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Mechanical Damage and Twisting of Cotton Fiber by Different Selection Varieties

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ABSTRACT: In this paper, samples of hard-to-clean Hampor, Sultan, Jarqurghon and well-cleaned Beshkahramon selection varieties were taken, their cleaning efficiency from small and large contaminants was determined on LKM instrument, and fiber samples were taken in the laboratory to determine their mechanical damage and torsion.

KEY WORDS: Biological damage, mechanical damage, radiographic method, fine-grained, radiograph.

I. INTRODUCTION

About 162 varieties of cotton created by our breeders are grown in the cotton fields of the country. They differ in maturity, yield, resistance to various diseases, agrotechnical and physico-mechanical properties, the impact of cotton ginning processes. Therefore, for each selection variety, an alternative option will be developed at ginneries.

Cotton is harvested in two different ways, by hand and by machine. During the cotton picking, storage and initial processing processes, the fibers are subject to various damages. For example, during the storage of cotton in the bale, the fibers are biologically damaged under the influence of spindles during mechanical harvesting of cotton, during the transfer of cotton to post-bale technological processes, during cleaning and separation of fiber from seeds.

If the amount of damage to cotton fiber increases, the quality of fiber and its products deteriorates, that is, the amount of mechanical damage leads to a decrease in the breaking strength and length of fiber, the amount of short fibers increases.

In order to obtain quality raw materials in ginneries, it is necessary to determine the optimal options after each technological process, starting from the storage of cotton in the gin.

In tests performed by foreign government scientists, it was found that the fiber breaks at the site of injury. Once the fiber is cut, the fiber length decreases. As a result, the quality of the fiber deteriorates. Alternatively, the fibers will have visible, invisible damage. If the mechanical damage to the fiber is visible, the quality of the fiber is impaired in a short technological process, if the mechanical damage to the fiber is invisible, it occurs after some technological process, that is spinning,rewinding,spinning arises in the weaving process. This has a negative impact on the quality of finished products obtained from raw materials [1].

II. ANALYSIS OF EXISTING FILTERING MATERIALS AND RESEARCH RESULTS

Therefore, in order to obtain quality raw materials in ginneries, samples of different varieties were taken and converted into fiber in the laboratory, and depending on the degree of maturity of the fiber, the amount of their mechanical damage was studied under a microscope [2].

The obtained research results are presented in Table 1.

1- table

Mechanical damage of cotton fiber of different selection varieties change

| t / r | Selection varieties | General injuries amount,% | The degree of maturity of the fiber | | |
|-------|---------------------|---------------------------|-------------------------------------|---------|---------|
| | | | 0-1,0 | 1,5-2,5 | 3,0-4,0 |
| 1. | Xampor | 28 | 14 | 12 | 2 |
| 2. | Sultan | 29 | 16 | 10 | 3 |
| 3. | Jarqorgon | 24 | 14 | 8 | 2 |
| 4. | Beshqahramon | 27 | 16 | 9 | 2 |

Based on the results of the table above, Figures 1-2 show graphs of changes in the mechanical damage of cotton fiber for different selection varieties.

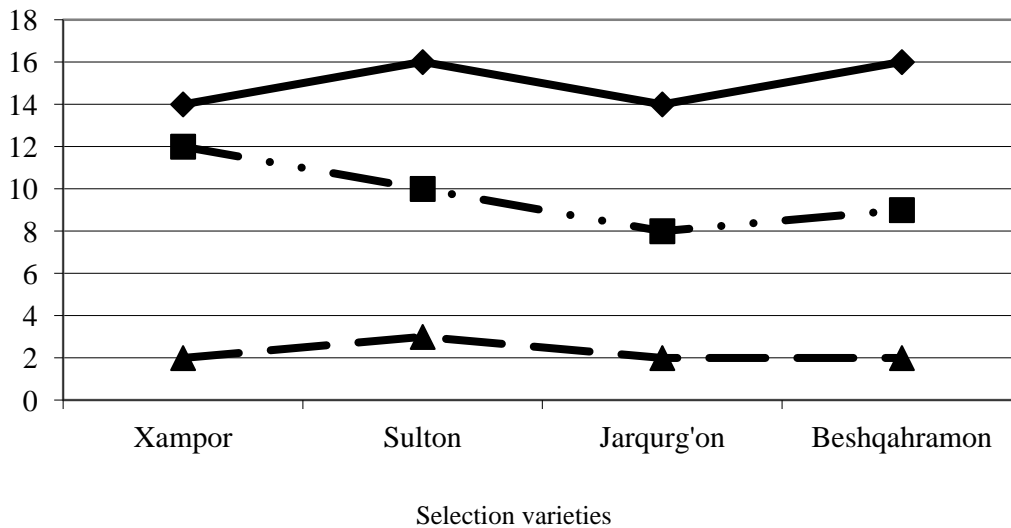


Figure 1. Variation of mechanical damage of cotton fiber by different selection varieties 1-0-1,0 degree of ripeness; 2-1,5-2,5 degree of ripeness; 3-3,0-4,0 degree of ripeness.

A number of scientists have worked on the damage of cotton fiber, including A.I.Boyarkin, L.N.Balenky, M.A.Khodzhinova and others.

Mechanical damage of cotton fiber was analyzed by A.I.Boyarkin and L.N. Belenky by microscopic radiographic method. In the test results, it was found that the mechanical damage of the fibers had a very fine roughness. They also received an X-ray of the fiber in mechanical injury.

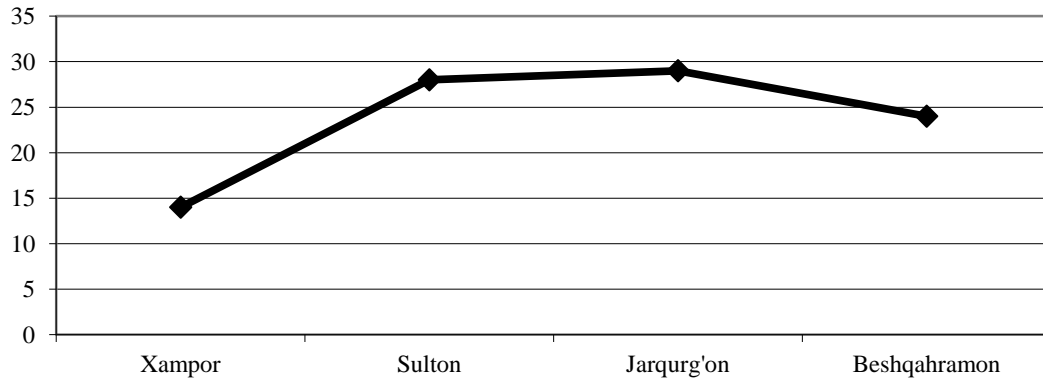


Figure 2. Variation of mechanical damage of cotton fiber by different selection varieties.

III. EXPERIMENTAL RESULTS

The analysis of the results of the study shows that in comparison with the indicators of cotton fiber of Hampor selection variety, mechanical damage of cotton fiber decreased by 12.5% when the maturity level of Sultan selection variety fiber was 0-1.0, cotton maturity when fiber maturity was 1.5-2.5. mechanical damage to the fiber increased by 10.0%, mechanical damage to the cotton fiber increased by 33.3% when the degree of maturity of the fiber was 3.0-4.0, total mechanical damage to the cotton fiber increased by 3.4%, maturity of the fiber of Jarqurghon selection variety Mechanical damage of cotton fiber did not change at 0-1.0, mechanical damage of cotton fiber at 1.5-2.5 maturity decreased by 11.2%, mechanical damage of cotton fiber at 3.0-4.0 maturity did not change , the total amount of mechanical damage to cotton fiber increased by 14.3%, mechanical damage to cotton fiber increased by 12.5% when the degree of maturity of the fiber of the Beshkahramon selection variety was 0-1.0 decreased, mechanical damage of cotton fiber increased by 10.0% when the degree of maturity of the fiber was 1.5-2.5, mechanical damage of cotton fiber did not change when the degree of maturity of the fiber was 3.0-4.0, the total amount of mechanical damage of cotton fiber was 3.6 decreased by%.

Research has shown that the mechanical damage of fibers of different selection varieties is different, and the change under the influence of technological processes is also different [2,3].

The twist index of the fibers is important during the spinning process. When the degree of maturity of the fiber is 3.0-3.5, the fibers have the most torsion.

As cotton fiber matures, its twisting properties decrease as the amount of cellulose increases. As the fibrils and macro, microfibrils in the surface layer of the cotton fiber become parallel to the fiber axis, the torsion disappears.

Fiber twist is a wavy structure of the longitudinal axis of the fiber, determined by the number of twists at a distance of 1 cm.

The torsion of textile fibers can have a spatial and flat, sinusoidal character. Wool fibers have a natural twist. Twisting of synthetic fibers, textured yarns is created by special processing in the production process to increase their adhesion, elongation and volume. Twisting of fibers is one of the important properties of yarns. It is taken into account in the selection of the spinning system, fiber processing in the process of obtaining quality yarns and fabrics. The intensity of the twist depends on the number and height of twists per unit length.

The main indicators of fiber torsion are the frequency of torsion, the degree of torsion and the stability of torsion, which is determined by the standard [4].

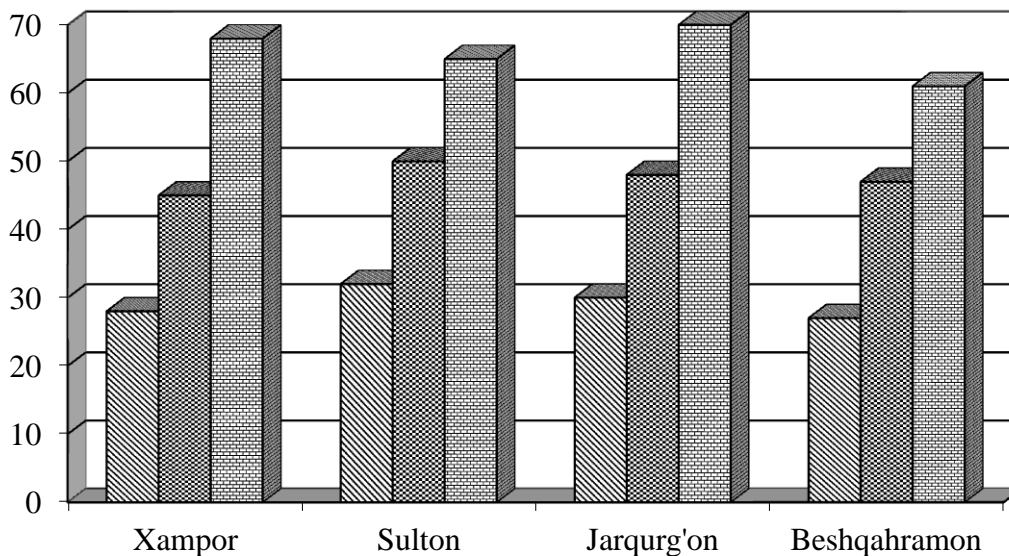
In the process of yarn production in spinning mills, the twisting parameters of the fibers are important. For example, if the twist of cotton fiber is reduced, then the ductility of the yarns obtained is reduced, resulting in an increase in the degree of unevenness of the yarns. Conversely, if the twist of the fiber increases, then the linear density of the yarns and the square unevenness in the number of twists will decrease, making it possible to produce smooth and soft fabrics. Scientific research has been carried out at ginneries to determine the twisting of cotton fibers of different selection varieties, depending on the degree of maturity.

The research results are presented in Table 2.

2- table
Different selection of cotton fiber twist
variation by varieties

| t / r | Selection varieties | The degree of maturity of the fiber | | |
|-------|---------------------|-------------------------------------|---------|---------|
| | | 0-1,0 | 1,5-2,5 | 3,0-4,0 |
| 1. | Xampor | 28 | 45 | 68 |
| 2. | Sultan | 32 | 50 | 65 |
| 3. | Jarqorgon | 30 | 48 | 70 |
| 4. | Beshqahramon | 27 | 47 | 61 |

Based on the results of the table, Figure 3 shows the histograms of changes in the degree of maturity of cotton fiber for different selection varieties.



Selection varieties

Figure 3. Different selection of cotton fiber twist variation by varieties.

- the degree of maturity of the fiber 0-1,0; - the degree of maturity of the fiber 1,5-2,5; - the degree of maturity of the fiber 3,0-4,0.

If we analyze the variability of cotton fiber twisting indicators for different selection varieties, compared with the performance of Humpor selection cotton, Sultan twisted fiber has a maturity of 0-1.0, fiber twist is 12.5%, fiber maturity is 1.5-2, When 5, the fiber twist increased by 10.0%, when the fiber maturity level was 3.0-4.0, the fiber twist decreased by 4.4%, when the Jarkurgan selection fiber maturity level was 0-1.0, the fiber twist increased by 6.7%. decreased, fiber twisting increased by 6.3% when fiber maturity was 1.5-2.5, fiber twist increased by 2.9% when fiber maturation was 3.0-4.0, fiber maturity was increased to 0-1 by Beshkahramon selection variety, When 0, the fiber twist decreased by 3.4%, when the fiber maturity level was 1.5-2.5, the fiber twist increased by 3.4%, when the fiber maturity level was 3.0-4.0, the fiber twist increased by 10.3% decreased.

IV. CONCLUSION AND FUTURE WORK

The results of the study show that when the maturity of the fiber of the Sultan selection variety is 0-1.0 and 1.5-2.5, the twist of the fiber increases from 10.0% to 12.5%, when the maturity of the fiber is 3.0-4.0. fiber twisting



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decreased to 4.4%, Jarkurgan selection fiber maturity decreased from 0-1.0 fiber twist to 6.7%, fiber twisting time when fiber maturity was 1.5-2.5 and 3.0-4.0 It was found to increase from 2.9% to 6.3%.

The analysis of the results of the study shows that as a result of the initial processing of cotton varieties of Hampor and Jarqurghon selection mechanical damage of fibers was observed more mechanical damage than other selection varieties. Fiber twisting rates were found to be higher in Jarqurghon and Hampor selection varieties.

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