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CREATION OF BREEDING MATERIALS WITH HIGH FIBER QUALITY INDICATORS IN THE SELECTION OF COTTON VARIETIES BELONGING TO G. HIRSUTUM L.

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ABSTRACT

The study evaluated fiber quality traits of promising cotton breeding lines (T-340, T-160, T-176-191, T-165-179) compared with the standard variety Andijan-36 (2023). The new lines showed superiority over the standard in fiber strength (30.4–31.8 g/tex vs. 28.1 g/tex), fiber length (1.24–1.30 in vs. 1.23 in), uniformity (87.2–88.5% vs. 86.4%), and spinning consistency index (164–170 vs. 163). The most notable advantages were observed in T-340 and T-160 for strength, T-160 for length and SCI, T-176-191 for uniformity and short fiber performance, and T-340 for elongation and maturity. These lines are considered promising genetic sources for further breeding aimed at improving fiber quality.

Keywords. Cotton, breeding lines, fiber quality, micronaire, fiber length, fiber strength, uniformity index, short fiber index, maturity, SCI.

INTRODUCTION

At the global level, a number of studies are being conducted to improve breeding methods aimed at obtaining high fiber yield from cotton, as well as to create new cotton varieties that meet international standards by determining the additive effects, degree, and direction of dominance of genes controlling fiber quality traits.

In Uzbekistan, the creation of new cotton varieties characterized by high fiber quality indicators and high fiber yield is of great importance for solving the problem of complete processing of cotton fiber. Currently, fiber yield in the republic amounts to 6–7 c/ha, which is 2–2.5 times lower than that of leading cotton-producing countries such as the USA, China, and Australia. Therefore, studies aimed at increasing fiber yield are attracting significant scientific attention.

Fiber quality indicators are among the main traits in cotton variety breeding, ensuring market competitiveness. The micronaire value characterizes fiber fineness and air permeability. According to international standards, in the breeding of varieties belonging to G. hirsutum L., the fiber micronaire should range from 3.8 to 4.9. Fiber length is one of the key indicators of fiber quality, determining fiber strength. Currently, nearly 90% of the varieties created in

Uzbekistan correspond to fiber type 4. In general, all fiber quality parameters are of critical importance for the textile industry.

According to the experimental data presented in the table, the fiber micronaire of the breeding lines ranged from 4.0 (T-160) to 4.3 (T-340), while the standard variety Andijan-36 showed a value of 4.4. Specific breaking strength, which depends on fiber micronaire and length, is measured in g/tex. In our studies, this indicator ranged from 30.5 g/tex (T-176-191) to 31.8 g/tex (T-340). The standard variety exhibited 28.1 g/tex, and all newly developed lines demonstrated superiority over the standard.

In terms of fiber length, the standard variety Andijan-36 had a value of 1.23 inches, whereas the newly developed lines showed values ranging from 1.24 inches (T-176-191, T-165-179) to 1.30 inches (T-160), indicating the development of long-fiber lines. The fiber uniformity index ranged from 87.2% (T-160) to 88.5% (T-176-191), while the standard variety showed 86.4%. Analysis of the short fiber index revealed values from 5.3% (T-165-179) to 5.7% (T-160, T-176-191), compared to 6.0% in Andijan-36.

Elongation at break was 5.1% in the standard variety, while in the lines it ranged from 5.3% (T-165-179) to 6.2% (T-340). The maturity coefficient was 84.8 in the standard variety and ranged from 85.5 (T-506-510) to 86.8 (T-340) in the lines. The spinning consistency index was 163 in the standard variety, while in the lines it ranged from 164 (T-340) to 170 (T-160).

Table Fiber quality indicators of breeding lines, 2023

Lines	mic	Str, g/tex	Len, inches	Unf, %	Sfi, %	Elg, %	Rd, %	SCI
T-340	4,3	31,8	1,25	87,6	6,4	6,2	86,8	164
T-160	4,0	31,5	1,30	87,2	6,4	5,7	86,4	170
T-176-191	4,1	30,5	1,24	88,5	6,0	5,7	86,0	167
T-165-179	4,4	30,4	1,24	87,5	6,1	5,3	85,5	165
Andijan-36	4,4	28,1	1,23	86,4	6,0	5,1	84,8	163

Thus, based on the obtained results, it was established that all newly developed lines showed superiority in fiber micronaire values. With respect to specific breaking strength, the lines **T-340** and **T-160** demonstrated clear advantages, while in terms of upper half mean fiber length, the **T-160** line was distinguished. The **T-176-191** line showed superior performance in fiber uniformity and short fiber index. The **T-340** line stood out in elongation at break and fiber maturity coefficient. Relatively higher results in fiber spinning consistency were observed in the **T-160** line.

Therefore, the use of these lines in genetic and breeding studies aimed at improving fiber quality traits is considered appropriate and promising.

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