

STUDY OF DAMAGE TO TEXTILE FIBERS

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Abstract: The work is devoted to the study of damage to natural, chemical fibers, products in the process of growth, storage and processing.

Influence of damage on the quality of the produced yarn and on the range of products, as well as a method for determining damage. According to the research results, the main types of damage to natural and chemical fibers during growth, storage and processing are given.

Key word: damage, fungi, mechanical damage, damage during growth, storage, biodamage, nanotechnologies, microorganisms, destruction, antimicrobial effect.

Introduction

The traditional type of production on the territory of Uzbekistan is textiles. This industry still has significant potential for further effective and successful development. For the development of the economy of Uzbekistan, the textile industry is strategically important. The presence of a raw material base, the labor intensity of light industry sectors, and the availability of a sales market make the development of the textile and clothing industry one of the potential growth drivers. The disclosure of this potential and the formation of a strong sector of the textile and light industry is one of the priority areas of the Republic of Uzbekistan for the coming years. The industry is faced with the task of reducing the export of raw materials and semi-finished products, increasing production, selling products with high added value, expanding the sales market, creating additional jobs, and solving issues of employment. In this regard, in addition to the state, effective support is provided by tax, customs, credit and other services. Many enterprises are exempted from paying taxes on profits, property, customs payments for imported equipment, components for those manufactured in Uzbekistan. Uzbekistan is the sixth cotton producer in the world, but it is necessary to develop the raw material base and increase the efficiency of its use. International standards are being introduced into the textile industry, which will improve the quality of products. Export of products in 2021 compared to 2020 increased by almost 50%. Over the past 10 years, production facilities have been equipped with new equipment by almost 100%.

The light industry carries out both the primary processing of raw materials and the production of finished products, which include: textile, clothing, fur, knitwear, leather and footwear and other industries. It is not profitable to transport raw materials for the textile industry over long distances, so it is more convenient to place enterprises for the primary processing of raw materials near sources. For the production of high-quality products, the most important is high-quality textile raw materials.

One of the main tasks facing the industry is the preservation of raw materials and finished products from various types of damage: biological, mechanical and others, the establishment of their sources

of origin. Based on the study of fibers, it is fundamentally important to know the properties and structure of materials.

Textiles and fibers can be damaged. The resistance of fibers and tissues to biodamage by microorganisms, insects, rodents and other agents of biodamage depends primarily on the chemical nature of the fibers from which it is made. Chemical fibers, especially synthetic fabrics, are more bioresistant, but microorganisms - biostructures - also adapt to them.

The destruction of textile materials by microorganisms depends on the degree of wear of their type and origin, organic composition, temperature and humidity, conditions, degree of aeration, etc. The impact of microorganisms on textile materials leading to destruction, which is carried out in two ways (direct and indirect), these are fungi and bacteria, destruction damage.

Textile materials are damaged by bacteria and microscopic fungi. Bacterial, the destruction of textile materials is more active than the destruction under the action of fungi. Damage to materials of natural origin under the influence of biological factors is widespread in nature and causes damage on an enormous scale. According to the International Bulletin of Biological Materials, the damage is over 2% of the value of the materials produced. The total amount of losses from damage to raw materials and materials (fibers, leather, shoes, wood, paper, plastics, fur and others) to the share of only microbiological damage on a global scale is 15-20%. Due to tissue damage, annual losses in the world amount to hundreds of millions of dollars. With the microbiological destruction of materials, accompanied by a decrease in their molecular weight and a change in character, a noticeable deterioration in their physical and mechanical properties, primarily strength and deformation characteristics. The varying degree of damage by microorganisms is due to the difference in the structure of the tissues themselves. Fabrics with a lower surface density and high porosity are most susceptible to damage, as the contact area of the material with microorganisms increases, which allows them to easily penetrate into the depth of the material. An increase in the degree of twist of the yarn contributes to an increase in biostability.

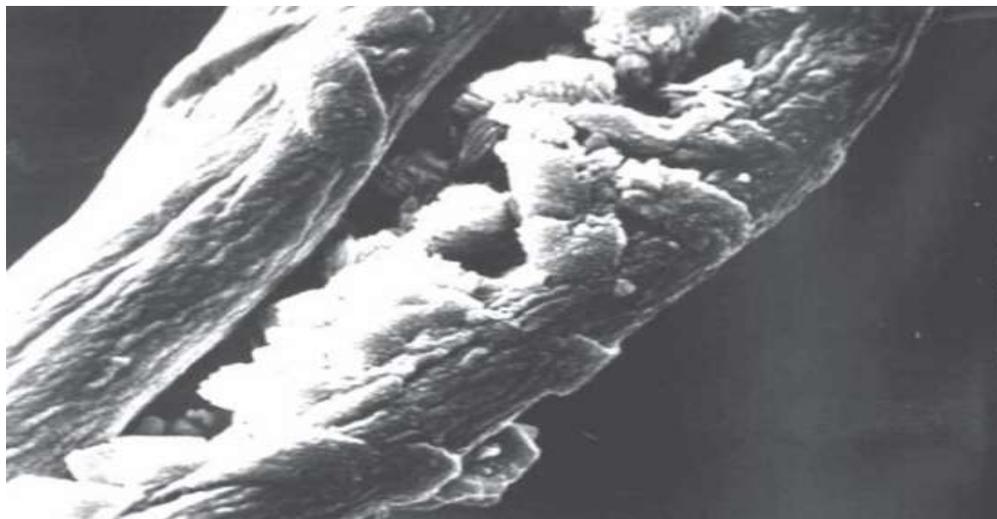
With biodamage of textile materials, a change in color occurs - this is the appearance of spots on textile materials and their coatings, flaws, disruption of bonds in fibrous materials, deterioration of mechanical properties, loss of mass, change in chemical properties.

The main sign of damage to textile materials by microorganisms is the appearance of yellow-orange, red-violet, green-brown spots produced by microorganisms, the color of the fabric. The appearance of stains on textile materials is accompanied by the appearance of a strong musty odor. Conditions that contribute to the process of biodeterioration of materials are elevated temperature and humidity. Fibers of mineral origin can be considered the most biostable. On the basis of literary sources, it has been established that in order to impart antimicrobial properties to synthetic fibers, the oiling process is carried out. The choice of dyes affects the biostability of fibrous materials. Dyes destroy synthetic fibers by microorganisms. make the surface of the fibers more accessible to fungi and bacteria. The treatment of textile materials with silicones gives the fabrics an antimicrobial effect.

According to the developments of scientists, an analysis of studies of damage to natural fibers was carried out.

. Natural cellulose fibers are cotton, bast, jute and some other fibers of plant origin. Cotton fibers are the richest in cellulose, which makes up about 90% of their mass. Bast fibers - flax, hemp contain slightly less cellulose - about 70%, the fibers also contain components, some of which increase the bioreistance of the fibers. Raw cotton is affected by microorganisms already during collection and subsequent storage. The rate of infection increases with contact with soil and increased cotton moisture. Drying provides effective protection; if the water content of cotton is kept below 8%, the growth of microorganisms stops.

Types of damage to cotton fiber



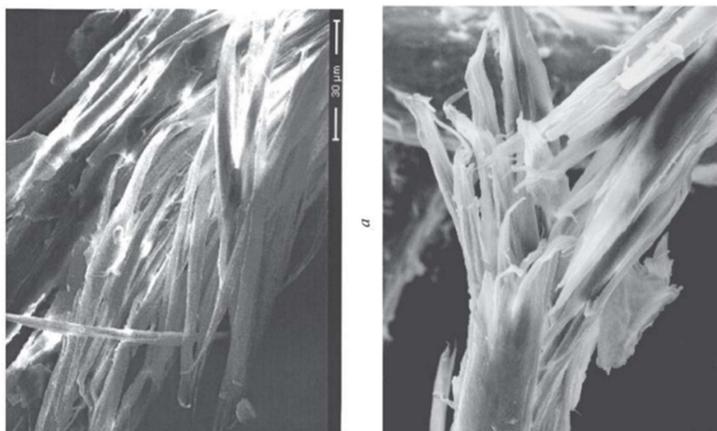
Linen, hemp (hemp) and other bast fibers and fabrics based on them contain, in addition to cellulose, about 10% lignin, as well as wax. . These components are more biostable than cellulose and, as a rule, have a positive effect on the biostability of bast fibers. In general, it is believed that in terms of biostability, bast fibers are approximately on the same level as cotton fibers. The biostability of cellulose fibers is greatly influenced by their subsequent treatment with finishing solutions - dressings and dressings containing starch, flour, gelatin, resins and other substances that give textile materials wear resistance, crease resistance, fire resistance and other valuable properties.

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Natural protein fibers include casein fiber - the basis of wool fiber and fibroin fiber - the basis of natural silk. Fibroin fiber is more biostable than casein, so silk fabrics are less susceptible to microbiological damage than woolen ones. In addition to microorganisms, keratophage insects, especially moths, pose a great danger to wool. Microbiological destruction of keratin, which forms casein fiber, occurs under the action of proteolytic enzymes, mainly trypsin. Enzymatic cleavage

of keratin by peptide bonds can go up to individual amino acids. The colonization of wool by microorganisms occurs even before the animal is sheared.

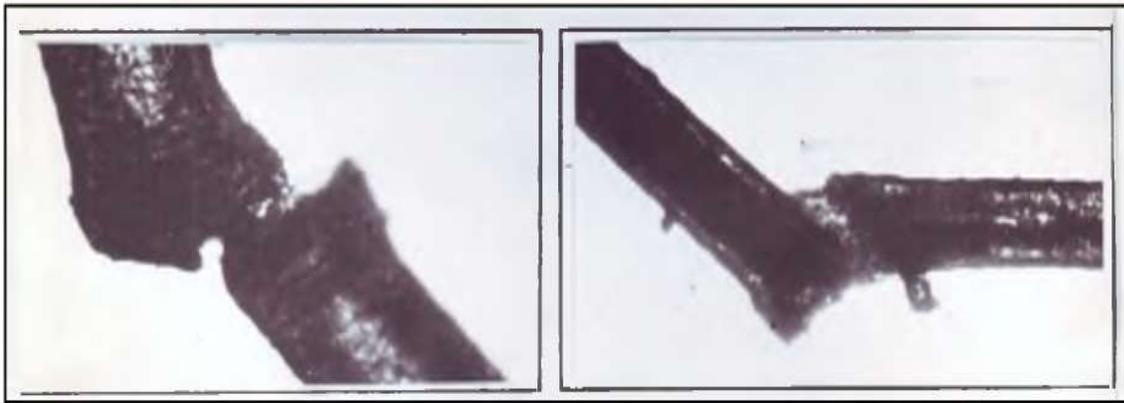
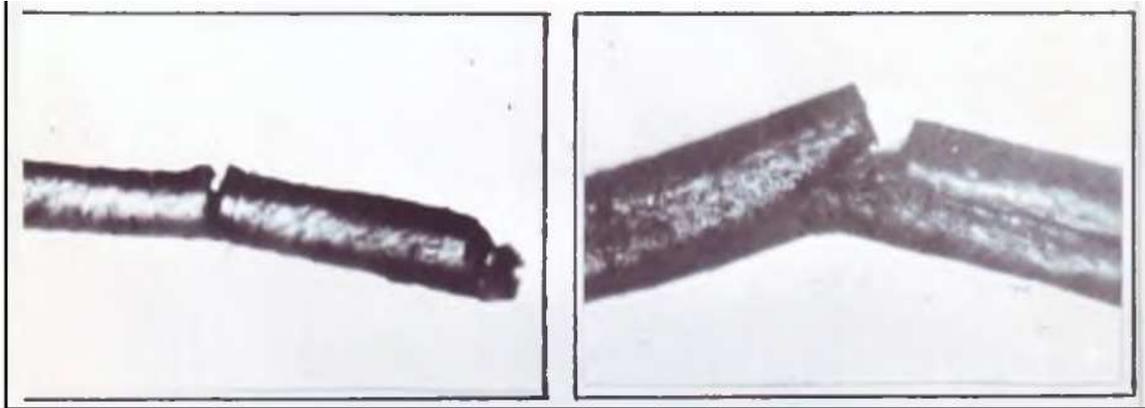
Types of wool fiber damage



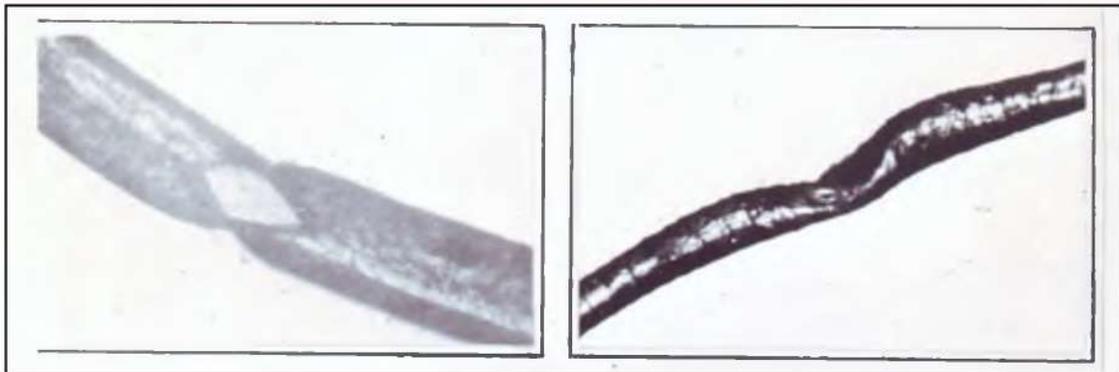
Some of these microorganisms are able not only to remain viable during the technological operations of yarn production, but also to continue their destructive activity on woolen fabrics and in finished products. Microbiological damage to wool and wool products is manifested in the loosening and splitting of the fiber, the appearance of colored spots and a putrefactive odor. High humidity and contact of wool with the soil also contribute to the development of biodamages. Microorganisms are especially dangerous for insufficiently dried wool. In its bales during storage or transportation, thermophilic bacteria can actively develop, the vital activity of which is accompanied by the release of a large amount of heat, leading to strong heating up to spontaneous combustion. Contamination of fabrics and products from woolen fabrics are the primary foci of infection with bacteria and fungi and, subsequently, biodamage. Timely washing and cleaning of woolen products is one of the important conditions for protecting them from microbiological damage.

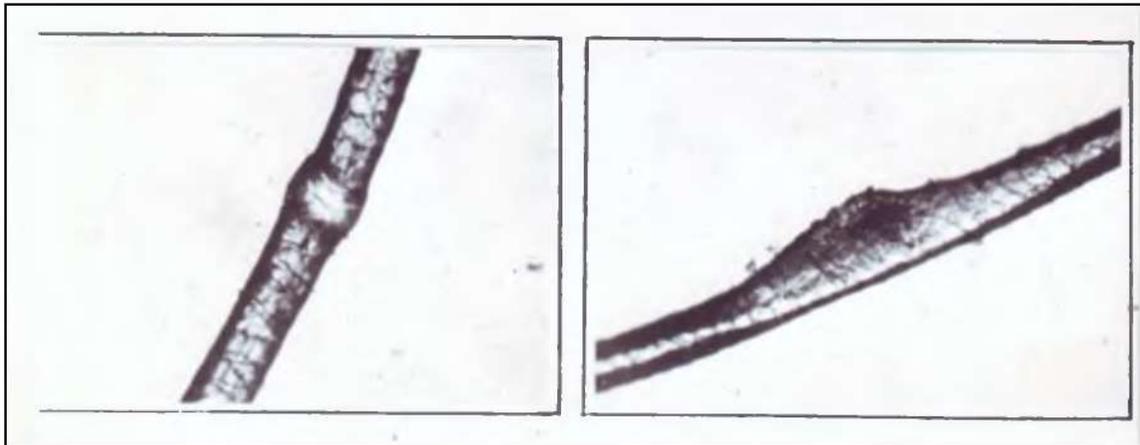
The main raw material for the production of carpets is wool mixed with other types of chemical fibers. We have conducted a study of damage to wool fibers (karakul wool) in the process of growth, storage, technological processing according to the method developed by Academician Khadzhinova M.A. Below are the types of damage to wool fibers during processing. and storage.

Types of mechanical damage to wool fiber (karakul wool) during processing.

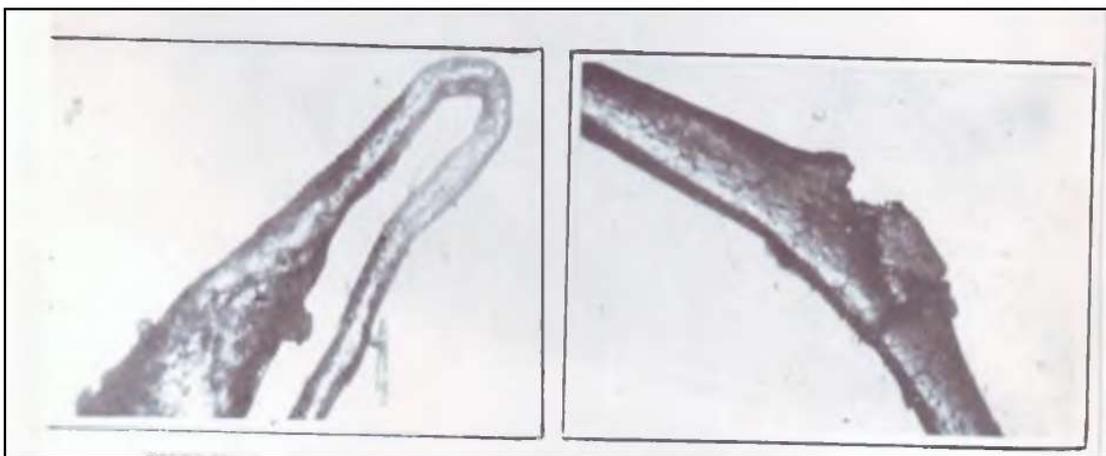
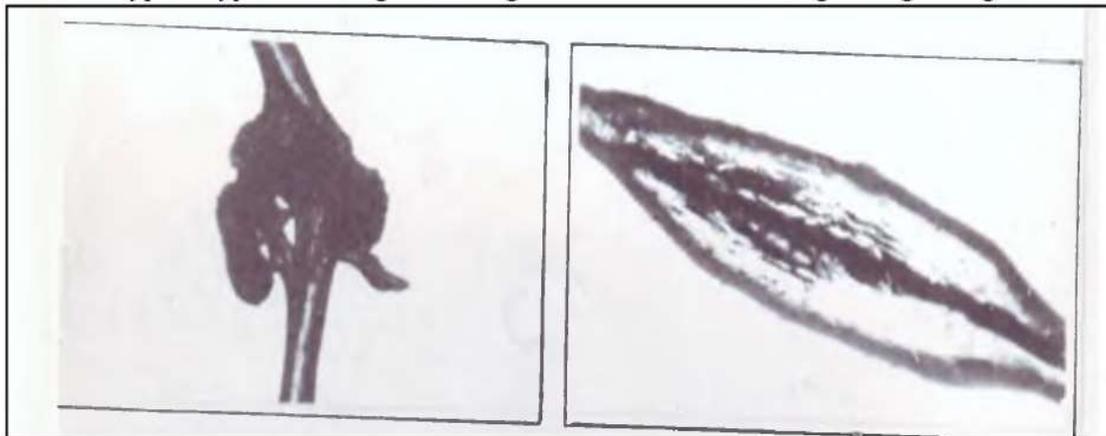


Types of damage to wool fibers in the process of growth and development

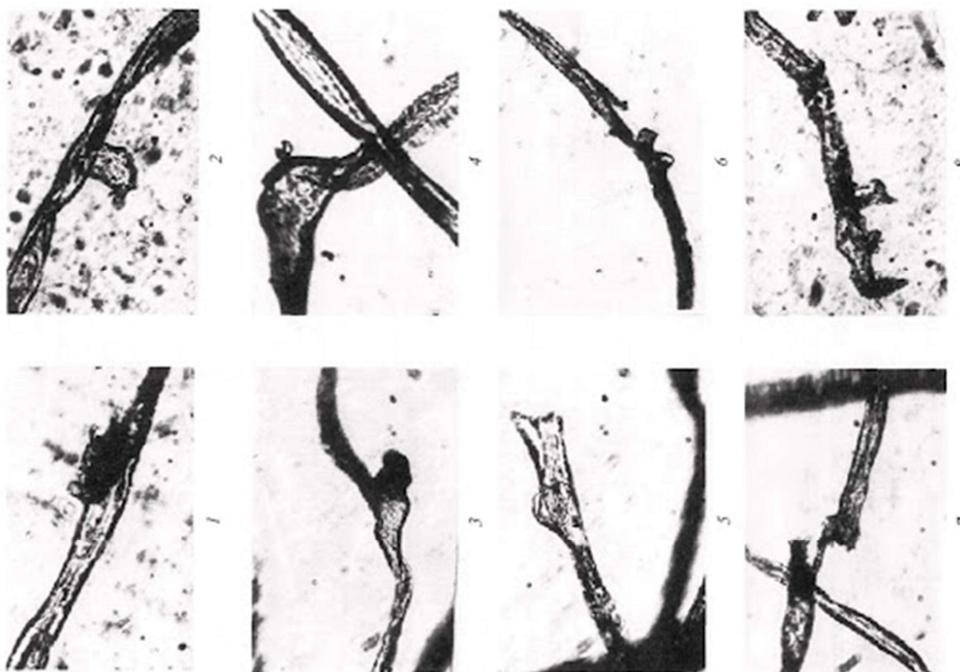




Types of damage to wool fibers during storage



The following are microbiological damages of various types of fibers (based on literature) sources



Artificial fibers and fabrics are obtained by chemical processing of natural cellulose and sometimes protein fibers. Cellulose-based artificial fibers include viscose, acetate and other fibers that are widely used. Protein casein fibers have a rather limited use. Viscose fibers are oriented hydrated cellulose fibers obtained by chemical processing of wood and other cellulose. In terms of chemical structure and microbiological stability, they are close to ordinary cellulose cotton fibers. Rayon rayon, staple, cord tape and other materials made from viscose fibers do not have high biostability, especially when in contact with the soil.

A study was also carried out on the damage to the kenaf fiber during storage and processing. The work consisted in a microbiological study of the fibers in three repetitions and the selection of the most characteristic types of damage during storage and the technological process. Studies have shown that in the process of growth in case of violation of the diet, such an indicator as hungry fineness appears. In the process of storage, bloating, accumulation of microorganisms, thinning, splitting are observed.

Based on the research, it was found that microorganisms damage the structure of the fiber, which, during processing, affect the quality indicators of yarn and products. Therefore, proper storage of fibers (based on standards), care, feeding, compliance with the technological process, the operation of mechanisms and personnel will ensure good quality of raw materials, and, accordingly, finished products.

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