Now the warp is dried and the ends are separated from each other. Now the warp ends are wound on the weaver's beam. The strength of warp yarn is increased after the sizing process. The hairiness of yarn gets reduced too. During the sizing process, warp yarn passes under

*Corresponding author: varshani.tx19@bitsathy.ac.in

moderate tension. This tension causes some stretch in the yarn, thus elongation of yarn after sizing gets reduced. This is a negative aspect of the sizing process. Many types of sizing agents are used in the sizing process to improve various properties of the yarn. This process is carried out carefully and precisely. Improper and poor sizing results from many difficulties in weaving. An excess amount of sizing also creates difficulties. The amount of size pick-up is applied according to the yarn parameters used in warp yarn. The selection of correct sizing ingredients plays a major role in the quality performance of sizing. Better process control and quality control in sizing always result in the form of the best performance of the sizing process.

4. Work Plan

We have taken these natural samples for warp yarn sizing:

- Tamarind
- Aloe Vera
- Garlic
- Wood gum

Mixed samples of,

- Tamarind and Aloe Vera
- Tamarind and Garlic
- Tamarind and Wood gum
- Wood gum and Garlic
- Wood gum and Aloe Vera

Fig. 2.

1. *Film Formation Test:* Film forming tests are done and the samples are collected for binding hairiness during sizing.
2. *Single Yarn Strength Test:* Single yarn strength tests are done for checking the strength properties of treated samples of yarns.
3. *Abrasion Test:* Abrasion tests are done for checking abrasion resistance properties of yarn samples.

5. Results and Discussion

Film forming test results – These samples give good results,

Fig. 3. Tamarind and Aloe Vera

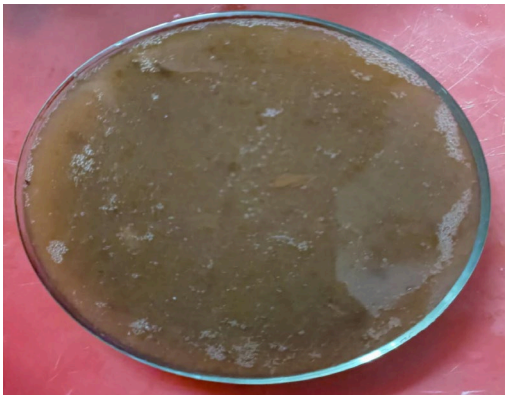

Fig. 4. Tamarind and Garlic

Single yarn strength results – These samples give good results.

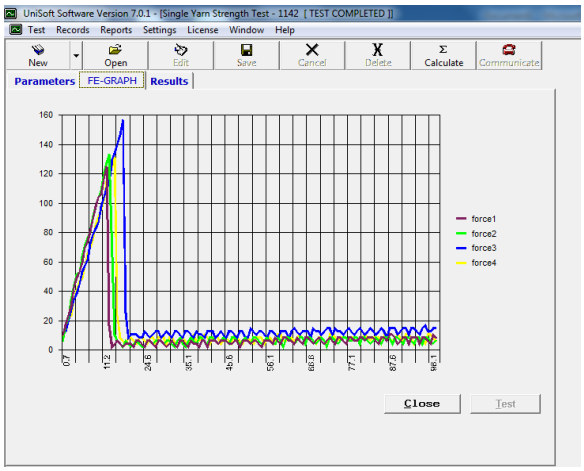

Fig. 5. Tamarind and Garlic (60:40)

Table 1
Comparison between Single yarn strength test results with 40s ring spun yarn

Test	40s Sized yarn	Tamarind and Garlic (60:40)	Garlic (100 %)	Tamarind and Aloe Vera (50:50)
Elongation (%)	1.75	2.45	2.52	2.82
Tensile Strength (RKM)	8.7	9	12.8	8.7

Table 2
Comparison between Abrasion test results with 40s ring spun yarn

Results	40s Sized yarn	Tamarind and Aloe Vera (50:50)	Tamarind and Garlic (60:40)
RRI	437. 76	1172. 21	1833. 26
Minimum	44. 00	117. 00	151. 00
Maximum	164. 00	414. 00	652. 00
Average	84. 10	225. 00	352. 20
SD	37. 463	81. 601	138. 268
CV (%)	44. 546	36. 235	39. 258
Q95(+/-)	17. 292	38. 322	64. 493

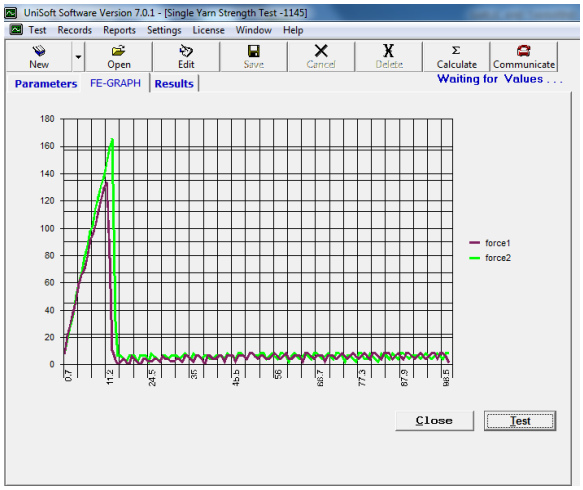

Fig. 6. Garlic (100 %)

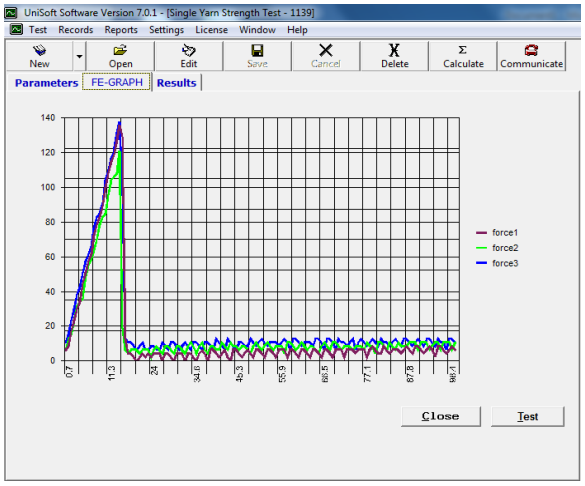

Fig. 7. Tamarind and Aloe Vera (50:50)

Abrasion test results – These samples give good results.

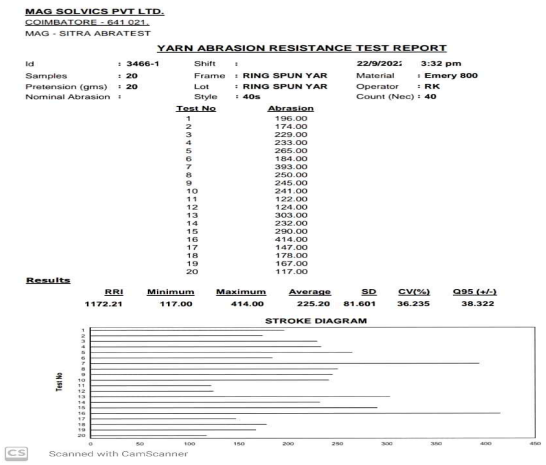

Fig. 8. Tamarind and Aloe Vera (50:50)

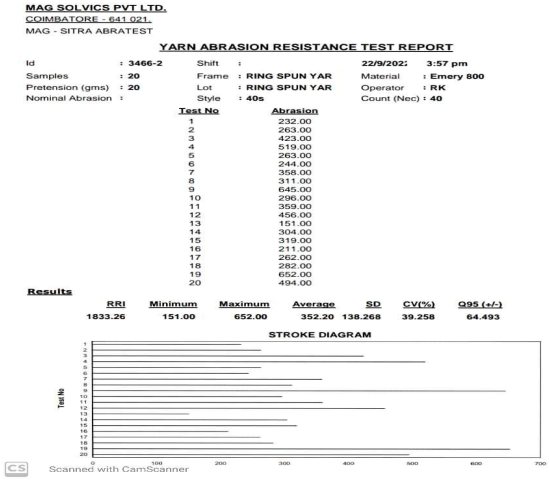

Fig. 9. Tamarind and Garlic (60:40)

6. Conclusion

The process of applying a proactive adhesive coating upon the surface of the yarn is called sizing. This is the most important operation to attain maximum weaving efficiency, especially for blended & filament yarns. Due to sizing, increases the elasticity of yarn, yarn strength, the weight of the yarn, smoothness, frictional resistance. We have comparatively studied the naturally sized yarns with 40s sized synthetic ring spun yarn and got the results like Naturally sized yarns gives good results than synthetic sized yarns. The ultimate aim of the

project is to give good strength and abrasion resistance properties using natural materials like Tamarind, Aloe Vera, Garlic and Wood gum also with combinations of different ratios. As the synthetic materials are harmful for the environment, the natural materials are used as a replacement. It is environmental friendly processing that is sustainable using the earth's resources without causing damage to the environment. As a result, it gives good weaving efficiency with minimum effluent load.

References

[1] Maninder Kaur & Sukriti Singh, "Physicochemical, Morphological, Pasting, and Rheological Properties of Tamarind (Tamarindus indica L.) Kernel Starch", in International Journal of Food Properties, vol. 19, no. 11, pp. 2432-2442, 2016.

[2] Sangareswari Nagajothi, A. Balasubramanian, Nandhkishore Thombare and P.R. Renganayaki, "Effect of Different Seed Sources on Tamarind Kernel Powder and Seed Gum Yield," in Int. J. Curr. Microbiol. App. Sci., vol. 6, no. 7, pp. 318-323, 2017.

[3] Mazharul Islam Kiron, "Yarn Sizing: Important Warp Preparatory Process".

[4] Taosif Ahmed, Rony Mia, Gazi FarhanI Shraque Toki, JarinJahan, Md Mahamudul Hasan, Md. Arif Saleh Tasin, Md Salman Farsee, Suza Ahmed, "Evaluation of sizing parameters on cotton using the modified sizing agent," in Cleaner Engineering and Technology, vol. 5, 100320, Dec. 2021.

[5] Tamrat Tesfaye, Jonas Johakimu, Bruce Sithole, "Valorisation of mango seeds via starch extraction: preliminary techno-economic analysis," in Clean Techn. Environ. Policy, vol. 20, pp. 81–94, 2018.

[6] V. Parihar "Sizing materials used in textile industry", 2003.

[7] Selamu Temesgen, Bharani Murugesan, Rotich K. Gideon, "Performance Evaluation of Cotton Yarn Sized with Natural Starches Produced from Native Corn, Cassava and Potato Starches".

[8] Nandkishore Thombare, Sanjay Srivastava, A. Roy Chowdhury, "Multipurpose applications of tamarind seeds and kernel powder", 2014.

[9] Stana Kovacevic, Suzana Dordevi, Dragan Dordevic, "Natural Modified Starch and Synthetic Sizes in Function of Characteristics of Sized Yarn," in Fibres and Textiles in Eastern Europe, vol. 24, no. 1, pp. 56-66, Jan. 2016.