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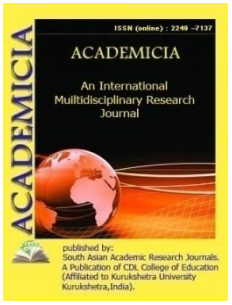


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# MICRONEYR (MIC) OF COTTON FIBER AND ITS EFFECT ON IP PHYSICAL-MECHANICAL PROPERTIES OF THE YARN

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## ABSTRACT

*Determining what is a micronaire indicator of cotton fiber and what effects this indicator has on yarn production. The degree of maturity of cotton fibre is an important property indicator, and its determination is a very laborious process. This work can be done mainly in research centres or institutions. Cotton ginning and textile enterprises operating in Uzbekistan use special methods to do this. These methods are a bit tedious and can take a certain amount of time.*

**KEYWORDS:** *Fiber Maturation, Micronaire Performance, Cotton Fibre, Yarn And The Entire Spinning Process*

## INTRODUCTION

Micronaire index (Mic) - a description of the maturity and linear density of cotton fibre is determined by the air permeability of the fibre. Using the micronaire indicator, it is possible to draw conclusions about the degree of maturity and linear density of the fibre. This figure ranges from 3.5 to 4.9 for the base range of medium fibre cotton.

It should be noted that theoretical and experimental research on the micronaire index is rarely covered in the scientific literature.

A sample of 3.24 grams of cotton fibre is selected to detect the micronaire, for example, in a KMA (Keissoki) test device. The thinner and unripe the fibres, the higher their resistance to airflow. Determining the micronaire value of cotton fibre on special equipment takes only a few seconds.

## MATERIALS AND METHODS

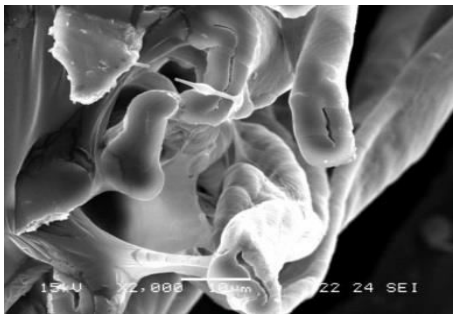
In the HVI system, a 10-gram cotton fibre sample is taken from the toy to determine the micronaire, and the tests are performed in a few seconds. The value of micronaire affects the physical and mechanical performance of the yarn and the entire spinning process.

The micronaire value of cotton fiber accepted at the enterprise is too small, which can cause problems during the spinning process. This is because the cotton fiber is not sufficiently mature, as a result of which the walls of the fiber do not fully develop, and one of the main quality indicators of the fiber is very low toughness.

In some cases, when the micronaire index is small, the degree of fiber maturation is higher than the required level. Cotton fiber, which has a large micronaire performance, may not meet the plan for the production of yarn from such fibers, despite the fact that the fineness and degree of maturity meet the requirements. Cotton fiber with high micronaire performance is extremely coarse. Such fibers are not suitable for the production of small linear density yarns during spinning; in the process leads to the deterioration of the roughness of the yarn and other physical and mechanical properties.

Fiber fineness is usually expressed as gravimetric fineness or linear density (mtex) and is expressed as the degree of maturity. Shirley Developments Limited Fineness Maturity Tester (FMT) and Micronair KMA were first used to determine fineness and ripeness, but now tests are being performed on HVI and AFIS equipment in the Uster® family to determine the fineness and ripeness of cotton fiber in Uzbek textile enterprises. carried out.

This equipment allows you to quickly, reliably and objectively assess the quality of cotton fiber in the planning of spinning processes.



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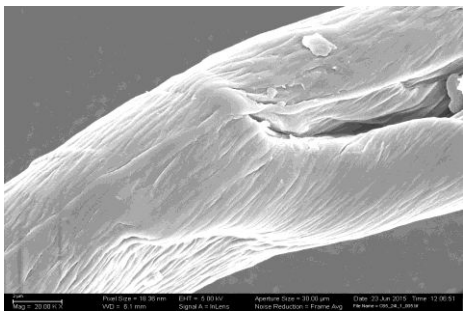

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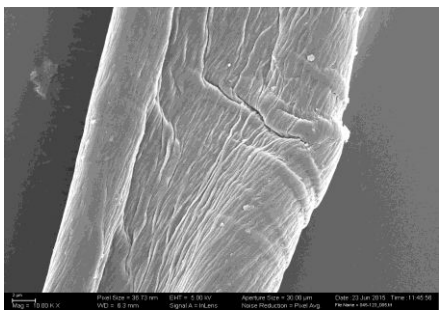

D)

**Figure.1 - Micrograph of cotton fiber of selection variety S 6524**

**a) cross section; b) longitudinal view of the fiber: c and d) damaged fiber.**

Statistical analysis of cotton fiber micronaire performance for many years and test results of cotton fiber of the Center "SIFAT", which is part of the Scientific Center of JSC "Uzpahtasanoat" show that cotton fiber produced by ginneries of Namangan region Namangan-77, S-6524 , Andijan-35, Omad and Bukhara-108 and other selection varieties, micronaire quality index has increased from 3.8 to 5.0 in recent years. A similar problem is observed in all regions of Uzbekistan.

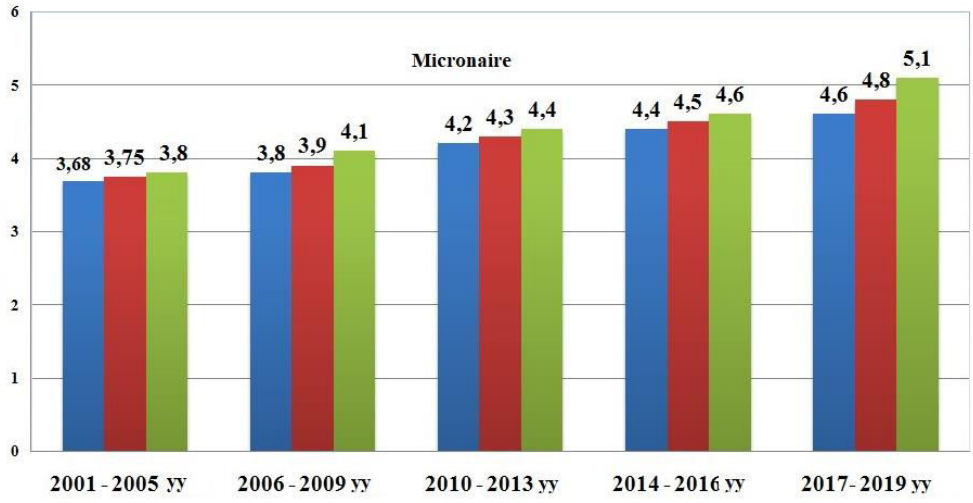


**Figure 2** - Cotton fiber in micronaire index over the years growth dynamics

From Figure 2 it can be seen that the micronaire index of cotton fiber grown in the Republic has been growing since 2001 in recent years. While in 2001-2005 this figure was between 3.68-3.8 (blue, red, blue columns), in 2017-2019 we can see that this figure is between 4.6-5.1.

As a result of these changes, as mentioned, it will complicate the process of yarn production. In world practice, cotton fiber with a wide range of micronaire performance is also grown and processed.

Typically, when the linear density of the fiber is small, the stiffness of the yarn is high, and the unevenness is observed at the required level. Therefore, the small size of the micronaire leads to an improvement in yarn quality. The relationship between micronaire value and fiber thinness is expressed by the following formula:

$$T = \frac{Mic}{25,4} * 100; \qquad (1)$$

Where: T - linear density, mtex; Mic is the micronaire of the fiber.

The number of fibers in the cross section of a thread can be determined using the following formula recognized by SITRA scientists in India:

$$n = \frac{5314,87}{Mic * 0,354 * Ne} \quad \text{or}$$

$$n = \frac{15000}{Mic * Ne} \qquad (2)$$

Where: Mic - fiber micronaire; Ne is the English number of the yarn;

5314.87 is the correlation coefficient between the NM system and the Ne system.

**Results.** Research shows that the production of yarn from fibers with a small micronaire index (3.6-4.5) reduces the roughness and defects of the yarn.

## CONCLUSION

From the above data, cotton fiber with a high micronaire index leads to a decrease in the number of fibers in the yarn section, which in turn affects the deterioration of yarn quality, and therefore in the design of yarn properties and selection of cotton fiber types, spinning process planning and yarn quality performance. it is important to take into account the value of the micronaire from the physico-mechanical parameters. For the production of yarns of medium linear density, it is recommended to use mainly cotton fiber with 3.8-4.2 micronaire.

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